Compiling a homogeneous Earthquake Catalogue for Southern Africa

Thifhelimbilu Faith Mulabisana

School of Geoscience, University of Witwatersrand

The Dissertation submitted to the Faculty of Science, University of Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science

Johannesburg, 2016

Declaration

I declare that this Dissertation is my own, unaided work. It is being submitted for the Degree of Master of Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

____

(Signature of candidate)

27th Day of May 20 16 in Silverton

Abstract

An accurate seismic hazard assessment can only be carried out if a homogeneous and sufficiently complete catalogue for the study area is available. Since the catalogue for southern Africa was last updated in the early 1990s for the Global Seismic Hazard Assessment Program (GSHAP), it is necessary that a new updated, homogeneous and complete earthquake catalogue be compiled that includes data acquired during the last two decades. The process of compiling the new earthquake catalogue for southern Africa (South Africa, Lesotho, Swaziland, Botswana, and Namibia) was done as part of the Global Earthquake Modelling (GEM) project.

The data from published and unpublished sources, and databases from the South African National Seismograph Network (SANSN), Bulawayo (BUL), the Geological Survey of Botswana, the National Earthquake Information Centre (NEIC), the Advanced National Seismic System (ANSS), and the International Seismic Centre (ISC) were retrieved and evaluated. After the data from the different sources were merged, duplicates and induced earthquakes were removed. The catalogue was unified with all magnitude types converted to moment magnitude (M_W). Unifying the southern African catalogue to one magnitude scale had multiple challenges, considering that the catalogue is mostly incomplete, and it was therefore not easy to derive relations between different magnitude scales. The question of which method and relations are most suitable for converting all magnitude scales to M_W had to be addressed. To ensure that all the events are independent, several procedures were carried out to decluster the catalogue and most suitable method selected.

The final catalogue includes all available events, i.e. historical, and instrumental events from 1690 to December 2011, excluding fore- and aftershocks and induced events. This catalogue has 920 events with $M_W \geq 4$ whereas GSHAP has only 100 events with $M_S \geq 4$ in the southern African region. The largest event in the final catalogue occurred in 1952 and is located in the Okavango Delta region in Botswana with magnitude $M_W = 6.7$. The maximum likelihood method was used at each point on a grid covering the study area, to estimate the spatial distribution of the *b*-value and the activity rate. The maximum curvature method was used for estimating the spatial distribution of magnitude of completeness, which was also substantiated with the Gutenberg-Richter, time-scale and spatial-scale magnitude of completeness graphs.

Acknowledgements

I would like to extend my sincere gratitude to the following people and organisations:

- The Council for Geoscience for financial support and provision of data
- Dr. Vunganai Midzi, at the Council for Geoscience for extensive guidance
- Mr Brassnavy Manzunzu, Mr Brian Zulu and Miss Valerie Nxumalo for continuous advice and guidance
- My colleagues in Geophysics Competency at the Council for Geoscience
- Global Earthquake Modelling sub-Saharan team for continuous advice and guidance
- And last but not least, my supervisor Professor Ray Durrheim

Table of Contents

List of Figures

List of Tables

Chapter 1

1. Introduction

1.1. Background

Construction of costly infrastructure (such as power stations, reservoirs, commercial and residential buildings) requires engineers to take precautions against potential hazards such as the shaking of the ground caused by earthquakes. Such precautions usually require seismic hazard assessments of the site. The assessments are carried out using either probabilistic or deterministic methods and consist of the estimation of hazards such as ground shaking, surface fault rupture or soil liquefaction. McGuire (1995) describes Probabilistic Seismic Hazard Assessment (PSHA) as a method that considers numerous earthquakes and ground motions to calculate the probability at which ground motion is likely to exceed selected threshold values. Thereafter, the results of PSHA are presented as a hazard curve showing annual frequency of exceedance with ground motion intensity. Values can then be obtained from hazard curve to prepare hazard maps or uniform hazard spectra for specific return periods (e.g. 475 years, which is equivalent to 10% probability of exceedance in 50 years). This seismic hazard assessment method is not well understood within the engineering community and it renders difficulties to check the computations due to large quantities of data (McGuire, 2001). On the other hand, Deterministic Seismic Hazard Assessment (DSHA) is described as a way of identifying the strongest credible earthquake which is likely to affect a site, taking geology and seismic history into account (Bolt and Abrahamson, 2003). Inherent uncertainty along with the frequency of earthquakes is not taken into account when assessing Hazard using DSHA (McGuire, 2001). Among the many hazard assessments that have been done in Africa, the Global Seismic Hazard Assessment Program (GSHAP) for sub-Saharan Africa (Midzi *et al.*, 1999) is probably the largest in scale. It was part of an effort to create a global seismic hazard map and provide a global seismic framework (Giardini *et al.*, 2003).

A recent initiative to update and improve on the GSHAP products is the Global Earthquake Model (GEM). It aims to develop resources for seismic risk assessment, and to deploy tools such as the OpenQuake software (GEM, 2006). The OpenQuake software package can be used to calculate seismic hazard and risk at any scale and though still in development, is freely available from the GEM website (github.com/gem/oq-engine/wiki/Installation).

A critical input in all seismic hazard assessments is a reliable and accurate catalogue of earthquakes. Several versions have been compiled for the continent. Gane (1939) compiled the first catalogue for southern Africa, though this effort focused only on South Africa. Later on, Gane and Oliver (1953), Fernandez and Guzman (1979), and Brandt *et al.* (2005) updated the catalogue as the years went by and new events were recorded. Mangongolo and Hutchins (2006) compiled an earthquake catalogue of Namibia and Malephane (2007) compiled a Lesotho catalogue as part of her seismic hazard assessment studies. The first catalogue compilation that covered the whole study area was that associated with the GSHAP. Turyomurugyendo (1996) compiled the first catalogue that covered the whole of southern and eastern Africa, which was used in the GSHAP seismic hazard assessment for sub-Saharan Africa (Midzi *et al.*, 1999). However, it is now almost two decades since this compilation was made and therefore it is pertinent to update the catalogue in accordance with international best practise. The analysis will include the homogenisation of the earthquake magnitudes to the internationally accepted moment magnitude scale. Thus, this project aims to compile a new earthquake catalogue for southern Africa that will contribute data to the African component of the GEM project.

1.2. Aims and Objectives

The main aim of this project was to compile a comprehensive and homogeneous, paleoseismic, historical and instrumental earthquake catalogue for southern Africa (i.e. Lesotho, Swaziland, South Africa, Botswana, and Namibia). This was achieved through the following steps:

- Collecting available data in published and unpublished sources, and databases such as the USGS Advanced National Seismic System (ANSS), the Geological Survey of Botswana, the South African National Seismic Network (SANSN), the International Seismological Centre (ISC), the Geological Survey of Namibia, and the USGS National Earthquake Information Centre (NEIC).

- The merging of all collected data into one catalogue,
- The removal of duplicates and mining-related events,
- The homogenisation of the earthquake magnitudes to moment magnitude,
- The declustering of the homogenised catalogue, and
- The analysis of the new catalogue by assessing its completeness levels and estimating the spatial distribution of earthquake recurrence parameters, such as *b*-values and activity rate at each point on a grid covering the study area.

1.3. Key Questions

Key questions that needed to be answered during the course of the project include the following:

1. The homogeneity of the catalogue depends on the range of magnitude types used to describe the earthquakes. To be homogeneous the catalogue must have one magnitude type for all the events. To achieve this, conversion of magnitude from one type to another is required. What is the best way to do this?
2. The interaction between the Wegener Stress Anomaly and other stress fields acting on the African plate is said to be the cause of natural seismicity in South Africa, especially those with moderate to large magnitude size (Bird *et al.*, 2006). However, seismicity in South Africa is dominated by mining-related seismicity, which needs to be removed from the catalogue when assessing hazard posed by natural seismicity. What is the best method for identifying and removing the mine-related events?
3. What are the best procedures to determine earthquake parameters such as magnitude of completeness, and the distribution of *b*-value and activity rate?

1.4. Challenges

There were several significant challenges to the compilation of a homogeneous catalogue:

1. The lack of paleo-seismic investigations of faults in southern Africa severely limits the available information on the activity of faults in the region, as well as on historical

events. Only a few such investigations have been carried out, such as that on the Kango fault in the Eastern Cape (Goedhart, 2005, 2006), and the Tshipise and Bosbokpoort fault zones in the Limpopo Province, South Africa (Eskom, 1998).

2. The limited time span and limited data affected the further investigations of certain aspects such as that of calculating the relation of all the other magnitude types to that of M_W.
3. The variation in sensitivity of seismometers and different ways of analysing the waveform data of earthquake events, according to the agency, also contributed to the low accuracy of converting all magnitude types to M_W.

Chapter 2

2. Geological and Tectonic Setting of Southern Africa

2.1. Regional Stress Field

Andreoli *et al.* (1996) mapped neotectonic faults for South Africa using Landsat, SEASAT and GEOSAT satellite imagery; seismic and stress databases; aerial photography; and detailed field mapping, and discovered the following:

1. On-shore neotectonic activity is currently taking place in the south-western Cape, Namaqualand, and over a large area extending from the Free State to the Limpopo and KwaZulu-Natal Provinces (previously known as the Orange Free State, Northern Transvaal and Natal).
2. A compressional anomaly, which Andreoli *et al.* (1996) named the "Wegener stress anomaly (WSA)", stretches from southern Angola to the offshore Transkei basin.
3. Neotectonic faulting and intraplate seismicity, possibly including some large events in South African mines, is caused by the interaction of the WSA and other stress fields acting on the African plate.

Bird *et al.* (2006) modelled the WSA, a zone of northwest-southeast-directed horizontal principal stress along the western edge of southern Africa, using thin-shelled finite-element modelling (shown in Figure 2.1) constrained by data from the 2004 World Stress Map (Reinecker *et al.*, 2004) and 17 additional Holocene stress markers. They concluded that the ultimate cause of the WSA is the relative rotation between the Nubian and Somalian Plates as the East African Rift zone opens and propagates southwards. They also identified possible local influences of the Wegener stress anomaly such as:

- Resistance of unbroken lithosphere to plate rotation, and
- Stress concentration ahead of the crack tip of the East African Rift zone.

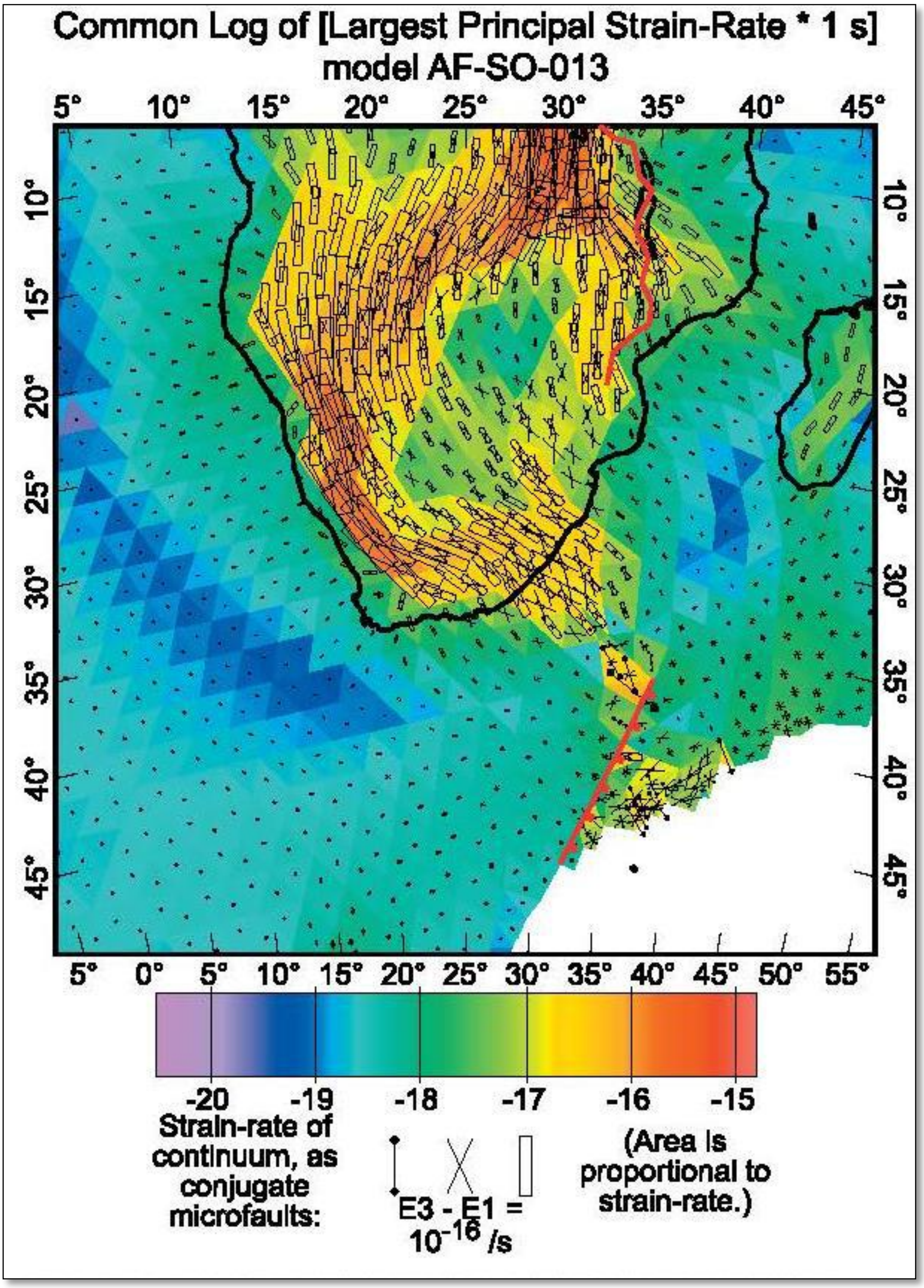


Figure 2.1: Southern African model of the Wegener stress anomaly (Bird *et al.*, 2006). The colour scale indicates the common logarithm of the magnitude of the principal strain rate with greatest absolute value in units of s^{-1}. The symbols show orientation of the strain rate tensor. Rectangles represent extension, crosses represent strike-slip and a line with diamonds at each end represents compression. The red line indicates the East African Rift System and the red line with red triangles shows the Andrew Bain Fracture Zone (Bird *et al.*, 2006).

Furthermore, Bird *et al.* (2006) stated that a pervasive extensional tectonic regime is indicated by the regional stress field and that it is associated with normal faulting, though the south western corner of Africa (SW region of the Western Cape Province) has a strike slip stress regime associated with strike slip faulting as shown in Figure 2.2. Zoback *et al.* (1989) discovered that the most southern part of Africa is subject to west or northwest directed compression, circled in Figure 2.2 below.

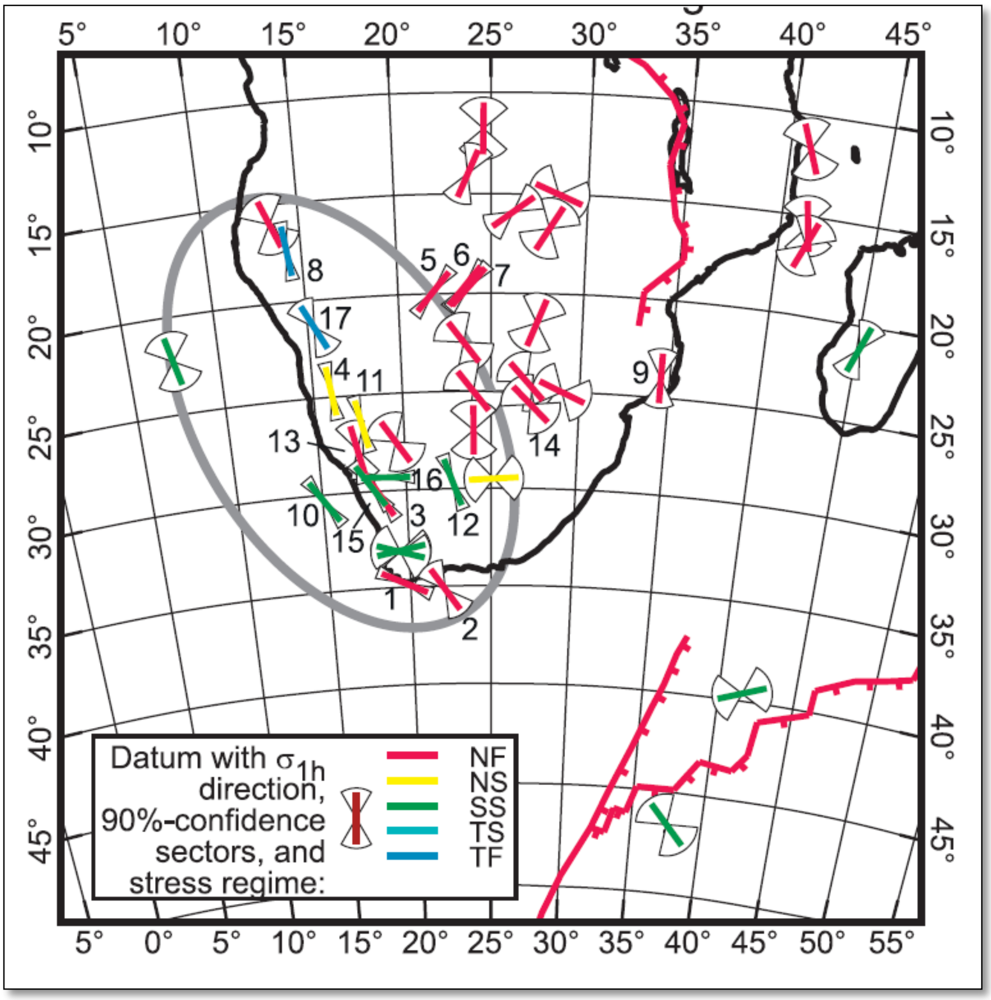


Figure 2.2: Southern African regional intraplate stress directions and regimes (Bird *et al.*, 2006).

NF – Normal faulting represented with red, **NS** – Normal-Slip faulting represented with yellow, **SS** – Strike-Slip represented with green, **TS** – Thrust-slip faulting represented by light blue, and **TF** – Thrust faulting represented by dark blue. The sign σ is the direction of the maximum compressive stress. The approximate region of the Wegner stress anomaly is indicated by the grey ellipse. (Bird *et al.*, 2006).

2.2. Tectonic Domains and Cratons of Southern Africa

Southern Africa is generally classified as a stable continental region (Johnston *et al.*, 1994), bounded to the northeast by the East African Rift system (EARS). However, the southern African region experiences a low level of seismicity. Southern African earthquakes generally have a focal mechanism of normal faulting, which is similar to the ones along the EARS. Therefore several scientists have suggested that the EARS extends along geophysical elements into southern Africa (Johnston *et al.*, 1994).

The Kalahari Craton, aged ~1800 Ma includes the Kaapvaal Craton, the Zimbabwe Craton, the Limpopo Mobile Belt, the Kheis Belt, the Okwa Belt, and the Namaqua-Natal Belt (Carney *et al.*, 1994). The Kaapvaal Craton (shown in Figure 2.3) is the oldest tectonic region in southern Africa aged ~3644 Ma (Hunter *et al.*, 2006). The Kaapvaal Craton is subdivided into the Kimberley, Witwatersrand, Pietersburg and Swaziland Terranes, which were assembled before the extrusion of the Ventersdorp lavas at 2700 Ma (Cornell *et al.*, 2011). De Wit and Ransome (1992) state that the Kaapvaal Craton collided with the Zimbabwe Craton along the Limpopo Mobile Belt during late Archean, which caused dominant foliation in the Zimbabwe Craton (Johnston *et al.*, 1994). The Zimbabwe Craton is aged ~ 3500 Ma and it's stabilization occurred between 2600 Ma and 2670 Ma (Dirks and Jelsma, 1998). The Pongola rift, situated near the eastern edge of the Kaapvaal Craton, later underwent reactivation as a compressional zone, probably in the late Proterozoic (Johnston *et al*., 1994).

Cornell *et al.* (2011) describe the Kheis Belt (shown in Figure 2.3) as a thin-skinned region with east-verging thrust belt characteristics, which could either be an orogenic belt (~1800 Ma) or a northern branch of the Namaqua-Natal Belt. This province was formed between ~ 2000 Ma and 1000 Ma and is bounded by the Kaapvaal Craton to the east. In the south, the Kaapvaal Craton is bounded by the Namaqua-Natal Belt, whereas it is bounded in the north-west by the Kheis province (Johnston *et al.*, 1994).

The Cape Fold Belt is the dominant structural domain along the southern coast and is assumed to have been caused by late Palaeozoic compression associated with the assemblage of Pangea (Hälbich, 1983). According to Tucholke *et al.* (1981), the belt extends southwards offshore as the Agulhas Bank along the strike-slip margin of south-eastern Africa. Booth *et al.* (2004) concluded that the eastern part of the Cape Fold Belt is a large duplex structure, formed along the southern margin of Gondwana. This duplex structure, formed during the Late Palaeozoic, contains typical patterns of numerous north-verging thrust faults and associated folds.

2.3. Sources of Present Day Seismicity

Though seismic locations are generally insufficiently accurate to characterise fault sources at present, it is of paramount importance to discuss them so this can be achieved in the future with ease, and they can also be used for studying seismotectonics.

The Cape Fold Belt (shown in Figure 2.4) contains faults such as the Kango, Baviaanskloof, Zuurberg, Worcester, Colenso and Piketberg-Wellington faults. The Kango and Baviaanskloof faults are normal faults with E-W strike and reactivated scarps of 2 and 4 m in both faults (Singh *et al.*, 2011). Kisters *et al.* (2002) described the Colenso fault as a major northwest to southeast trending fault zone in the Cape Fold Belt.

The Cedarville fault, (Shown in Figure 2.4) is located on the inland flank of the Ciskei-Swaziland Axis (Figure 2.3), which is located south east of the Kaapvaal Craton and northeast of Namaqua-Natal Belt (Singh *et al.*, 2011). The Lesotho highlands are a synclinal structure shaped like a broad basin, and they are crossed by linear structures such as faults, fractures, shears, and joints. The above mentioned structures have an orientation of E – W to ESE – WNW (Letlatsa, 2004).

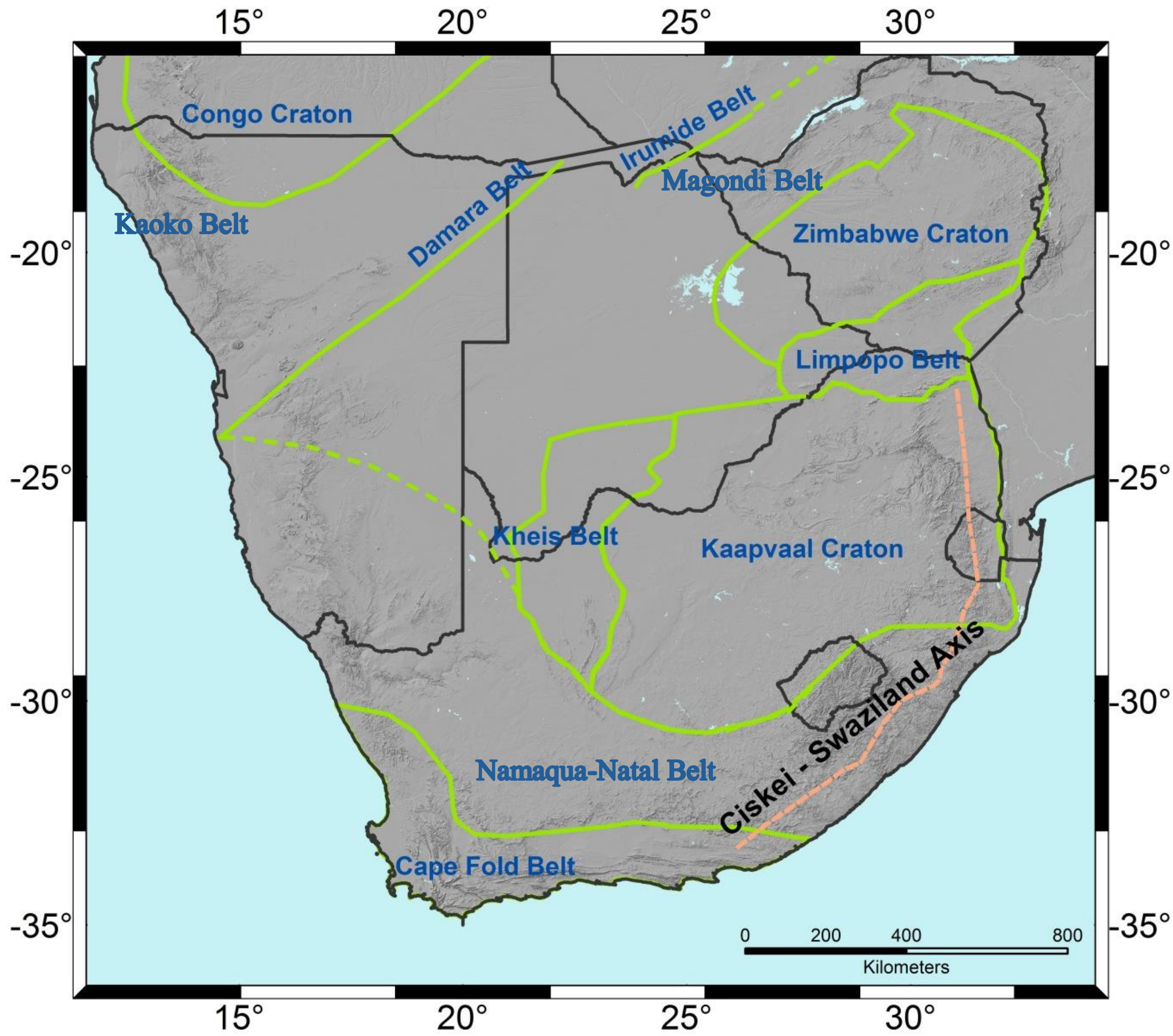


Figure 2.3: The mobile belts and cratons of southern Africa, with the Ciskei-Swaziland Axis. Edited from James *et al.* (2001), Nguuri *et al.* (2001), James and Fouch (2002), James *et al.* (2003), Gore *et al.* (2009), Vinnik *et al.* (2009), Adams and Nyblade (2011), and Cornell *et al.* (2011).

Dolerite dykes are also aligned along the linear structures in the Lesotho highlands. The northern part of Lesotho has kimberlite pipes, shown in Figure 2.5. There are deep earthquakes around the Lesotho highlands caused predominantly by east-west compressive stresses found in the basement rocks below the Karoo sediments of the Lesotho highlands (Letlatsa, 2004). This was deduced after the development of the seismotectonic model derived from limited source mechanism studies, which were done as part of the Lesotho Highlands Water Project (LHWP) phase 1B.

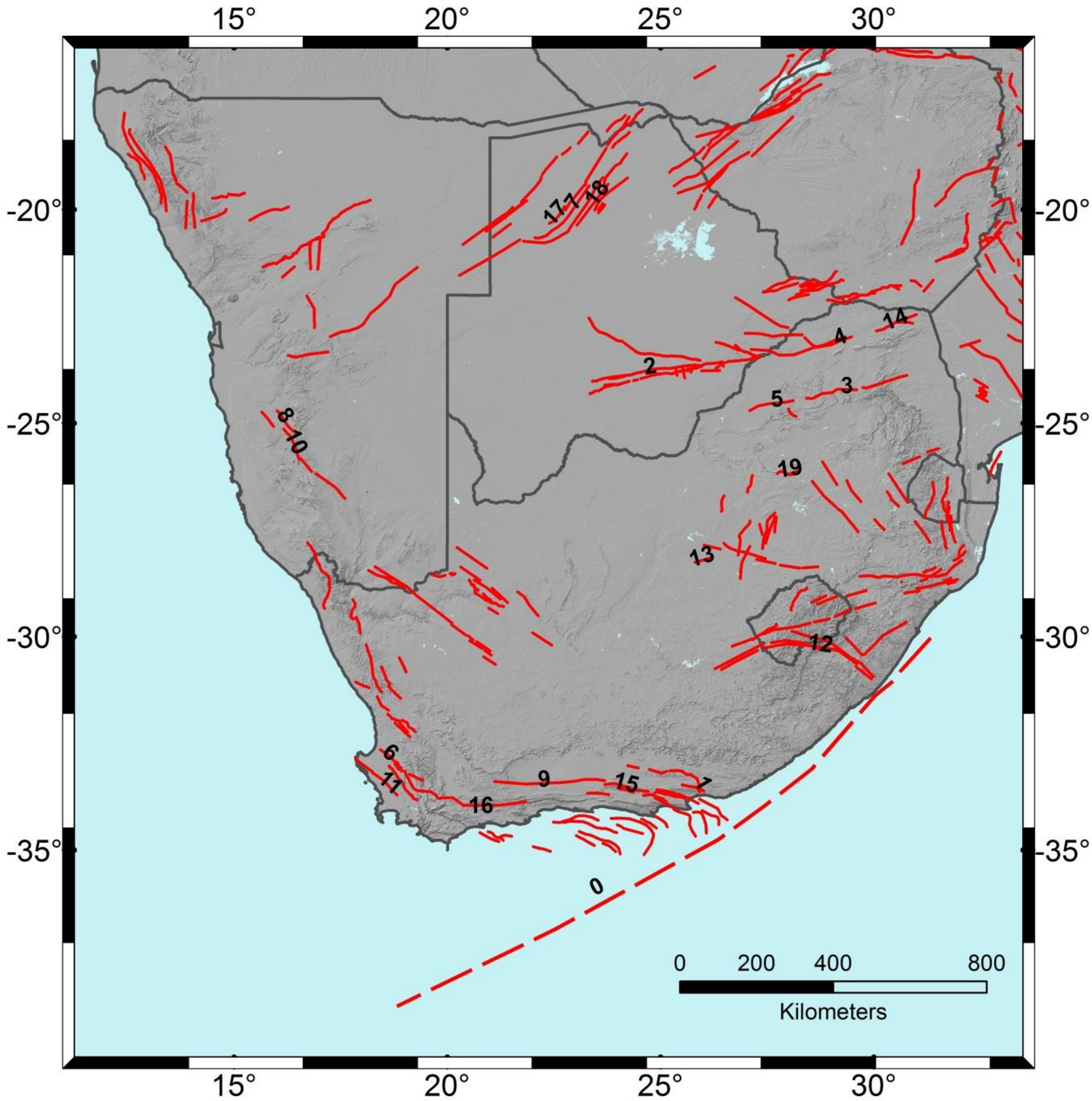


Figure 2.4: The southern African major faults in red, labelled with black numbers.

Main faults (red lines) labelled in black, mobile Belts and Cratons (green) labelled in blue, edited from Nguuri *et al.* (2001), James and Fouch (2002), James *et al.* (2003), Gore *et al.* (2009), Vinnik *et al.* (2009), Adams and Nyblade (2011), and Cornell *et al.* (2011). The faults are labelled in the Table 1.

Table 1: The labelling of faults mentioned in the text

Fault Numbers	Fault Names
0	Agulhas
1	Zuurberg
2	Zoetfontein
3	Zebediela
4	Tshipise
5	Thabazimbi
6	Piketberg-Wellington
7	Lecha
8	Kuiseb
9	Kango
10	Hebron
11	Colenso
12	Cedarville
13	Bultfontein
14	Bosbokpoort
15	Baviaanskloof
16	Worcester
17	Tsau
18	Thamalakane
19	Rietfontein

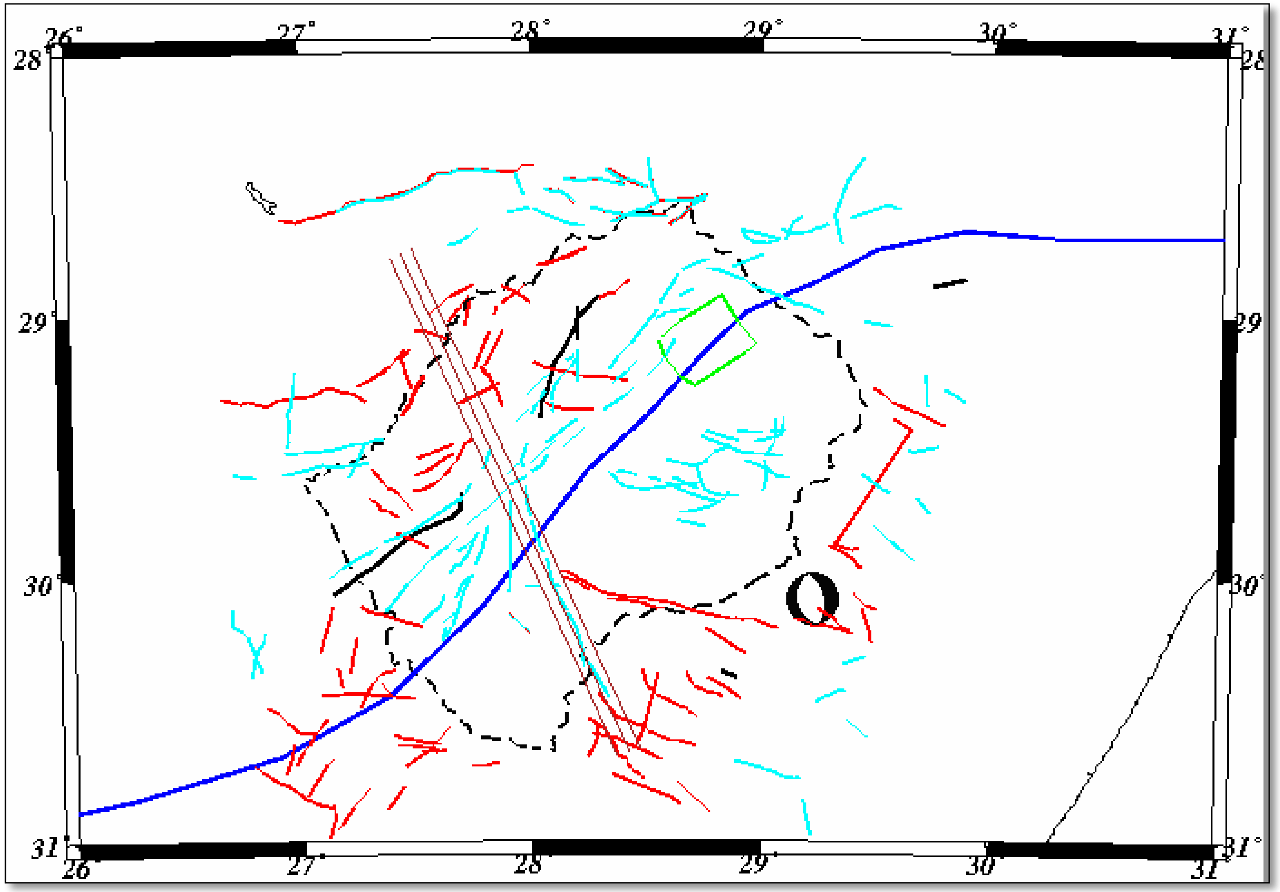


Figure 2.5: Linear discontinuities in and around Lesotho (Malephane, 2007).

Red lines show the dolerite dykes, black lines the major faults and cyan lines all the other lineaments, which are not clearly defined, in the area. The area in which the kimberlite pipes are, is indicated by a green block in the northern part of Lesotho, the beach ball represents normal faulting, the purple parallel lines running from NNW-SSE shows proposed plate boundaries, the blue line shows the boundary of the Kaapvaal Craton and Namaqua-Natal Belt (Malephane, 2007).

The Precambrian Bultfontein fault zone (shown in Figure 2.4) located at the centre of the Kaapvaal Craton, shows evidence of widespread reactivation. This fault zone is located near the mining regions at Welkom and Klerksdorp. The Rietfontein fault cuts through the Central Rand and Carletonville-West Rand mining region (Singh *et al.*, 2011).

Other significant faults include the Thabazimbi and Zebediela faults, shown in Figure 2.4, which are located along the Thabazimbi-Murchison lineament (Singh *et al.*, 2011) in the northern part of the Kaapvaal Craton. These faults are associated with a number of thermal springs and also related to the subsidence of the Bushveld Complex by 400 m (Singh *et al.*, 2011). Young fault scarps, ranging from 2 m to 10 m height, appear along the Tshipise and Bosbokpoort faults. These faults are situated along the Limpopo Mobile Belt and have EW strike.

The Zoetfontein fault (see Figure 2.4) is one of the major faults, situated in the southern part of Botswana. This fault reactivated during the Karoo sedimentation and developed as a growth fault (Modie, 2007), and it has a NW – SE trending strike (Segwabe, 2008). The Okavango rift zone (ORZ) is the most seismically active region in Botswana and it forms part of the Makgadikgadi-Okavango-Zambezi basin (Malservisi *et al.*, 2013). Bufford *et al.* (2012) describe the ORZ as an incipient rift at the southern tip of the south-western branch of the East African Rift System (EARS). The ORZ is bounded by NE-trending normal faults that form a NW-dipping border fault zone. Bufford *et al.* (2012) investigated the geometry and nature of the Kunyere, the Thamalakane, the Lecha, and the Tsau faults (shown in Figure 2.6) using Magnetotelluric and Electrical Resistivity Tomography imaging. They discovered that the Kunyere fault is becoming tectonically inactive and strain is being transferred further east to the more active Thamalakane fault, and also that the Lecha and Tsau faults are still active. Bufford *et al.* (2012) stated that the frequent occurrence of micro-seismicity within the ORZ is due to the presence of water which lubricates the faults.

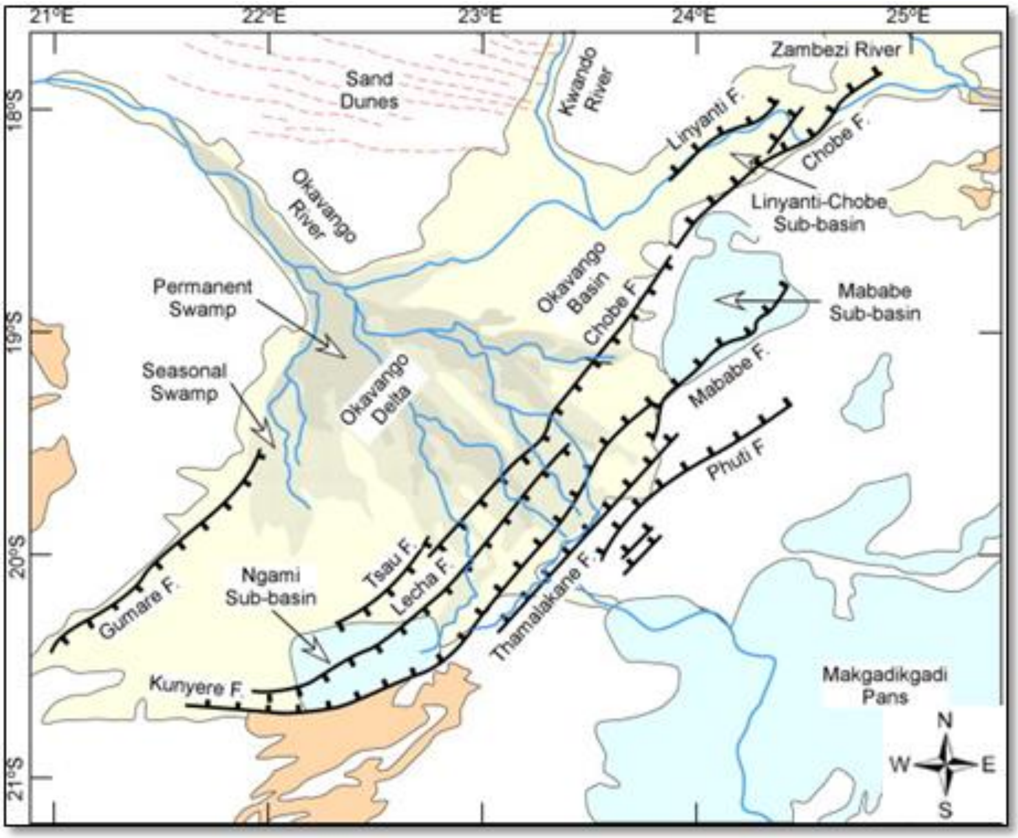


Figure 2.6: The Okavango Rift Zone (ORZ) showing basins and faults around the area (Bufford *et al.*, 2012).

Light blue represent areas with Holocene lacustrine deposits, white represents areas with Quaternary Kalahari alluvium, powdered yellow represents areas with Quaternary unconsolidated and underlying lacustrine and fluvio-deltaic sediments, and peach represents areas with Precambrian crystalline rocks.

The phases of intracontinental rifting, spreading, subduction, and continental collision lasting from ~ 900 Ma – 460 Ma gave rise to the Kaoko and Damara Belts (Miller, 2008). The Kaoko Belt is elongated for about 1 200 km in the northward direction, along the Atlantic continental margin, while the Damara Belt, which is almost 400 km wide, extends in a north-easterly direction (Tankard *et al.*, 1982). Passchier *et al.* (2002) observed that the Kaoko Belt trends in a NW – SE direction and Damara Belt is trending in the NE – SW direction. The Kuiseb and Hebron faults (shown in Figure 2.4) are some of the major faults along the Kaoko Belt. Singh *et al.* (2011) state that, according to a personal communication with T. Partridge, the above mentioned faults displaced Cenozoic/Quaternary sediments by up to 65 m.

Chapter 3

3. Catalogue Compilation

3.1. Seismicity

Seismicity can be divided into three different types, according to how and when the earthquakes were recorded and reported. These are paleo-, historical and instrumental seismicity.

Paleo-seismicity refers to seismicity that happened centuries or millennia ago. Paleoseismic events are used to understand historic and recent aspects of geology, e.g. to determine if there was any recent reactivation on the fault (Grant, 2002). This is done by:

1. Identifying and mapping faults, in order to describe any recognizable tectonic deformation or environmental changes caused by the fault at or near the surface of the Earth;
2. Investigating the chronologies of earthquakes by identifying and dating the evidence (such as surface rupture, ground deformation, and ground failures due to shaking) of multiple earthquakes along the fault. Geochronological dating methods include isotope techniques such as radiocarbon, uranium series, and cosmogenic isotopes (Grant, 2002);
3. Estimating the fault slip, because it yields information about the magnitude of paleo-earthquakes and average rate of deformation; and
4. Estimating the magnitude of paleo-earthquakes from the measurements of slip per event or surface rupture length.

Paleo-seismic investigations have only been conducted in South Africa at the Kango fault zone in the Eastern Cape (Goedhart, 2005, 2006), and the Tshipise and Bosbokpoort fault zones in the Limpopo Province (Eskom, 1998). The lack of paleo-seismic data in southern Africa led to the decision to exclude paleo-seismicity from the final catalogue.

Historical seismicity refers to seismic events that were described by people prior to the deployment of seismic stations. Therefore the accuracy of their location and magnitude is questionable, since they are estimated using intensity data. Various intensity scales have been developed over the years; one of the most popular is the Modified Mercalli Intensity (MMI) scale, developed by Harry Wood and Frank Neumann in 1931 (USGS, 2013). USGS (2013) defines the MMI scale as an arbitrary ranking based solely on the observed effects. Fernandez and Guzman (1979) compiled the catalogue of historical events in South Africa, calculating the magnitude using the Richter equation below,

$$M_{Intensity} = \frac{2}{3} I_{\max} + 1.0 \qquad 1$$

Brandt *et al.* (2005) later updated the above mentioned catalogue. Singh and Hattingh (2009) produced isoseismal maps for South Africa using all the records of macroseismic effects that were found in historical reports. This work was subsequently updated by Midzi *et al.* (2013). Albini *et al.* (2014) investigated historical seismicity in Grahamstown, Eastern Cape from 1820 to 1936, using descriptions found in old diaries, newspapers, journals, etc. These earthquake events were included in the final catalogue.

Instrumental seismicity refers to events that were recorded by seismographs and quantitatively analysed and documented in space and time using the relations between the seismic records and the amplitude and the frequency content of ground motions (Romanelli, 2005). Woessner *et al.* (2010) described the results of this analysis to be an earthquake catalogue that lists the magnitude (size and type), location, depth, and occurrence time. Instrumental seismology originated in the early 1900s. The instrumental events were collected from different data sources named in section 3.2 below.

3.2. Sources of Data used to compile the Catalogue

3.2.1. Global Seismic Networks and Catalogues

The larger events in Africa are recorded by global networks such as the World-Wide Standard Seismograph Network (WWSSN), the Comprehensive nuclear Test Ban Treaty Organization (CTBTO), the Global Seismographic Network (GSN), the Advanced National Seismic System (ANSS), and the National Earthquake Information Centre (NEIC).

Prominent among the international databases that provided data for this study is that of the International Seismological Centre (ISC). The ISC was founded in 1964, concurrently with the establishment of the World Wide Standardised Seismographic Network (WWSSN). Its mission is to continue the gathering of instrumental recordings world-wide, previously undertaken by the International Seismological Summary (ISS), in order to calculate source parameters that are well-constrained (Adams, 2011). The ISC Bulletin typically presents the source parameters calculated by the individual agencies contributing the data, followed by a reappraised solution, calculated by ISC staff, who consider all available data. This bulletin includes the Engdahl (EHB) catalogue, which have 116 events from 1963 to 2008 in the study region.

For the southern Africa region, the ISC Bulletin lists source parameters from 1966 onwards, contributed mainly by the CGS (or its predecessor, the Geological Survey of South Africa) and the Goetz Observatory at Bulawayo (BUL). The National Earthquake Information Centre (NEIC) of the US Geological Survey also contributes solutions for larger events, but these have been found to be less well constrained and hence less reliable than the ISC solutions as far as the southern Africa region is concerned. Other organisations, such as the Geological Survey Department of Zambia and the Geophysical Survey of the Russian Academy of Sciences, also occasionally contribute sets of source parameters, but their solutions are generally unreliable due to the limited number of recordings used, as well as the large distance from the source at which these recordings were obtained. As a consequence, only solutions contributed by BUL or reappraisals by the ISC are considered in the present study as alternatives to those determined by the CGS. A total number of 24,737 events was collected from the ISC database.

The first WWSSN station was installed in 1961, but operations only commenced in June 1963 (USGS, 2011b). The stations were installed under the sponsorship of scientific organizations such as United States Coast and Geodetic Survey (Powell and Fries, 1964). By 1965, WWSSN had 111 stations installed; when the final station was installed in 1971, the network consisted of 120 stations in more than 60 countries (USGS, 2011b). WWSSN operated five stations in southern Africa: located at Sutherland, Pretoria and Grahamstown in South Africa; Windhoek in Namibia; and Bulawayo in Zimbabwe. The WWSSN produced seismic data up until the mid-1900s (USGS, 2011b). All the events which were recorded before the United States Geological Survey (USGS) started coordinating the operation of the WWSSN, were sent to the ISC by the WWSSN and now the data is sent by the USGS (Noson *et al.*, 1988).

The CTBTO was established in 1996 to monitor global nuclear explosions, using seismic, hydroacoustic, infrasound and radionuclides. CTBTO has a global network of 337 monitoring facilities, a communications infrastructure, an international data centre, and the capability to carry out on-site inspections. CTBTO operates five seismic stations in southern Africa: located at Sutherland and Boshof in South Africa, Lobatse in Botswana, Tsumeb in Namibia, and Matopo in Zimbabwe. The seismic stations in Boshof, Lobatse, Tsumeb and Matopo are auxiliary seismic stations, whereas the one in Boshof are a primary seismic station (CTBTO, 2012). The analysed seismic data from their seismic network are shared with the ISC (CTBTO, 2012).

The GSN was formed in 1986 to serve as a multi-use scientific facility and societal resource for monitoring, research and education (Gee and Leith, 2011). This was done in partnership with the USGS, the United States National Science Foundation (USNSF), and the Incorporated Research Institutions for Seismology (IRIS, a university consortium). The GSN consists of over 150 modern seismic stations with broadband, high-dynamic range seismographs located in over 80 countries world-wide (USGS, 2011a). This includes five stations in southern Africa: located at Sutherland and Boshof in South Africa, Lobatse in Botswana, Tsumeb in Namibia, and Bulawayo in Zimbabwe. The data are available on the IRIS database. These are the same stations as those under the GSN seismic network.

ANSS and NEIC are both coordinated by USGS and its partners. ANSS maintains and operates some of the seismic stations which constitute the USGS seismic networks. There are no seismic stations which are operated and maintained by the ANSS in southern Africa (USGS, 2011a). NEIC compiles and maintains the global earthquake database from the USGS networks. Therefore some of the earthquake events are compiled in both the ANSS and NEIC database (USGS, 2011a). A total number of 1,825 and 1,772 events were collected from the ANSS and NEIC databases, respectively.

The International Seismological Centre (ISC) and the United States Geological Survey (USGS) are scientific organizations which collect the seismicity databases from worldwide seismic networks. The ISC and USGS catalogues are available from the following websites:

http://www.isc.ac.uk/iscbulletin/search/catalogue/ and
http://earthquake.usgs.gov/earthquakes/search/ respectively.

3.2.2. National Seismic Networks and Catalogues

a) South Africa

In August 1899, the Royal Observatory located in Cape Town installed a Milne seismograph (Strasser and Mangongolo, 2013). The Royal Observatory was previously known as the Cape of Good Hope Observatory from 1820 – 1931. This seismograph was upgraded to a Milne-Shaw instrument in 1920. In 1931 its operation ceased. The Department of Applied Mathematics at the University of Cape Town later operated this seismograph from 1935 to 1947, along with another horizontal Milne-Shaw seismograph (Krige and Maree, 1948). In 1950, the Hermanus Magnetic Observatory took over the operations of the Milne-Shaw seismological instrument up until 1986, focussing mainly on teleseismic events (Theron, 1974).

The Bernard Price Institute of Geophysical Research at the University of the Witwatersrand, Johannesburg was responsible for analysis of seismograms from the Council for Geoscience from 1949 to 1968, and the Bulawayo networks from 1959 to 1964 (Strasser and Mangongolo, 2013). The Bernard Price Institute installed and operated a network of short period Benioff Seismographs from 1949 to 1951, at Kimberley, Grahamstown, Pietermaritzburg, Pretoria and Windhoek (Green and Bloch, 1971). The Grahamstown, Pretoria and Windhoek stations were later upgraded and operated by WWSSN from 1964 to 1965.

The Union Observatory in Johannesburg, which was later renamed the Republic Observatory, Johannesburg, installed a 200 kg Wiechert seismograph and operated it from July 1910 to April 1972 (Strasser and Mangongolo, 2013). Their primary focus was to monitor seismic activity in the Gauteng gold-mining regions.

As can be seen from the description above of the history of seismic monitoring in South Africa, prior to 1970 seismic monitoring took place through isolated deployments of seismographs (Saunders *et al.*, 2008). After the occurrence of the Ceres earthquake of magnitude 6.2 M_W, on 29 September 1969, a temporary network of five mobile stations was deployed in the epicentral region to monitor aftershock activity in the area (Green and Bloch, 1971).

The responsibility for monitoring local and regional earthquakes was taken over by the Council for Geoscience with the establishment of the South African National Seismograph Network (SANSN) in 1971, consisting of several analogue seismological stations, which were later upgraded to digital stations from 1988. The SANSN is currently operating 25 broadband, short-period and extended short-period stations (listed in Table 2 and their locations shown in Figure 3.1). Some of these stations form part of the AfricaArray (see Table 2). The Seismology Unit of the Council for Geoscience (CGS) operates the SANSN and keeps an earthquake database that forms the backbone of this catalogue. These data have been shared with the ISC at least once a year since 2000 (CGS, 2012). A total number of 46,333 events were collected from the CGS database.

Water Ingress (WI) and Mine Health and Safety Council (MHSC) projects started at the beginning of 2010 in the central basin of the Witwatersrand, which was later expanded to Far-West Rand and Klerksdorp, Orkney, Stilfontein, Hartbeesfontein (KOSH) area in November 2012. Some of the SANSN stations were moved to be part of these projects.

Table 2: South African National Seismograph Network stations with their installation date and type of instrumentation (CGS, 2012).

SANSN – South African National Seismograph Network, Broadband – B, Extended Short Period – ESP, Short Period – SP, Strong Motion – SM, Vertical – V, East West – EW, North South – NS, Mine Health and Safety Council – MHSC, Operation Ceased – OC, Water Ingress – WI, Station Vandalised - SV

Station Name	Operation Date	Instrumentation	Status
Grahamstown (GRM)	Oct 1967 to Nov 2013	B: V, EW and NS	OC – SV, part of AfricaArray
Ceres (CER)	May 1971 to Present	B: V, EW and NS	SANSN, part of AfricaArray
Gariep Dam (HVD)	Jun 1971 to Present	ESP: V, EW and NS	SANSN, part of AfricaArray
Koster (KSR)	Jun 1972 to Present	ESP: V, EW and NS	SANSN
Silverton (SLR)	Jul 1981 to Present	B: V, EW and NS	SANSN
Senekal (SEK)	Sep1982 to 2011	ESP: V, EW and NS	OC – SV
Belfast (BFT)	Mar 1986 to 2009	ESP: V, EW and NS	OC – SV
Upington (UPI)	Sep1991 to Present	B: V, EW and NS	SANSN, part of AfricaArray
Calvinia (CVNA)	Feb 1992 to Present	B: V, EW and NS	SANSN, part of AfricaArray
Prieska (PKA)	Jul 1992 to Present	ESP: V, EW and NS	SANSN, part of AfricaArray
Schweizer-Reneke (SWZ)	Aug 1992 to Present	ESP: V, EW and NS	SANSN
Newcastle (NWL)	Nov 1992 to 2004	SP: V	OC – SV
Musina (MSNA)	Sep 1993 to Present	B: V, EW and NS	SANSN, part of AfricaArray
Kokstad (KSD)	Apr 1995 to Present	B: V, EW and NS	SANSN

Elim (ELIM)	Oct 1996 to Present	SP: V, EW and NS	SANSN
Komaggas (KOMG)	May 1997 to Present	ESP: V, EW and NS	SANSN
Buffelsbos (BUFB)	Dec 1997 to Present	SP: V, EW and NS	SANSN
Mopani (MOPA)	Apr 2004 to Present	SP: V, EW and NS	SANSN, part of AfricaArray
Lephalale (LEP)	Nov 2004 to 2005	ESP: V, EW and NS	OC – SV
Parys (PRYS)	Nov 2004 to Present	ESP: V, EW and NS	SANSN
Pongola (POGA)	Mar 2005 to Present	B: V, EW and NS	SANSN, part of AfricaArray
Somerset East (SOE)	Mar 2005 to Present	ESP: V, EW and NS	SANSN, part of AfricaArray
East Rand Propriety Mines (ERPM)	May 2006 to Present	SP: V, EW and NS	SANSN
Kloof (KLOOF)	Aug 2006 to Present	SP: V, EW and NS	SANSN
Buffelsfontein (BFSD)	Apr 2008 to 2012	SM: V, EW and NS	MHSC
Tau Lekoa (TLEK)	Apr 2008 to 2012	SM: V, EW and NS	MHSC
Moab Khotsong (MOAB)	May 2008 to 2012	SM: V, EW and NS	MHSC
Western Deep Levels Mine (WDLM)	Dec 2009 to Present	B: V, EW and NS	SANSN
Crown Mines (CRWM)	Feb 2010	SP: V, EW and NS	OC – new WI strong motion broadband station installed nearby
Keimoes (KEIM)	Nov 2010 to Present	SP: V, EW and NS	SANSN
Observatory (OBSV)	2010 to 2012	SP: V, EW and NS	WI
Augrabies	Apr 2011 to Present	ESP	SANSN

(AUGR)			
Kromhout (KROM)	Sep 2011 to Present	SP: V, EW and NS	SANSN
Rosenhof (ROSN)	Sep 2011 to Present	SP: V, EW and NS	SANSN
Grantham (GRAN)	Nov 2012 to Present	ESP: V, EW and NS	SANSN

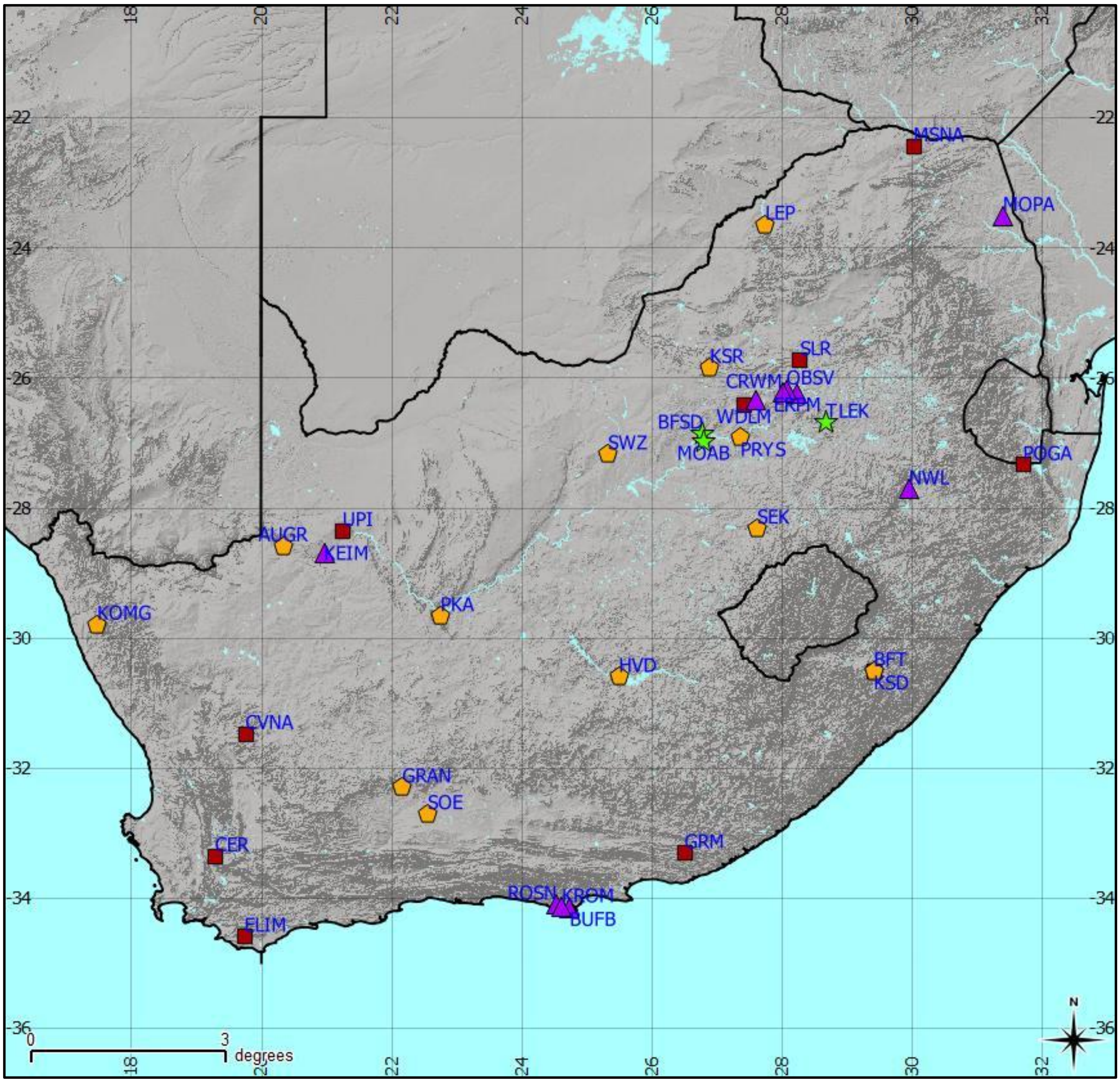


Figure 3.1: South African National Seismograph Network (SANSN) station locations.

b) Lesotho and Swaziland

Seismic networks were installed to monitor induced seismicity from the Lesotho Highlands Water Projects (LHWP) (Malephane, 2007). The Katse network in Lesotho began operation in 1991, while the Mohale micro-seismic network was installed in 2001, only coming into full operation in July 2002 (Malephane, 2007). The Katse network consists of five stations namely, Katse Dam Office (KTS1), Soai (SOIK), Suaone (SUAK), Mapeleng (MAPK), and Mamohau (MHUK). The Mohale micro-seismic network consists of six stations, namely Mohale Dam office (MOH1), Moholobela (MHLM), Matebeleng (MTBM), Vital Communication Link Tower (VCLM), Koporale (KPRM), and Rapokolana (RPKM). These seismic stations are no longer operational since they were installed to monitor seismicity during the impoundment of the of the Katse and Mohale dams, which are now complete. The next impoundment of dams constructed in phase two of LHWP is planned to begin on August 2018, during which monitoring may also have to take place.

Since there are no long term seismic stations in both Lesotho and Swaziland, events are recorded using the SANSN seismic stations, and therefore included in the data collected from the CGS.

c) Botswana

The deployment of seismic stations in Botswana dates as far back as 1972, but these stations were frequently vandalised (King, 2008). Lobatse (LBTB) seismic station, which forms part of the GSN, became operational in 1993. The Department of Geological Surveys (DGS) has installed six seismic stations since 2003, mainly for the seismotectonic study of the Okavango Delta. The University of Botswana (UB) is also operating three seismic station in the country, including a broadband station. An earthquake catalogue for Botswana with events from 1950 to 2008 was kindly provided by the DGS. A total number of 225 events were collected.

d) Namibia

In 1963, the USGS established the Windhoek (WIN) seismological station as part of the WWSSN. The Tsumeb (TSUM) seismological station was established in 1991 to monitor worldwide seismicity (Lushetile and Hutchins, 2008) as part of the GSN (Mangongolo and Hutchins, 2006). The installation of new stations and upgrades of old stations has progressed steadily from 2000 and has accelerated since 2002, with all stations becoming operational in 2004. These stations include Opuwo, Kamanjab, Aus, Rundu, Ariamsvlei, Gobabis, Karibib, and Katima Mulilo (Lushetile and Hutchins, 2008). The Geological Survey of Namibia installed these stations to form the national seismological network. Mangongolo and Hutchins (2006) compiled a catalogue of seismicity for Namibia from data obtained from the NSN network as well as from other sources. Their catalogue was to complement the information available for Namibia in the current study. A total number of 116 events were collected.

3.3. Uncertainties in Earthquake Location and Magnitude

When assessing seismic hazard, it is important to be aware of uncertainties concerning earthquake locations and magnitude. The earthquake location uncertainties need to be accounted for when assessing seismic hazard of a certain area and also when looking at source parameters, whereas magnitude uncertainties are to be considered when calculating recurrence parameters.

3.3.1. Earthquake Location Uncertainties

This section presents the scheme implemented to assess and classify the uncertainties associated with locations of the seismic events included in the catalogue presented in the current study, especially for earthquakes located using data from South African seismic stations.

a) Historical Seismicity

The quality of a location determined from historical data depends on the detail of the information available, as well as its spatial distribution. When the information is sufficient to construct a full isoseismal map, the epicentral location can be constrained by the extent of the highest intensity isoseismal contour. However, in practice, the assessment is often based on incomplete isoseismal information (particularly for coastal locations). The detail of the description of felt effects, or negative reports (*i.e.*, reports that the earthquake has not been felt at a given locality), can help in improving location quality. When only a few intensity reports are available, it is often ambiguous whether they correspond to a small event felt only locally, or to a larger, more distant event for which close-in reports are not available. This ambiguity leads to a location bias towards population centres (*e.g.*, there seem to be more historical events in Cape Town than in the surrounding, more sparsely populated areas). The ambiguity can be resolved as more data becomes available, from the research that is currently being done on historical events by the Council for Geoscience.

b) Instrumental Seismicity

The quality of locations determined using instrumental data depends critically on the number of stations, their distance to the source, as well as their azimuthal distribution. The best-constrained solutions are obtained from dense, local networks surrounding the source. With the exception of the local network deployed by Green and Bloch (1971) to record aftershocks of the Ceres sequence, such recording conditions are generally not available for southern African earthquakes of tectonic origin, for which determinations are generally based on data from distant stations, with only 1 or 2 local stations. Distant stations are considered to be those stations which are ~ 1 000 km away from the epicentre whereas local station are ≤ 150 km away. Additionally, the quality of locations for earthquakes occurring along the coastal areas is affected by the absence of recording stations in the oceans.

Location uncertainties are routinely determined as part of the location process by CGS and ISC. CGS provides estimates in terms of latitude and longitude error, LatErr and LonErr. ISC provides the dimensions of the major and minor axes of an error ellipse, S_{maj} and S_{min}, and the strike of the error ellipse clockwise from the north. The error ellipses for the events in the current dataset are all orientated NS or EW, hence the CGS and ISC location error parameters can be considered equivalent. The relations between the direction of the error ellipses and the distribution of the stations is also explained by Bai *et al.* (2006), who state that the reason why the location error in the latitude is larger than the location error in the longitude is the fact that the stations which they used are distributed in the NNW direction. For ease of comparison with the uncertainties determined from macroseismic data, which are expressed as radii, equivalent error radii are defined as equations below, for the CGS and ISC data, respectively.

$$ErrR_{CGS} = \sqrt{LatErr \times LonErr} \qquad 2$$

and

$$Err_{ISC} = \sqrt{S_{maj} \times S_{\min}} \qquad 3$$

It should, however, be noted that due to lack of stations in the direction of the oceans, the error driving the uncertainty assignment for most of the earthquake locations along the coastal areas is the longitude error.

The accuracy of event locations depends highly on the velocity models. Midzi *et al.* (2010) computed a 1-D velocity model for South Africa through the inversions of the *P*-wave travel time data and investigated the effect it has on earthquake locations. They discovered a shift in the event locations compared to the old locations and also that the errors obtained using the model they computed were less than the errors obtained using the old model. The shift in locations using the new velocity models was more prominent towards the north and west, in both the Witbank cluster and West-Rand cluster respectively. This explains the importance of having a reliable velocity model when calculating event locations and also how big an effect velocity models have on earthquake location uncertainties.

3.3.2. Magnitude Uncertainties

When calculating the magnitude of an earthquake, either from macroseismic data for historical events, or seismographs for instrumental events, uncertainties are quantified. The uncertainties of instrumental events are mostly influenced by the following factors: the sensitivity of the instruments, the distance from the station to the epicentre, and the methods used to calculate the magnitude. Whereas, historical events uncertainties are mostly influenced by the reliability of the newspaper articles or any other library archives, which are usually used to determine the intensities. Those intensities are then used to locate the event and also calculate the magnitude. The catalogue presented in this report has been developed in terms of moment magnitude for compatibility with future manipulations as part of the seismic hazard analysis. The data sources, from which the catalogue was compiled, however, use various magnitude scales. Additionally, magnitudes for historical and some early instrumental events have been estimated from intensity data. The uncertainties associated with these conversions are discussed below.

a) Historical Seismicity

The following uncertainties specified by Johnston (1996) for the estimation of M_W from macroseismic parameters were adopted, because Johnston (1996) estimated M_W from the Modified Mercalli Intensity, which is what was used when calculating the magnitude of historical events in the southern African catalogue:

- For estimations based on I_{max} only, the average uncertainty on M_W is 0.52 magnitude units;
- For estimations based on total felt area (intensity II and greater), the average uncertainty is 0.39 magnitude units;
- For estimations based on individual isoseismal areas, the uncertainty ranges from 0.28 magnitude units for the intensity III isoseismal to 0.47 for the intensity V isoseismal;
- For estimations based on multiple isoseismal areas, the individual estimates are combined using a weighted average approach and the resulting uncertainty obtained through error propagation; details can be found in Johnston (1996).

b) Instrumental Seismicity

The uncertainties determined by Deichmann (2006) and Scordilis (2006) for conversions to moment magnitude from other instrumentally determined magnitude estimates were adopted:

- Estimations of M_W derived from body-wave magnitude (M_b) values or magnitudes determined by BUL were associated with an error of 0.29 magnitude units;
- M_W estimates based on the assumption that $M_W \approx M_L$ are treated as if they had been estimated from a $M_W - M_L$ regression, and carry an uncertainty of 0.4 magnitude units;
- M_W estimates adopted from publications (e.g. Johnston *et al.*, 1994) carry the uncertainties assigned by the authors.

The above mentioned uncertainties were chosen because, as it will be explained in detail in section 4.1.1, it was decided to use Deichmann (2006) and Scordilis (2006) for the conversions of M_L to M_W, M_b to M_W and also adopt the M_W estimates from publications. Those events which had M_S magnitude scale also had M_b; therefore M_b was chosen to be used for conversion and no further analysis on uncertainties was needed.

3.4. Merging Collected Data

CompiCat and Seisan computer programs were both used to merge collected data, as a way of testing which one could recognise duplicates in the catalogue better. This was an important process because the duplicates were not supposed to be removed at this stage, so to have enough events with different magnitude scales that could be used to calculate conversion relations, with an aim of using these relations to convert all available magnitude scales to M_W.

CompiCat is a C++ code which uses a Qt C++ tool kit for a multi-platform Graphic User Interface and application development for editing and compiling earthquake catalogues (MITPAN, 2008). CompiCat can be applied for importing and exporting catalogues, comparing catalogues, editing and compiling earthquake catalogues, converting magnitudes, identifying and removing duplicates, merging several catalogues into a single one, calculating and visualizing of spectrograms and histograms, amongst other applications.

Seisan is a seismic analysis system with a complete set of programs, tied to the same database, for analysing earthquakes from analogue and digital data (Ottemöller *et al.*, 2013). These programs are mostly written in Fortran and some in C, with all of the source codes available to the user. Ottemöller *et al.* (2013) states that the functions of Seisan include manual input of phase readings or picking them with a cursor, locating events, editing events, determining spectral parameters, seismic moment, azimuth of arrival from 3-component stations and plotting of epicentres. Local and global earthquake catalogues can both be used when analysing.

3.4.1. Merging Data using Compicat

The CompiCat tool 'Merge' is used to merge different catalogues with the 'initial' earthquake catalogue. First, the earthquake catalogues were manually converted into the ASCII text formats of the original seismic data reported by the ANSS, using Notepad++ and Kedit. Using the 'import' tool, the earthquake catalogues were then imported into the Compicat working directory and saved as .csf files.

The CGS catalogue was chosen to be the initial catalogue for events with small magnitudes ($M_W < 4$), because the SANSN has more stations closer to each other, and hence a smaller distance from the seismic stations to the epicentre for most of the events in southern Africa. The ISC catalogue was chosen as an initial catalogue for moderate to large event magnitudes ($4.0 \leq M_W \leq 6.7$), because the location is more accurate due to the number of stations used. The new project dialog box was opened to start a new project; the CGS catalogue was input as the initial catalogue; and thereafter the other catalogues were added (i.e. ISC, ANSS, NEIC, Namibia, and Botswana catalogues). The process of adding other catalogues requires the proximity limits (shown in Table 3) to be set, which would then be used to identify and automatically remove duplicates. At least three proximity limits must be the same between events for them to be considered duplicates, with time, latitude and longitude given the first preference. The catalogues which were merged includes historical and instrumental data, which means they vary widely with the processes used to calculate the magnitude, location and depth and also the accuracy of these parameters. Therefore selecting proximity limits in Table 3 was a challenging task because they need not be to too large for instrumental events or too small for historical events.

Table 3: The list of proximity limits used when merging the catalogues

Time	60 seconds
Latitude	0.1°
Longitude	0.1°
Depth	2 km
Magnitude	0.1

The final results of this process are an output file of the merged catalogues with no duplicates, but without a list of the removed duplicates. Without the list of removed duplicates, it is not possible to verify that the process was done correctly. The list is also needed for the homogenisation of the earthquake magnitudes and selection of preferred locations. As a result of this lack of control in this process, a decision was made not to use Compicat for this process of merging catalogues.

3.4.2. Merging Data using Seisan

As mentioned above in section 3.3, Seisan has a complete set of programs that can be used to merge different catalogues. The following programs were used in this section: ‘SPLIT’, ‘MAKEREA’, ‘COLLECT’ and ‘NORHEAD’. When merging the different catalogues, all the events in the catalogues are inserted into a database prepared specifically for this exercise using the programs MAKEREA (for creating the database) and SPLIT for inserting the events as individual events into the database. It is necessary to make sure events are not overwritten as the splitting process is done. Thereafter, all the events are then collected into one catalogue using the ‘COLLECT’ program. Thus, following the process discussed above, all the collected catalogues (i.e. ANSS, Botswana, CGS, ISC, Namibia, and NEIC) were combined into one catalogue containing all the events that were initially in the different catalogues. Since overwriting of events was not allowed, duplicates of events were also contained in the final catalogue.

It is important that only events that have been analysed using waveforms recorded by three or more stations should be included in the final catalogue. However, some of the events in the catalogue did not have an indication of how many stations were used. Thus, the events which may have been analysed using less than three stations but was not indicated in their respective catalogues could not be removed.

3.5. Identifying and Removing Event Duplicates

When merging catalogues from different data sources it is necessary to avoid the duplication of events that are reported in more than one of the source catalogues. This can be achieved by carefully checking the possible duplication of events (i.e. records which could be associated to the same earthquake) in the merged catalogue (Hussein *et al.*, 2008). Accordingly, the merging procedure has been performed as follows. Each event was carefully analysed to see if it has a duplicate event. Common events in terms of the origin time and epicentral location are identified manually one by one and treated using the following criteria:

- The ISC epicentre location was given first preference for the time period before 2010 as these solutions are determined using data from all other networks, including CGS data. The ISC has collected data from a total of 507 different agencies throughout its history; these data are then reviewed resulting in new location, date, time and magnitude. When the data for the southern African catalogue were collected, the ISC had only reviewed the events until 2010.
- The CGS location was given first priority for events after 2010 and also for all small events ($M_W \leq 4.0$) that were recorded and located using the South Africa network of stations only.
- Epicentral locations were selected from other catalogues where CGS or ISC locations are not available, giving priority to the local stations.
- Where the M_W magnitude was available, it was given first priority, followed by M_L and then M_b. The available M_W was calculated by specific agencies using waveform data, which then minimises the error that otherwise, will be encountered during conversion from other magnitude scale to M_W, using statistical relations.

Duplicates were first removed using CompiCat, but, as mentioned above in section 3.4.1, there was no output file of the removed duplicates when merging catalogues. This was the same when removing duplicates using the ‘remove duplicates’ tool. Therefore Compicat could not be used as the final procedure of removing duplicates.

Therefore, following the procedure stated above, a total number of 9 738 duplicates were single handily removed manually using the output file from Seisan (shown in Figure 3.2).

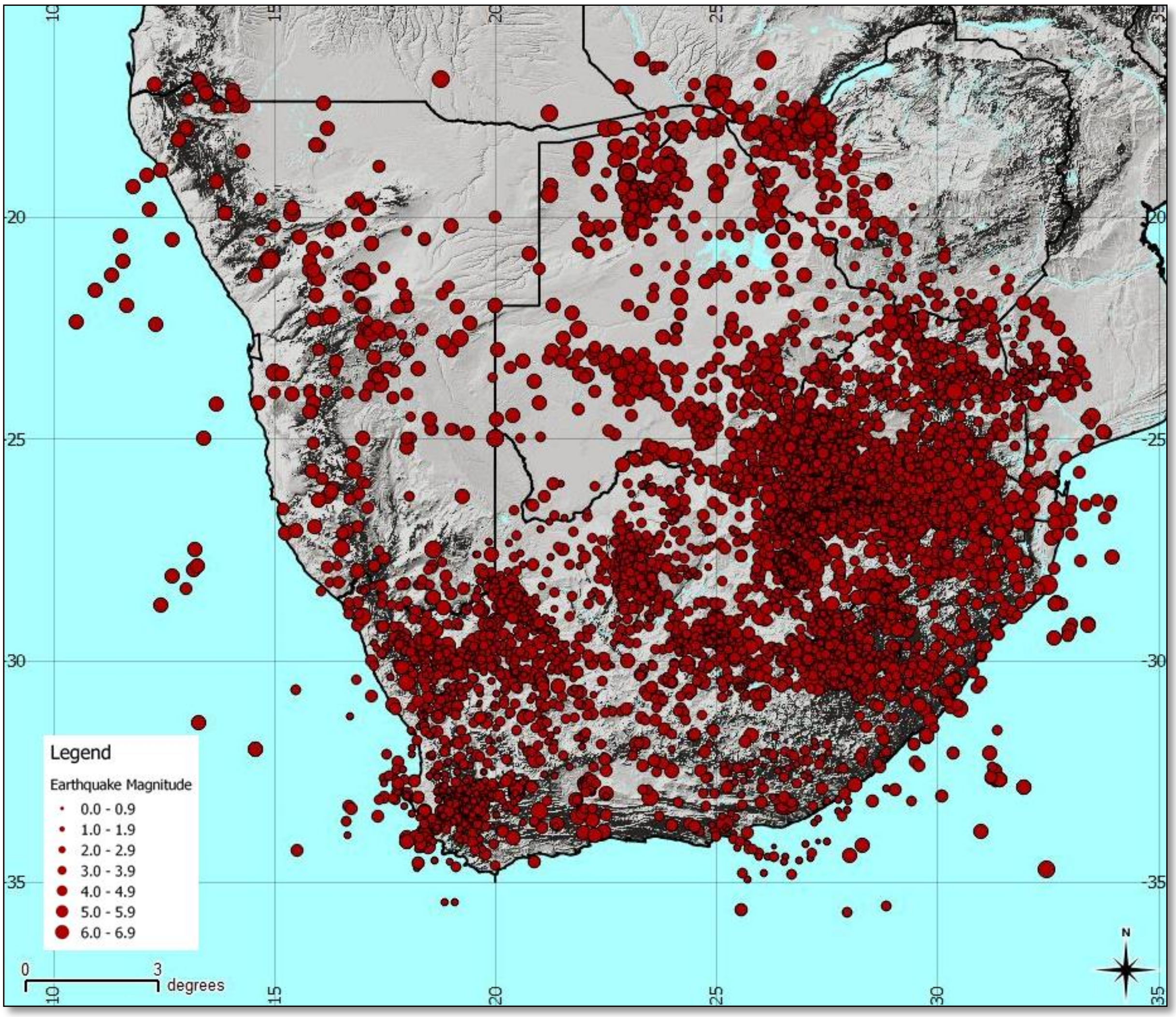


Figure 3.2: Seismicity of southern Africa after merging all available data and removing duplicates.

Sources of data are SANSN, ISC, ANSS, NEIC, and the geological surveys of Namibia and Botswana.

After removing the duplicates, 65,370 events were left in the catalogue, with the largest having a magnitude of $M_W = 6.7$, which occurred in the Okavango Delta on the 11th of October 1952. The catalogue includes events that extend as far as 100 km outside of the border of the study area, since they may have an impact on the seismic hazard assessment for the region.

3.6. Induced Seismicity

Certain human activities such as deep underground mining, large-scale surface quarrying, the filling of reservoirs, the injection of fluids in rocks at depth, the removal of fluids from subsurface formations, and the detonation of large underground explosions, causes alterations of the stresses and strains in the earth's crust and reduce the strength of faults (Gibson and Sandiford, 2013). These activities induce seismicity, which is recorded together with tectonic events. Therefore, determining whether an earthquake event is induced or natural is a challenge.

Mining induced seismicity and its hazardous manifestation, rock bursting, were encountered in South Africa in the first decade of the 20th century when gold mines reached a depth of several hundred feet below the outcrop, forming extensive excavations supported solely by small reef pillars (Durrheim *et al.*, 2005). Thereafter, as mines became deeper, mining induced events dominated the number of earthquakes recorded and analysed in South Africa. However, in seismic hazard assessment, the earthquake catalogues are expected to be Poissonian (i.e. random or not dependent on each other) and therefore to only consist of tectonic events. Mining induced events are considered to be dependent on human activities such as blasts in the mines, which activate the faults. Hence a catalogue that includes these events is not Poissonian. The process of removing them, however, is complicated, because the process of differentiating between tectonic and mining events is a difficult, especially without depth information. An attempt was made by comparing the location of the events to known location of mines in the country (Figure 3.3.). The mine boundaries were identified from various publications by the mines and compiled by the CGS staff. All the events within the boundaries and as far as 100 km from the boundaries (depending on how far these events extend along the mining regions) were removed (see Figure 3.4). The 10 - 100 km range was chosen by considering the location error of events analysed by the CGS.

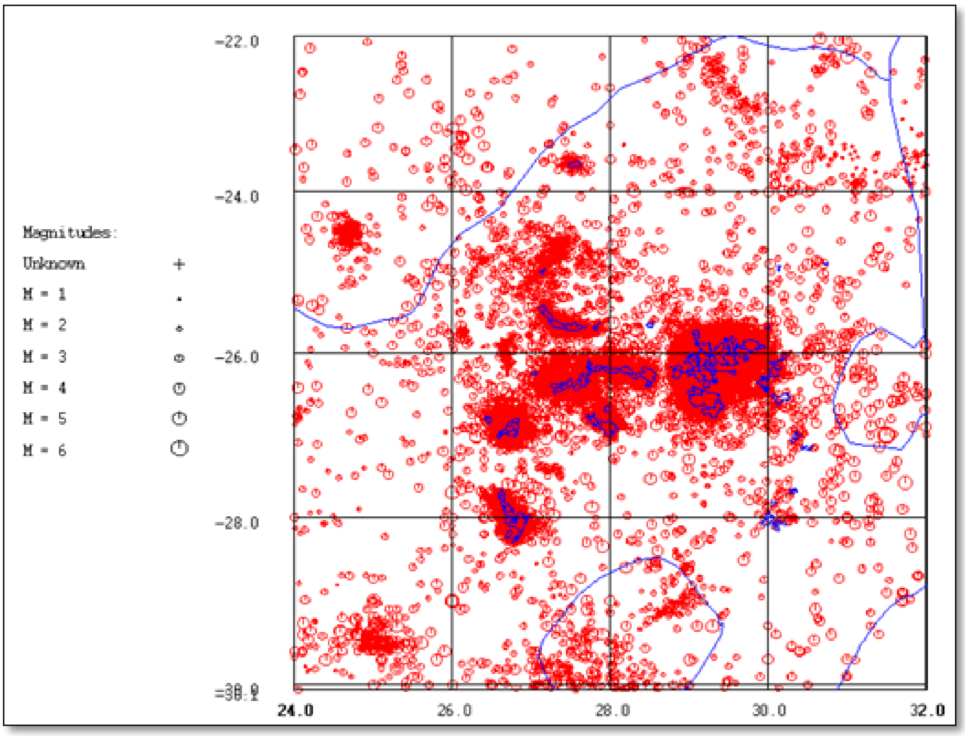


Figure 3.3: Seismicity map, with South African mine boundaries, before removing induced seismicity.

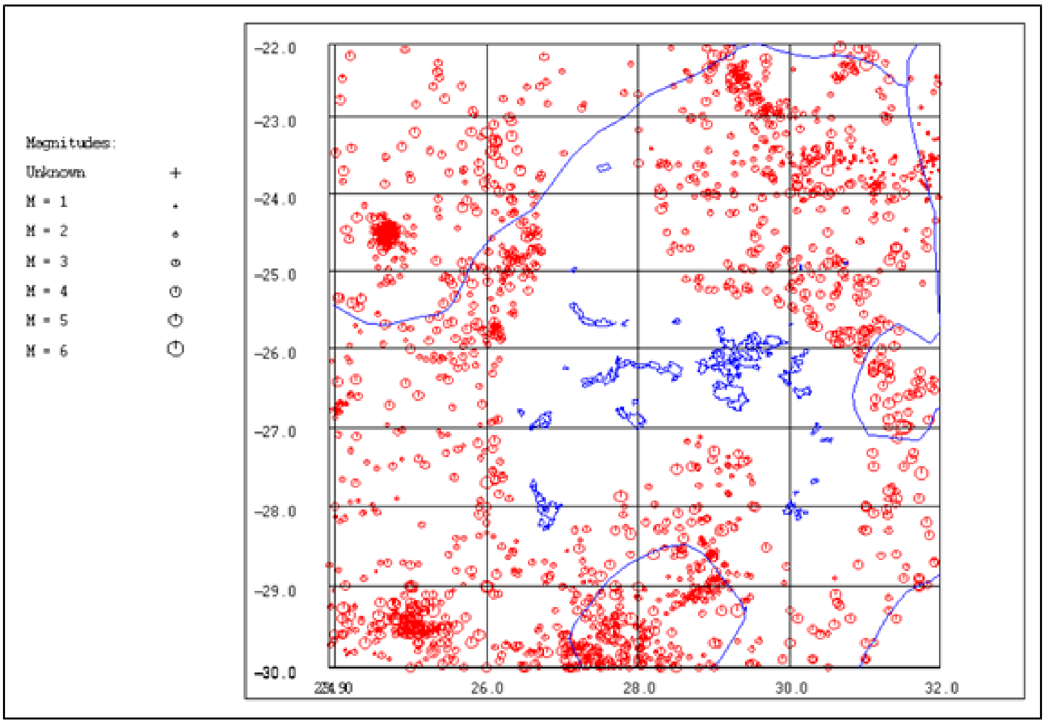


Figure 3.4: Seismicity map, showing mine boundaries and the removal of mine-related seismicity.

Given that moderately sized earthquakes (M ≥ 4) can and do cause damage (e.g. 9th March 2005, Stilfontein earthquake, M_L = 5.3, shown in Figure 3.5.) it was decided that such events should be included in the catalogue, even when located within mining boundaries. These will have an effect on the magnitude of completeness and recurrence parameters, therefore on hazard calculations in mining regions. The magnitude of completeness will obviously be high around the mining boundaries and the seismic hazard of the region will not be accurate, therefore it is advised to use the catalogue with all mining events if calculating the hazard in mining regions. The process of removing induced events resulted in a catalogue of 5,488 earthquakes (Figure 3.6.).

Figure 3.5: Damaged building at Stilfontein resulting from an earthquake event of magnitude, M_L = 5.3 on the 9th of March 2005 (Saunders *et al.*, 2008).

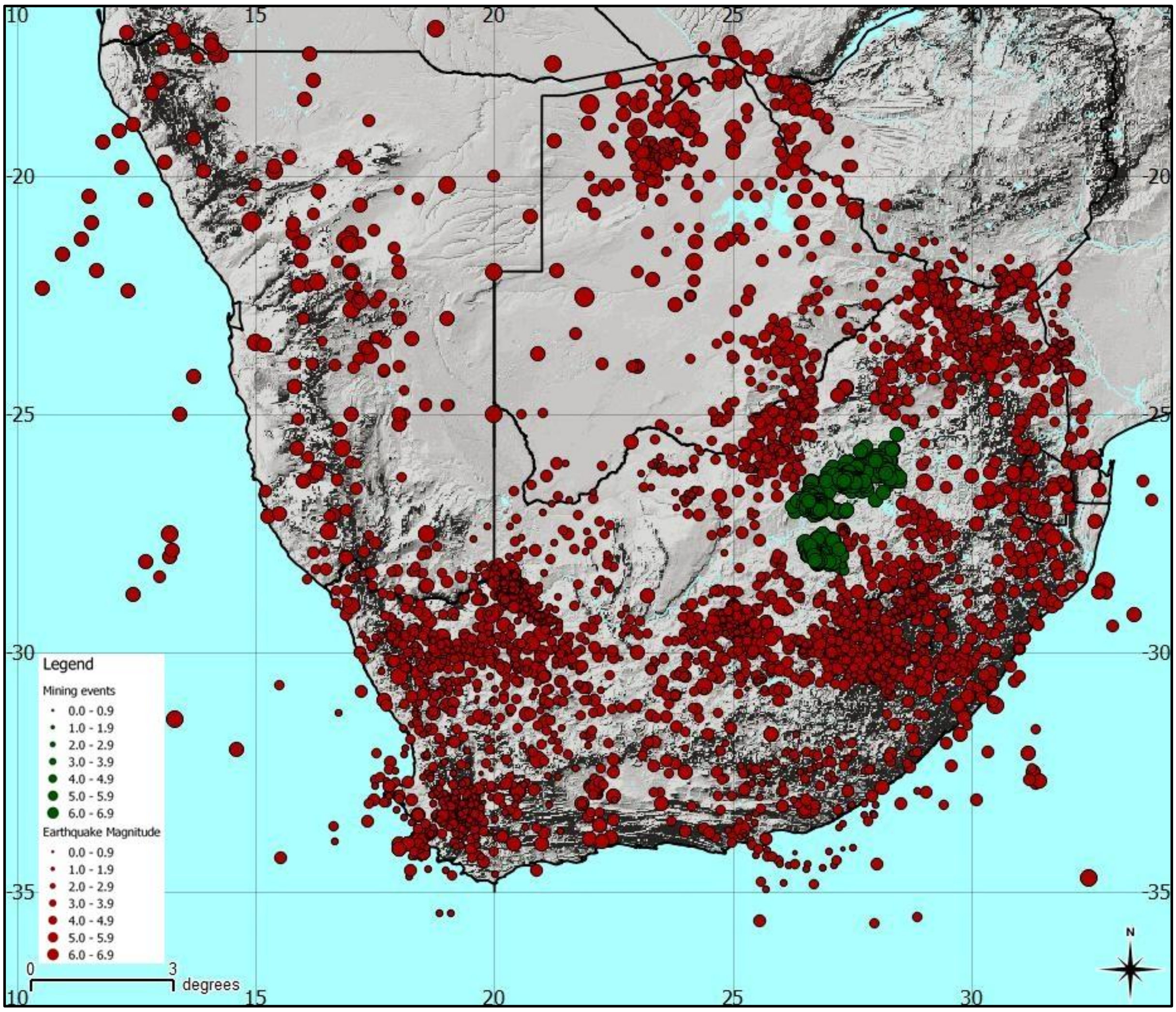


Figure 3.6: Seismicity of southern Africa after removing mine induced seismicity with the exception of events with magnitude 4 and above.

Chapter 4

4. Catalogue Analysis

4.1. Homogeneity

The merging of earthquake data from different catalogues usually produces a heterogeneous earthquake catalogue, because different magnitude types may not always be comparable. Specifically, in South Africa the most frequently reported estimate is the local magnitude (M_L), while the moment magnitude (M_W) is only reported for a few major earthquakes. In addition to these, the body wave ($M_{b)}$ and surface wave (M_S) magnitude scales are also reported, especially in the ISC and USGS global catalogues for moderate to large events. Therefore, when using a unified earthquake catalogue, the problem of selecting a magnitude scale that is as representative and as homogeneous as possible throughout the whole data set arises. In seismic hazard assessments, the standard magnitude type that is used is the Moment Magnitude scale, which is the only earthquake magnitude scale that does not saturate as the size of earthquake increases (Hanks and Kanamori, 1979). Therefore, it was decided to adopt the moment magnitude M_W as the standard magnitude type for the southern African unified catalogue. An effort was then made to convert all reported magnitude scales to moment magnitude by implementing the following procedure.

- Adopt reported moment magnitude values. These were normally obtained from published articles or from catalogues published by different agencies (e.g. USGS, CTBTO).
- Investigate and implement magnitude scale relations.

4.1.1. Relations between Different Magnitude Scales

Many researchers have made efforts to develop magnitude relations for conversion to moment magnitude including Das *et al.* (2012), Grünthal *et al.* (2009), Hussein *et al.* (2008) and Scordilis (2006). In their study, Das *et al.* (2012) used orthogonal regression to develop relations for the conversion of M_b and M_S to M_W based on earthquake events in the northeast of India from 1978 – 2006. Grünthal *et al.* (2009) derived relations between magnitude scales based on the chi-square maximum likelihood regression techniques with the uncertainties given by the 68% confidence bounds. This is a technique that considers errors of individual data, even unknown errors (Stromeyer *et al.*, 2004). Hussein *et al.* (2008) used linear regression relations between different magnitude types with relevant statistical parameters, which were derived using orthogonal regression, to convert all the other magnitude types to M_W. Though they managed to convert M_L to M_W for Europe, Grünthal and Wahlström (2003) found that the M_W values of the final catalogue were not strictly homogenised because one M_L and M_W relation had to be used for all M_L scales, ignoring the fact that the M_L scales reported by different agencies were also heterogeneous in nature. Such a challenge also occurred in our investigation.

The South African National Seismograph Network (SANSN) utilised two local magnitude relations for the period from 1971 to 2012. The first relation was used between 1971 and 1997, and was first published by Fernández (1973) as:

$$M_L = \log_{10}(A) - \log_{10}(A_0) + S \qquad 4$$

where A is the maximum amplitude, and - $log_{10}(A_0)$ and S are the distance and station correction terms, respectively. Through this relation, the distance-magnitude attenuation curves were derived for Southern California by Richter (1935). The procedure followed by the Council for Geoscience, from 1971 to 1997, involved measuring the maximum peak-to-peak amplitudes of the *S-Lg* wave recorded on the vertical channel of the short-period analogue seismograms, then reducing them to M_L using the relation above (Fernández, 1973, 1993; Saunders *et al.*, 2010).

With the introduction of the Seisan software (Havskov and Ottemöller, 2008b) for routine data analysis at the Council for Geoscience in 1998, an equivalent M_L relation for South Africa was identified and applied (Saunders *et al.*, 2013). The equation (equation 5) of Hutton and Boore (1987) was selected as it was found to compare well with the relation above (equation 4), that was used to determine M_L in South Africa. Since these two relations were found to be slightly equivalent, no conversion was necessary for the M_L values previously reported by the SANSN network.

$$M_L = 0.010(\log_{10}(A) - \log_{10}(A_0) + S) + 0.0118 \qquad 5$$

As also observed by Grünthal and Wahlström (2003), another challenge faced was that the other reported M_L magnitudes, from different agencies, were calculated using different equations from the SANSN relations, creating further heterogeneity. In addition, reported local magnitudes for historical earthquakes were estimated using information from macroseismic data. Ideally such issues can be resolved by developing conversion relations between the different M_L magnitude scales. However, in this study there were not enough data to be able to prepare such relations. As a result, while acknowledging the uncertainties, all M_L magnitude values from different agencies were considered to be equivalent.

An effort was then made to develop relations to convert the local magnitude values to moment magnitude. The relation between M_L and M_W was determined using the CGS catalogue, containing 330 events (with both M_L and M_W) starting from 1971 (Figure 4.1).

$$M_{W,CGS} = 0.776 M_{L,CGS} + 0.565 \qquad 6$$

The relation was prepared using the maximum likelihood from the Seisan program 'MAG'. The maximum likelihood was chosen over least squares because of the reasons explained in section 4.5 below. Since this relation would only apply for SANSN local magnitude, a second step was carried where all M_L and M_W magnitudes (a total of 353 events) were used (Figure 4.2) to derive the relation below.

$$M_{W,all} = 0.796 M_{L,all} + 0.539 \qquad 7$$

The two derived equations give similar values on converting to Mw as they are almost equivalent, but only start diverging at large magnitudes, $M_W > 6$ (shown in Figure 4.3.). However, on comparing the converted magnitudes (using both relations, equation 6 and 7) to published values, there was an average difference of about 0.2. As stated above, that the M_L values prior to 1971 were never converted using the Hutton and Boore (1987) equation because the relation was considered to be equivalent to that published by Fernández (1973). Thus, the slight difference between the two M_L values might have contributed to the difference between the converted and published M_W values. The assumption that all M_L scales are equivalent also contributed to such a great difference between converted and published values.

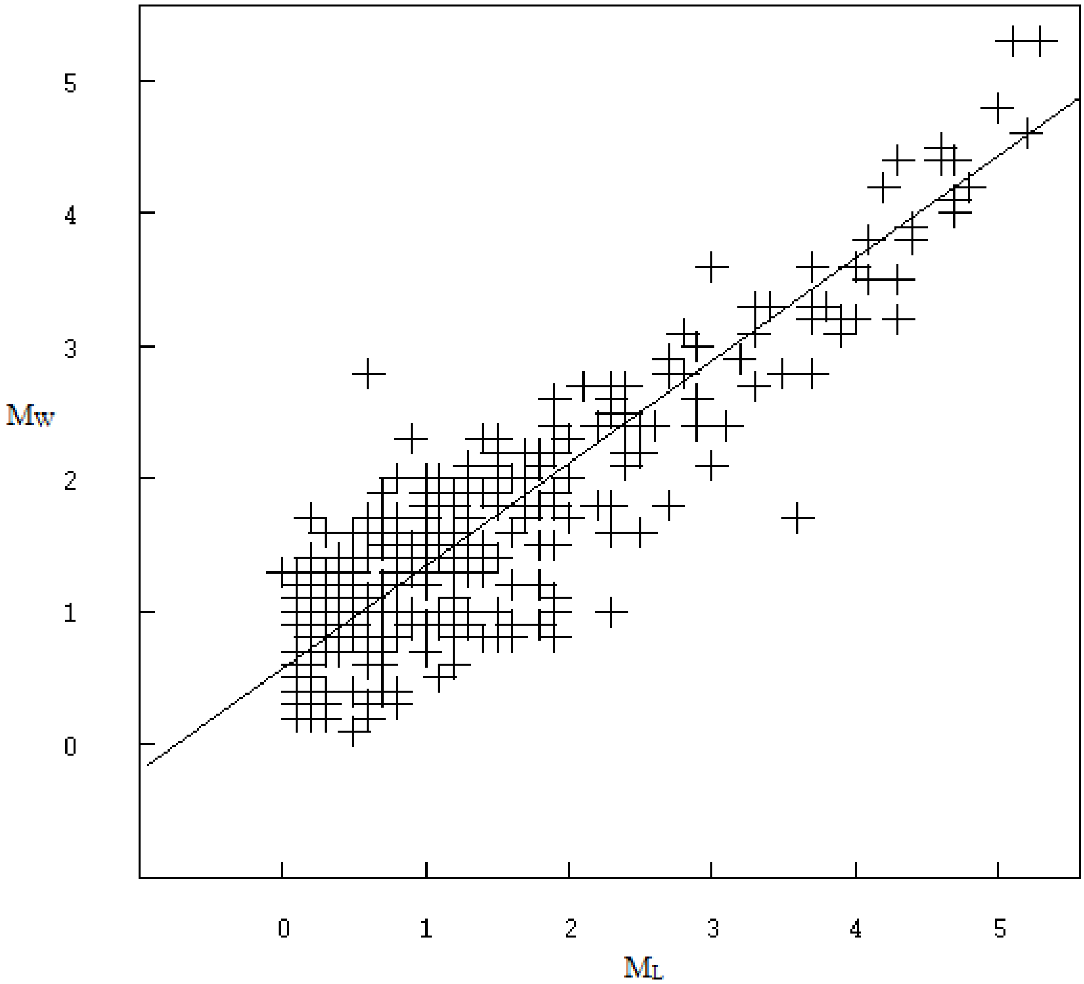


Figure 4.1: The relation between M_L and M_W for 330 events, both magnitude types reported in the CGS catalogue.

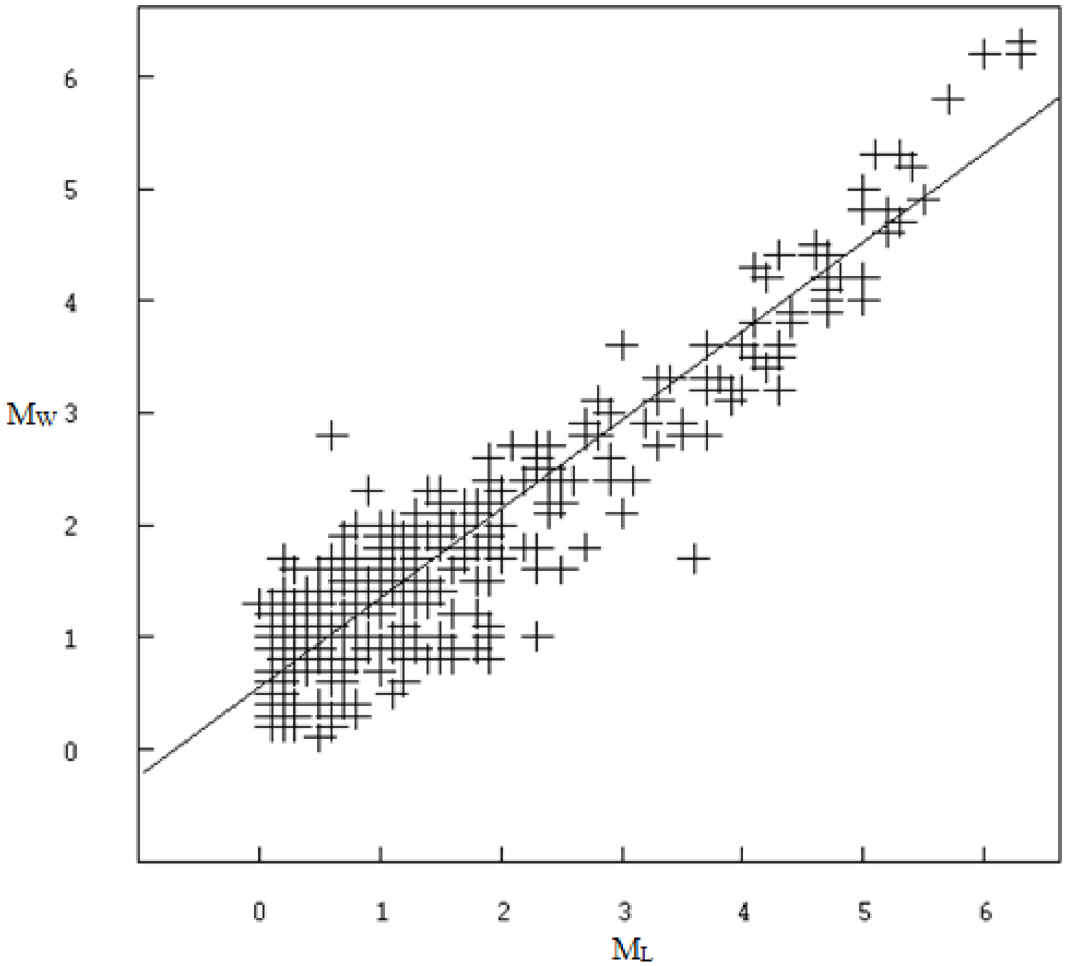


Figure 4.2: The relation between all M_L and M_W magnitude scales for 353 events.

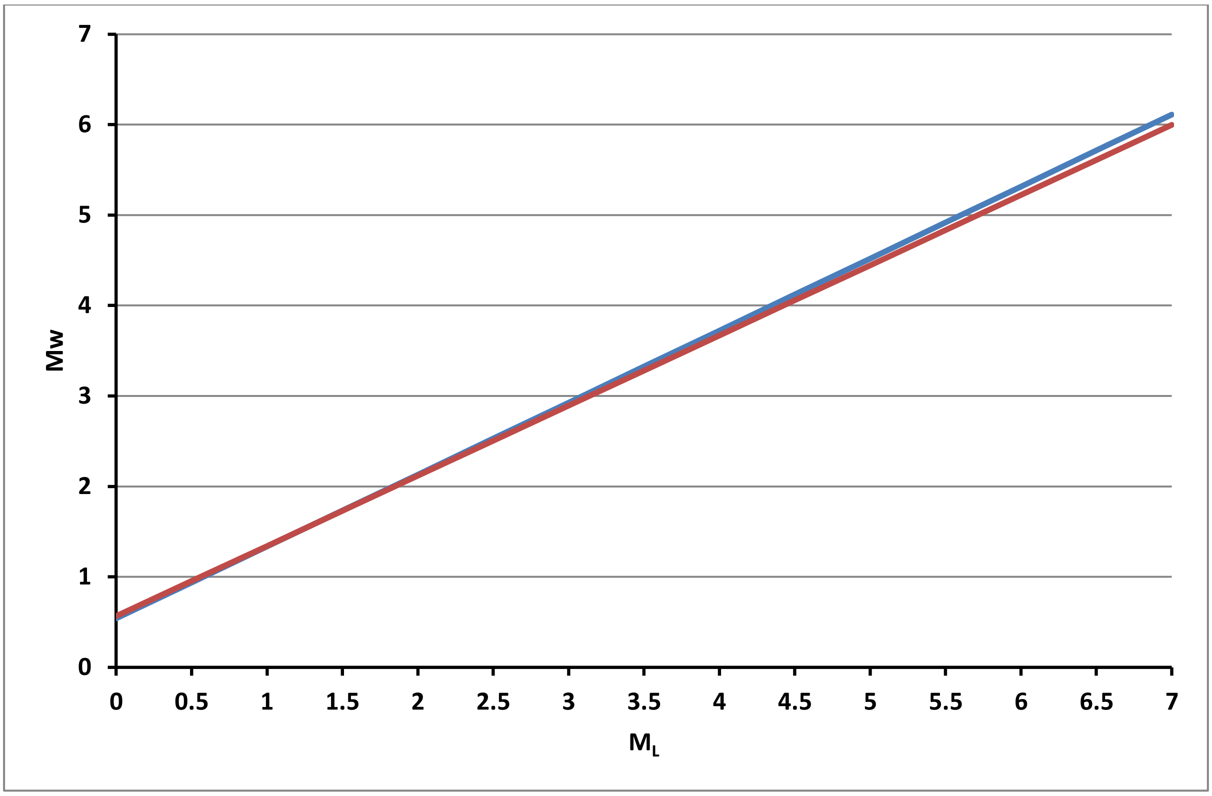


Figure 4.3: The comparison between the relations derived from all M_L magnitude scales and SANSN M_L magnitude scale.

The blue line represents all M_L magnitude scales; whereas the red line only represents M_L magnitude scales from SANSN.

An alternative method of conversion had to be considered because of the uncertainties which come with the conversions that were tried above. Campbell (2003) plotted a graph (Figure 4.4) which shows that M_L starts to diverge from M_W at M_L = 5.5 and saturates at M_L = 7.0. This is the reason why events at larger magnitude, in Figure 4.1 and Figure 4.2, are not fitting in with the relation and other events at lower magnitude. Deichmann (2006) states that the local magnitude was initially derived for moderate ($2 \leq M_L \leq 6$) magnitude earthquakes occurring at distances of up to several hundred kilometres from the seismograph station.

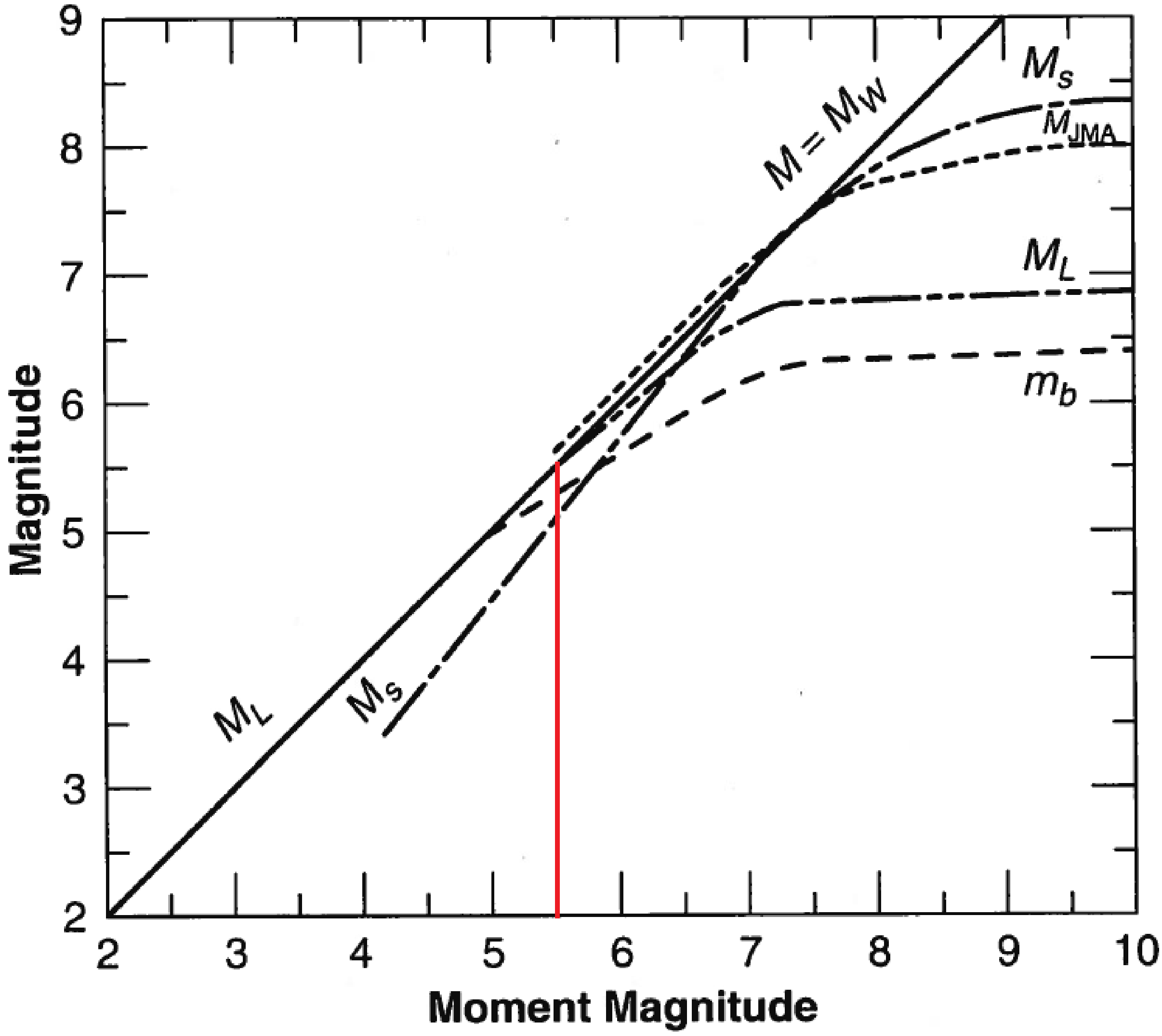


Figure 4.4: Comparison of magnitude scales.

The red line shows where the M_L magnitude scale starts to saturate. M_W is moment magnitude scale, M_S is the surface-wave magnitude scale, M_{JMA} is the Japan Meteorological Agency magnitude scale, M_L is the local magnitude, and m_b is short period body-wave magnitude scale, edited from Campbell (2003) and Zangeneh *et al.* (2013).

Deichmann (2006) explains that, in theory, $M_L \approx M_W$ over the entire range ($2 \leq M_L \leq 5.5$), though this does not necessarily apply in practice. Furthermore, Deichmann (2006) states that the discrepancies at small magnitude ($M_W < 2$) might be caused by some underestimation, in most cases due to analysis of events using data from a single station. Therefore, the Deichmann (2006) theory (see equation 8) was adopted considering that Figure 4.4 shows that M_L only deviates from M_W at magnitude 5.5 and above, and also that Figure 4.3 shows that the relations derived from all the M_L scales in the catalogue, and only that from the SANSN are equivalent. The biggest event in this catalogue is $M_W = 6.7$, meaning most of the events fit perfectly with Deichmann (2006).

$$M_W = M_L \qquad 0 \le M_L \le 5.5 \tag{8}$$

The errors are observed at lower magnitude $M_W < 2$ and higher magnitude $M_W \geq 5.5$, for up to 0.5 in the range where M_L is not saturated ($0 \le M_L \le 2$ and $5.5 \le M_L \le 7.0$). This is mainly because most of the smaller events are analysed using data from only one station, and for higher magnitude is the deviation of M_L due to saturation.

Given that some of the other events in the catalogue only had body wave magnitude, M_b, another relation had to be identified to convert those events to M_W. However, it was also noted that all the events that had the magnitude M_S also reported either M_b or M_L. Therefore a decision was made to only convert M_L and M_b. Scordilis (2006) derived global relations to convert M_b and M_S to M_W, but could not relate M_L to M_W because reported M_L magnitudes are differently reported from one agency to the other, therefore M_b was converted using the relation below:

$$M_W = 0.85(\pm 0.04)M_b + 1.03(\pm 0.23), \qquad 3.5 \le M_b \le 6.2 \tag{9}$$

All the events were then converted to M_W using ‘MAG’ code on Seisan, starting with M_L through the application of Deichmann (2006), and then M_b through Scordilis (2006) equation above.

Where duplicate M_W are available from the conversion process described above (i.e. published M_W, M_W from M_L and M_W from M_b), only one value was selected and used in the catalogue according to the following criteria.

1. Priority was given to the published M_W value.
2. The second priority used was the M_W value obtained by conversion from M_L.
3. The last priority was the M_W converted from M_b.

Some of the events had coda / duration magnitude, while others had no magnitude at all. These events were removed from the catalogue since they couldn't be converted to M_W.

4.2. Declustering

For seismic hazard assessment and earthquake prediction modelling, the earthquake catalogues are expected to be homogeneous in time (i.e. Poissonian). A Poissonian catalogue is one which has all the events occurring independently and uniformly in time, and characterised only by the rate of occurrence (Utsu, 2002), simply meaning that the catalogue must not consist of events which are dependent on other events. The process of creating such catalogues involves the removal of those dependent events, such as fore- and / or after-shocks of major earthquakes (Van Stiphout *et al*., 2012). Dependent earthquakes can only be distinguished through the basis of their spatio-temporal proximity to the main large earthquake, and also the fact that their occurrence rate is much greater than the average seismicity occurrence in the region over long durations. The process of declustering never yields a unique solution because all the available algorithms rely on a model which defines a main shock differently from the succeeding main shocks described from the next algorithm (Van Stiphout *et al*., 2012). There are many declustering algorithms; some of them are discussed in detail in the sections below.

In his analysis of the earthquake catalogue for southern California, Knopoff (1964) made an assumption that the histogram of earthquakes per decade should fit the Poisson distribution if the earthquake catalogue is truly random. It was found that the histogram is most Poissonian if dependent earthquakes are removed. Therefore, for an earthquake catalogue to generally be truly random, a process of declustering must be applied. This conclusion led to the development of declustering algorithms.

There are deterministic and probabilistic algorithms and some were used in this project, like the window methods, cluster methods and those methods based on correlation metrics. Probabilistic algorithms are based on the classification of each earthquake as a main shock or dependent event, whereas stochastic algorithms describe how each event generates dependent earthquakes on the basics of a space-time branching process model (Zhuang *et al.*, 2002).

4.2.1. Window Methods

Window methods provide the simplest way of identifying and removing dependent earthquakes using inter-event distances in space and time throughout the whole catalogue (Christophersen *et al.*, 2011). If the process of identifying and removing dependent earthquakes is not done thoroughly, the resulting catalogue can be non-Poissonian (Gardner and Knopoff, 1974). Thus, Gardner and Knopoff (1974) introduced window methods and parameters which can be used to improve the identification and removal of dependent earthquakes. These methods specify a certain time and distance interval from which an event described as a main shock happened, and use this to identify all the earthquakes which happened during that space and time interval as dependent earthquakes (Van Stiphout *et al*. 2012). However, these time and space windows were found to be dependent on the magnitude of the main shock (Christophersen *et al.*, 2011), and the space window is circular, which disregards fault extension, especially when the main shock is large (Van Stiphout *et al*., 2012).

The downfall of these methods is that so far they cannot distinguish between direct and indirect fore- and after-shocks. Direct fore- and after-shocks are those dependent entirely on the main events, whereas indirect are dependent on the fore- and after-shocks. Reasenberg (1985) states that window methods inadequately identify dependent events by overestimating the number of dependent events for a particular mainshock since the spatial and temporal extents vary widely from one event to the other. The parameters adopted from Gardner and Knopoff (1974) and Uhrhammer (1986) into the ZMAP software (Wyss *et al.*, 2001) were used to decluster the catalogue.

The parameters mentioned above were available on ZMAP for window method declustering and since the aim was to establish which method and which parameters decluster the southern African catalogue best, they were all used as a test. Since the parameters are part of the program, the user gets only the freedom of choosing which parameter to use (either Gardner and Knopoff (1974) or Uhrhammer (1986)). The window methods did not work well with the southern African catalogue. Figure 4.5 shows the declustered (green circles) and original (red circles) catalogues, with the events inside the red ellipse removed after declustering though they appear not to be dependent due to distance and location. All the parameters provided on ZMAP for window method considered those events in the red ellipse in Figure 4.5 to be dependant events, therefore they were removed. Thus, it was decided not to use the window methods.

4.2.2. Cluster Methods

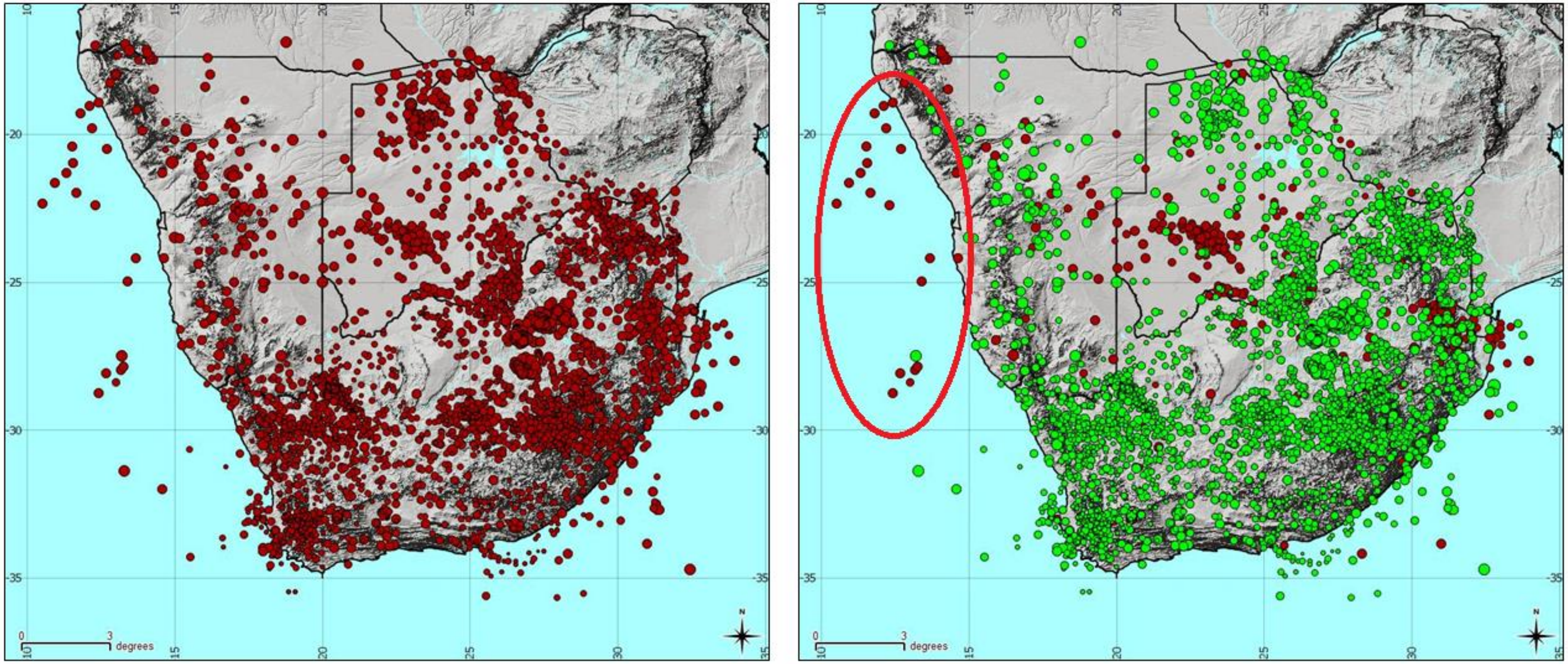
Savage (1972) used the distribution of seismicity to define the size or shape of a cluster, hoping to avoid the overestimation of the number of dependent events. Reasenberg (1985) used the basis of this algorithm to come up with a similar model, which used interaction zones in spatial and temporal extension to link earthquakes to clusters. Spatial extension was chosen according to the stress distribution near the mainshock, whereas temporal extension was chosen based on Omori's law (Van Stiphout *et al.*, 2012). Utsu *et al.* (1995) defined Omori's law as an empirical relation for the temporal decay of aftershock rates.

$$n(t) = \frac{K}{(t+c)^p} \qquad \textit{10}$$

modified from

$$n(t) = \frac{K}{t+c} \qquad \textit{11}$$

where n(t) is frequency of aftershocks per unit time interval, K and c are constants, t is time, and p is a value derived from the aftershock sequences. The largest event in a cluster of linked events is considered to be the main shock and all the other small events are dependent events. However, Christophersen *et al.* (2011) found that this algorithm fails to adequately identify dependent earthquakes if the magnitude of completeness is high, as the method needs many small earthquakes to keep the cluster together.



Un-declustered Catalogue **Catalogue declustered using Uhrhammer parameters**

Figure 4.5: Comparison between one set of window method parameters (Uhrhammer, 1986) used and the original catalogue.
The red circles, in both figures, shows the catalogue before declustering and the green circles in the right hand side figure shows the catalogue after declustering using window methods with Uhrhammer (1986) parameters.

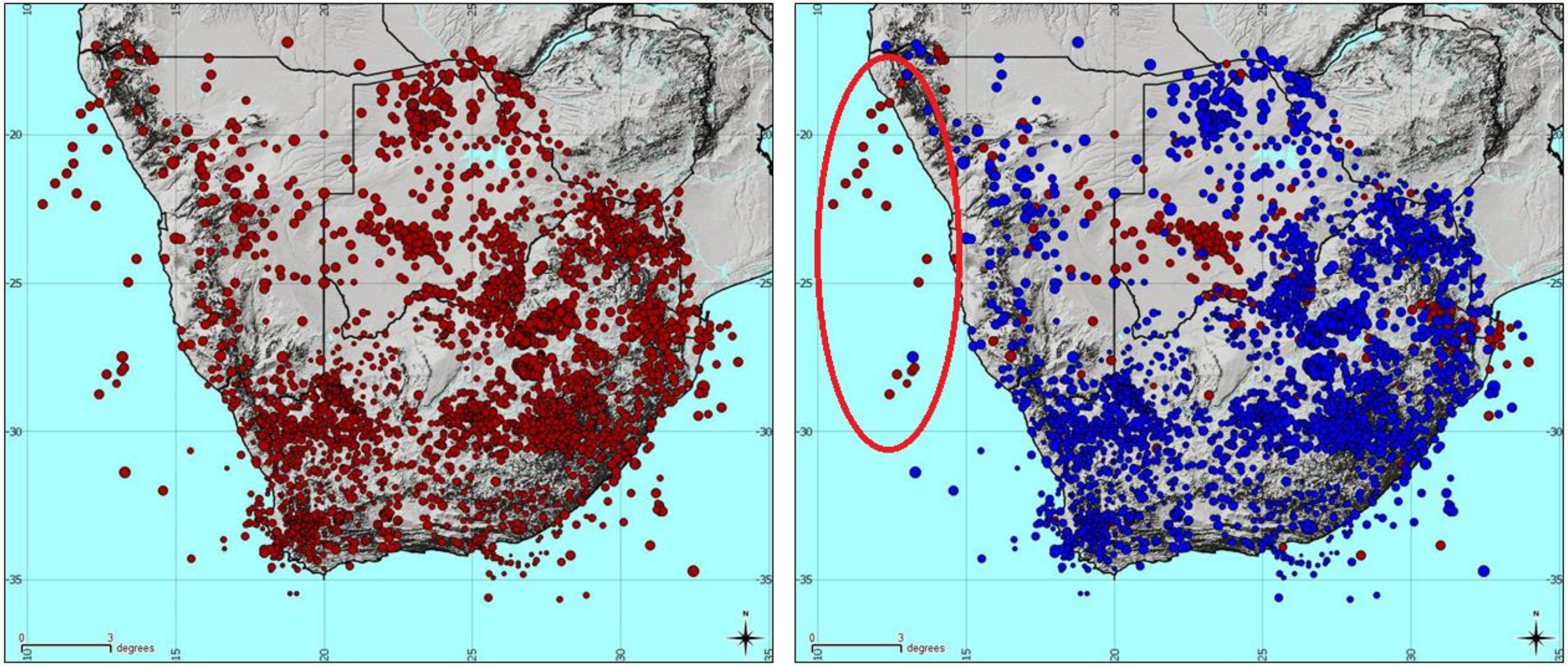
Tibi *et al.* (2011) also found out that the Reasenberg (1985) algorithm fails to accurately decluster earthquake catalogues due to the fact that dependent events are inadequately represented by a Poisson process. Therefore, Tibi *et al.* (2011) modified the Reasenberg (1985) algorithm by using an earthquake catalogue with small magnitude events ($3.0 \leq M_W \leq 4.9$). This was done by refraining from assuming a specific model for the occurrence of dependent events and using the estimated stress distribution of the mainshock as the basis of the spatial and temporal extension of the interaction zone. Tibi *et al.* (2011) also made sure that the analyst time parameters and algorithms dependent on the magnitude of completeness are not required. Molchan and Dmitrieva (1992) also modified the Reasenberg (1985) method by assuming that dependent event sequences are finite, that is, the concentration of dependent events depends on space and time, and are mixed with independent events.

In addition to the methods described above (Window methods), an attempt was made to decluster the catalogue using the Reasenberg (1985) code in the ZMAP software package (Wyss *et al.*, 2001) using minimum, standard, and maximum of parameters recommended by Reasenberg (1985) (minimum and maximum look-ahead time – τ_{min} and τ_{max}, respectively; the probability of detecting the next clustered event p_1; the increase of the lower cut-off magnitude – x_k; minimum magnitude cut-off for the earthquake catalogue – x_{meff}; the number of crack radii surrounding each earthquake within new events considered to be part of the cluster – r_{fact}). The cluster method, using parameters recommended by Reasenberg (1985), did not work well with the southern African catalogue, as shown in Figure 4.6. Therefore it was decided not to use these parameters.

Another cluster method used was the one implemented in the 'CLUSTER' code which is part of the Seisan software package (Havskov and Ottemöller, 2008b). This is a program that searches for the dependent events in a given catalogue with respect to time and distance windows in each selected cluster. The program selects cluster first, then evaluate the events in each cluster whether they are dependant events or not. The input is a standard Nordic file with header lines only (compact file). The header line contains the origin date and time of the event, its epicentral location, depth and magnitude. The user is required to give the number of days to be searched before and after the main event, and the distance limits in kilometres. In this case, 30 was chosen to be the number of days before the event whereas 180 was chosen to be the number of days after the event and 100 km was chosen as the distance from the main shock to the fore- and/or aftershock. This was decided upon considering the world standards, foreshocks usual occur not more than 30 days before the event and as for aftershocks, they can occur up to a year after the main shock.

The command prompt was used to execute this code; after inputting the data, the parameter, which is magnitude, is requested. This is the minimum magnitude at which the dependent events must be removed, which in this case was decided to be M = 5. This was decided upon because hazard assessment are usually estimated using those events of magnitude M ≥ 5, and also recurrence parameters are calculated using catalogues with events of magnitude M ≥ 5. Therefore, the total number of events which were considered when identifying if there are main shocks for a particular cluster were 232 in total. The output is a file of chosen clusters with '?' placed at the end of each dependent event which falls within the limits defined in the interactive input in time and distance. The output file was then checked systematically to analyse identified dependents events before removing them from the catalogue. This process was done manually, to ensure independent events are not removed, especially in the historical part of the catalogue.

The difference between declustering using Uhrhammer (1986) parameters (see Figure 4.5) and Reasenberg (1985) parameters is shown in Figure 4.7. The catalogue declustered using Uhrhammer (1986) parameters overlays the catalogue declustered using Reasenberg (1985) parameters, which then overlays the original catalogue. This figure (Figure 4.7) was used to show the difference between the window and cluster methods. The right hand figure is just the zoomed in section shown in the orange square. The red circles, in both figures, shows the catalogue before declustering; the blue circles in the right hand side figure (also in the left hand figure but not visible if not zoomed in) shows the catalogue after declustering using cluster methods with Reasenberg (1985) parameters; and the green circles in both figures shows the catalogue after declustering using window methods with Uhrhammer (1986) parameters.



Un-declustered catalogue **Catalogue declustered using Reasenberg parameters**

Figure 4.6: Comparison between one set of cluster method using Reasenberg (1985) parameters and the original catalogue.

The red circles, in both figures, show the catalogue before declustering and the blue circles in the right hand side figure show the catalogue after declustering using cluster methods with Reasenberg (1985) parameters.

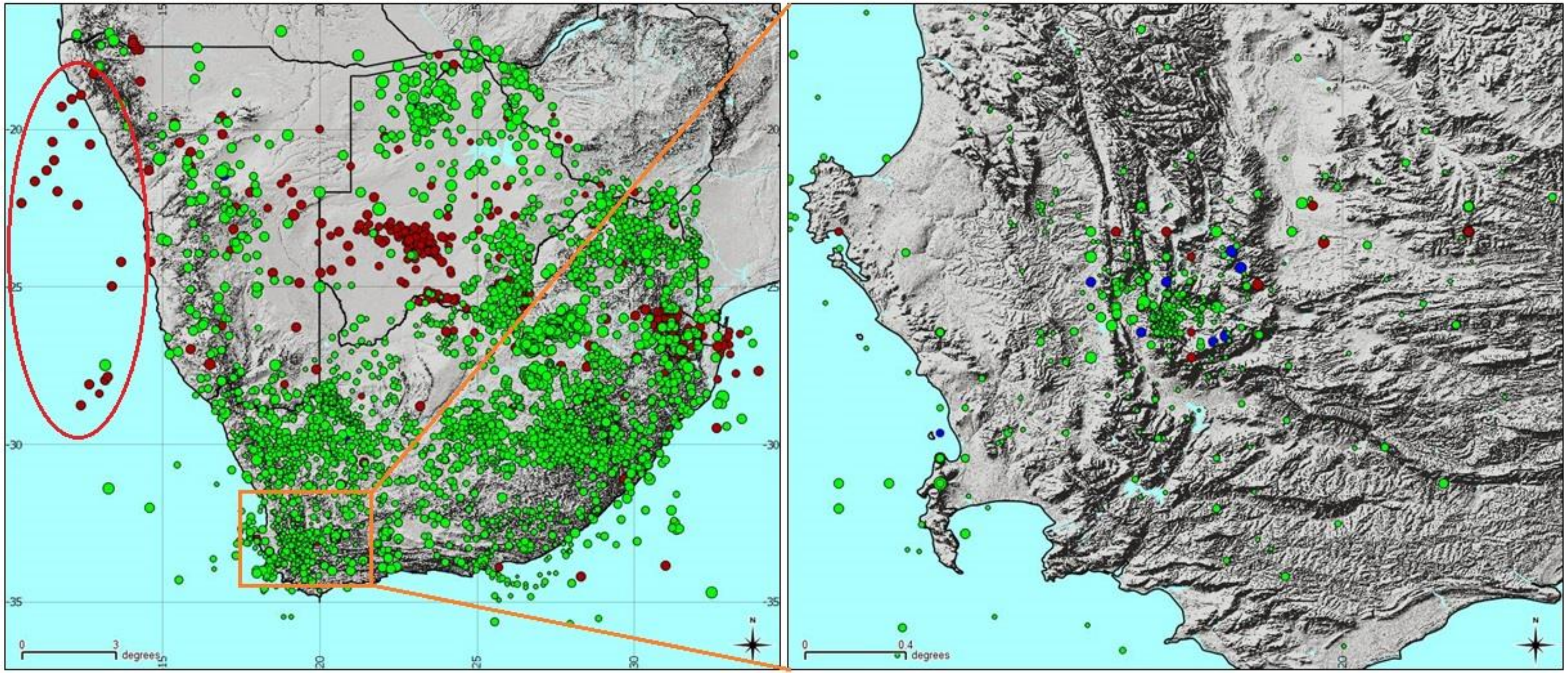


Figure 4.7: Comparison between one set of window method parameters (Uhrhammer, 1986) and one set of cluster method parameters (Reasenberg, 1985) used, and the original catalogue.

The right hand figure is just the zoomed in section showed in the orange square. The red circles, in both figures, shows the catalogue before declustering; the blue circles in the right hand side figure (also in the left hand figure but not visible if not zoomed in) shows the catalogue after declustering using cluster methods with Reasenberg (1985) parameters; and the green circles in both figures shows the catalogue after declustering using window methods with Uhrhammer (1986) parameters.

4.2.3. Declustering Methods based on a Correlation Metric

Probabilistic algorithms improve deterministic algorithms because the choice of the space-time window is optimized, meaning there is no need to assume arbitrary values for parameters that enter space and time windows. These algorithms give an individual event its associated probability for classifying it as a dependent event. Declustering an earthquake catalogue using correlation methods is accomplished by reducing every cluster to its largest event (Van Stiphout *et al*., 2012). Zaliapin *et al.* (2008) achieved this with the aid of a correlation metric proposed by Baiesi and Paczuski (2004), through identification of independent events by exploring the graphical representation of space-time windows. The metric used decreases as two events get closer in space and time, and also as the first event increases in size. The MATLAB code written and provided by Ilya Zaliapin was used to also decluster the catalogue.

The declustering process carried out in this study produced a total of eight independent declustered catalogues. However, on scrutinising the resulting catalogues it was found that all the methods that automatically removed identified dependent events, also removed many independent events, see Figure 4.5 and Figure 4.6, where the red ellipse shows events which are a great distance apart but were removed as dependent events. The window methods removed events that were not necessarily dependent on others. This might be mainly because the catalogue is mostly incomplete prior to 1971 and this method selects a window based on spatial and temporal variations throughout the whole catalogue, whereas cluster methods only focus on cluster events. Only the Seisan programme 'CLUSTER' allowed better control for the removal of dependent events. Thus only the catalogue resulting from this last method was kept as the final homogenised and declustered catalogue for southern Africa (Figure 4.8.).

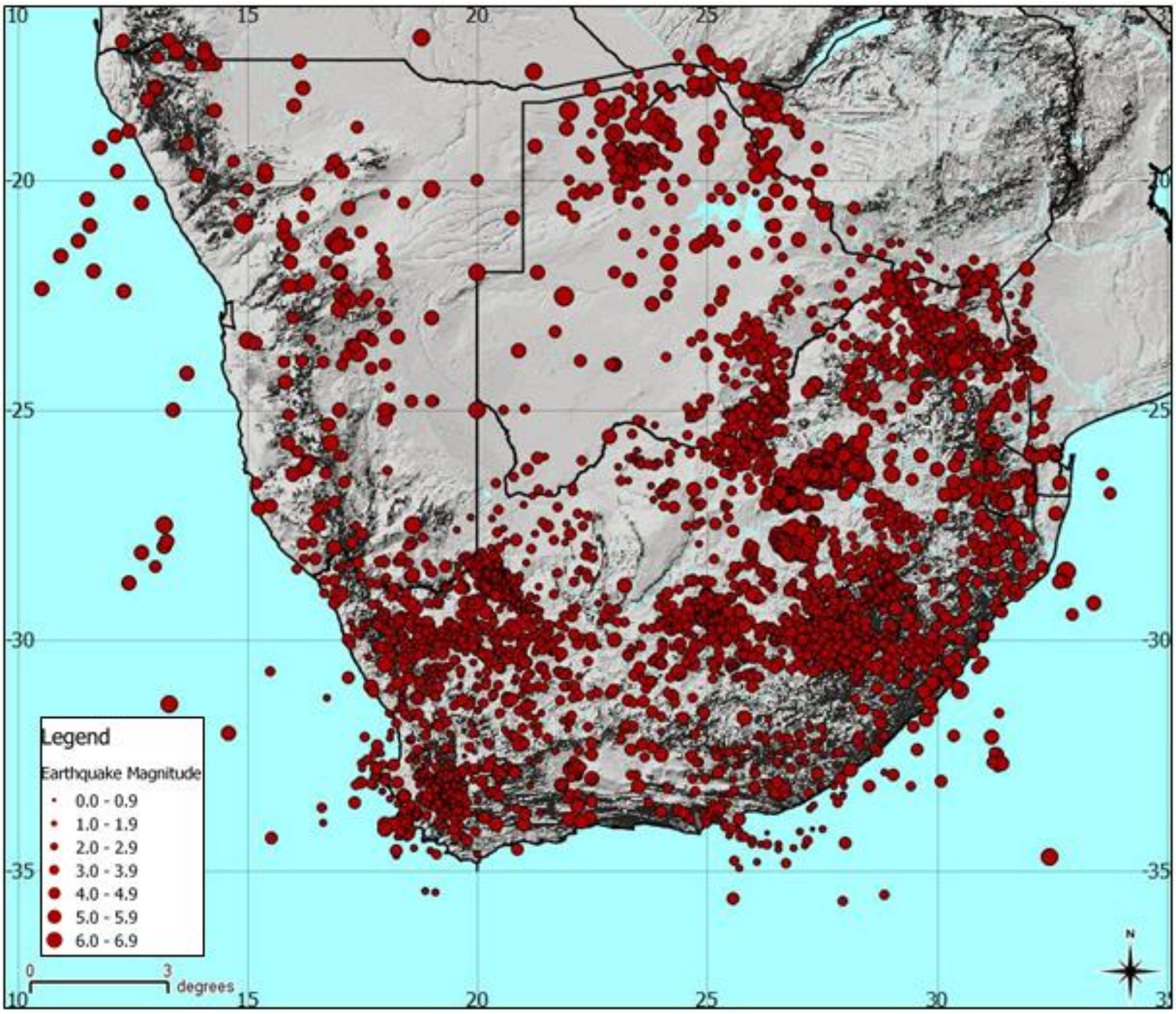


Figure 4.8: The seismicity of southern Africa after declustering the catalogue using 'CLUSTER' code in Seisan.

4.3. Completeness

A catalogue that is used for the calculation of recurrence parameters and seismic hazard assessment needs to be assessed in terms of its completeness (Mignan and Woessner, 2012). An earthquake catalogue can be said to be complete above a given magnitude M_c (magnitude of completeness) over a period T_c (period of completeness) if all earthquakes with magnitudes equal to or greater than M_c that have occurred during the period T_c in the region covered by the catalogue are listed in the catalogue. It is necessary to consider this aspect of the catalogue to avoid biasing the estimation of the recurrence parameters, which would affect the final hazard assessment results. Data completeness is largely dependent upon availability and is governed by factors including the time interval in question, geographical region and recording instrumentation used. It is fair to assume that with time, data availability will improve in most regions given implementation of superior monitoring methods. Thus, as can be expected, historical catalogues are incomplete. However, the historical information available provides a picture that represents most of the knowledge of past seismicity and thus is valuable.

The completeness of the catalogue can either be calculated using the network or catalogue-based methods (Mignan and Woessner, 2012). The network-based methods use phase-pick and waveform data, with the main aim being to define the probability level at which an earthquake can be detected given the sensitivity and distribution of the stations (Mignan and Woessner, 2012). The network-based methods are a function of the seismic network properties. The catalogue-based method, a more traditional method for estimating completeness of a catalogue, uses the cumulative frequency-magnitude distribution of Gutenberg and Richter (1944) and Richter (1958). The primary focus of catalogue-based methods is to determine the completeness of the dataset and the final result of this method is the cut-off magnitude. As explained above, the network-based method uses phase-pick and waveform data that were unavailable for this project. Therefore the methods that will be used to assess completeness will all be catalogue-based.

In general, there are several methods or procedures, which are catalogue-based, that are usually followed for assessing the completeness, such as the statistical approach e.g. (Stepp, 1972; Wiemer and Wyss, 2000; Beauval, 2003), the historical approach e.g. (Stucchi *et al.*, 2009), and the probability of detection approach e.g. (Schorlemmer and Woessner, 2008). The catalogue-based methods include the maximum curvature technique (Wiemer and Wyss, 2000), which is a statistical approach and was used in this study. Mignan and Woessner (2012) describe the maximum-curvature technique as a fast and straightforward way of estimating M_c through the process of computing the frequency-magnitude curve that requires the maximum curvature. The gradually curved frequency-magnitude distribution underestimates M_c. Wiemer and Wyss (2000) developed a statistical approach to assess the time-scale distribution of the data. In their technique cumulative number of events with time and spatial distribution of events with magnitude and time was utilized.

The catalogue-based method using the maximum curvature technique is best for this project because the main aim is to calculate the cut-off magnitude, and, as stated above, that maximum curvature is a straightforward way of estimating M_c by computing a frequency magnitude curve. The only available data that can be used to assess completeness for this project is the southern African catalogue, through which the event magnitudes can be used to compute the frequency-magnitude curves and thus M_c. Also, ideally, it would be an achievement to be able to do so for the whole southern African catalogue and the maximum curvature technique can be used to try to calculate M_c for the whole study region.

4.3.1. Completeness – Maximum-Curvature

The magnitude of completeness, M_c = 4.06 (shown in Figure 4.9) for the southern African catalogue was calculated in ZMAP, using ‘Ztools’ from ‘analyse time series’ tab (summarised steps shown in Appendix B, Figure B - 1). However, calculating the magnitude of completeness this way yields uncertain results, considering the installation and closure of stations through the years, as well as the spatial distribution of the earthquakes. Therefore, temporal and spatial variations must be considered when calculating M_c.

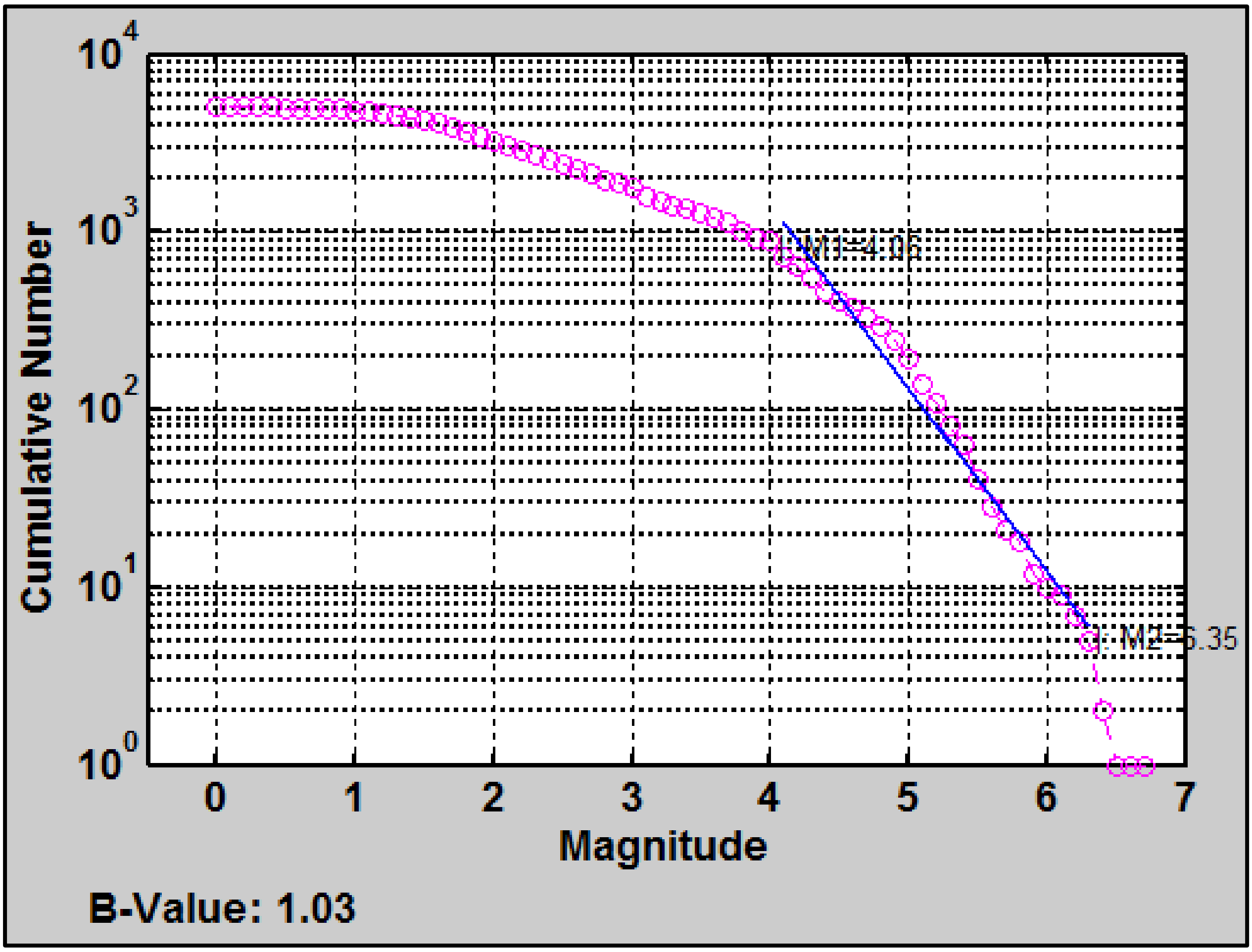


Figure 4.9: Estimation of the magnitude of completeness using Maximum-Curvature.

The completeness magnitude map in Figure 4.10 was created in ZMAP using the 'ZTool' and the parameters in Table 4 (See Appendix B, Figure B - 2 for summarised steps). The white dots represent the earthquake epicentres. The 'fixed M_c' parameter is used to identify if a selected grid has the minimum number of events which are larger than "fixed M_c", before calculating M_c. This procedure extrapolates the calculated M_c outward to areas with no data. ZMAP does not include country boundaries nor does it include the coast line, therefore it was decided to include the map with country boundaries and coast line.

The magnitude of completeness along the mining regions is high (Figure 4.10) as consequences of removing mine-induced seismic events (section 3.6). All the events with magnitude, $M < 4$ in and around the mining areas were removed. This method was used because it is impossible to distinguish between tectonic and mining events and also that only events with magnitude $M \geq 4$ have the potential to cause great damage. The southwest and centre of South Africa has relatively low magnitude of completeness ($M_c \leq 3$). This may be due to the density of seismic stations (i.e. events of small magnitude size are recorded). In Namibia the magnitude of completeness is moderate ($3 \leq M_c < 4$); and moderate to high ($3.5 \leq M_c \leq 5.5$) in most parts of Botswana, with moderately low ($M_c \leq 2$) M_c along the Okavango Delta. This might be due to the high number of stations clustered in the Okavango Delta.

Table 4: The parameters used to produce the spatial distribution of magnitude of completeness

Number of events	100
Spacing in x (dx)	0.1°
Spacing in y (dy)	0.1°
Minimum number of events > M_c	50
Fixed M_c	4.06
M_c correction	0.2

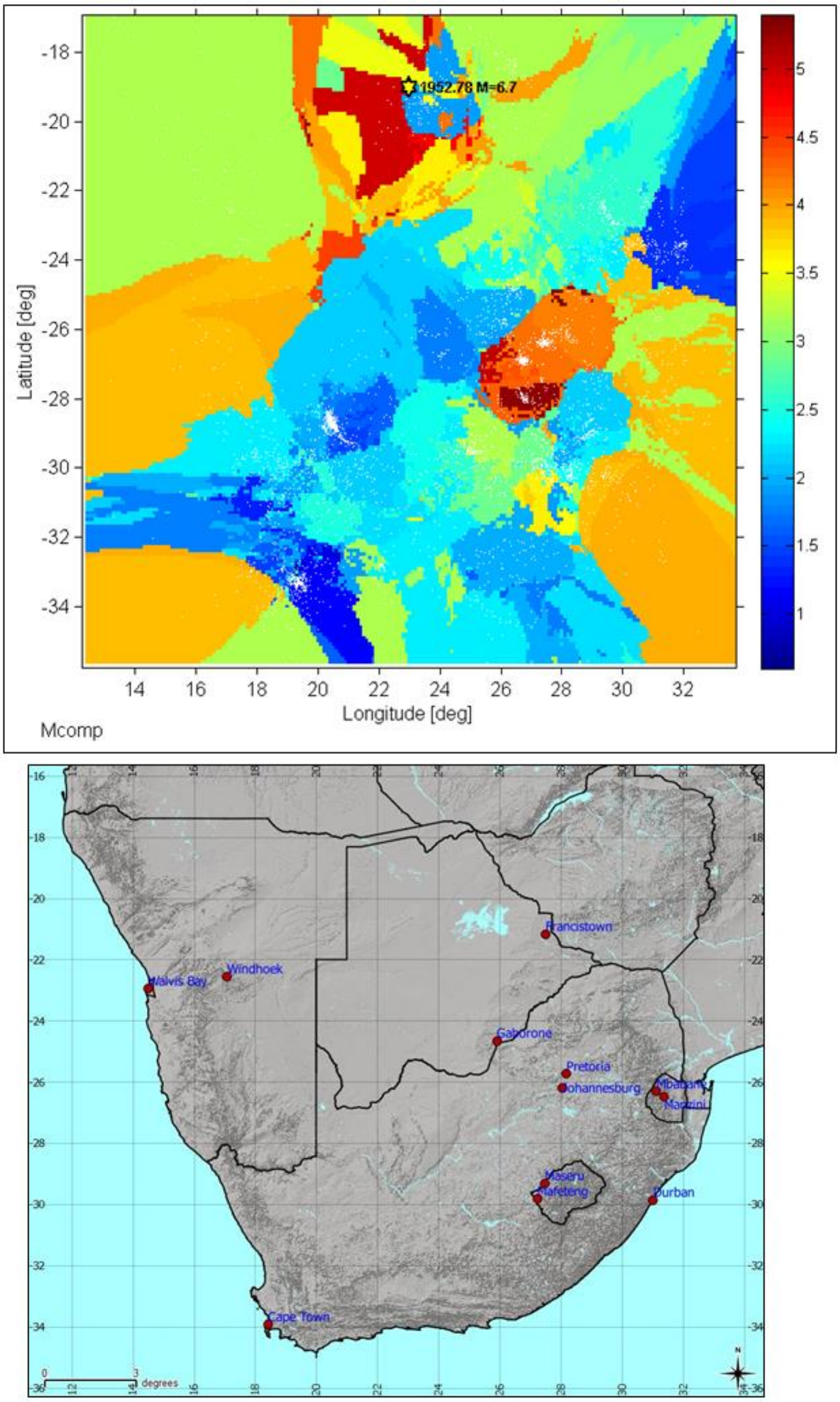


Figure 4.10: Magnitude of completeness spatially distributed with white dots indicating the seismic events.

The bar scale on the right hand shows the magnitude of completeness, meaning at some area it is as low as one and some areas as high as five. The bottom figure shows the country borders, and major cities.

4.3.2. Completeness – Time Scale

Seismological data can be represented on a time scale in many ways. In this case it was analysed using Microsoft Excel. Figure 4.11 and Figure 4.12 present the seismic histories of the whole catalogue for southern Africa, showing the change in earthquake magnitude with time.

On analysing the distribution shown in Figure 4.11 and Figure 4.12, several questions immediately spring to mind:

1. Is it true that there were no earthquakes of magnitude larger than 4 before 1800, given that smaller earthquakes were observed in that period?
2. What caused the lines of discrete magnitude values in the early instrument period (1900 to 1950)?
3. There is a drastic increase in seismicity between 1949 and 1951. What could be the cause of this increase in levels of seismicity?
4. In 1958, only two events are included in the final catalogue. These events have the same magnitude and occurred about a month apart. Are these the only events which occurred that year?
5. Also in 1959, there are only three events with two of them having the same magnitude size, occurring a couple of days apart. Are these events also the only events that occurred that year and are their magnitudes accurate?
6. There are no events in 1960 and only one event in 1962. Is this a true reflection of the seismic activity on those years?
7. In 2005, the number of events with magnitude $M \leq 1$ decreases. This is seen after the detection levels of earthquakes increased in 2000, probably due to an increase in number of stations and therefore a decrease in the distance between stations. What is the cause of this drastic change in the detection level of earthquakes in 2005?

To try and answer the questions that arose above, the seismicity and seismic stations history of southern African was analysed, reaching to the following conclusions:

1. The sparse network of stations, as well as the use of macroseismic data for determining earthquake locations and magnitude, at that time, resulted in relatively

poor locations, mostly to a single decimal degree, and poor estimates of magnitude. The seismicity increased as the WWSSN stations were installed around the world and also local networks were installed. This is especially clear in the early 1970's when the South African national network was installed.

2. The 'uniform' magnitude sizes, derived from intensity estimates, causes the 'horizontal lines' of events at distinct values observed in Figure 4.11 in the period before 1950.
3. The apparent increase in seismicity seen between 1949 and 1951 is likely linked to the installation and operations of a network of short period Benioff Seismographs from 1949 to 1951, at Kimberley, Grahamstown, Pietermaritzburg, Pretoria and Windhoek (Green and Bloch, 1971). This network was installed and operated by the Bernard Price Institute. Seismicity detection levels then increased as the WWSSN stations were installed around the world and also local networks were installed.
4. It is highly possible that in 1958, there were more events than those indicated in the catalogue but probably a decrease in detection levels lead to only two events being recorded.
5. Also, in 1959, it is highly possible that there were more events than those indicated in the catalogue but probably a decrease in detection levels lead to only three events being recorded and low number of stations used to record events has a negative impact on the accuracy of magnitude.
6. Seismic networks in southern Africa during this time period, i.e. prior to 1971, were very sparse; meaning only those events with moderate to large magnitude could be recorded. And again seismicity occur randomly, some years will have more events than others.
7. The drop in recorded earthquakes after 2006 is not clearly understood.

Figure 4.11: Seismicity of southern Africa since 1690.

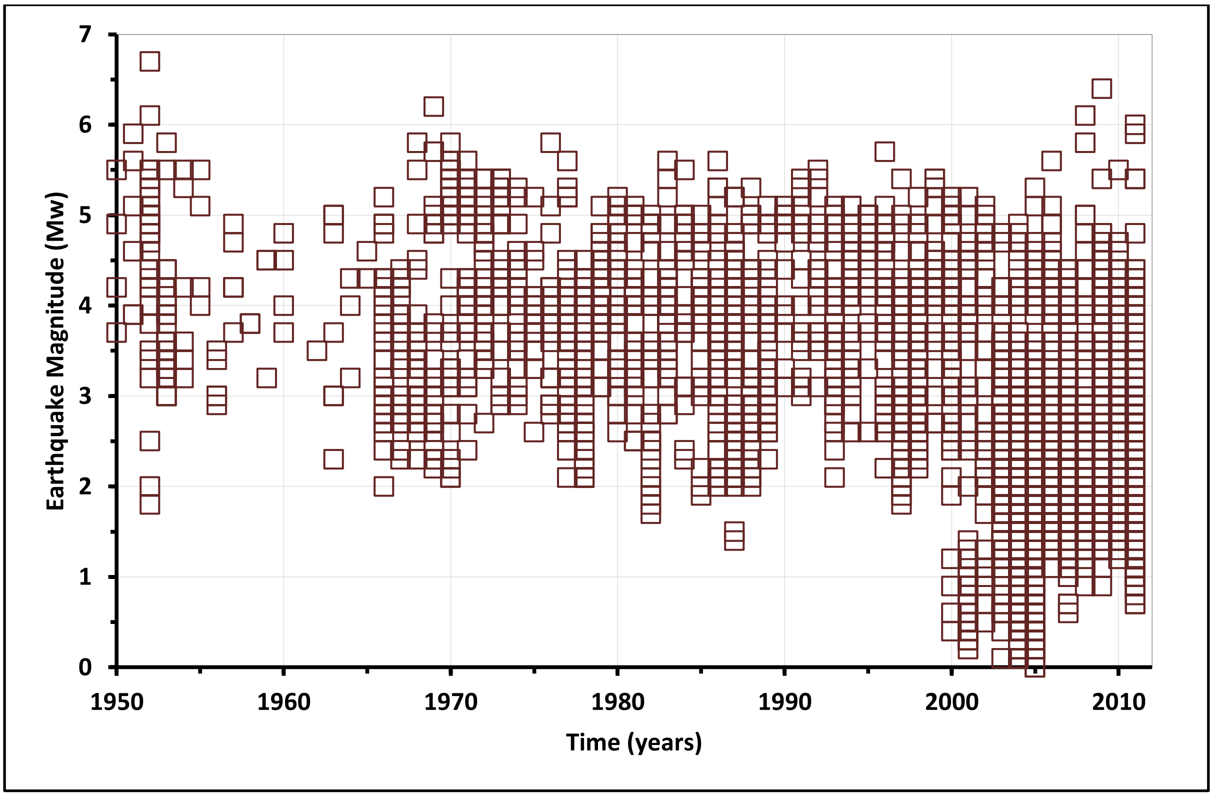


Figure 4.12: Seismicity of southern Africa after 1950.

The completeness levels of the whole catalogue are determined by inspecting visually the seismic history of the region. As can be observed in Figure 4.11, Figure 4.12 and Figure 4.13 the number of events increases as the years go by and also the events with small magnitude are recorded in recent years. The observed completeness levels are shown in Figure 4.13 using the black line with the results summarised in Table 5 and substantiated with Gutenberg-Richter curves in Figure 4.14. The Gutenberg-Richter curves were computed using ZMAP the same way as Figure 4.9 (see summarised steps in Appendix B, Figure B - 1).The period prior to 1950 is much more difficult to assess as very little data are available. However, given that moderate events appear to have been recorded and located throughout the region, it is possible that the period between 1900 and 1950 is complete for moderately sized earthquakes ($M_W \geq 4$).

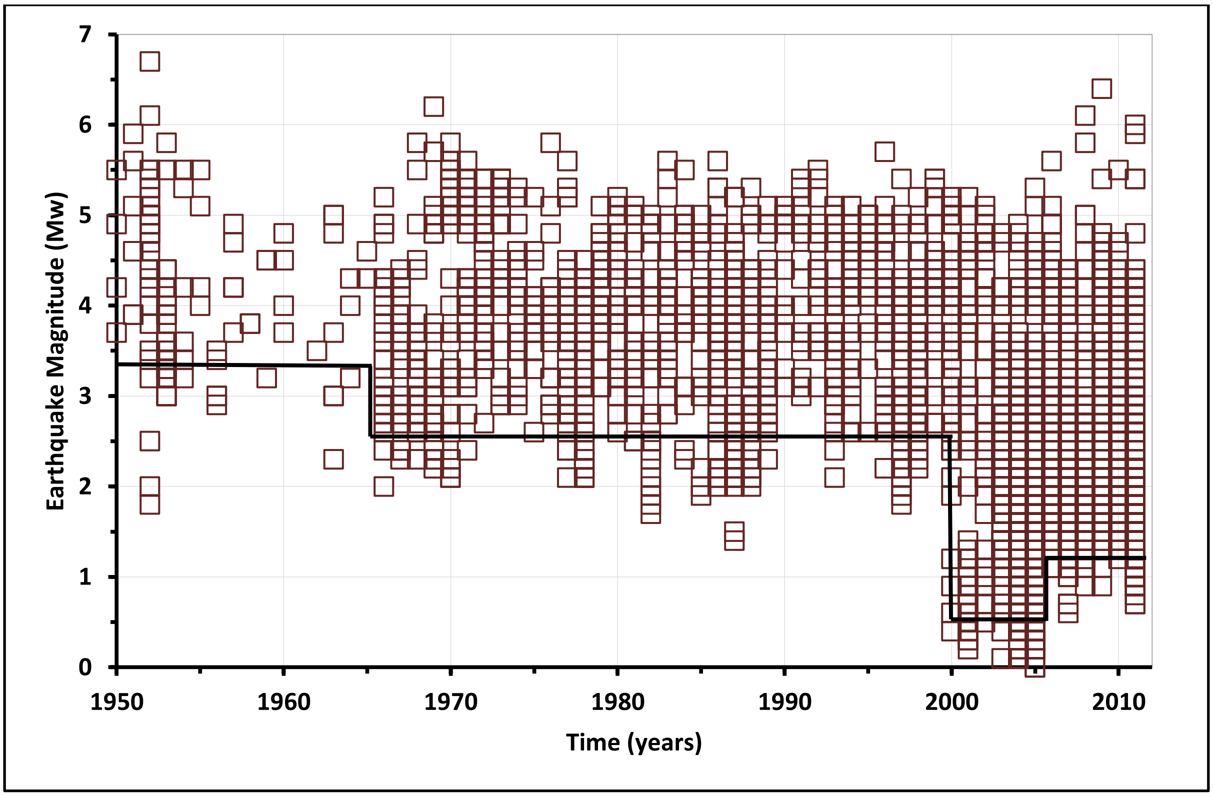


Figure 4.13: Completeness time intervals for the instrumental catalogue of southern Africa (Includes the latter half of the early instrumental catalogue).

Table 5: Time intervals for catalogue completeness analysis of southern Africa.

Dates	Magnitude of completeness for the whole of southern Africa	Justification
1690 - 1900	incomplete	Scattered information available, mostly from Cape Town
1901 - 1949	4.00	Installation of stations across South Africa.
1950 - 1964	3.25	Short period Benioff network installed making it possible to keep a continuous catalogue of events.
1965 - 2000	2.50	Installation of WWSSN, including the setup of the South African network of stations.
2001 - 2006	0.50	Introduction of Seisan for analysis and upgrade to digital stations.
2007 - 2012	1.00	Modern full digital stations.

The Gutenberg-Richter graphs shown in Figure 4.14 were created using the same procedure shown in Appendix B, Figure B - 1, the only difference being that the data was divided into six time windows. These graphs show that the magnitude of completeness changes with time, as this is expected due to improvements on stations and sensitivity of seismograms. The change in magnitude of completeness results in *b*-value changes. M_1 is the magnitude of completeness and M_2 is the maximum magnitude which is used along with M_1 to calculate the *b*-value. M_2 is chosen by the user as the final point where the data fit the Gutenberg-Richter relation.

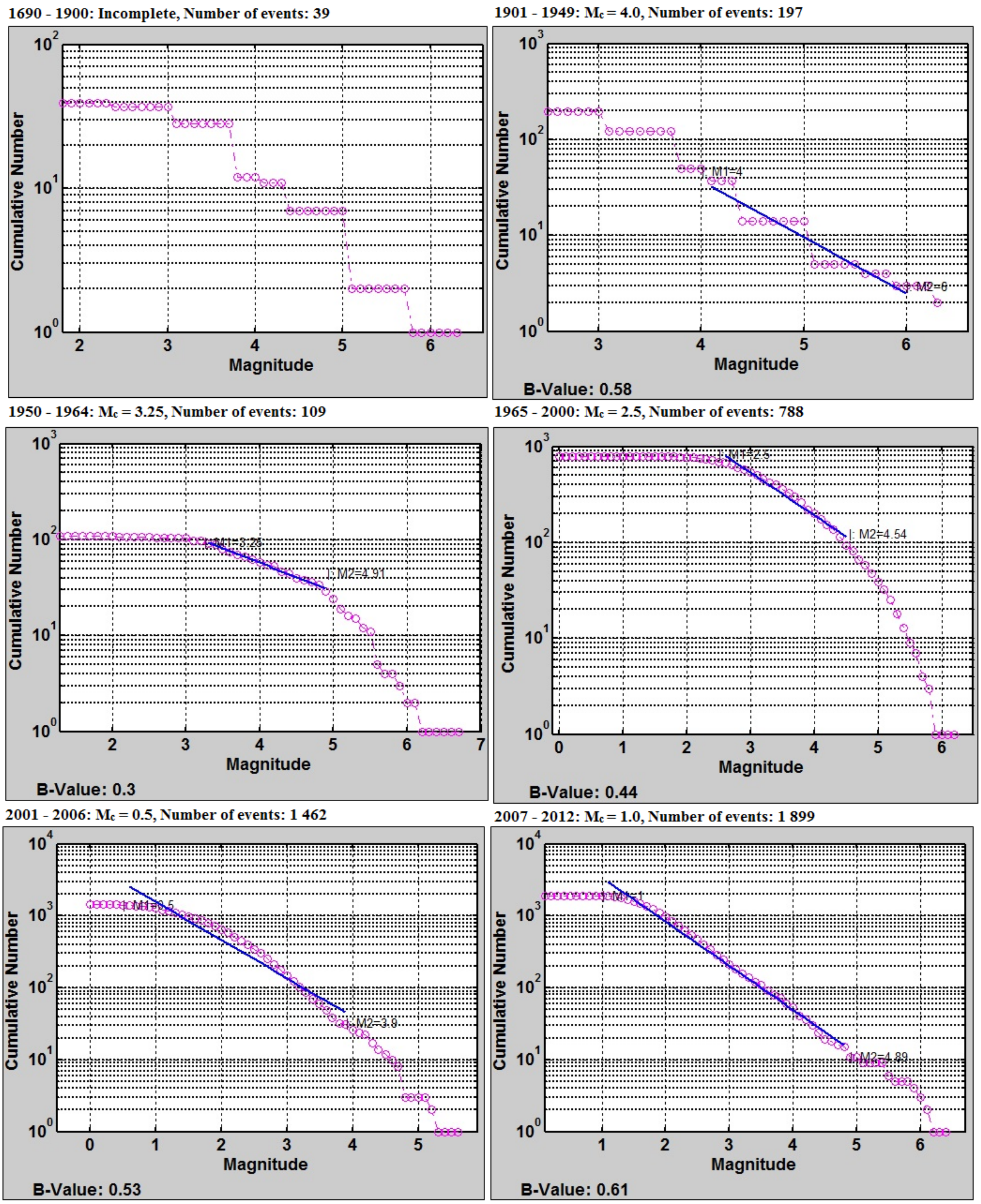


Figure 4.14: Gutenberg Richter graphs showing the completeness analysis for southern Africa

4.3.3. Completeness – Spatial Scale

To adequately answer some of these questions, it is necessary to also consider the spatial distribution of seismicity with time. Therefore, it is recommended that completeness levels be determined for specific regions rather than for the whole catalogue, especially when using this catalogue in calculating recurrence parameters for zones in a seismic hazard assessment. This is necessary because it is very clear that the levels are very region-dependent, as shown in Figure 4.15 and Figure 4.16, and so the results in Figure 4.13 are not necessarily representative of the whole region. Completeness with spatial scale was analysed, the same way as completeness with time scale, using Microsoft Excel. Plots of such distribution of the southern Africa earthquakes are shown in Figure 4.15 and Figure 4.16.

Historical earthquakes, especially before 1860, are all located in the Western Cape near Cape Town. This is not surprising given that this is where Europeans first settled in southern Africa. Documents, newspaper reports, diaries, journals etc., describing earthquakes only started being prepared at that time and macroseismic data extracted from such documents were used to determine earthquake source parameters (Fernandez and Guzman, 1979). It is reasonable to assume that the catalogue is incomplete in the historical period as earthquakes are likely to have occurred north of Cape Town, but are just not recorded in history. More events are observed in the latter half of the 19th century further into the subcontinent, especially in the Free State, which corresponds to migration and settlement inland. Though still incomplete, the catalogue becomes more densely populated with earthquakes throughout the region in the 20th century as seismic stations were installed. The drop in seismicity between 1954 and 1965 (see Figure 4.17) is again seen when assessing spatially completeness.

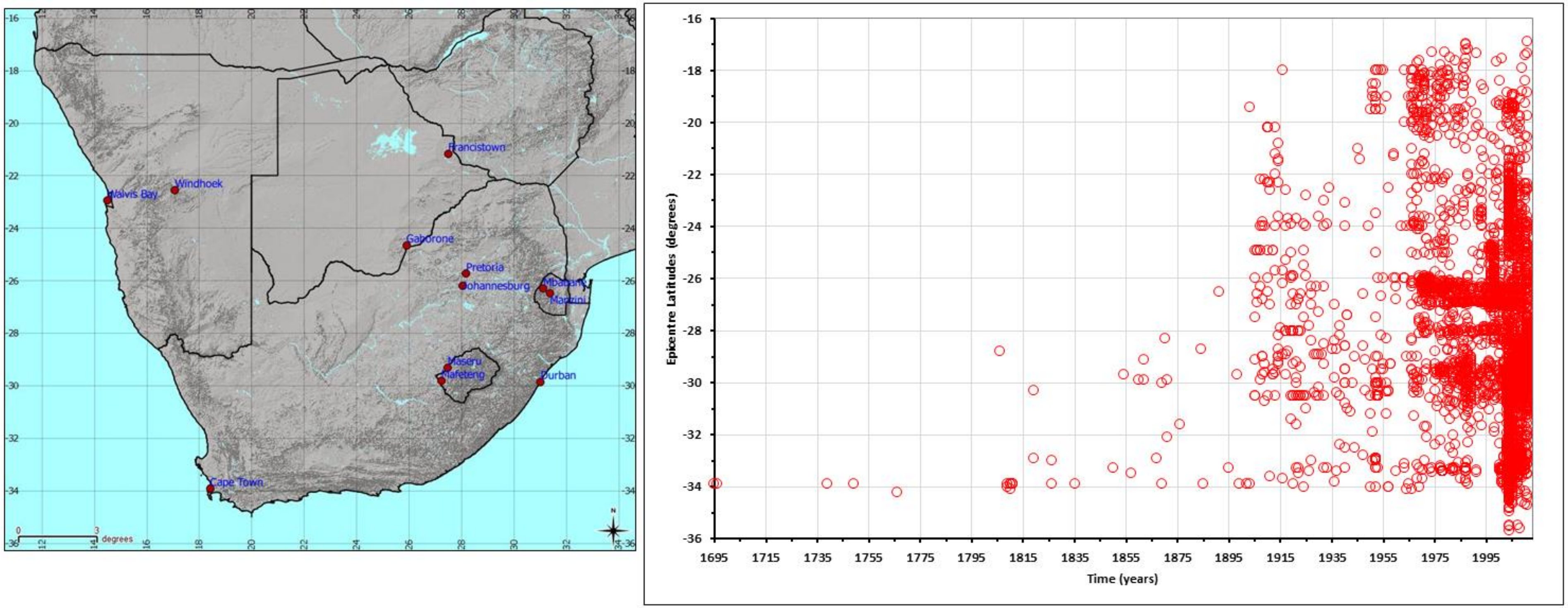


Figure 4.15: Latitudinal spatial distribution of southern African seismicity with time.

The figure on the left hand side shows the country borders, and major cities.

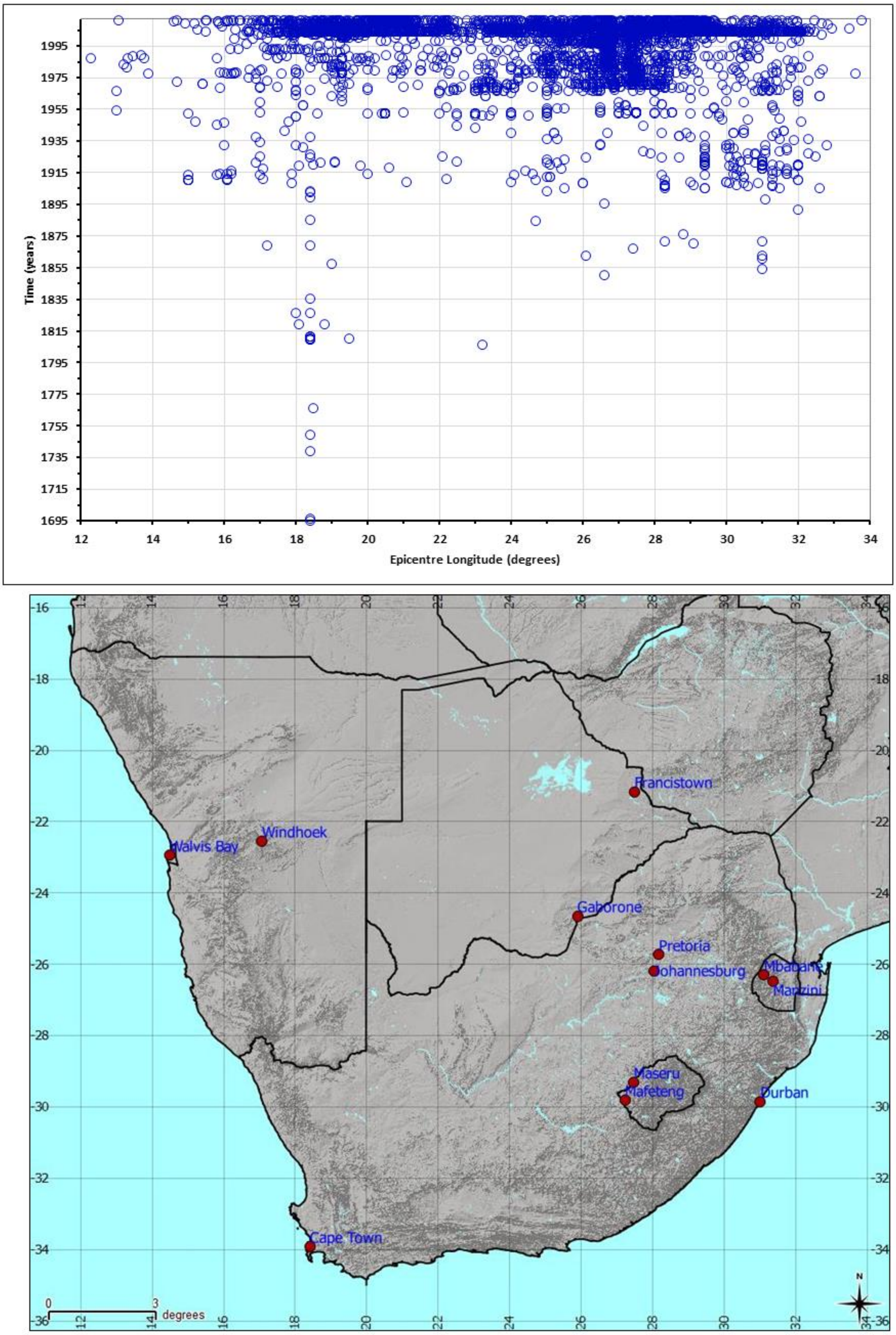
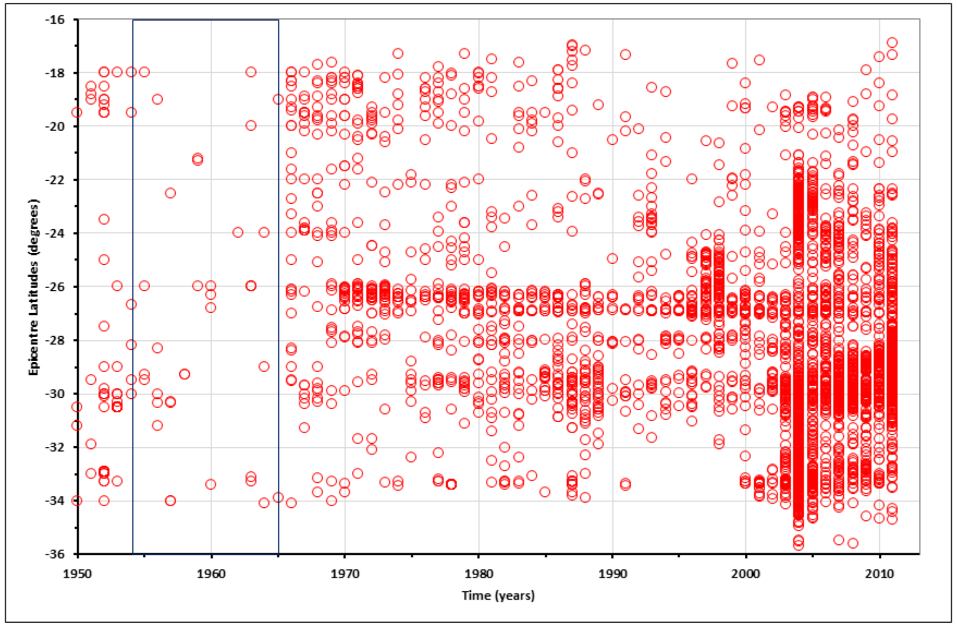


Figure 4.16: Longitudinal spatial distribution of southern African seismicity with time. The bottom figure shows the country borders, and major cities.



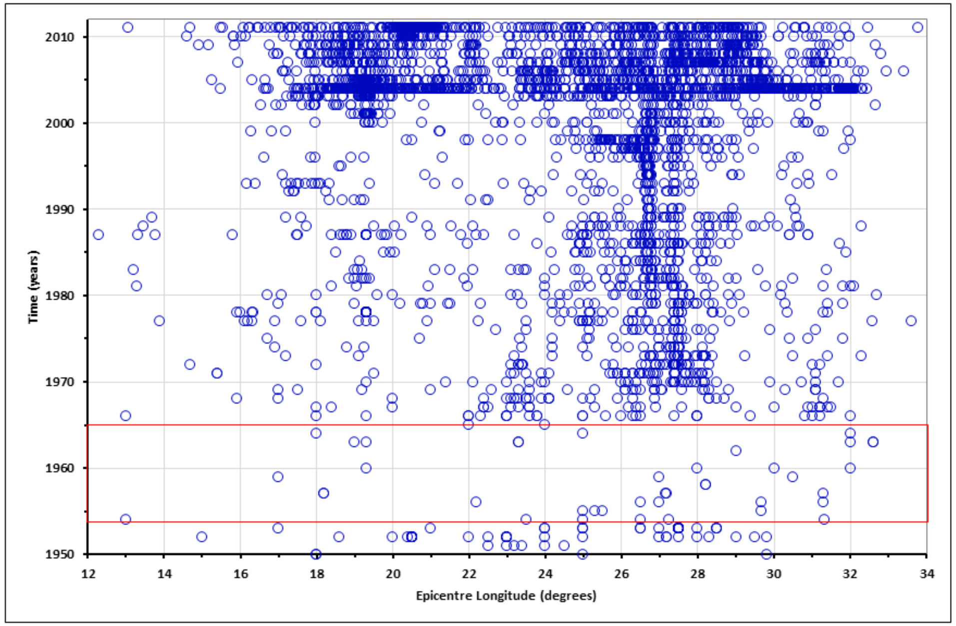


Figure 4.17: The drop in seismicity between 1954 and 1965, shown in both blue and red boxes.

4.4. Earthquake Depth

One of the main parameters used in characterising an earthquake hypocentre is the depth. However, this is one of the most difficult parameters to determine, especially with a 2-D network of stations and low density of stations, as with the South African National Seismograph Network. To obtain accurate depths, Bondár *et al.* (2004) said that at least one of the stations needs to be located within a distance of 30 km to the epicentre. This condition is very rarely met for events detected by the SANSN due to the sparse nature of the network. In routine processing of seismic data by the SANSN for southern Africa, only the first arriving P and S waves are identified.

According to Saunders *et al.* (2010), depths are usually fixed to default values depending on the nature of the earthquake (i.e. h = 0 km for explosions; h = 2 km for mining-related events; h = 5 km for local and regional tectonic events; h = 10 km for teleseismic events). Local, regional and teleseismic events are events recorded by stations which are within 1,000 km distance from the epicentre, between 1,000 km and 2,000 km distance from the epicentre and at a distance greater than 20° from the epicentre, respectively (Havskov and Ottemöller, 2008a).

Efforts have been made to determine well-constrained depths values for a few South African earthquakes. This was only possible through advanced studies such as moment tensor inversion and/or waveform fitting (See Table 6). Efforts to utilise such methods were continued, as well as relocation after identifying depths phases to determine depths for more earthquakes. The difference in depth value of one event is likely caused by the different methods used to calculate the depth values.

Table 6: Depth values determined for certain earthquake events in South Africa

Date	Latitude	Longitude	Magnitude	Author	Depth	Comments
1969/09/29	-33.280	19.210	6.2	Green and Bloch (1971)	< 9 km, possibly < 6.5 km	Estimated depth using aftershocks: Deepest aftershock where located within 17 km radius from the mainshock epicentre, with maximum depth of 9 km. Most shallow aftershocks occurred prior to 1970/04/14, with depth smaller than 6.5 km
				Shudofsky (1985)	30 km	Estimated depth using Rayleigh-wave inversion and body wave modelling
				Wagner and Langston (1988)	4 km	Estimated depth using waveform inversion and waveform, fitting of digitised WWSSN data: Used both P- and SH-waves to obtain focal solution
				Foster and Jackson (1998)	5 km	Estimated depth using waveform inversion and waveform, fitting of digitised WWSSN data: Used both P- and SH-waves to obtain focal solution
				Storchak (2009)	~ 10 km	Estimated depth using reanalysis of teleseismic ISC data
				Krüger *et al.* (2011)	< 20 km, centroid depth 15 km	Estimated depth using moment tensor solution which was calculated from digitised WWSSN data: Used both P- and SH-waves to obtain focal solution
1970/04/14	-33.343	19.311	5.8	Green and Bloch (1971)	< 9 km	Estimated depth using aftershock locations from temporary local network: Maximum aftershock depth is 9 km
				Shudofsky (1985)	10 km	Estimated depth using Rayleigh-wave inversion and body-wave modelling
1976/07/01	-29.508	25.167	5.8	Shudofsky (1985)	6 km	Estimated depth using Rayleigh-wave inversion and body-wave modelling
				Jensen (1991)	5.5 km	Estimated depth using body-wave inversion of long-period WWSSN data
				Storchak (2009)	7 km to 11 km	Estimated depth using reanalysis of teleseismic ISC data
1986/10/05	-30.529	28.841	5.3	(Dziewonski *et al.*, 1987)	15 km	Estimated depth using Harvard centroid moment tensor solution
1990/09/26	-28.100	27.100	5.0	Dziewonski *et al.* (1991)	28.3 ± 8.8 km (later revised to 5 km)	Estimated depth using Harvard centroid moment tensor solution
2014/08/05	-26.942	26.818	5.5	Midzi *et al.* (2015)	4.7 ± 1.2 km	Estimated depth using the Council for Geoscience data

4.5. Recurrence Parameters

One of the primary uses of earthquake catalogues in seismic hazard assessment is the calculation of the rate of occurrence of events of specified magnitude (Bender, 1983). These recurrence parameters were described as positive real constants of the Gutenberg-Richter empirical formula (Equation 12), which is defined as the distribution of earthquakes with magnitude (Kulhanek, 2005). Earthquake occurrences are generally expected to follow the relation below (Bender, 1983). The *b*-value is a tectonic parameter which describes the occurrence of small events relative to large events, whereas activity rate, *a*, describes the rate of occurrence of seismicity for magnitude M > 0 (Kulhanek, 2005). The parameters, *b*-value and activity rate were calculated in this section.

$$\log N = a - bM \qquad 12$$

where *N* is a cumulative number of events with magnitude greater than *M*, *b* and *a* are the *b*-value and activity rate, respectively as defined above. The above mentioned relation implies the occurrence of earthquakes at any magnitude size (Bender, 1983). Though the relation is linear, there are some deviations that are normally observed at small and large magnitude values, mainly due to incompleteness of catalogues and saturation of magnitude scales, respectively (Kulhanek, 2005).

The spatial and temporal variations of the *b*-value exist mainly because of heterogeneity in stresses, thermal gradients, depth and crustal structures, after- and foreshocks, swarms, and focal mechanism (Kulhanek, 2005). Nuannin *et al.* (2005) also concluded that the spatial variation of the *b*-value is caused by stress heterogeneity.

The *b*-value and activity rate are estimated by fitting a set of observed earthquake magnitudes to the magnitude-frequency relationship in Equation 12. Different fitting techniques, such as linear fit by eye, linear least squares, and maximum likelihood can be used for the estimations of these recurrence parameters (Kulhanek, 2005). It appears in his work on estimating recurrence parameters, that Bender (1983) preferred using the maximum likelihood method. Weichert (1980) also concluded that the recurrence parameters should be estimated using the maximum likelihood method because the use of other methods, such as the least squares method, does not allow the inclusion of predetermined judgement on maximum magnitude and the information content of the empty magnitude intervals, whereas the maximum likelihood method allows this.

An easier way to mathematically analyse the *b*-value as a constant will be to introduce its natural log, β (β = b ln10). Aki (1965) derived the maximum likelihood formula for β, which applies to continuous magnitude values (equation 13). Utsu (1965) also derived the same formula by equating the first moments of the data and the sample. Page (1968) derived the same parameter for continuous magnitudes and finite maximum magnitude.

Continuous magnitude can be described using the following example: 1.0 < M < 6.5, as indicated in Figure 4.14 bottom right figure. Karnik (1971) derived β using interval magnitude data. The sample mean magnitude is used, in all of the derivations mentioned above, to estimate β (Weichert, 1980).

$$\frac{1}{\beta} = \overline{m} - m_o \qquad 13$$

where β = b ln10 (b is the *b*-value mentioned above in equation 13, $\overline{m}$ is the average magnitude of the sample and m_o is the lowest magnitude at which event observations are complete. The estimation of β in equation 13 is biased because events are commonly grouped into classes of equal magnitude increment, considering that events can rarely be specified accurately to a quarter magnitude unit, but rather usually to a half unit. Therefore, Utsu (1966) modified equation 13, by tabulating a correction factor and incorporating half-width, δ (a half magnitude unit within which an event can be specified accurately).

$$\frac{1}{\beta}\frac{\beta\delta}{\tanh(\beta\delta)} = \overline{m} - m_o \qquad 14$$

Page (1968) considered that the realistic analysis must admit a regional maximum magnitude even though it may not be possible to reliably estimate it. Therefore, he gave a maximum likelihood for β indicated by equation 15, for data with continuous magnitudes between m_o and m_x.

$$\frac{1}{\beta} = \overline{m} - m_o - \frac{m_x \exp\left(-\beta\left(m_x - m_o\right)\right)}{1 - \exp\left(-\beta\left(m_x - m_o\right)\right)} \qquad 15$$

where m_o and m_x denote an arbitrary magnitude range.

The following example shows how it is of paramount importance to use the derived maximum likelihood equation (see equation 15) to calculate the *b*-value. The data which were used to compile the bottom right figure in Figure 4.14 was used to execute this example. Therefore, $m_o = 1.0$ was determined from the figure and $\overline{m} = 2.1$ was calculated using equation 16,

$$\overline{m} = \frac{\sum_{i=1}^{n} m_i N_i}{\sum_{i=1}^{n} N_i} \qquad 16$$

where *N* is the number of events with magnitude *m*, and then inserted into equation 13,

$$\frac{1}{\beta} = 1.1$$
$$\beta = 0.9$$
$$b = 0.4$$

The *b*-value, as indicated in the bottom right figure of Figure 4.14, is 0.61. This shows that, the correction factor

$$a' = -\frac{m_x \exp\left(-\beta\left(m_x - m_o\right)\right)}{1 - \exp\left(-\beta\left(m_x - m_o\right)\right)} \qquad 17$$

in equation 15, must be added in order to calculate the *b*-value using maximum likelihood. The *b*-value is hugely affected by the values of m_o and $\overline{m}$, this can be illustrated using arbitrary values (see Table 7).

Table 7: *b*-values calculated using arbitrary values to show the effect of m_o and $\overline{m}$

m_o	$\overline{m}$	$\overline{m} - m_o$	β	b
1.0	2.0	1.0	1.0	0.4
	2.5	1.5	0.7	0.3
	3.0	2.0	0.5	0.2
1.5	2.0	0.5	2.0	0.9
	2.5	1.0	1.0	0.4
	3.0	1.5	0.7	0.3

Kijko and Funk (1994) defined the assessment of the activity rate using the relation below

$$\lambda = \frac{n}{T} \qquad 18$$

where *n* is the number of events with magnitude greater than or equal to the magnitude of completeness and T is the time span of the earthquake catalogue. The catalogue can be divided into different regions (otherwise known as seismic zones) according to the same behavioural pattern of earthquakes, geological setting and stress pattern in order to calculate activity rate that is more accurate when assessing seismic hazard. The data which were used to compile the bottom right figure in Figure 4.14 were used to execute an example showing how activity rate (λ) can be calculated (M_c = 1.0, therefore n = 16,992 and T = 5 years).

$$\lambda = \frac{1888}{5} = 3.7 \times 10^2$$

The activity rate (λ) is hugely affected by the magnitude of completeness (M_c) and the time span of the catalogue; this is illustrated in Table 8.

Table 8: Activity rate values calculated using arbitrary values to show the effect of M_c and T.

T	M_c	n	λ
5	1.5	1 585	3.1×10^2
	2.0	968	1.9×10^2
	2.5	470	9.4×10^1
317	1.5	4 343	1.3×10^1
	2.0	3 373	1.0×10^1
	2.5	2 469	7.8×10^0

Given that the study area is quite large, a single *b*-value or activity rate would not adequately explain the occurrence of seismicity in the region, considering the spatially varying stresses and tectonic structures. Therefore, maps of the spatial distribution of the recurrence parameters were created using the maximum likelihood method as implemented in the ZMAP software package (Wiemer, 2001). The ZMAP software allows the user to select whether to use maximum likelihood or linear least squares, and it also provides the modified maximum likelihood method. ZMAP, a MATLAB code which was first published in 1994, is a set of tools driven by graphical user interface designed to analyse earthquake catalogues (Wiemer, 2001). A grid of 0.1° by 0.1° was chosen to be used, so to create a smooth map, magnitude of completeness was chosen to be M_c = 4 because this was the largest magnitude of completeness estimated in section 4.3.2.

Presented in Figure 4.18 is the estimated spatial distribution of *b*-values in the study area. The *b*-value distribution map was compiled the same way as the spatial distribution of the magnitude of completeness map (see Appendix B, Figure B - 2), excluding the final step since the first map that is produced is the *b*-value distribution map. The *b*-value is found to be high in the mining regions ($b \geq 1$), towards the north-western part of South Africa and in Augrabies. Mine-induced seismicity usually yields high *b*-values (Nuannin et al., 2005), though the high values in this case may be influenced by the fact that only events of $M_W \geq 4$ in and around mining regions, were included in the catalogue. This procedure is justified in further detail in section 3.6. The white area indicates regions where the data in a 0.1° by 0.1° grids, were not enough to calculate the *b*-value according to the parameters provided in Table 4. A swarm of events was previously recorded in the Augrabies area, thus explaining the high *b*-value observed (Kulhanek, 2005). The low *b*-values ($b \leq 0.6$) in the rest of the region are in agreement with expectations for regions with natural events (McGarr, 1984). However, it should be noted that the values obtained are only indicative of the trend in the distribution of the *b*-values. Calculated values should not be used in seismic hazard assessment. Rather, *b*-values should be estimated specifically for seismic source areas. The distribution of high *b*-values along the mining regions and north-western part of South Africa correlates with the values Singh *et al.* (2011) calculated for zones they identified, and so do the low *b*-values associated with events of tectonic nature.

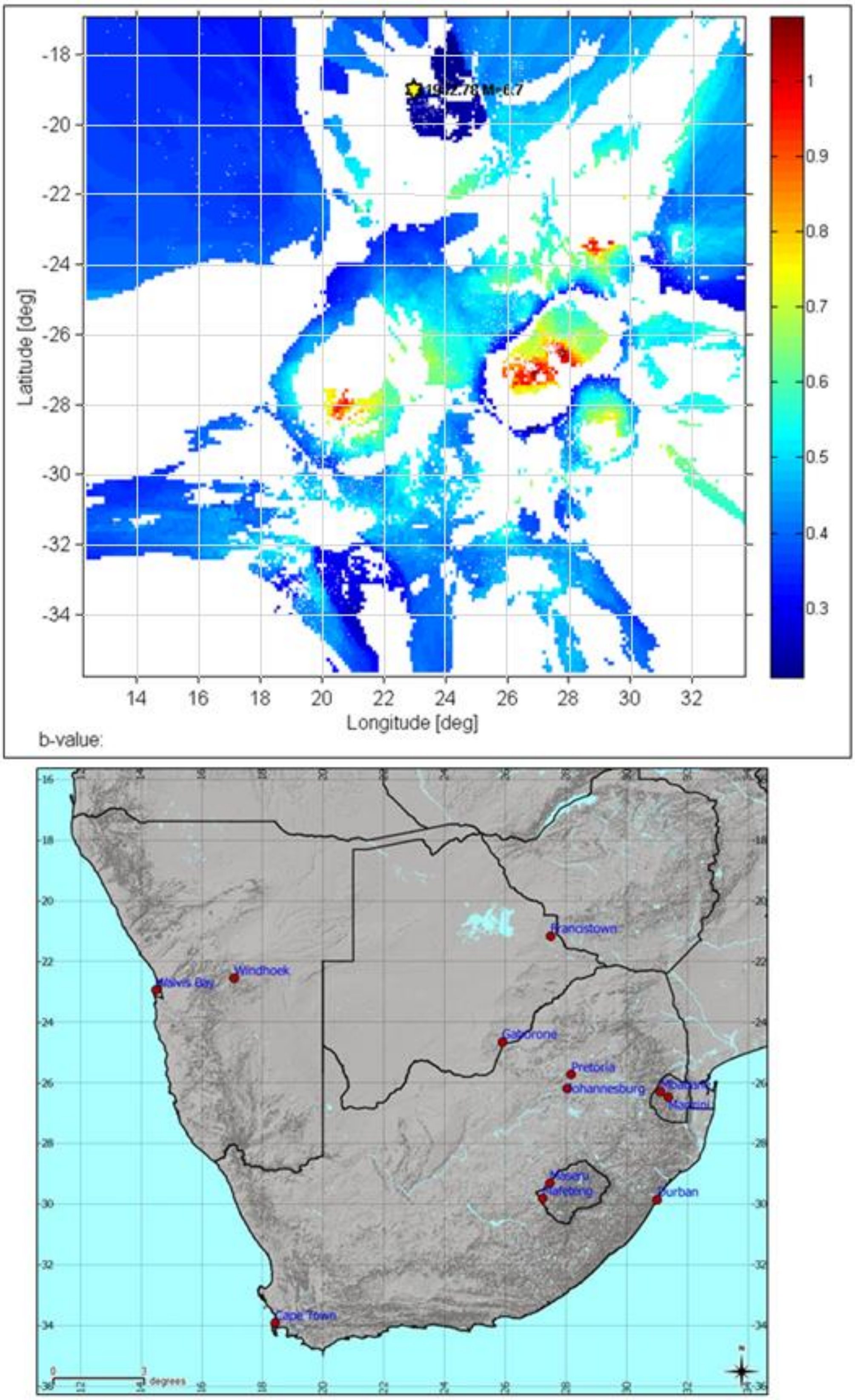


Figure 4.18: Spatial distribution of the *b*-values, where cold colours show low *b*-values and warm colours high *b*-values.

The bottom figure shows the country borders, and major cities.

The activity rate distribution shown below (Figure 4.19) was compiled in the same way as the spatial distribution magnitude of completeness map (see Appendix B, Figure B - 2), until the final step where under the 'maps' tools, the 'a-value map' tool was selected instead of 'Magnitude of completeness map' tool, replacing the *b*-value distribution map with an activity rate map. The spatial distribution of seismic activity rates is shown in Figure 4.19 and, as expected, the values are high in mining region where many earthquakes are recorded daily. The mining area has the highest activity rate with more than 10^6 events of M > 0 recorded per year. The Lesotho area is observed to have moderate activity, whilst the rest of the region is lower. The white area indicates regions where the data in a 0.1° by 0.1° grids, were not enough to calculate the a-value according to the parameters provided in Table 4.

An approximate number of events greater than a certain magnitude can be calculated using values from both Figure 4.18 and Figure 4.19, and equation 12. For example, take Okavango Delta (Latitude limits: -20.0, -18.0 and Longitude limits: 22.0, 24.0) with b = 0.3 and a = 2.5, respectively and calculate number of events per year with M ≥ 2. Okavango Delta is region prone to high seismic activity, the approximate number of events per year calculated below is a good indication of such.

$$\begin{aligned}
&\log N = a - bM \\
&\log N = 2.5 - (0.3 \times 2) \\
&\log N = 1.9 \\
&N = 10^{1.9} \\
&N = 0.8 \times 10^{2}
\end{aligned}$$

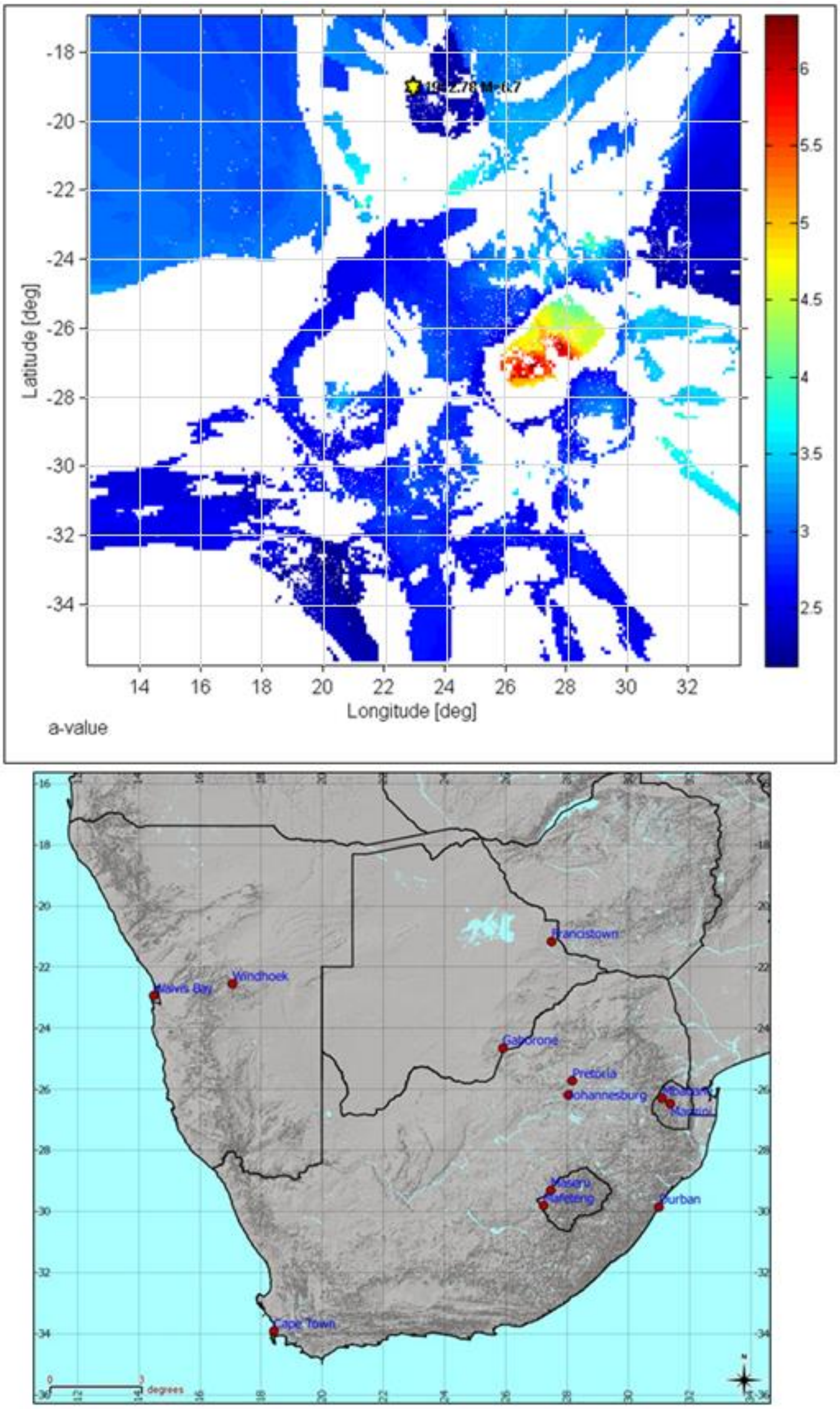


Figure 4.19: Spatial distribution of the activity rate (*a* value) with cold colours showing low *a*-values and warm colours high *a*-values, per annum.

The bottom figure shows the country borders, and major cities.

Chapter 5

5. Conclusion and Recommendations

The final southern African catalogue (South Africa, Lesotho, Swaziland, Botswana and Namibia) created in this project is the new standard for the assessment of seismic hazard in southern Africa. It contains 5,102 events for the period from the year 1690 until December 2011. A map of all events, with magnitude (M_W) range in between 0 and 6.7, is shown in Figure 5.1. The complete catalogue is included in the Appendix.

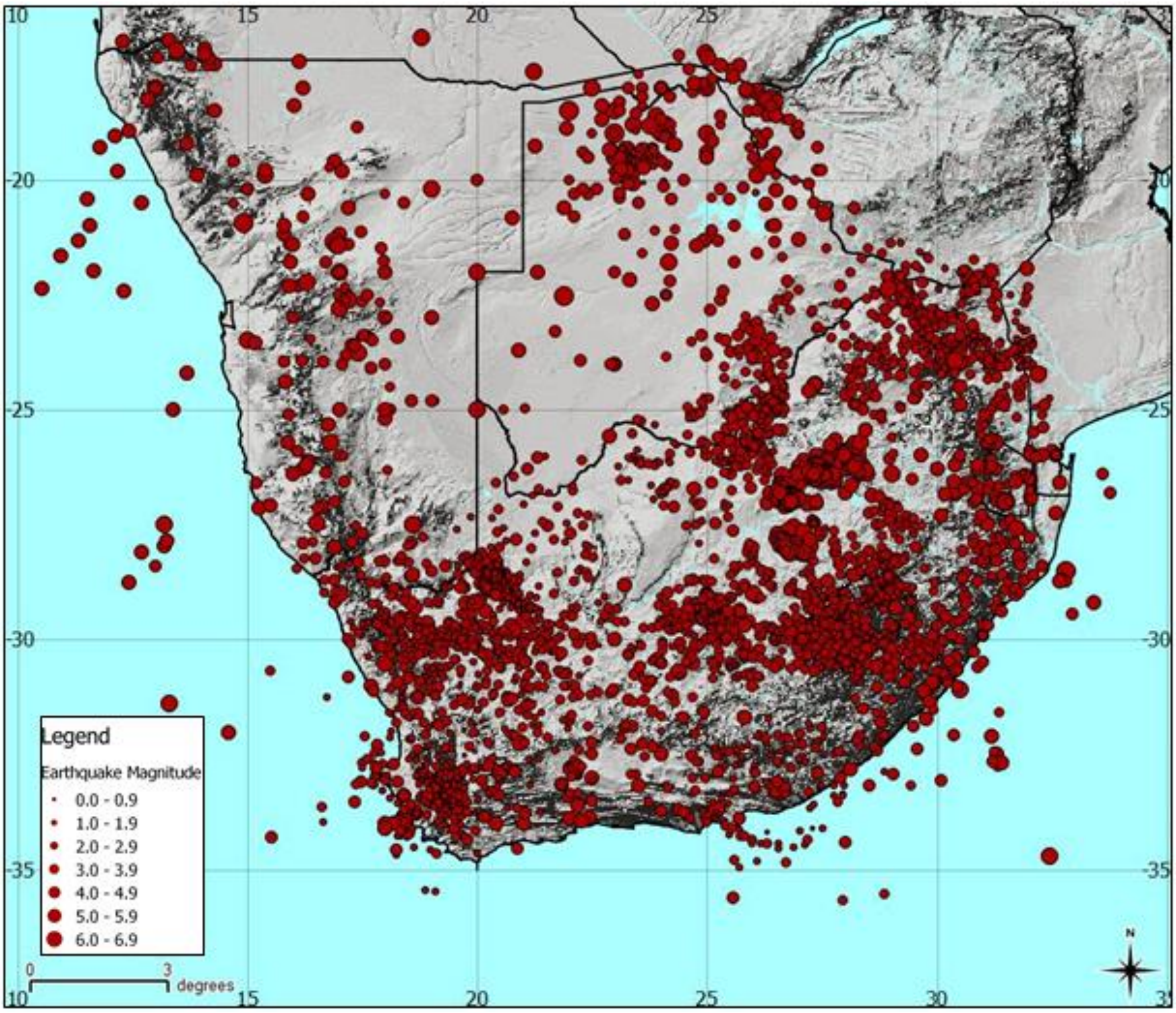


Figure 5.1: Location of earthquakes that make up the final catalogue (red circles).

The distribution of earthquakes in the catalogue according to magnitude values is shown in Figure 5.2 for specific magnitude intervals. There are a total of 920 earthquakes of magnitude (M_W) greater than 4, of which nine are large events with magnitude (M_W) $\geq$ 6. The incompleteness of the catalogue is shown by the small number of small earthquakes (M_W < 3). This is mainly due to poor station coverage over the years.

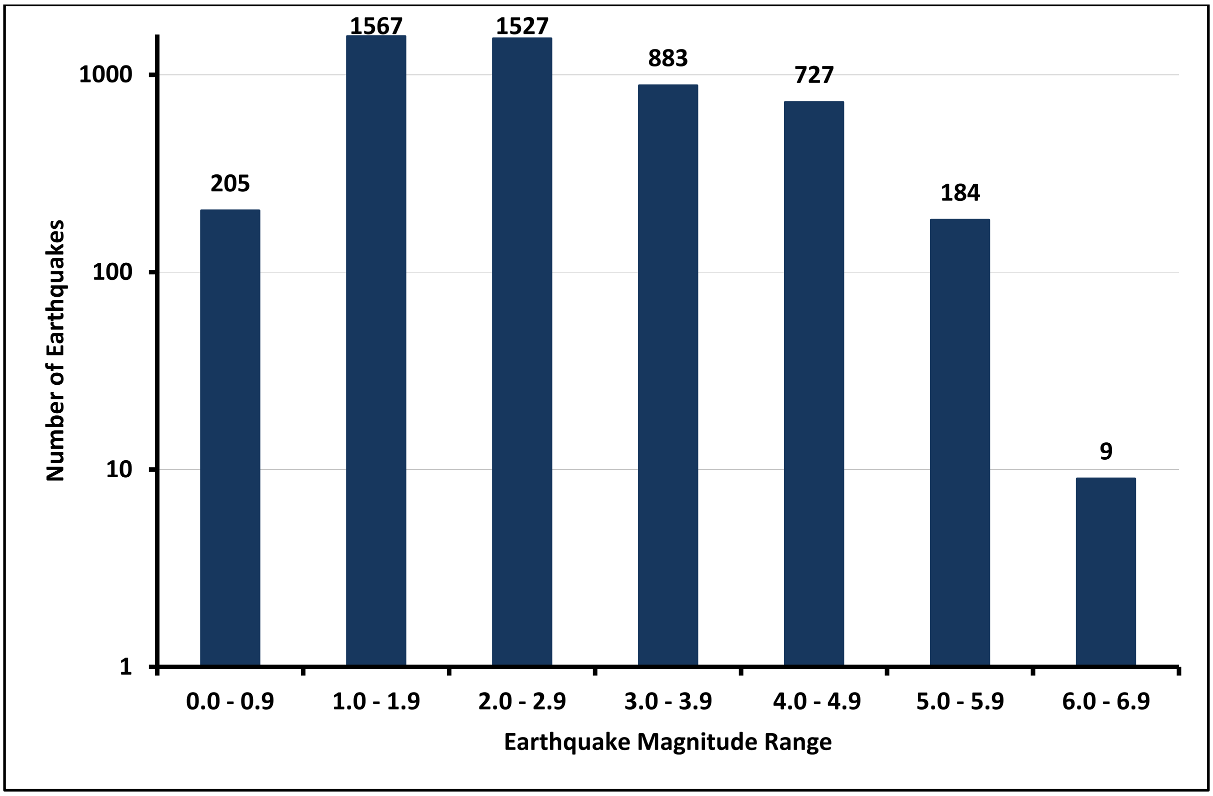


Figure 5.2: Southern Africa Catalogue magnitude distribution (to one decimal point).

Global Earthquake Model (GEM) is an initiative which aims to improve the Global Seismic Hazard Assessment Program (GSHAP) catalogue; the following improvements have been achieved:

- The new southern African catalogue included historical events from 1690 to December 2011, though these events are only located in South Africa.
- The catalogue has been homogenised to moment magnitude scale because it does not saturate at higher magnitude.

- The new catalogue has many more events (920 events of $M_W \geq 4$) compared to the Global Seismic Hazard Assessment Program (GSHAP) catalogue, which only had 100 events of $M_S \geq 4$ in southern Africa.

One of the main challenges encountered in compiling the catalogue was the lack of paleoseismic and historical seismicity data in most of southern Africa. The lack of paleoseismic records can impede deduction of critical information pertaining to past fault activity when studying the seismotectonics of the region. Some investigations, such as Albini *et al.* (2014) and unpublished work done at the Council for Geoscience, aimed at compiling historical data have been carried out, mostly in South Africa. However, more effort is needed to improve the completeness of this part of the catalogue for the whole region. The South African National Seismograph Network (SANSN) estimates the epicentral location uncertainty, which is presented as longitude and latitude errors. The International Seismological Centre (ISC) also provides dimensions of an error ellipse Smaj and Smin, which is very similar to that produced by the Council for Geoscience (CGS). Re-analysing and calculating some of the depth for the events in the southern African catalogue will be a major benefit to seismic hazard studies of southern Africa.

The discussion of faults, cratons and belts in Chapter 2, along with the final catalogue will be highly useful when studying the seismotectonics of southern Africa. The largest event in the catalogue is located in the Okavango delta; therefore it was of paramount importance to give a more detailed discussion of the area. Lesotho has a lot of small magnitude events and also some linear structures such as dykes and faults. This can be very useful when studying the seismotectonics of the area.

The best way to remove mine induced seismicity is to remove all the events located within the mining regions because it is so far impossible to distinguish between tectonic and induced events from the catalogue. However, it was decided that, since events of magnitude $M_W \geq 4$ can cause serious structural damage, they should be included in the catalogue.

After removing mine-induced seismicity, the catalogue was then homogenised. All events which had magnitude scale M_W from published articles or agencies were given first priority when homogenising the catalogue, followed by those with M_L which was converted to M_W using Deichmann (2006), and lastly those with M_b converted to M_W using Scordilis (2006).

Due to the fact that the historical data of the catalogue is mostly incomplete, most of the declustering methods do not work well with the southern African catalogue. The cluster method in Seisan described the fore- and after-shocks and then gave the user control on whether they should be removed or not. Thus this method was considered the best that can be used.

The catalogue is mostly complete between 2001 and 2006 with $M_c = 0.5$, least complete between 1901 and 1949 with $M_c = 4.0$ and incomplete prior to 1900.

The spatial distribution of seismicity correlates with the *b*- and a-value distributions. As noted above, both the *b*- and *a*-value are highest in the mining regions. Though southern Africa is usually assumed to be seismically stable, the results of this study show that there is moderate seismicity, with occasional events large enough to cause damage.

References

Adams, A. and A. Nyblade (2011), Shear wave velocity structure of the southern African upper mantle with implications for the uplift of southern Africa, *Geophysical Journal International*, **186,** 808 - 824.

Adams, R. (2011), *Notes on the history of the International Seismological Centre*, International Seismological Centre, United Kingdom. Available: http://www.isc.ac.uk/about/history/radams/, downloaded on: 12/03/2012.

Aki, M. (1965), Maximum likelihood estimate of b in the formula log N = a - bM and its confidence limits, *Bulletin of Earthquake Research Institution*, **43,** 237 - 239.

Albini, P., F. O. Strasser and N. S. Flint (2014), Earthquakes from 1820 to 1936 in Grahamstown and surroundings (Eastern Cape Province, South Africa), *Bulletin of Earthquake Engineering*, **12,** 45 - 78.

Andreoli, M. A. G., M. Doucoure, J. Van Bever Donker, D. Brandt and N. J. B. Andersen (1996), Neotectonics of southern Africa - a review, *Africa Geoscience Review*, **3,** 1 - 16.

Bai, L., Z. Wu, T. Zhang and I. Kawasaki (2006), The effect of distribution of stations upon location error: Statistical tests based on the double-difference earthquake location algorithm and the bootstrap method, *Earth Planets Space*, **58,** 9 - 12.

Baiesi, M. and M. Paczuski (2004), Scale-free networks of earthquakes and aftershocks, *Physical Review E* **69,** 1 - 8.

Beauval, C. (2003), *Analysis of uncertainties in probabilistic seismic hazard assessment: The example of France*, PhD Thesis, Universite-Joseph Fourier, Grenoble, France.

Bender, B. (1983), Maximum likelihood estimation of *b*-values for magnitude grouped data, *Bulletin of the Seismological Society of America*, **73,** 831 - 851.

Bird, P., Z. Ben-Avraham, G. Schubert, M. Andreoli and G. Viola (2006), Patterns of stress and strain rate in southern Africa, *Journal of Geophysical Research*, **111,** 1 - 14.

Bolt, B. A. and N. A. Abrahamson (2003), Estimation of Strong Seismic Ground Motions, In: *International Handbook of Earthquake and Engineering Seismology*, W. H. K. Lee, H. Kanamori, P. C. Jennings & C. Kisslinger (Eds.), Academic Press, London, **59**, 983 - 1001.

Bondár, I., S. C. Myers, E. R. Engdahl and E. Bergman (2004), Epicentre accuracy based on seismic network criteria, *Geophysical Journal International*, **156,** 483 - 496.

Booth, P. W. K., G. Brunsdon and R. W. Shone (2004), A duplex model for the Eastern Cape Fold Belt? Evidence from the Palaeozoic Witteberg and Bokkeveld Groups (Cape Supergroup), near Steytlerville, South Africa, *Gondwana Research*, **7,** 211 - 222.

Brandt, M. B. C., M. Bejaichund, E. M. Kgaswane, E. Hattingh and D. L. Roblin (2005), *Seismic History of southern Africa*, Seismologic Series, Council for Geoscience, Report **37**, pp. 32.

Bufford, K. M., E. A. Atekwana, M. G. Abdelsalam, E. Shemang, E. A. Atekwana, K. Mickus, M. Moidaki, M. P. Modisi and L. Molwalefhe (2012), Geometry and faults tectonic activity of the Okavango Rift Zone, Botswana: Evidence from magnetotelluric and electrical resistivity tomography imaging, *Journal of African Earth Sciences*, **65,** 61 - 71.

Campbell, K. W. (2003), Strong-Motion Attenuation Relations, In: *International Handbook of Earthquake and Engineering Seismology*, W. H. K. Lee, H. Kanamori, P. C. Jennings & C. Kisslinger (Eds.), Academic Press, London, **60**, 1003 - 1012.

Carney, J. N., D. T. Aldiss and N. P. Lock (1994), *The Geology of Botswana*, Director, Geological Survey Department, Lobatse, Botswana, **37**, 4 - 9pp.

CGS (2012), *South African National Seismological Network (SANSN)*, Council for Geoscience, Silverton, Pretoria. Available: http://www.geoscience.org.za/index.php?option=com_content&view=article&id=1598:south-african-national-seismological-network&catid=138:seismology-unit-activities&Itemid=615, downloaded on: 30/07/2012.

Christophersen, A., M. C. Gerstenberger, D. A. Rhoades and M. W. Stirling (2011), Quantifying the effect of declustering on probabilistic seismic hazard, *Ninth Pacific Conference on Earthquake Engineering: Building an Earthquake-Resilient Society*, Auckland, New Zealand, 206 - 213 pp.

Cornell, D. H., V. van Schijndel, O. Ingolfsson, A. Scherstén, L. Karlsson, J. Wojtyla and K. Karlsson (2011), Evidence from Dwyka tillite cobbles of Archaean basement beneath the Kalahari sands of southern Africa, *Lithos*, **125,** 482 - 502.

CTBTO (2012), Comprehensive Nuclear Test Ban Treaty Organization, Vienna, Austria. Available: http://www.ctbto.org/specials/who-we-are/, downloaded on: 12/03/2012.

Das, R., H. R. Wason and M. L. Sharma (2012), Temporal and spatial variations in the magnitude of completeness for homogenized moment magnitude catalogue for northeast India, *Journal of Earth System Science*, **121,** 19 - 28.

De Wit, M. J. and I. G. D. Ransome (1992), Regional Inversion Tectonics along the Southern Margin of Gondwana, In: *Inversion Tectonics of the Cape Fold Belt, Karoo and Cretaceous Basins of Southern Africa*, M. J. de Wit & I. G. D. Ransome (Eds.), A. A. Balkema, Rotterdam, 15 - 22.

Deichmann, N. (2006), Local magnitude, a moment revisited, *Bulletin of the Seismological Society of America*, **96,** 1267 - 1277.

Dirks, P. H. G. M. and H. A. Jelsma (1998), Horizontal accretion and stabilization of the Archean Zimbabwe Craton, *Geology*, **26,** 11 - 14.

Durrheim, R. J., S. M. Spottiswoode, M. K. C. Roberts and A. Z. Brink (2005), Comparative seismology of the Witwatersrand Basin and Bushveld Complex and emerging technologies to manage the risk of rockbursting, *The Journal of The South African Institute of Mining and Metallurgy*, **105,** 409 - 416.

Dziewonski, A. M., G. Ekström, J. H. Woodhouse and G. Zwart (1987), Centroid-moment tensor solutions for October–December 1986, *Physics of the Earth and Planetary Interiors*, **48**, 5 - 17.

Dziewonski, A. M., G. Ekström, J. H. Woodhouse and G. Zwart (1991), Centroid-moment tensor solutions for July–September 1990, *Physics of the Earth and Planetary Interiors*, **67**, 211 - 220.

Eskom (1998), *Report on paleoseismic investigations undertaken in the vicinity of the Tshipise and Bosbokpoort faults and their implications for slope stability under operating conditions within the upper dam basin of the Mutale pumped storage scheme*, Eskom, Johannesburg, Report **90583**.

Fernández, L. M. (1973), *Program to evaluate epicentral distance, origin time and local magnitude of regional tremors*, Geological Survey of South Africa, Report **Gh 1968**, pp. 11.

Fernández, L. M. (1993), *The practice of evaluating local Richter magnitude in South Africa*, Council for Geoscience, Pretoria, Report **1993–0038**, pp. 16.

Fernandez, L. M. and J. A. Guzman (1979), *Seismic History of southern Africa*, Seismologic Series, Council for Geoscience, Pretoria, Report **9**, pp. 38.

Foster, A. N. and J. A. Jackson (1998), Source parameters of large African earthquakes: implications for crustal rheology and regional kinematics, *Geophysical Journal International*, **134,** 422 - 448.

Gane, P. G. (1939), A statistical study of the Witwatersrand earth tremors, *Journal of the Chemical, Metallurgical and Mining Society of South Africa*, **40,** 155 - 172.

Gane, P. G. and H. O. Oliver (1953), South African earthquakes - 1949 to December, 1952, *Transactions of the Geological Society of South Africa*, **56,** 21 - 33.

Gardner, J. K. and L. Knopoff (1974), Is the sequence of earthquakes in southern California, with aftershocks removed, Poissonian?, *Bulletin of the Seismological Society of America*, **64,** 1363 - 1367.

Gee, L. S and W. S Leith (2011), United States Geological Survey, Reston, Virginia. Available: http://pubs.usgs.gov/fs/2011/3021/pdf/fs2011-3021.pdf, downloaded on: 20/06/2012.

GEM (2006), Global Earthquake Model, Pavia, Italy. Available: http://www.globalquakemodel.org, downloaded on: 12/03/2012.

Giardini, D., G. Gruenthal, K. Shedlock and P. Zhang (2003), The GSHAP Global Seismic Hazard Map, In: *International Handbook of Earthquake and Engineering Seismology*, W. H. K. Lee, H. Kanamori, P. C. Jennings & C. Kisslinger (Eds.), Academic Press, London, **74**, 1233 - 1239.

Gibson, G. and M. Sandiford (2013), Seismicity & induced earthquakes. Available: http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0017/31616/Seismicity-and-induced-earthquakes_Gibson-and-Sandiford.pdf, downloaded on: 24/03/2014.

Goedhart, M. L. (2005), *A geological investigation of neotectonic reaction along the Ceres – Kango – Baviaanskloof – Coega fault system in the southern and eastern Cape*, Council for Geoscence, Pretoria, Report **2005-0084**.

Goedhart, M. L. (2006), *A geological investigation of neotectonic reaction along the Ceres – Kango – Baviaanskloof – Coega fault system in the southern and eastern Cape*, Concil for Geoscience, Pretoria, Report **2006-0185**.

Gore, J., D. E. James, T. G. Zengeni and O. Gwavava (2009), Crustal structure of the Zimbabwe craton and the Limpopo Belt of southern Africa: New constraints from seismic data and implications for its evolution, *South African Journal of Geology*, **112,** 213 - 228.

Grant, L. B. (2002), Paleoseismology, In: *International Handbook of Earthquake and Engineering Seismology*, W. H. K. Lee, H. Kanamori, P. C. Jennings & C. Kisslinger (Eds.), Academic Press, London, **30**, 475 - 489.

Green, R. W. E and S. Bloch (1971), The Ceres, South Africa, earthquake of September 29, 1969. I. Report on some aftershocks, *Bulletin of the Seismological Society of America*, **61,** 851 - 859.

Grünthal, G. and R. Wahlström (2003), An M_w based earthquake catalogue for central, northern and northwestern Europe using a hierarchy of magnitude conversions, *Journal of Seismology*, **7,** 507 - 531.

Grünthal, G., R. Wahlström and D. Stromeyer (2009), The unified catalogue of earthquakes in central, northern, and northwestern Europe (CENEC) - updated and expanded to the last millennium, *Journal of Seismology*, **13,** 517 - 541.

Gutenberg, R. and C. F. Richter (1944), Frequency of earthquakes in California, *Bulletin of the Seismological Society of America*, **34,** 185 - 188.

Hälbich, I. W. (1983), Disharmonic Folding, Detachment and Thrusting in the Cape Fold Belt, In: *Geodynamics of the Cape Fold Belt, Special Publication of the Geological Society of South Africa*, A. P. G. Sohnge & I. W. Hälbich (Eds.), 115 - 123.

Hanks, T. C. and H. Kanamori (1979), A moment magnitude scale, *Journal of Geophysical Research*, **84,** 2348-2350.

Havskov, J. and L. Ottemöller (2008a), *Processing Earthquake Data*, Bergen University, 30pp.

Havskov, J. and L. Ottemöller (2008b), *The SEISAN earthquake analysis software for the IBM PC and SUN*, Institute of Solid Earth Physics, University of Bergen, Norway, **8**.

Hunter, D. R., M. R. Johnson, C. R. Anhaeusser and R. J. Thomas (2006), Introduction, In: *The Geology of South Africa*, M. R. Johnson, C. R. Anhaeusser & R. J. Thomas (Eds.), Geological Society of South Africa/Counsil for Geoscience, Johannesburg/Pretoria, 1 - 7.

Hussein, H. M., K. M. Abou Elenean, I. A. Marzouk, A. Peresan, I. M. Korrat, E. Abu El-Nader, G. F. Panza and M. N. El-Gabry (2008), Integration and magnitude homogenization of the Egyptian earthquake catalogue, *Natural Hazards*, **47,** 525 - 546.

Hutton, L. K. and D. M. Boore (1987), The M_L scale in southern California, *Bulletin of the Seismological Society of America*, **77,** 2074 - 2094.

James, D. E. and M. J. Fouch (2002), Formation and Evolution of Archaean Cratons: Insights from Southern Africa, In: *Special Publication of Geological Society*, C. M. R. Fowler, C. J. Ebinger & C. J. Hawkesworth (Eds.), London, 1 - 26.

James, D. E., M. J. Fouch, J. C. VanDecar, S. van der Lee and Kaapvaal Seismic Group (2001), Tectospheric structure beneath southern Africa, *Geophysical Research Letters*, **28,** 2485 - 2488.

James, D. E., F. Niu and J. Rokosky (2003), Crustal structure of the Kaapvaal craton and its significance for early crustal evolution, *Lithos*, **71,** 413 - 429.

Jensen, B. L. (1991), *Source parameters and seismotectonics of three earthquakes in the stable continental interior of Africa*, MSc Thesis, Memphis State University, Memphis, Tennessee.

Johnston, A. C. (1996), Seismic moment assessment of earthquakes in stable continental regions – I. Instrumental seismicity, *Geophysical Journal International*, **124,** 381 - 414.

Johnston, A. C., K. J. Coppersmith, L. R. Kanter and C. A. Cornell (1994), *The Earthquakes of stable continental regions*, Electric Power Research Institute (EPRI), Palo Alto, California, Report **495-2002**, pp. 5.

Karnik, V. K. (1971), *Seismicity of the European Area*, Publishing House of the Czechoslovak Academy of Sciences, Praha, Czechoslovakia, **2**, 123 - 169pp.

Kijko, A. and C. W. Funk (1994), The assessment of seismic hazards in mines, *The Journal of the South African Institute of Mining and Metallurgy*, **94,** 179 - 185.

King, J. (2008), *Botswana to get earthquake detectors*, MmegiOnline, Gaborone, Botswana. Available: http://www.mmegi.bw/index.php?sid=1&aid=31&dir=2008/December/Wednesday17, downloaded on: 23/02/2012.

Kisters, A., R. Belcher, R. Armstrong, R. Scheepers, A. Rozendaal and L. Smith Jordaan (2002), Timing and kinematics of the Colenso fault: The early Paleozoic shift from collisional to extensional tectonics in the Pan-African Saldania belt, South Africa, *South African Journal of Geology*, **105,** 257 - 270.

Knopoff, L. (1964), The statistics of earthquakes in southern California, *Bulletin of the Seismological Society of America*, **54,** 1871 - 1873.

Krige, L. J. and B. D. Maree (1948), *Earthquakes in South Africa*, Geological Survey of South Africa, Pretoria, South Africa, 14pp.

Krüger, F., S. Reichmann and F. Scherbaum (2011), *Moment tensor solution for the 29.9.1969 Ceres earthquake*, TNSP Workshop, 1 April 2011.

Kulhanek, O. (2005), *Seminar on b-value*, Charles University Prague, Report **1**, pp. 10.

Letlatsa, G. M. (2004), *Geological conditions and enviromental impact of the Mohale dam, Lesotho highlands water project*, PhD Thesis, Faculty of Science, University of Free State, Bloemfontein, South Africa.

Lushetile, B. and D. Hutchins (2008), *Government Initiative and Cooperation in Seismology Providing Knowledge and Training in Namibia*, The Geological Survey of Namibia, Ministry of Mines and Energy, Windhoek.

Malephane, H. R. (2007), *Seismicity and Seismic Hazard of Lesotho*, MSc Thesis, Department of Earth Sciences, University of Bergen, Bergen.

Malservisi, R., U. Hugentobler, R. Wonnacott and M. Hackl (2013), How rigid is a rigid plate? Geodetic constraint from the TrigNet CGPS network, South Africa, *Geophysical Journal International*, **192,** 918 - 928.

Mangongolo, A. and D. G. Hutchins (2006), Seismicity of Namibia from 1910 to 2006, In: *The Geology of Namibia: Upper Palaeozoic to Cenozoic*, R. M. Miller & T. Becker (Eds.), Ministry of Mines and Energy, Geological Survey of Namibia, Namibia, 1 - 7.

McGarr, A. (1984), Some application of seismic source mechanism studies to assessing underground hazard, *1st International Congress on Rockbursts and Seismicity in Mines*, Johannesburg, September 1982, 199 - 208 pp.

McGuire, R. K. (1995), Probabilistic seismic hazard analysis and design earthquakes: Closing the loop, *Bulletin of the Seismology Society of America*, **85,** 1275 - 1284.

McGuire, R. K. (2001), Deterministic vs. probabilistic earthquake hazards and risks, *Soil Dynamics and Earthquake Engineering*, **21,** 377 - 384.

Midzi, V., J. J. Bommer, F. O. Strasser, P. Albini, B. S. Zulu, K. Prasad and N. S. Flint (2013), An intensity database for earthquakes in South Africa from 1912 to 2011, *Journal of Seismology*, **17,** 1183 - 1205.

Midzi, V., D. J. Hlatywayo, L. S. Chapola, F. Kebede, K. Atakan, D. K. Lombe, G. Turyomurugyendo and F. A. Tugume (1999), Seismic hazard assessment in eastern and southern Africa, *Annals of Geophysics*, **42,** 1067 - 1083.

Midzi, V., I. Saunders, M. B. C. Brandt and T. Molea (2010), 1-D velocity model for use by the SANSN in earthquake location, *Seismological Research Letters*, **81,** 460 - 466.

Midzi, V., B. Zulu, B. Manzunzu, T. Mulabisana, T. Pule, S. Myendeki and W. Gubela (2015), Macroseismic survey of the ML5.5, 2014 Orkney earthquake, *Journal of Seismology*, **19,** 741 - 751.

Mignan, A. and J. Woessner (2012), Estimating the magnitude of completeness for earthquake catalogs. *Theme IV – Understanding Seismicity Catalogs and their*

Problems [Online], **IV**. Available: http://www.corssa.org/articles/themeiv/mignan_et_al/mignan_woessner.pdf, downloaded on: 21/06/2012.

Miller, R. McG. (2008), Neoproterozoic to Lower Paleozoic, In: *The Geology of Namibia*, Geological Survey, Ministry of Mines and Energy, Windhoek, Namibia, **2**, 13, 1 - 336.

MITPAN (2008), *Compilation Catalog Program*. Available: http://www.mitp.ru/en/soft/ecp/doc/edcat-introduction.html, downloaded on: 12/03/2014.

Modie, B. N. (2007), *The Palaeozoic Palynostratigraphy of the Karoo Supergroup and palynofacies insight into palaeoenvironmental interpretations, Kalahari Karoo Basin*, PhD Thesis, The University of Western Brittany, Brest, France.

Molchan, G. M. and O. E. Dmitrieva (1992), Aftershock identification: Methods and new approaches, *Geophysical Journal International*, **109,** 501- 516.

Nguuri, T. K., J. Gore, D. E. James, S. J. Webb, C. Wright, T. G. Zengeni, O. Gwavava, J. A. Snoke and Kaapvaal Seismic Group (2001), Crustal structure beneath southern Africa and its implications for the formation and evolution of the Kaapvaal and Zimbabwe cratons, *Geophysical Research Letters*, **28,** 2501 - 2504.

Noson, L. L., A. Qamar and G. W. Thorsen (1988), *Washington state earthquake hazards*, Washington Division of Geology and Earth Resources Information Circular, Report **85**, pp. 77.

Nuannin, P., O. Kulhanek, L. Persson and T. Askemur (2005), Inverse correlation between induced seismicity and *b*-value, observed in the Zingruvan mine, Sweden, *Acta Geodynamica et Geomaterialia*, **2,** 5 - 13.

Ottemöller, L., P. Voss and J. Havskov (2013), *Seisan earthquake analysis software for WINDOWS, SOLARIS, LINUX and MACOSX* Available: http://seis.geus.net/software/seisan/seisan.pdf, downloaded on: 12/03/2013.

Page, R. (1968), Aftershocks and microaftershocks of the great Alaska earthquake of 1964, *Bulletin of the Seismological Society of America*, **58,** 1131 - 1168.

Passchier, C. W., R. A. J. Trouw, A. Ribeiro and F. V. P. Paciullo (2002), Tectonic evolution of the southern Kaoko belt, Namibia, *Journal of African Earth Sciences*, **35,** 61 - 75.

Powell, T. and D. Fries (1964), Acoustics and Seismic Laboratory, In: *Handbook: World-Wide Standard Seismographic Network*, University of Michigan, Ann Arbor.

Reasenberg, P. (1985), Second-order moment of central California seismicity, 1969 - 1982, *Journal of Geophysical Research*, **90,** 5479 - 5495.

Reinecker, J., O. Heidbach, M. Tingay, P. Connolly and B. Muller (2004), *The 2004 release of the World Stress Map*. Washington D. C., United States of America: American Geophysical Union.

Richter, C. F. (1935), An instrumental earthquake magnitude scale, *Bulletin of the Seismological Society of America*, **25,** 1 - 32.

Richter, C. F. (1958), *Elementary Seismology,* W.H. Freeman and Company, San Francisco, 768pp.

Romanelli, F. (2005), *Earthquake Ground Motion*, University of Trieste, Italy, **II**, 1 - 5pp.

Saunders, I., M. Brandt, T. Molea, L. Akromah and B. Sutherland (2010), Seismicity of southern Africa during 2006 with special reference to the M_w=7 Machaze earthquake, *South African Journal of Geology* **113,** 396 - 380.

Saunders, I., M. Brandt, J. Steyn, D. Roblin and A. Kijko (2008), The South African National Seismograph Network, *Seismological Research Letters*, **79,** 203 - 210.

Saunders, I., L. Ottemöller, M. B. C. Brandt and C. J. S. Fourie (2013), Calibration of an M_L scale for South Africa using tectonic earthquake data recorded by the South African National Seismograph Network: 2006 to 2009, *Journal of Seismology*, **17,** 437 - 451.

Savage, W. U. (1972), Microearthquake clustering near Fairview Peak, Nevada, and in the Nevada Seismic zone, *Journal of Geophysical Research*, **77,** 7049 - 7056.

Schorlemmer, D. and J. Woessner (2008), Probability of detecting an earthquake, *Bulletin of the Seismological Society of America*, **98,** 2103 - 2117.

Scordilis, E. M. (2006), Empirical global relations converting M_S and m_b to moment magnitude, *Journal of Seismology*, **10,** 225 - 236.

Segwabe, T. (2008), *The geological framework and depositional environments of the coal-bearing Karoo Strata in the Central Kalahari Karoo Basin, Botswana*, MSc Thesis, Rhodes University, Grahamstown, South Africa.

Shudofsky, G. N. (1985), Source mechanism and focal depths of east African earthquakes using Rayleigh-wave inversion and body-wave modeling, *Geophysical Journal of the Royal Astronomical Society* **83,** 563 - 614.

Singh, M. and E. Hattingh (2009), Short communication: collection of isoseismal maps for South Africa, *Natural Hazards*, **50,** 403 - 408.

Singh, M., A. Kijko and R. Durrheim (2011), First-order regional seismotectonic model for South Africa, *Natural Hazards*, **59,** 383 - 400.

Stepp, J. C. (1972), Analysis of completeness of the earthquake sample in the Puget Sound area and its effect on statistical estimates of earthquake hazard, *1st International Conference on Microzonation*, 897- 910 pp.

Storchak, D. (2009), E-mail communication to M. Grobbelaar, dated: 12 March 2009.

Strasser, F.O. and A. Mangongolo (2013), TNSP Earthquake Catalogue. **2012 - 0166**. Available: http://www.eskom.co.za/Whatweredoing/SSHAC_ProjectResults/Documents/21TNSP_EarthquakeCatalogue.pdf, downloaded on: 19/11/2014.

Stromeyer, D., G. Grünthal and R. Wahlström (2004), Chi-square regression for seismic strength parameter relations, and their uncertainties, with applications to an M_W based earthquake catalogue for central, northern and northeastern Europe, *Journal of Seismology*, **8,** 143 - 153.

Stucchi, M., P. Albini, C. Mirto and A. Rebez (2009), Assessing the completeness of Italian historical earthquake data, *Annals of Geophysics*, **47,** 659 - 673.

Tankard, A. J., M. P. A. Jackson, K. A. Erickson, O. K. Hobday, D. R. Hunter and W. E. L. Minter (1982), *Crustal Evolution of Southern Africa: 3.8 Billion Years of Earth History*, Springer-Verlag, New York, 523pp.

Theron, J. N. (1974), The Seismic History of the South-Western Cape Province, In: *The Earthquake of 29 September 1969 in the South-Western Cape Province, South Africa*, W. L. VanWyk & L. E. Kent (Eds.), Geological Survey of South Africa, Pretoria, South Africa, **4**.

Tibi, R., J. Blanco and A. Fatehi (2011), An alternative and efficient cluster-link approach for declustering of earthquake catalogs, *Seismological Research Letters*, **82,** 509 - 518.

Tucholke, B. E., R. E. Houtz and D. M. Barrett (1981), Continental crust beneath the Agulhas plateau, southwest Indian ocean, *Journal of Geophysical Research*, **86,** 3791 - 3806.

Turyomurugyendo, G. (1996), *Some aspects of seismic hazard in the east and south African region*, MSc Thesis, Institute of Solid Earth Physics, University of Bergen, Bergen, Norway.

Uhrhammer, R. (1986), *Characteristics of northern and central California seismicity*, Earthquake Notes, Report **57**, pp. 21.

USGS (2011a), United States Department of the Interior, Albuquerque. Available: http://pubs.usgs.gov/fs/2011/3021/pdf/fs2011-3021.pdf, downloaded on: 20/06/2012.

USGS (2011b), *50 years of global seismology*, United States Department of the Interior, Albuquerque. Available: http://pubs.usgs.gov/fs/2011/3065/pdf/FS11-3065.pdf, downloaded on: 20/06/2012.

USGS (2013), *The modified Mercalli intensity scale*, Albuquerque. Available: http://earthquake.usgs.gov/learn/topics/mercalli.php, downloaded on: 24/02/2014.

Utsu, T. (1965), A method for determining the value of b in a formula log n = a - bM showing the magnitude-frequency relation for earthquakes, *Geophysics Bulletin*, **13,** 99 - 103.

Utsu, T. (1966), A statistical significance test of the difference in *b*-value between two earthquake groups, *Journal of Physics of the Earth*, **14,** 37 - 40.

Utsu, T. (2002), Statistical Features of Seismicity, In: *International Handbook of Earthquake and Engineering Seismology*, W. H. K. Lee, H. Kanamori, P. C. Jennings & C. Kisslinger (Eds.), Academic Press, London, **43**, 719 - 732.

Utsu, T., Y. Ogata and R. S. Matsu'ura (1995), The centenary of the Omori formula for a decay law of aftershock activity, *Journal of Physics of the Earth*, **43,** 1 - 33.

Van Stiphout, T., J. Zhuang and D. Marsan (2012), *Seismicity Declustering: Theme V – Models and techniques for analysing seismicity* [Online], **V**. Available: http://www.corssa.org/articles/themev/van_stiphout_et_al/vanstiphoutetal2012.pdf, downloaded on: 21/06/2012.

Vinnik, L., S. Oreshin, G. Kosarev, S. Kiselev and L. Makeyeva (2009), Mantle anomalies beneath southern Africa: Evidence from seismic S and P receiver functions, *Geophysical Journal International*, **179,** 279 - 298.

Wagner, G. S. and C. A. Langston (1988), East African earthquake body wave inversion with implications for continental structure and deformation, *Geophysical Journal*, **94,** 503 - 518.

Weichert, D. H. (1980), Estimation of the earthquake recurrence parameters for equal observation periods for different magnitudes, *Bulletin of the Seismological Society of America*, **70,** 1337 - 1346.

Wiemer, S. (2001), A software package to analyze seismicity: ZMAP, *Seismological Research Letters*, **72,** 374 - 383.

Wiemer, S. and M. Wyss (2000), Minimum magnitude of complete reporting in earthquake catalogs: Examples from Alaska, the Western United States, and Japan, *Bulletin of the Seismological Society of America*, **90,** 859 - 869.

Woessner, J., J. L. Hardebeck and E. Haukkson (2010), What is an instrumental seismicity catalog? *Theme IV – Understanding seismicity catalogs and their problems* [Online], **IV**. Available: http://www.corssa.org/articles/themeiv/woessner_et_al/woessner_et_al.pdf, downloaded on: 21/06/2012.

Wyss, M., S. Wiemer and R. Zúñiga (2001), *ZMAP: A tool for analyses of seismicity patterns*, ETH Zurich, Switzerland, **6**.

Zaliapin, I., A. Gabrielov, V. Keilis-Borok and H. Wong (2008), Clustering analysis of seismicity and aftershock identification, *Physical Review Letters*, **101,** 1 - 4.

Zangeneh, N., E. Eberhardt, R. M. Bustin and A. Bustin (2013), A numerical investigation of fault slip triggered by hydraulic fracturing. **23**. Available: http://cdn.intechopen.com/pdfs/43883/InTech-A_numerical_investigation_of_fault_slip_triggered_by_hydraulic_fracturing.pdf, downloaded on: 18/11/2014.

Zhuang, J., Y. Ogata and D. Vere-Jones (2002), Stochastic declustering of space-time earthquake occurences, *Journal of the American Statistical Association*, **97,** 369 - 380.

Zoback, M. L., M. D. Zoback, J. Adams, M. Assumpcao, S. Bell, E. A. Bergman, P. Blumling, D. Denham, J. Ding, K. Fuchs, N. Gay, S. Gregersen, H. K. Gupta, A. Gvishiana, K. Jacob, R. Klein, P. Knoll, M. Magee, J. L. Mercier, B. C. Muller, C. Paquin, K. Rajendran, O. Stephansson, G. Suarez, M. Suter, A. Udias, Z. H. Xu and M. Zhizhin (1989), Global patterns of tectonic stress, *Nature*, **341,** 291 - 298.

Appendix A

Table 9: A homogeneous catalogue for southern Africa, with all the independent events $0 \leq M_W \leq 6.7$.

Year	Month	Day	Hour	Minutes	Seconds	Latitude	Longitude	Depth	Moment Magnitude
1690						-33.900	18.400	0.0	3.7
1695	10	4	17			-33.900	18.400	0.0	3.7
1696	1	11				-33.900	18.400	0.0	3.7
1739	9	5				-33.900	18.400	0.0	3.7
1749	8	27				-33.900	18.400	0.0	3.0
1766	7	14				-34.200	18.500	0.0	4.3
1806	1					-28.800	23.200	0.0	4.3
1809	12	4	20	8		-34.000	18.400	0.0	6.3
1809	12	28				-33.900	18.400	0.0	3.7
1810	1	29				-33.900	18.400	0.0	3.0
1810	4	11	1			-33.900	18.400	0.0	3.7
1810	12	26				-34.100	19.500	0.0	3.0
1811	1	7	4			-33.900	18.400	0.0	3.0
1811	6	2	7			-33.900	18.400	0.0	5.7
1811	6	19	8			-33.900	18.400	0.0	5.0
1819	4	14	3			-30.300	18.100	0.0	4.3
1819	6	24				-32.900	18.800	0.0	3.0
1826						-33.000	18.000	0.0	3.7
1826	4	14	5			-33.900	18.400	0.0	3.0
1835	11	11	1	48		-33.900	18.400	0.0	4.3
1850	5	21	20	30		-33.300	26.600	0.0	5.0
1854	8	20	9			-29.700	31.000	0.0	3.7
1857	8	14	21	30		-33.500	19.000	0.0	5.0
1860	6	15				-29.900	31.000	0.0	3.7
1860	9	21				-29.600	30.400	0.0	3.7
1862	6	16	14			-29.900	31.000	0.0	3.7

1862	6	23				-29.100	26.100	0.0	3.7
1867	10	15	10	15		-32.900	27.400	0.0	3.7
1869	10	31				-33.900	18.400	0.0	3.7
1869	11	23	17	50		-30.000	17.200	0.0	3.7
1870	8	3	13	20		-28.300	29.100	0.0	5.0
1871	4	15	17	58		-32.100	28.300	0.0	3.7
1871	9	30	6	30		-29.900	31.000	0.0	2.3
1876	10	14				-31.600	28.800	0.0	2.3
1882	4	29	0			-29.700	17.900	0.0	3.7
1883	9	26	8	45		-29.800	27.400	0.0	3.0
1883	9	30	22			-33.900	25.700	0.0	3.0
1884	2	19	22	24		-28.700	24.700	0.0	3.0
1884	7	11	17	40		-30.600	21.400	0.0	3.0
1885	5	10	21	41		-33.900	18.400	0.0	3.0
1891	3	17	19			-26.500	32.000	0.0	4.0
1895	5	9				-33.300	26.600	0.0	3.7
1898	8	11	19	20		-29.700	31.100	0.0	3.0
1899	9	13	10	23		-33.900	18.400	0.0	5.0
1690						-33.900	18.400	0.0	3.7
1695	10	4	17			-33.900	18.400	0.0	3.7
1696	1	11				-33.900	18.400	0.0	3.7
1739	9	5				-33.900	18.400	0.0	3.7
1749	8	27				-33.900	18.400	0.0	3.0
1766	7	14				-34.200	18.500	0.0	4.3
1806	1					-28.800	23.200	0.0	4.3
1809	12	4	20	8		-34.000	18.400	0.0	6.3
1809	12	28				-33.900	18.400	0.0	3.7
1810	1	29				-33.900	18.400	0.0	3.0
1810	4	11	1			-33.900	18.400	0.0	3.7
1810	12	26				-34.100	19.500	0.0	3.0
1811	1	7	4			-33.900	18.400	0.0	3.0
1811	6	2	7			-33.900	18.400	0.0	5.7

1811	6	19	8			-33.900	18.400	0.0	5.0
1819	4	14	3			-30.300	18.100	0.0	4.3
1819	6	24				-32.900	18.800	0.0	3.0
1826						-33.000	18.000	0.0	3.7
1826	4	14	5			-33.900	18.400	0.0	3.0
1835	11	11	1	48		-33.900	18.400	0.0	4.3
1850	5	21	20	30		-33.300	26.600	0.0	5.0
1854	8	20	9			-29.700	31.000	0.0	3.7
1857	8	14	21	30		-33.500	19.000	0.0	5.0
1860	6	15				-29.900	31.000	0.0	3.7
1860	9	21				-29.600	30.400	0.0	3.7
1862	6	16	14			-29.900	31.000	0.0	3.7
1862	6	23				-29.100	26.100	0.0	3.7
1867	10	15	10	15		-32.900	27.400	0.0	3.7
1869	10	31				-33.900	18.400	0.0	3.7
1869	11	23	17	50		-30.000	17.200	0.0	3.7
1870	8	3	13	20		-28.300	29.100	0.0	5.0
1871	4	15	17	58		-32.100	28.300	0.0	3.7
1871	9	30	6	30		-29.900	31.000	0.0	2.3
1876	10	14				-31.600	28.800	0.0	2.3
1882	4	29	0			-29.700	17.900	0.0	3.7
1883	9	26	8	45		-29.800	27.400	0.0	3.0
1883	9	30	22			-33.900	25.700	0.0	3.0
1884	7	11	17	40		-30.600	21.400	0.0	3.0
1884	2	19	22	24		-28.700	24.700	0.0	3.0
1885	5	10	21	41		-33.900	18.400	0.0	3.0
1891	3	17	19			-26.500	32.000	0.0	4.0
1895	5	9				-33.300	26.600	0.0	3.7
1898	8	11	19	20		-29.700	31.100	0.0	3.0
1899	9	13	10	23		-33.900	18.400	0.0	5.0
1902	5	28	21	45	0.0	-33.900	18.400		4.3
1903	7	9	10	6	0.0	-33.900	18.400		3.7

1903	8	3	0	0	0.0	-19.400	25.000		4.3
1905	2	20	7	0	0.0	-26.000	32.600		4.3
1905	5	5	15	20	0.0	-24.900	28.300		3.7
1905	5	5	15	20	0.0	-29.100	25.500		3.0
1905	11	1	0	0	0.0	-27.500	31.500		3.7
1905	11	28	0	0	0.0	-30.500	29.400		3.7
1905	12	1	0	0	0.0	-30.500	29.400		3.7
1906	5	20	10	30	0.0	-24.900	28.300		3.7
1906	6	2	19	45	0.0	-24.900	28.300		3.0
1906	8	27	9	0	0.0	-26.600	30.600		3.7
1906	12	10	8	12	0.0	-26.900	31.300		4.3
1907	3	3	2	0	0.0	-24.000	28.300		4.3
1907	3	20	19	45	0.0	-29.900	30.300		3.0
1907	6	6	7	0	0.0	-24.900	28.300		3.7
1907	6	15	0	0	0.0	-24.900	28.300		3.0
1907	8	5	4	50	0.0	-26.300	31.300		3.0
1907	9	6	19	30	0.0	-22.200	29.100		3.7
1908	2	20	2	45	0.0	-23.800	30.100		3.7
1908	8	18	3	0	0.0	-29.000	26.000		4.0
1908	9	24	18	50	0.0	-24.000	30.500		4.0
1908	9	26	21	7	0.0	-29.000	26.000		5.0
1908	10	20	21	0	0.0	-26.800	30.900		3.0
1908	12	30	0	20	0.0	-29.700	17.900		4.0
1909	3	19	0	0	0.0	-29.300	21.100		3.0
1909	4	15	0	0	0.0	-30.700	30.000		3.7
1909	8	5	8	37	0.0	-22.200	29.000		5.0
1909	8	16	20	15	0.0	-29.600	24.000		3.7
1909	8	17	12	20	0.0	-24.000	30.000		3.7
1910	5	15	5	0	0.0	-26.000	32.000		3.7
1910	5	19	18	30	0.0	-24.900	28.300		3.0
1910	7	11	8	51	0.0	-22.300	16.100		3.0
1910	7	18	8	0	0.0	-20.200	15.000		3.0

1910	7	24	6	45	0.0	-22.300	16.100		3.0
1910	8	15	22	0	0.0	-26.500	32.000		3.0
1910	8	20	6	15	0.0	-20.200	15.000		3.0
1910	10	3	19	3	0.0	-20.200	15.000		3.0
1910	10	21	18	42	0.0	-30.500	24.700		4.0
1910	10	22	7	46	0.0	-20.200	15.000		3.0
1911	3	15	13	42	0.0	-22.300	16.100		3.0
1911	7	6	20	15	0.0	-33.600	22.200		4.0
1911	8	6	16	30	0.0	-27.000	31.300		3.0
1911	11	8	21	58	0.0	-22.600	17.100		5.0
1912	2	20	13	3	0.0	-29.500	25.000	35.0	6.2
1912	3	20	18	35	0.0	-24.900	30.500		4.3
1912	3	20	23	9	0.0	-24.900	30.500		4.3
1912	4	19	18	0	0.0	-29.700	25.100		3.7
1912	11	16	23	43	0.0	-29.700	25.100		4.0
1913	5	5	0	55	0.0	-25.700	28.200		4.0
1913	6	13	5	0	0.0	-24.000	30.300		3.7
1913	6	15	0	0	0.0	-29.600	24.100		3.7
1913	7	3	3	35	0.0	-21.200	15.800		4.3
1913	8	1	8	44	0.0	-22.000	17.000		5.8
1913	9	17	0	0	0.0	-30.500	29.400		3.7
1913	9	22	19	33	0.0	-20.200	15.000		3.0
1914	2	6	12	35	0.0	-29.000	31.700		3.0
1914	2	16	23	50	0.0	-29.000	31.700		4.3
1914	3	31	12	45	0.0	-28.700	31.900		3.7
1914	4	20	11	30	0.0	-21.500	17.900		3.0
1914	5	19	8	47	0.0	-29.200	24.600		3.7
1914	5	20	16	0	0.0	-22.300	16.100		3.0
1914	5	26	18	30	0.0	-20.800	16.200		3.0
1914	6	14	2	0	0.0	-29.300	31.300		3.0
1914	6	15	16	20	0.0	-21.400	15.900		3.0
1914	6	20	4	3	0.0	-28.200	20.000		3.0

1914	8	21	6	59	0.0	-23.600	30.200		3.0
1915	7	10	4	30	0.0	-27.900	31.400		4.0
1916	3	23	10	30	0.0	-33.700	24.400		3.0
1916	3	24	12	35	0.0	-28.900	31.700		3.0
1916	7	27	17	45	0.0	-25.700	31.300		4.0
1916	8	14	20	0	0.0	-18.000	16.200		4.0
1916	10	31	0	25	0.0	-26.200	30.400		4.3
1917	4	11	4	5	0.0	-28.900	31.700		3.7
1917	4	25	16	18	0.0	-28.000	31.000		3.7
1917	9	3	6	30	0.0	-29.700	25.400		3.0
1917	9	9	15	23	0.0	-28.000	31.000		3.7
1917	9	20	3	39	0.0	-28.000	31.000		3.0
1917	11	3	22	53	0.0	-22.600	17.100		3.7
1917	11	29	7	30	0.0	-25.300	31.000		3.7
1917	12	17	9	20	0.0	-24.000	30.300		3.7
1918	3	9	3	26	0.0	-23.700	30.200		3.7
1918	9	25	0	30	0.0	-28.800	20.600		3.7
1919	1	13	12	0	0.0	-31.400	19.800		3.0
1919	4	28	22	25	0.0	-26.000	32.000		3.7
1919	5	14	21	50	0.0	-28.000	31.000		3.0
1919	5	15	0	0	0.0	-28.000	31.000		3.7
1919	6	24	4	14	0.0	-30.500	29.400		3.0
1919	8	23	14	15	35.0	-25.900	32.000		3.0
1919	11	7	18	52	0.0	-28.000	31.000		3.7
1919	12	6	21	0	0.0	-23.900	30.100		3.0
1919	12	15	0	0	0.0	-25.000	18.100		3.7
1920	1	31	17	0	0.0	-29.300	31.300		3.0
1920	3	7	8	10	0.0	-28.000	31.000		3.0
1920	4	3	16	57	0.0	-28.000	31.000		3.7
1920	4	11	12	25	0.0	-25.900	32.000		3.7
1920	4	12	23	24	0.0	-28.000	31.000		3.0
1920	5	8	16	0	0.0	-30.500	29.400		3.0

1920	6	10	22	50	0.0	-25.900	32.000		3.7
1920	7	8	4	15	0.0	-26.600	25.100		3.7
1920	8	13	7	5	0.0	-33.900	18.500		3.0
1920	9	10	3	41	0.0	-30.500	29.400		3.7
1921	1	22	4	55	0.0	-30.500	29.400		4.3
1921	2	19	0	0	0.0	-31.600	18.700		3.7
1921	3	16	0	10	0.0	-30.000	25.000		3.7
1921	3	23	0	0	0.0	-29.800	25.300		3.0
1921	3	31	10	0	0.0	-27.000	30.800		3.0
1921	9	24	2	20	0.0	-23.700	30.200		3.7
1921	10	9	13	20	0.0	-33.300	19.100		5.0
1921	12	15	19	44	0.0	-29.200	16.900		3.0
1922	1	3	0	0	0.0	-33.300	19.100		3.7
1922	3	20	22	30	0.0	-30.500	29.400		4.3
1922	3	21	3	26	0.0	-28.000	31.000		3.7
1922	5	8	22	43	0.0	-28.000	31.000		3.0
1922	6	23	0	0	0.0	-26.800	30.400		5.0
1922	8	1	0	0	0.0	-26.800	30.400		5.0
1922	9	18	0	0	0.0	-30.500	29.400		3.7
1922	10	31	0	0	0.0	-33.500	22.500		3.0
1923	1	12	1	45	0.0	-29.400	25.000		3.0
1923	3	1	0	23	0.0	-30.500	25.500		3.7
1923	3	29	19	10	0.0	-28.000	31.000		4.0
1923	8	7	17	27	0.0	-30.500	29.400		3.0
1923	11	9	12	0	0.0	-26.600	30.600		3.7
1924	1	4	5	0	0.0	-25.500	26.100		3.0
1924	2	22	5	40	0.0	-34.000	18.400		3.0
1924	3	6	9	56	0.0	-30.500	29.400		3.7
1924	4	9	14	55	0.0	-23.900	30.100		4.0
1924	10	28	10	45	0.0	-30.500	29.400		3.0
1924	11	25	2	31	0.0	-24.900	28.200		3.7
1924	12	4	3	25	0.0	-27.500	28.700		3.7

1925	1	26	8	27	0.0	-24.000	30.300		3.0
1925	6	29	23	4	0.0	-25.900	32.500		4.3
1925	8	6	2	28	0.0	-31.000	22.100		3.7
1925	9	3	0	0	0.0	-30.500	29.400		3.7
1925	10	10	0	0	0.0	-22.800	17.000		5.0
1926	3	27	8	40	0.0	-27.800	30.800		3.7
1926	8	11	0	0	0.0	-33.400	18.400		4.0
1927	3	10	4	5	0.0	-28.400	32.300		3.7
1927	3	11	3	30	0.0	-26.300	31.100		3.7
1927	3	18	15	39	0.0	-27.000	30.800		3.0
1927	8	11	0	20	0.0	-26.600	30.600		3.0
1927	9	22	20	30	0.0	-33.000	27.900		3.7
1928	7	10	16	30	0.0	-30.400	27.700		3.0
1928	11	15	5	45	0.0	-28.900	31.500		3.7
1929	6	24	15	45	0.0	-28.900	31.700		3.7
1929	8	27	0	0	0.0	-26.300	31.100		3.0
1929	12	28	2	15	0.0	-30.500	29.400		3.7
1930	1	9	23	45	0.0	-27.300	30.100		4.0
1930	4	24	5	25	0.0	-30.500	29.400		3.7
1930	5	14	0	38	0.0	-28.900	31.700		3.0
1930	5	27	6	0	0.0	-23.600	30.200		3.7
1930	7	20	1	5	0.0	-30.200	30.000		4.3
1931	11	20	6	45	0.0	-28.900	18.200		3.7
1932	5	22	20	30	0.0	-26.300	31.100		3.0
1932	5	25	0	0	0.0	-29.300	30.000		3.0
1932	6	30	20	25	0.0	-30.500	29.400		3.7
1932	8	9	0	56	0.0	-33.300	26.500		5.0
1932	11	3	0	0	0.0	-23.000	16.000		3.7
1932	11	18	7	54	0.0	-24.000	18.000		3.7
1932	12	31	6	31	0.0	-28.500	32.800		6.3
1933	2	25	16	56	0.0	-33.300	26.500		3.0
1933	12	8	8	0	0.0	-23.900	30.100		3.7

1934	1	1	0	0	0.0	-22.500	17.000		3.0
1935	2	20	17	15	0.0	-28.700	31.900		3.0
1936	1	12	5	16	24.0	-27.000	31.500		5.0
1936	1	16	9	38	0.0	-29.800	25.300		5.0
1936	4	26	18	45	0.0	-33.800	25.000		3.0
1936	9	18	8	45	0.0	-28.400	32.300		3.0
1937	2	25	20	0	0.0	-30.400	29.000		3.0
1937	8	19	14	0	0.0	-33.400	18.400		3.0
1937	11	1	18	29	9.0	-28.700	16.900		3.7
1938	1	21	4	0	0.0	-30.500	29.400		3.7
1938	2	10	20	4	0.0	-27.800	31.300		4.3
1938	9	4	13	25	0.0	-32.400	28.700		3.0
1938	10	25	5	45	0.0	-28.200	28.700		3.0
1940	2	29	23	40	0.0	-28.600	28.200		4.3
1940	6	15	19	0	0.0	-23.100	28.900		3.7
1940	8	28	14	35	0.0	-30.000	30.500		3.0
1940	9	19	14	30	0.0	-28.600	31.400		3.0
1940	9	29	0	0	0.0	-30.800	30.200		3.7
1940	10	13	13	45	0.0	-32.500	24.000		4.3
1940	10	24	19	54	0.0	-30.000	30.500		3.0
1940	10	26	17	30	0.0	-29.500	25.200		3.0
1940	10	27	0	0	0.0	-29.500	25.200		3.0
1940	11	10	0	0	0.0	-33.300	26.700		3.0
1940	11	10	21	0	0.0	-24.000	30.200		5.0
1941	1	10	4	30	0.0	-27.400	31.600		3.7
1941	1	13	7	40	0.0	-27.400	31.600		3.7
1941	10	23	18	30	0.0	-31.000	17.700		4.3
1942	11	1	4	50	0.0	-31.100	30.500		5.5
1943	11	24	22	45	0.0	-30.000	23.000		4.3
1944	8	28	0	0	0.0	-32.500	22.500		3.0
1944	11	12	10	55	0.0	-29.000	27.700		4.3
1945	8	30	0	0	0.0	-21.000	15.800		4.3

1946	7	18	0	0	0.0	-21.400	16.000		4.3
1947	2	27	10	19	0.0	-32.800	17.800		3.7
1947	5	8	5	13	0.0	-28.600	32.100		3.7
1947	8	3	13	0	0.0	-26.600	15.200		3.7
1948	2	3	4	29	0.0	-29.100	30.600		4.3
1948	9	25	1	45	0.0	-30.300	29.900		4.3
1949	10	4	8	13	0.0	-24.000	31.500		4.0
1950	2	5	7	59	27.0	-31.200	29.800		3.7
1950	2	10	4	42	11.0	-19.500	25.000	0.0	4.9
1950	9	30	16	56	56.0	-30.500	18.000		5.5
1950	11	19	0	0	0.0	-34.000	18.000		4.2
1951	1	19	6	15	21.0	-29.500	24.500	0.0	3.9
1951	4	19	23	9	56.0	-18.800	23.400	0.0	5.6
1951	6	10	14	15	19.0	-19.000	24.000	0.0	5.1
1951	6	13	14	8	18.0	-31.900	23.200		3.9
1951	9	16	16	33	8.0	-33.000	22.500		4.6
1951	9	17	14	53	20.0	-18.500	23.000	0.0	5.9
1952	1	28	16	41	22.0	-32.900	20.500		5.4
1952	2	26	0	0	0.0	-34.000	20.400		4.2
1952	3	25	8	18	48.0	-30.000	28.300		3.5
1952	5	10	6	23	34.0	-18.000	22.500	0.0	5.5
1952	5	13	12	59	8.0	-32.900	20.500		4.4
1952	6	9	17	40	46.0	-27.500	18.600		5.5
1952	6	11	19	26	57.0	-30.100	29.800		4.2
1952	8	9	17	40	0.0	-27.500	18.600		5.5
1952	8	30	16	10	31.0	-30.000	27.500		3.4
1952	9	4	23	40	7.0	-23.500	15.000		5.0
1952	9	7	4	56	6.0	-29.000	28.000		3.8
1952	9	11	8	23	24.0	-18.500	22.000	0.0	6.1
1952	9	23	17	48	38.0	-33.300	27.200		1.8
1952	9	23	17	50	5.0	-33.300	27.200		2.0
1952	9	23	19	46	54.0	-30.000	29.000		3.2

1952	10	2	10	17	33.0	-18.000	24.000	0.0	4.9
1952	10	11	1	23	56.0	-19.000	23.000	0.0	6.7
1952	10	14	2	37	34.0	-29.800	27.000		4.4
1952	10	16	10	7	10.0	-19.000	25.000	0.0	5.3
1952	11	8	1	16	25.0	-25.000	20.000	0.0	5.2
1952	12	1	1	24	30.0	-30.500	29.500		2.5
1953	1	3	2	16	18.0	-30.500	27.500		3.4
1953	1	3	3	37	51.0	-30.500	27.500		3.4
1953	1	6	0	57	3.0	-30.500	27.500		3.6
1953	1	6	4	56	37.0	-30.500	27.500		3.4
1953	1	15	1	17	28.0	-30.500	27.500		4.1
1953	1	15	1	34	31.0	-30.500	27.500		3.3
1953	1	15	16	43	29.0	-30.500	27.500		3.4
1953	1	15	17	14	5.0	-30.500	27.500		3.5
1953	1	15	20	43	4.0	-30.500	27.500		4.0
1953	1	16	3	40	14.0	-30.500	27.500		3.8
1953	1	16	4	12	10.0	-30.500	27.500		3.2
1953	1	16	5	43	59.0	-30.500	27.500		3.6
1953	1	20	5	47	0.0	-33.300	26.500		3.0
1953	1	21	6	11	28.0	-30.500	27.500		3.9
1953	1	24	11	33	55.0	-30.500	27.500		3.6
1953	1	24	20	4	51.0	-30.500	27.500		4.2
1953	1	24	20	16	46.0	-30.500	27.500		3.5
1953	1	28	1	27	0.0	-30.500	27.500		3.4
1953	1	30	11	33	50.0	-30.500	27.500		4.4
1953	2	5	18	14	8.0	-30.500	27.000		3.4
1953	2	26	9	14	17.0	-30.000	21.000		4.4
1953	3	25	23	28	2.0	-30.300	28.500		3.5
1953	4	13	18	23	41.0	-26.000	25.000		3.4
1953	5	1	1	7	2.0	-29.000	17.000		5.8
1953	5	27	10	24	6.0	-19.500	23.000	0.0	5.4
1953	6	17	5	9	4.0	-30.000	28.500		3.9

1953	7	29	20	51	11.0	-30.500	28.000		3.6
1953	8	15	9	54	2.0	-30.500	28.500		3.0
1953	8	31	19	48	32.0	-30.000	26.500		3.0
1953	11	5	21	1	49.0	-30.500	24.000		3.2
1953	11	5	21	5	7.0	-30.500	24.000		3.3
1953	11	27	19	2	4.0	-18.000	25.000	0.0	5.5
1954	1	6	15	35	24.0	-30.000	26.500		4.2
1954	2	9	23	3	30.0	-29.500	25.000		3.2
1954	8	18	18	0	6.0	-19.500	23.500	0.0	5.5
1954	9	9	12	48	48.0	-26.667	31.333		3.4
1954	11	18	1	29	54.0	-28.200	27.250		3.6
1954	11	26	21	39	40.0	-18.000	13.000		5.3
1954	11	28	21	39	40.0	-18.000	13.000		5.3
1955	5	20	6	23	40.0	-29.300	25.300		5.1
1955	7	30	13	24	30.0	-26.000	29.667		4.2
1955	10	28	13	17	16.0	-29.500	25.500		4.0
1955	11	27	19	2	4.0	-18.000	25.000	0.0	5.5
1956	4	23	16	52	30.0	-19.000	27.000	0.0	3.0
1956	6	26	9	9	52.0	-30.000	26.500		2.9
1956	6	29	19	50	40.0	-28.300	31.300		3.0
1956	7	13	14	12	4.0	-30.333	29.667		3.4
1956	10	23	21	21	3.0	-31.200	22.200		3.5
1957	4	13	21	54	4.0	-30.333	27.167		4.9
1957	4	23	13	23	20.0	-30.300	27.200		4.7
1957	8	2	1	0	0.0	-22.500	31.300		3.7
1957	9	20	3	38	0.0	-34.000	18.200		4.2
1957	9	30	0	0	0.0	-34.000	18.200		4.2
1958	2	10	18	54	10.0	-29.300	28.200		3.8
1958	2	11	15	50	52.0	-29.300	28.200		3.8
1959	6	1	11	23	0.0	-21.300	27.000	0.0	4.5
1959	6	14	15	2	52.0	-21.200	17.000		4.5
1959	8	12	18	30	56.0	-26.000	30.500		3.2

1960	1	21	19	26	30.0	-26.800	28.000		4.5
1960	2	15	1	48	34.0	-26.300	30.000		4.0
1960	6	16	0	30	0.0	-26.000	32.000		3.7
1960	8	29	7	35	0.0	-33.400	19.300		4.8
1962	5	19	7	3	5.0	-24.000	29.000		3.5
1963	4	2	16	40	0.0	-26.000	32.600		3.0
1963	7	9	19	5	33.0	-18.000	23.300		3.0
1963	7	15	6	13	58.0	-20.000	23.300	0.0	5.0
1963	7	30	14	30	0.0	-26.000	32.000		3.7
1963	8	27	0	48	0.0	-33.100	19.000		5.0
1963	9	17	23	40	0.0	-33.300	19.300		4.8
1963	9	23	9	7	0.0	-26.000	32.600		2.3
1964	2	21	0	0	0.0	-34.100	18.000		4.3
1964	6	9	20	1	18.0	-29.000	25.000		4.0
1964	9	2	20	26	34.0	-24.000	32.000		3.2
1965	9	28	0	0	0.0	-33.900	22.000		4.3
1965	11	9	1	30	0.0	-19.000	24.000	0.0	4.6
1966	2	2	8	14	9.0	-22.000	23.000	0.0	3.4
1966	2	17	17	6	35.0	-18.000	25.000	0.0	2.9
1966	2	18	11	42	4.0	-29.500	25.000		4.0
1966	2	22	4	36	53.0	-29.000	28.000		3.8
1966	3	1	0	4	0.0	-34.100	18.000		4.3
1966	3	4	23	15	39.0	-20.000	22.000	0.0	2.7
1966	3	5	11	9	10.0	-20.000	22.000	0.0	2.7
1966	3	15	15	40	59.4	-26.200	28.000	34.0	4.9
1966	3	26	9	42	18.9	-18.500	26.400	33.0	5.2
1966	3	30	13	14	16.0	-27.000	32.000		2.6
1966	4	2	4	0	31.0	-18.300	26.500		2.0
1966	4	29	7	27	10.0	-20.000	20.000		3.0
1966	5	6	17	27	37.4	-26.100	28.000	15.0	4.9
1966	6	18	5	21	6.0	-29.520	29.370		4.2
1966	6	20	2	22	43.0	-28.300	31.000		4.0

1966	7	11	14	16	35.0	-25.000	26.000		3.0
1966	7	15	17	5	35.0	-18.000	13.000		3.6
1966	8	15	19	37	2.0	-22.700	23.800	0.0	4.1
1966	8	23	17	58	26.0	-18.300	26.300		3.2
1966	8	25	1	27	38.0	-28.400	19.300		3.7
1966	8	25	1	27	38.0	-28.400	13.000		3.6
1966	8	27	22	19	45.0	-21.000	25.600	0.0	3.4
1966	9	14	2	21	16.0	-19.400	22.300	0.0	3.0
1966	9	15	19	37	6.0	-24.000	23.000	0.0	4.3
1966	10	3	19	30	5.0	-21.600	23.600	0.0	2.4
1966	10	13	11	7	7.0	-23.300	30.800		3.2
1966	10	22	13	14	11.4	-26.300	27.400	16.0	4.8
1966	11	9	9	48	40.0	-26.100	31.200		3.1
1966	11	9	15	1	54.0	-19.300	23.800	0.0	2.9
1966	11	17	23	30	12.0	-19.000	23.000		2.8
1967	2	5	10	21	1.0	-18.000	23.600	0.0	3.9
1967	3	11	13	32	36.0	-23.800	31.200		2.4
1967	4	13	18	13	27.0	-29.700	29.000		4.2
1967	4	26	13	41	7.0	-23.800	31.500		2.4
1967	5	10	17	7	32.0	-20.200	25.300	0.0	3.0
1967	6	10	5	43	34.0	-19.500	22.400	0.0	3.9
1967	6	10	8	48	43.0	-19.500	22.400	0.0	3.3
1967	6	10	15	52	22.0	-23.600	26.200	0.0	4.4
1967	6	11	16	26	9.0	-18.900	26.900		2.7
1967	6	16	14	51	35.0	-30.400	18.400		4.3
1967	6	16	18	59	35.0	-30.200	27.600		3.6
1967	6	21	3	58	8.0	-19.500	26.400	0.0	2.8
1967	6	22	9	24	12.0	-22.000	18.000		4.2
1967	7	3	15	41	18.0	-26.200	30.900		2.9
1967	7	7	13	6	5.0	-23.900	31.000		2.7
1967	7	12	22	36	22.0	-30.000	20.000		3.7
1967	8	9	23	10	29.0	-31.300	23.300		3.6

1967	8	22	2	33	7.9	-19.600	23.600	33.0	4.1
1967	8	23	12	41	2.0	-29.700	30.000		3.8
1967	10	17	6	41	3.0	-19.500	23.100	0.0	3.4
1967	11	21	0	13	15.0	-23.900	31.200		2.9
1967	11	21	0	14	32.0	-23.900	31.200		2.4
1967	12	4	13	11	49.0	-19.000	22.500	0.0	2.7
1967	12	23	13	47	48.0	-23.900	31.400		2.8
1967	12	30	2	0	52.0	-19.900	26.500		2.3
1968	1	9	9	54	53.0	-29.800	28.300		3.3
1968	1	11	19	50	27.0	-30.300	28.500		3.9
1968	1	12	1	0	7.0	-33.170	23.500	12.0	4.9
1968	1	12	1	0	8.0	-33.700	25.200		5.5
1968	2	5	12	33	57.0	-17.700	23.500		2.7
1968	2	12	19	11	55.0	-18.300	23.100	0.0	3.0
1968	2	15	3	52	30.0	-23.000	28.700		2.6
1968	2	23	6	15	12.0	-18.400	26.300		2.8
1968	2	24	2	23	48.0	-30.200	20.000		3.6
1968	3	5	7	2	41.0	-24.000	23.000	0.0	2.9
1968	3	19	12	0	24.0	-29.900	28.300		3.2
1968	5	22	19	45	58.0	-22.500	24.100	0.0	3.0
1968	5	28	7	49	57.0	-22.500	24.100	0.0	2.8
1968	6	22	0	56	37.0	-25.100	15.900		3.7
1968	7	17	5	25	33.0	-19.600	23.600	0.0	3.5
1968	7	20	5	2	38.0	-24.100	31.300		2.3
1968	8	11	16	21	25.0	-20.300	22.400	0.0	3.2
1968	8	22	22	45	55.8	-19.763	23.266	33.0	4.5
1968	8	28	14	45	17.0	-19.700	24.100	0.0	2.6
1968	8	29	22	33	34.0	-22.000	17.000		3.5
1968	8	31	13	13	32.0	-29.600	25.900		4.4
1968	9	27	12	42	27.0	-29.000	25.000		3.4
1968	10	5	23	10	12.0	-18.900	23.900	0.0	3.1
1968	10	29	13	9	51.0	-19.300	23.200	0.0	3.3

1968	11	28	18	28	45.0	-19.600	15.700	0.0	4.9
1968	12	25	9	16	46.1	-26.748	26.867	2.0	5.8
1969	1	13	0	3	34.0	-26.000	17.000		3.8
1969	1	15	14	16	24.0	-23.900	31.100		2.7
1969	1	16	13	13	52.0	-24.100	31.100		2.4
1969	1	29	14	50	22.0	-30.400	27.600		3.2
1969	2	23	1	13	44.0	-27.700	17.500		3.7
1969	3	3	12	22	15.0	-19.900	23.300	0.0	3.1
1969	3	6	1	29	2.0	-18.800	25.300	0.0	2.3
1969	3	24	12	55	12.0	-19.700	13.100	0.0	4.9
1969	3	25	20	11	27.0	-19.000	26.100	0.0	2.8
1969	4	6	22	8	35.0	-18.200	26.500		2.2
1969	4	8	10	59	56.0	-18.300	26.400		2.4
1969	4	23	17	35	29.7	-27.630	27.035	33.0	4.9
1969	5	3	7	38	12.0	-18.200	26.300		2.3
1969	5	30	12	31	35.0	-24.000	31.100		2.5
1969	6	5	22	17	23.0	-29.900	30.300		3.4
1969	6	7	9	55	50.0	-23.600	28.300		3.2
1969	8	14	14	23	0.0	-19.600	26.100	0.0	3.0
1969	8	20	22	46	50.0	-20.200	22.600	0.0	3.0
1969	8	30	15	52	27.4	-26.857	26.875	14.0	5.7
1969	9	3	2	29	50.0	-17.600	24.600		3.0
1969	9	7	15	59	21.0	-18.400	23.600		2.7
1969	9	11	21	45	19.2	-34.000	21.000	33.0	4.8
1969	9	24	14	33	8.0	-21.600	28.800		2.4
1969	9	29	20	3	26.0	-33.280	19.210	10.0	6.2
1969	10	31	22	9	56.3	-28.100	27.065	38.0	5.1
1969	11	16	13	46	8.9	-25.880	28.186	33.0	4.8
1969	11	20	3	19	41.8	-26.144	28.133	33.0	5.0
1969	12	29	8	41	58.0	-27.517	26.884	33.0	4.8
1970	1	1	14	35	23.2	-26.166	28.173	33.0	5.2
1970	1	7	17	0	43.4	-26.092	27.659	33.0	5.2

1970	1	20	6	3	15.0	-29.900	29.900		3.2
1970	1	22	3	16	38.0	-18.200	26.400		3.3
1970	1	22	21	28	36.3	-26.134	27.415	33.0	5.1
1970	2	11	3	9	2.0	-19.600	24.000	0.0	3.1
1970	2	23	3	9	34.0	-20.300	22.100	0.0	3.6
1970	3	21	23	56	56.6	-27.875	27.767	33.0	3.3
1970	3	26	13	40	47.0	-24.000	31.100		2.2
1970	4	14	19	8	17.0	-33.343	19.311	33.0	5.8
1970	4	18	13	7	46.0	-19.000	26.100		2.3
1970	4	22	10	17	37.0	-27.900	31.700		3.7
1970	4	25	19	56	51.0	-19.600	23.000	0.0	3.1
1970	5	10	18	55	5.0	-19.000	23.900	0.0	2.8
1970	5	22	3	54	41.5	-26.016	27.970	37.0	4.9
1970	6	15	4	24	21.0	-26.060	28.123	33.0	5.6
1970	6	15	17	18	8.5	-26.006	27.846	33.0	5.2
1970	6	22	23	52	37.0	-18.000	26.000		2.1
1970	6	27	13	55	7.2	-26.273	27.377	33.0	5.0
1970	7	4	19	14	40.0	-21.500	28.500		2.1
1970	7	15	1	30	25.4	-26.394	27.296	33.0	5.4
1970	8	18	22	19	31.0	-26.419	27.345	33.0	5.2
1970	8	22	13	32	28.6	-26.358	27.390	33.0	5.4
1970	9	3	21	22	4.0	-18.400	26.200		4.3
1970	9	25	14	22	58.5	-26.852	26.819	33.0	5.3
1970	9	29	13	31	45.5	-26.558	26.924	33.0	5.5
1970	10	31	2	42	9.9	-26.846	26.883	33.0	5.5
1970	11	11	21	51	22.0	-21.500	27.600	0.0	2.6
1970	11	19	5	30	18.6	-22.190	30.730		5.0
1970	11	19	21	22	29.0	-18.200	23.600	0.0	3.3
1970	12	2	1	38	4.6	-26.042	28.179	33.0	5.0
1971	1	3	16	25	27.3	-26.112	27.692	33.0	5.0
1971	1	4	18	1	35.5	-28.100	25.900	2.0	3.4
1971	1	12	21	31	28.7	-25.879	28.025	26.0	4.0

1971	1	16	14	3	59.3	-25.985	28.276	24.0	5.2
1971	1	25	5	33	30.8	-26.700	26.700	2.0	4.0
1971	1	27	18	18	26.1	-27.500	31.100	30.0	4.3
1971	1	27	20	53	2.0	-26.015	27.944	13.0	4.2
1971	1	29	23	24	4.5	-25.911	28.095	33.0	5.2
1971	2	5	1	23	13.7	-29.562	28.134	33.0	5.0
1971	2	19	14	16	54.4	-26.077	27.815	33.0	4.0
1971	2	20	1	22	20.5	-26.400	26.900	2.0	4.0
1971	2	22	12	17	8.0	-18.425	26.474	33.0	4.3
1971	2	22	19	15	18.0	-18.400	26.500	0.0	2.8
1971	3	3	17	13	49.9	-19.900	15.400	30.0	5.4
1971	3	3	17	45	51.0	-19.800	15.400	30.0	4.9
1971	3	9	1	2	57.1	-18.500	25.900	30.0	3.7
1971	3	9	1	3	1.0	-18.600	26.500	0.0	3.1
1971	3	10	0	36	57.0	-18.500	26.300		3.1
1971	3	10	0	56	57.0	-18.500	26.300	0.0	2.4
1971	3	14	23	20	46.2	-26.298	27.415	38.0	4.2
1971	3	15	17	16	10.3	-21.600	26.100	50.0	3.8
1971	4	6	1	36	48.0	-27.700	26.600	2.0	4.1
1971	5	1	7	37	50.2	-20.400	23.100	30.0	3.7
1971	6	23	17	9	27.9	-26.067	27.412	33.0	5.4
1971	6	27	15	15	0.0	-18.100	26.100		3.2
1971	6	27	15	24	53.0	-18.100	26.100	0.0	5.1
1971	7	5	15	24	54.6	-18.600	23.900	10.0	5.1
1971	7	29	3	15	40.4	-31.700	25.800	30.0	4.2
1971	8	2	16	52	28.7	-27.759	26.964	33.0	4.8
1971	8	19	7	41	23.0	-20.500	23.500		3.4
1971	8	29	1	50	32.0	-21.200	23.200		3.7
1971	8	29	22	17	55.1	-25.000	25.700	30.0	3.8
1971	8	29	22	18	5.0	-23.600	25.900	0.0	3.4
1971	9	1	22	53	27.9	-26.500	26.843	33.0	5.3
1971	9	9	13	23	57.9	-26.531	26.746	33.0	5.2

1971	9	28	17	1	14.5	-33.000	19.500		5.1
1971	10	14	4	59	1.2	-26.148	27.661	54.0	5.6
1971	11	4	18	49	4.1	-26.358	27.392	33.0	5.1
1971	12	8	10	27	39.4	-28.069	26.844	33.0	5.2
1971	12	16	20	59	55.7	-18.770	24.100	30.0	4.0
1972	1	9	23	24	19.6	-22.100	31.000	33.0	3.4
1972	1	14	1	7	17.0	-24.451	27.352	32.0	5.2
1972	1	14	1	7	17.0	-24.451	27.352	32.0	4.8
1972	1	17	23	46	17.9	-26.100	27.800	2.0	4.0
1972	1	22	10	37	14.2	-32.100	31.200		4.0
1972	1	22	13	13	59.3	-19.481	23.426	33.0	4.6
1972	1	26	3	5	9.0	-19.700	23.400		3.3
1972	2	1	2	20	46.0	-19.900	23.400		3.4
1972	2	8	15	47	5.6	-26.500	27.400	2.0	4.1
1972	2	9	2	20	3.0	-19.800	23.300		3.3
1972	2	13	1	55	43.5	-29.300	27.200	30.0	3.6
1972	2	29	20	53	10.1	-26.000	27.700	2.0	4.0
1972	3	6	14	6	10.4	-20.274	23.092	33.0	3.7
1972	3	8	15	50	17.0	-19.300	23.300	33.0	3.5
1972	3	9	23	7	45.3	-26.224	27.440	33.0	5.2
1972	3	17	7	36	43.4	-27.000	26.900	2.0	4.2
1972	3	23	8	34	45.7	-26.100	27.100	2.0	4.0
1972	4	25	17	26	27.6	-26.113	27.582	33.0	4.1
1972	5	4	21	19	28.3	-26.300	27.500	2.0	4.2
1972	5	27	1	0	39.0	-19.600	14.700		3.9
1972	6	6	9	52	46.0	-20.300	18.000		2.7
1972	6	10	0	11	18.4	-26.409	27.398	33.0	4.1
1972	6	10	12	51	50.9	-26.111	27.428	33.0	5.2
1972	6	27	16	27	52.0	-26.137	27.390	33.0	4.1
1972	7	3	7	51	57.8	-26.071	27.733	33.0	5.4
1972	7	4	18	30	13.6	-27.692	26.521	33.0	4.5
1972	7	19	17	35	25.5	-31.700	25.800	33.0	4.1

1972	7	22	14	54	34.3	-28.100	26.900	2.0	4.0
1972	9	1	4	19	52.5	-26.400	28.300	2.0	4.0
1972	9	2	22	17	5.3	-26.261	27.399	33.0	4.8
1972	9	2	22	31	15.5	-26.096	27.410	33.0	5.4
1972	9	13	17	40	42.4	-26.400	27.400	2.0	4.1
1972	9	21	23	26	18.0	-29.500	25.600		4.9
1972	10	9	23	38	23.3	-26.500	27.400	2.0	4.3
1972	11	1	21	14	40.3	-27.000	26.900	2.0	4.7
1972	11	2	14	43	42.0	-26.295	27.344	20.0	4.8
1972	12	10	10	50	5.0	-26.428	26.645	26.0	5.1
1972	12	29	17	6	21.3	-28.029	27.023	33.0	5.4
1973	1	4	6	7	18.0	-19.500	23.200		3.7
1973	1	10	18	55	6.4	-26.500	27.300	2.0	4.0
1973	1	12	5	27	14.8	-33.327	19.103	7.0	4.5
1973	1	17	11	39	36.1	-26.272	28.126	30.0	5.1
1973	1	24	11	19	46.2	-26.041	28.130	33.0	5.2
1973	1	29	13	54	52.0	-20.600	17.200	5.0	4.9
1973	2	5	18	12	35.4	-23.700	30.500	5.0	4.4
1973	2	6	9	50	41.4	-26.387	28.388	33.0	4.3
1973	3	9	13	1	46.5	-27.988	27.055	33.0	4.3
1973	3	18	1	39	13.1	-26.300	27.500	2.0	4.2
1973	3	25	20	2	26.7	-26.005	27.930	30.0	5.3
1973	3	26	3	10	36.5	-26.000	28.200	2.0	4.0
1973	3	27	0	48	7.7	-26.176	28.164	33.0	5.2
1973	4	7	20	17	11.6	-25.100	32.300	5.0	2.9
1973	4	16	2	49	16.6	-26.900	26.800	2.0	4.0
1973	4	22	2	9	11.3	-30.600	27.400	5.0	3.5
1973	4	26	3	46	59.1	-26.123	28.196	33.0	4.0
1973	4	27	9	48	21.4	-26.291	27.662	31.0	5.2
1973	7	5	17	59	47.3	-26.031	27.425	33.0	5.4
1973	7	8	9	27	6.0	-18.200	24.200	0.0	3.0
1973	7	11	8	54	51.7	-24.700	31.400	5.0	3.2

1973	7	17	16	5	12.8	-26.300	27.500	2.0	4.2
1973	8	14	13	1	3.3	-26.847	26.770	33.0	4.9
1973	8	25	7	48	8.2	-26.099	27.699	14.0	5.4
1973	8	29	15	6	5.1	-22.484	29.245	33.0	5.2
1973	9	6	20	13	35.7	-27.832	26.840	33.0	5.1
1973	9	16	17	52	56.0	-19.600	16.900	5.0	4.1
1973	9	30	6	58	29.0	-26.605	26.618	33.0	5.4
1973	10	1	19	26	23.5	-26.015	27.373	33.0	5.4
1973	10	11	10	18	51.0	-20.400	25.100	0.0	2.9
1973	10	31	8	18	12.0	-18.500	14.300		4.0
1973	11	21	8	16	47.4	-26.377	27.461	62.0	5.3
1973	12	3	19	22	26.5	-25.934	27.994	33.0	4.9
1973	12	19	3	6	58.8	-27.053	26.772	33.0	5.4
1974	1	1	23	28	19.0	-17.300	25.000		3.3
1974	1	9	16	15	10.0	-19.200	26.200		3.9
1974	1	20	0	42	42.0	-19.800	27.400		3.0
1974	1	21	15	15	54.0	-26.091	28.136	25.0	4.9
1974	1	24	14	19	24.7	-26.400	27.400	2.0	4.4
1974	2	1	15	49	29.4	-18.070	25.880	33.0	5.2
1974	3	15	11	34	21.9	-26.400	27.300	2.0	4.2
1974	3	17	9	1	56.3	-26.900	26.600	2.0	4.1
1974	3	21	12	17	35.4	-26.400	27.400	2.0	4.5
1974	4	3	19	6	59.0	-18.800	27.000		2.9
1974	4	24	6	59	2.0	-22.200	24.200	0.0	3.6
1974	4	26	17	53	45.0	-27.000	16.900		3.8
1974	5	7	5	40	53.2	-26.400	27.500	2.0	4.1
1974	5	14	6	51	15.4	-26.272	27.533	22.0	4.5
1974	5	15	15	20	41.1	-20.100	23.400	1.0	4.1
1974	6	24	15	12	57.8	-26.266	27.261	16.0	4.6
1974	6	25	15	27	32.2	-26.400	27.200	2.0	4.4
1974	7	8	15	6	41.3	-26.500	27.500	2.0	4.2
1974	7	23	14	9	56.0	-26.604	26.996	33.0	5.3

1974	12	19	9	17	53.5	-33.294	19.249	5.0	3.1
1974	12	23	17	22	58.1	-33.436	18.802	5.0	3.5
1975	1	5	11	52	16.5	-26.500	27.500	2.0	4.1
1975	1	5	17	47	59.7	-29.900	20.700	33.0	3.9
1975	1	5	17	48	2.0	-32.370	23.343	10.0	3.7
1975	1	7	14	33	19.1	-26.600	24.200	3.0	2.6
1975	1	8	0	1	6.8	-29.600	30.400	10.0	3.5
1975	1	18	6	4	5.0	-21.800	16.700		3.8
1975	2	11	5	5	14.9	-26.500	27.500	2.0	4.0
1975	2	11	5	5	15.6	-26.162	27.342	21.0	4.6
1975	2	15	22	3	3.9	-25.724	28.342	33.0	5.2
1975	5	14	0	17	40.9	-28.800	25.800	10.0	3.7
1975	6	4	17	56	49.0	-26.900	27.000	2.0	4.0
1975	6	8	18	32	53.5	-29.300	25.167	33.0	4.5
1975	6	10	0	11	26.9	-29.500	25.100	5.0	3.3
1975	8	3	16	49	38.0	-22.100	30.900		3.3
1975	8	10	15	42	53.3	-30.300	27.700	10.0	4.1
1975	9	25	0	14	47.2	-26.500	27.600	2.0	4.0
1975	10	20	23	28	3.0	-24.700	31.800		3.5
1976	2	21	11	45	4.1	-26.400	26.300	2.0	2.9
1976	2	28	3	52	23.0	-26.300	27.500		4.0
1976	3	6	0	9	18.0	-18.200	26.500		3.2
1976	3	18	11	36	17.9	-24.600	27.200	10.0	4.0
1976	4	3	8	29	54.0	-19.300	27.400		3.8
1976	4	10	22	5	13.2	-26.200	28.000	2.0	4.1
1976	4	13	11	58	40.9	-26.500	27.600	2.0	4.2
1976	4	30	1	41	56.9	-26.400	27.400	2.0	4.0
1976	5	3	2	15	52.0	-29.700	28.100		3.6
1976	5	15	11	10	24.0	-19.000	27.000		2.9
1976	5	21	10	15	10.0	-18.600	26.300		2.8
1976	5	28	23	15	32.0	-18.600	26.400		3.2
1976	6	3	1	7	27.0	-18.700	22.700		4.2

1976	6	4	12	34	9.0	-30.925	29.908		4.8
1976	7	1	11	24	5.3	-29.508	25.167	33.0	5.8
1976	7	6	9	21	13.0	-22.200	31.100		4.0
1976	7	20	15	40	52.3	-19.600	23.500	10.0	3.8
1976	9	30	21	41	3.0	-25.000	28.400		3.2
1976	10	5	20	29	22.0	-20.500	26.800	0.0	2.9
1976	12	8	8	38	21.0	-27.900	26.800		5.1
1977	1	25	23	1	22.2	-28.000	16.900	10.0	4.4
1977	3	2	4	55	21.0	-32.228	20.920	10.0	5.6
1977	3	14	15	41	33.0	-28.114	27.104	33.0	5.2
1977	3	20	19	52	27.7	-29.500	25.000	10.0	2.7
1977	3	23	1	35	11.8	-29.500	25.000	10.0	2.4
1977	4	7	11	54	37.1	-26.933	26.656	11.0	5.2
1977	4	12	23	15	26.1	-29.600	24.900	10.0	2.1
1977	4	28	23	26	9.5	-33.200	19.100	10.0	3.8
1977	5	19	22	8	1.8	-24.500	18.100	10.0	2.8
1977	5	24	7	47	8.6	-23.400	17.600	10.0	3.5
1977	6	7	20	19	28.0	-33.300	19.300	10.0	5.2
1977	6	7	20	20	48.2	-29.700	24.400	10.0	4.5
1977	6	11	9	34	16.0	-19.500	23.500		3.4
1977	6	16	20	18	17.6	-26.100	16.300	10.0	3.5
1977	6	21	8	15	22.9	-29.500	25.400	5.0	2.8
1977	6	21	14	26	38.0	-29.400	24.900	5.0	2.6
1977	6	28	9	20	4.4	-29.500	25.200	10.0	2.7
1977	7	5	21	38	18.8	-26.400	25.500	2.0	3.2
1977	7	10	22	8	34.6	-29.490	25.110	2.0	3.4
1977	7	13	14	16	55.6	-29.600	25.000	10.0	2.4
1977	7	16	11	43	55.0	-26.400	33.600		3.8
1977	7	16	13	44	26.0	-26.300	16.200		4.4
1977	7	28	4	7	12.0	-18.400	26.300		3.0
1977	7	30	13	8	43.0	-18.200	26.200		3.1
1977	8	2	1	11	25.8	-26.400	27.420	2.0	4.3

1977	8	7	22	12	17.4	-29.600	25.100	10.0	2.7
1977	8	8	21	1	39.7	-23.940	22.260	2.0	3.7
1977	8	11	4	54	39.0	-17.800	25.100		3.1
1977	9	8	17	3	43.0	-18.700	26.700		2.8
1977	9	17	12	27	24.2	-26.400	27.400	2.0	4.1
1977	9	20	23	36	4.7	-26.440	27.560	2.0	4.0
1977	9	23	12	50	33.5	-27.250	32.590	2.0	4.0
1977	10	3	16	46	39.0	-19.900	13.900		4.0
1977	10	6	5	39	45.0	-25.900	16.100		3.9
1977	10	28	0	22	18.0	-19.100	26.200		3.6
1977	11	4	4	12	38.0	-19.000	26.300	0.0	3.3
1977	11	22	17	20	55.3	-28.180	28.840	2.0	3.1
1977	12	7	14	31	46.2	-26.410	27.400	2.0	4.0
1978	1	27	4	33	55.0	-22.300	15.900		4.2
1978	2	6	1	45	3.0	-18.800	24.200	0.0	3.0
1978	2	19	11	52	26.4	-33.400	19.300		2.4
1978	2	20	4	38	45.1	-33.400	19.300		2.9
1978	2	25	3	56	30.5	-33.400	19.300		2.1
1978	2	28	19	33	32.5	-29.570	25.160	1.0	3.2
1978	3	3	4	14	1.5	-23.000	18.000		4.3
1978	3	9	19	2	29.4	-26.400	27.400	2.0	4.0
1978	3	19	15	0	10.5	-33.400	19.300		2.7
1978	3	21	23	30	45.9	-26.550	27.580	2.0	4.1
1978	4	4	10	55	55.3	-33.400	19.300		2.2
1978	4	5	13	4	51.5	-33.400	19.300		2.2
1978	4	9	17	15	47.3	-33.400	19.300		2.6
1978	4	10	11	56	57.1	-33.400	19.300		2.3
1978	4	10	21	30	18.5	-33.400	19.300		2.4
1978	4	11	15	51	40.0	-33.400	19.300		3.1
1978	4	14	5	30	50.0	-18.100	24.700	0.0	3.6
1978	4	17	21	41	6.1	-26.600	27.500	2.0	4.0
1978	4	18	15	3	27.0	-26.400	27.500	2.0	4.0

1978	4	18	16	50	25.9	-24.560	26.530	2.0	4.2
1978	4	19	15	28	52.3	-33.400	19.300		2.3
1978	4	21	6	28	17.7	-26.300	28.390	2.0	4.3
1978	4	24	7	10	12.6	-26.110	16.350	2.0	3.7
1978	5	2	16	57	33.4	-26.200	28.400	2.0	4.3
1978	5	7	11	45	10.1	-26.500	27.500	2.0	4.0
1978	5	17	5	41	52.0	-33.400	19.300		2.6
1978	6	1	1	46	15.7	-33.400	19.300		2.1
1978	6	1	17	24	29.2	-33.400	19.300		2.6
1978	6	2	11	16	47.3	-29.500	25.200	10.0	3.6
1978	6	16	11	14	24.0	-22.200	29.200	0.0	3.4
1978	6	21	13	57	33.6	-33.400	19.300		2.3
1978	6	21	22	14	38.0	-33.400	19.300		2.4
1978	7	8	12	15	33.0	-30.600	25.500		2.6
1978	7	17	10	34	13.5	-24.300	31.300		3.8
1978	7	27	23	31	33.0	-29.400	31.400		3.1
1978	8	5	19	19	8.0	-27.800	26.500		4.3
1978	8	10	17	39	43.9	-18.020	25.800	0.0	3.5
1978	8	16	15	39	13.2	-26.400	27.500	2.0	4.0
1978	8	25	10	51	25.0	-20.000	24.500		3.5
1978	9	11	5	40	36.0	-33.400	19.300		2.6
1978	9	25	9	36	22.8	-25.000	26.300	10.0	4.1
1978	9	29	11	38	12.6	-33.400	19.300		2.9
1978	10	21	4	44	33.8	-33.400	19.300		2.7
1978	10	24	10	41	17.3	-33.400	19.300		2.1
1978	10	24	12	7	3.0	-26.200	16.300		4.0
1978	10	25	2	54	15.7	-25.200	18.000	10.0	4.3
1978	10	26	18	39	57.3	-33.400	19.300		2.1
1978	11	26	15	32	55.5	-33.400	19.300		2.6
1978	12	8	9	39	24.2	-33.400	19.300		2.7
1978	12	8	14	21	6.2	-26.780	30.360	2.0	4.5
1978	12	8	14	21	26.0	-26.400	27.400		4.0

1978	12	10	23	45	14.0	-26.400	16.000		4.0
1978	12	22	16	36	29.0	-26.500	27.600	2.0	4.0
1978	12	27	17	30	21.0	-28.400	28.600		4.0
1979	1	13	15	19	6.7	-26.500	27.500	2.0	4.0
1979	1	19	15	18	8.6	-26.600	27.700	2.0	4.1
1979	1	24	10	54	44.8	-27.000	26.800	2.0	4.1
1979	1	25	9	42	11.0	-27.000	26.900	2.0	4.2
1979	2	15	7	36	12.0	-19.500	23.400		3.8
1979	2	21	10	59	1.1	-29.600	21.000	10.0	5.1
1979	3	12	16	27	4.7	-29.550	24.890	10.0	3.1
1979	4	6	5	33	11.0	-26.900	26.700	2.0	4.1
1979	4	10	0	48	55.0	-24.500	31.800		4.1
1979	5	8	21	26	44.0	-23.600	30.300		3.8
1979	5	18	15	34	40.6	-26.450	27.520	2.0	4.1
1979	5	27	15	11	17.0	-26.500	27.500	2.0	4.0
1979	5	29	11	50	28.0	-19.000	24.200		3.8
1979	6	11	8	34	41.0	-18.600	25.300		3.7
1979	6	13	14	29	55.4	-26.280	27.290	2.0	4.0
1979	6	16	6	36	45.6	-29.530	25.140	10.0	3.3
1979	6	20	16	8	4.6	-26.400	27.500	2.0	4.1
1979	6	23	7	33	44.0	-26.300	28.000		4.6
1979	6	26	15	17	57.4	-26.300	27.600	2.0	4.1
1979	7	6	3	1	12.0	-26.100	27.900		4.7
1979	7	23	22	41	46.0	-22.100	28.900	0.0	3.1
1979	7	25	15	5	42.3	-26.400	27.500	2.0	4.0
1979	7	27	20	57	42.8	-26.410	27.400	2.0	4.0
1979	8	4	9	30	47.4	-31.100	19.000	10.0	4.5
1979	8	4	9	31	10.9	-29.686	20.732	10.0	4.8
1979	8	7	9	22	14.0	-29.800	21.500	10.0	4.4
1979	8	7	16	37	18.0	-17.300	24.400		3.5
1979	8	11	4	0	4.8	-29.805	20.808	10.0	4.8
1979	8	17	1	9	46.2	-29.400	20.200	10.0	4.3

1979	8	17	1	10	0.9	-29.953	21.463	10.0	4.4
1979	8	21	9	36	32.0	-24.700	31.400		4.4
1979	9	5	22	46	35.7	-26.300	28.400	2.0	4.0
1979	10	2	18	52	54.4	-27.000	26.900	2.0	4.0
1979	10	24	0	48	53.0	-20.200	22.300		3.9
1979	11	19	7	18	12.6	-28.060	26.820	2.0	4.1
1979	11	28	0	25	43.0	-24.200	28.300	10.0	4.2
1979	11	30	15	1	38.0	-23.600	28.000		3.8
1979	12	20	14	59	35.0	-26.300	27.700		4.4
1979	12	30	22	19	30.0	-25.000	17.000		4.8
1980	1	9	22	51	49.0	-18.200	26.500		3.8
1980	1	23	9	45	39.0	-22.000	20.000		5.0
1980	1	23	9	45	49.0	-19.806	17.071	33.0	4.9
1980	1	28	6	30	45.4	-27.024	26.300	33.0	4.9
1980	1	28	6	30	59.8	-26.400	27.400	2.0	4.0
1980	2	5	14	26	45.0	-18.600	26.300		3.4
1980	2	17	0	58	33.0	-26.844	30.174	33.0	4.3
1980	2	17	20	58	3.0	-28.000	26.800		4.4
1980	2	17	21	1	21.5	-27.621	26.787	33.0	5.1
1980	3	22	2	14	11.9	-26.200	27.800	2.0	3.8
1980	4	3	22	45	40.3	-26.200	27.800	2.0	4.0
1980	4	8	0	39	34.6	-26.304	27.611	33.0	4.6
1980	4	25	22	13	42.1	-30.320	23.290	5.0	3.0
1980	5	9	8	16	25.2	-30.400	25.800	10.0	2.6
1980	6	12	3	3	41.6	-26.900	26.900		4.0
1980	6	13	21	15	6.5	-27.000	26.900	2.0	3.9
1980	6	24	3	36	28.0	-25.000	18.000		4.3
1980	6	30	6	3	16.6	-18.027	25.850	33.0	4.4
1980	7	12	15	33	33.0	-26.200	28.200	2.0	4.0
1980	7	13	22	53	24.0	-18.500	23.100		3.9
1980	7	19	6	58	11.1	-28.100	27.800	2.0	3.0
1980	8	1	10	16	42.5	-30.140	19.600	10.0	3.8

1980	8	25	8	26	58.0	-28.700	32.700		4.6
1980	8	28	14	37	51.3	-30.697	24.399	33.0	5.2
1980	8	28	14	38	51.7	-26.900	26.800	2.0	4.0
1980	8	30	10	36	7.4	-26.200	28.200	2.0	4.8
1980	9	9	2	7	11.5	-26.360	16.710	5.0	3.6
1980	10	14	17	13	13.2	-28.100	27.800	2.0	2.8
1980	10	22	10	25	56.0	-29.600	24.600	10.0	3.2
1980	11	12	22	40	54.0	-18.000	24.000	0.0	3.3
1980	12	8	13	52	52.0	-18.500	26.400		3.4
1980	12	18	6	18	21.0	-29.300	29.100		4.5
1980	12	23	18	47	6.6	-28.770	28.810	10.0	3.2
1981	1	2	22	9	57.0	-23.200	26.000		4.2
1981	1	28	16	20	33.4	-26.073	27.611	33.0	4.1
1981	2	18	8	28	20.0	-26.625	26.607	33.0	5.0
1981	2	22	16	17	48.0	-25.500	32.100		3.8
1981	3	10	12	41	13.0	-26.200	28.400		4.7
1981	3	18	8	53	30.0	-18.200	26.400		4.3
1981	3	20	15	6	41.8	-26.360	27.430	2.0	4.0
1981	3	20	22	46	18.4	-30.720	21.950	10.0	3.6
1981	3	20	22	46	21.3	-30.219	20.950	10.0	3.8
1981	4	7	14	53	49.7	-30.910	30.220	10.0	3.5
1981	4	17	7	7	5.0	-28.000	26.800	2.0	4.1
1981	5	21	16	15	12.0	-26.115	27.584	33.0	4.1
1981	6	1	4	13	58.1	-26.900	32.000	10.0	3.8
1981	7	7	12	52	42.2	-26.302	27.331	33.0	4.0
1981	7	10	21	55	40.0	-17.500	25.700		4.0
1981	8	6	2	1	49.8	-31.400	13.300	10.0	5.0
1981	8	6	4	25	40.6	-27.480	25.190	2.0	3.1
1981	8	6	10	52	41.0	-23.400	26.100		3.8
1981	8	14	9	8	55.0	-32.500	31.300		4.1
1981	8	24	1	27	3.0	-33.340	19.040	15.0	4.4
1981	9	7	15	55	30.3	-26.213	27.372	33.0	5.0

1981	10	5	15	20	34.8	-28.200	26.000	2.0	2.8
1981	10	8	0	0	29.2	-26.961	26.751	25.9	5.1
1981	11	5	20	19	30.8	-29.950	27.370	10.0	4.0
1981	11	18	3	32	25.0	-28.200	31.800	10.0	4.1
1981	11	21	6	46	12.0	-18.700	24.000		3.2
1981	12	3	21	11	15.8	-23.790	29.770	10.0	3.0
1981	12	4	8	19	23.3	-20.490	18.410	10.0	3.4
1981	12	9	11	37	44.2	-29.200	24.800	10.0	2.5
1981	12	14	14	41	4.4	-26.230	27.380	2.0	4.0
1981	12	15	14	11	33.8	-27.648	27.089	33.0	5.0
1981	12	27	11	27	28.5	-29.500	24.900	10.0	2.5
1982	2	13	18	13	59.7	-28.100	26.000	2.0	2.1
1982	2	17	18	11	25.5	-26.201	28.235	12.5	4.9
1982	3	26	13	41	48.3	-27.300	29.000	10.0	4.3
1982	3	28	15	51	38.8	-26.200	28.100	2.0	4.0
1982	4	1	7	11	0.6	-29.980	18.850	15.0	3.4
1982	4	9	1	52	35.7	-26.800	26.603	5.0	4.9
1982	4	13	11	26	47.2	-27.926	26.783	5.0	4.6
1982	4	27	23	23	14.1	-26.300	27.300	2.0	4.0
1982	5	8	17	5	21.3	-29.800	27.200	10.0	2.8
1982	5	9	0	53	22.1	-29.800	27.200	10.0	2.5
1982	5	9	7	7	1.7	-29.600	27.060	10.0	3.4
1982	5	12	3	7	28.0	-28.500	25.600	10.0	2.3
1982	6	1	15	13	20.4	-29.700	27.000	10.0	2.4
1982	6	7	0	56	13.4	-27.917	26.829	5.0	5.0
1982	6	16	17	57	21.5	-23.460	26.050	15.0	4.1
1982	6	18	14	40	1.0	-28.000	28.800	2.0	2.7
1982	7	5	11	36	53.4	-32.000	24.000	10.0	1.8
1982	7	6	11	41	14.3	-28.800	25.600	10.0	2.5
1982	10	13	23	22	25.3	-26.362	27.337	5.0	4.9
1982	10	31	6	43	23.5	-27.400	27.300	2.0	3.5
1982	11	3	7	57	38.3	-33.340	19.250	2.0	3.2

1982	11	3	15	30	11.0	-26.400	27.400	5.0	4.8
1982	11	12	6	11	32.3	-26.906	26.750	5.0	4.6
1982	11	18	13	45	15.6	-29.400	27.500	10.0	3.6
1982	11	22	8	21	51.5	-33.300	19.200	10.0	1.9
1982	11	24	21	44	9.0	-24.500	30.500		4.1
1982	11	30	23	25	8.8	-32.700	19.400	5.0	2.5
1982	12	2	20	45	36.4	-30.730	21.870	5.0	3.2
1982	12	8	15	11	25.2	-33.300	19.000	5.0	2.0
1982	12	11	22	3	57.0	-26.855	26.589	5.0	4.9
1982	12	13	1	31	6.1	-33.400	19.300	5.0	1.7
1982	12	17	9	6	56.4	-29.300	25.100	10.0	2.3
1982	12	23	19	27	7.4	-27.980	26.860	2.0	4.0
1983	2	21	20	21	8.1	-27.970	31.390	10.0	3.0
1983	2	22	16	26	18.7	-29.187	27.927	10.0	4.4
1983	2	24	6	46	44.4	-33.375	19.085	10.0	5.6
1983	2	24	14	54	29.3	-30.770	23.440	10.0	3.3
1983	4	7	1	40	8.0	-17.600	25.500		3.9
1983	4	14	15	57	23.7	-28.137	27.028	5.0	4.9
1983	4	14	18	22	35.4	-26.905	26.651	5.0	4.9
1983	5	11	12	57	11.0	-20.800	22.100		3.6
1983	5	21	18	8	57.0	-26.300	21.100		3.8
1983	6	2	9	57	4.0	-19.500	23.100		4.0
1983	6	6	1	48	53.7	-26.900	26.800	2.0	4.2
1983	6	6	10	48	50.5	-26.885	26.664	5.0	5.4
1983	6	6	11	59	30.3	-26.900	26.800	2.0	4.3
1983	6	7	15	48	23.0	-20.100	23.300		3.8
1983	6	21	19	45	29.3	-32.380	29.580	10.0	3.8
1983	7	15	13	45	30.7	-26.300	27.400	2.0	4.0
1983	7	31	0	35	41.4	-31.190	24.250	10.0	3.8
1983	8	4	6	5	48.4	-33.300	19.200	10.0	2.8
1983	8	9	4	24	39.3	-27.500	13.200	10.0	5.2
1983	8	26	21	19	26.0	-30.800	21.500	10.0	2.8

1983	9	5	0	33	32.4	-29.224	24.776	5.0	4.6
1983	9	9	3	5	33.5	-29.540	24.900	10.0	3.4
1983	9	11	17	39	21.0	-26.840	26.820	2.0	4.0
1983	10	17	11	47	31.0	-18.500	26.100		3.6
1983	11	2	13	51	45.0	-28.500	26.200		3.5
1983	11	2	23	16	47.3	-30.000	25.700	10.0	3.2
1983	11	5	16	55	41.0	-19.600	23.500		4.1
1983	12	7	20	4	53.7	-26.900	26.700	2.0	4.0
1983	12	25	7	51	1.1	-26.312	27.273	5.0	4.2
1983	12	27	7	38	24.4	-26.421	27.387	5.0	4.3
1983	12	30	11	26	38.0	-26.800	26.800	2.0	4.0
1983	12	30	16	56	56.0	-23.000	19.000		4.4
1983	12	30	16	57	0.8	-29.800	27.200	10.0	3.8
1984	1	28	13	16	8.1	-26.885	26.694	5.0	5.0
1984	1	28	14	40	13.8	-26.900	26.600	5.0	4.9
1984	3	16	22	5	31.4	-26.426	27.464	5.0	4.7
1984	3	20	0	17	49.0	-18.300	26.500		4.7
1984	4	1	9	37	20.0	-29.900	27.300	10.0	2.4
1984	4	7	21	42	45.0	-28.085	26.878	10.0	4.9
1984	4	8	16	33	44.3	-26.400	28.500	5.0	4.9
1984	4	17	23	54	2.0	-19.800	27.500		3.8
1984	4	18	12	48	40.4	-28.000	26.900	2.0	4.5
1984	5	4	6	17	43.6	-26.900	26.800	2.0	3.9
1984	5	26	19	39	37.9	-19.505	26.389	10.0	4.6
1984	6	4	6	45	10.0	-20.200	26.500		3.7
1984	6	11	11	46	20.0	-26.279	28.353	8.7	5.0
1984	6	20	4	49	37.2	-28.000	26.800	2.0	3.9
1984	7	20	10	2	43.0	-23.700	25.900		3.7
1984	7	28	15	47	9.0	-22.600	26.700		3.1
1984	8	5	22	23	3.3	-30.210	26.130	10.0	3.1
1984	8	11	15	49	46.2	-33.096	19.144	5.0	2.9
1984	8	11	21	23	14.4	-26.900	26.700	2.0	4.1

1984	8	19	15	31	52.3	-29.500	26.700	10.0	2.3
1984	10	26	7	44	17.0	-19.900	26.100	33.0	5.5
1984	11	21	20	28	13.8	-26.200	28.100	2.0	3.9
1984	12	8	19	6	33.8	-26.130	28.139	5.0	4.5
1985	4	10	11	20	33.6	-29.260	25.010	10.0	4.1
1985	4	24	2	48	56.6	-26.820	26.665	5.0	4.3
1985	4	30	19	6	22.6	-29.192	19.760	10.0	4.7
1985	4	30	19	6	25.5	-29.130	20.050	10.0	4.2
1985	5	8	11	35	43.0	-29.354	25.701	5.0	4.6
1985	5	9	16	10	13.0	-29.400	24.810	10.0	4.3
1985	5	11	23	30	7.6	-29.200	24.800	10.0	2.2
1985	5	17	21	35	16.1	-27.968	27.277	5.0	4.0
1985	5	26	1	54	39.2	-26.766	26.636	5.0	4.2
1985	5	27	12	26	35.5	-29.370	25.100	5.0	3.0
1985	6	8	2	19	23.2	-26.920	26.800	2.0	4.3
1985	6	14	3	27	24.5	-26.229	27.535	5.0	4.8
1985	7	4	15	9	9.1	-26.900	26.700	2.0	4.0
1985	8	11	9	44	13.9	-26.300	27.300	2.0	4.0
1985	8	26	12	31	52.1	-29.201	19.941	5.0	5.0
1985	8	28	11	10	53.9	-33.700	18.500	10.0	2.0
1985	8	31	6	3	52.5	-30.100	27.130	10.0	3.1
1985	9	20	14	30	6.7	-26.200	28.200	2.0	4.2
1985	11	3	11	53	52.2	-29.900	25.200	5.0	1.9
1985	11	21	0	56	15.0	-29.460	24.170	10.0	3.9
1985	11	22	23	52	17.4	-26.410	27.290	2.0	4.0
1985	12	3	18	59	10.9	-29.910	25.570	10.0	3.4
1985	12	4	13	43	48.0	-26.400	31.900		3.2
1985	12	11	10	17	58.0	-29.770	28.020	10.0	3.6
1985	12	23	9	10	2.0	-19.500	26.000		3.8
1986	1	1	16	0	51.9	-26.800	26.700	2.0	4.9
1986	1	9	22	13	39.8	-26.623	26.612	5.0	4.8
1986	1	20	14	54	51.1	-18.895	21.956	10.0	4.8

1986	1	24	16	43	5.4	-29.700	25.500	5.0	2.4
1986	1	27	21	32	21.4	-26.930	26.800	2.0	4.1
1986	1	31	21	55	23.7	-23.430	26.400	10.0	3.6
1986	2	10	20	45	1.7	-27.944	26.753	5.0	5.3
1986	2	18	0	1	30.7	-26.300	27.300	2.0	4.0
1986	2	23	15	35	0.0	-26.950	26.740	2.0	4.0
1986	3	12	19	30	39.0	-20.000	26.900		2.9
1986	3	20	12	20	25.0	-18.600	26.300		3.5
1986	3	23	5	3	53.1	-29.410	24.920	10.0	3.7
1986	3	29	6	25	29.7	-18.264	26.291	10.0	4.5
1986	4	20	21	13	50.8	-29.600	24.900	5.0	2.4
1986	4	22	7	33	48.7	-26.400	27.300	2.0	3.9
1986	6	11	10	13	12.0	-20.600	28.200		3.7
1986	7	2	17	22	19.2	-28.810	27.380	5.0	3.0
1986	7	3	15	37	39.5	-26.400	27.400	2.0	3.7
1986	7	18	15	7	40.0	-19.700	26.300	33.0	5.6
1986	7	29	19	13	21.8	-29.630	27.500	5.0	3.2
1986	7	30	19	43	55.7	-30.870	28.290	5.0	3.0
1986	8	5	18	3	9.6	-28.200	28.100	10.0	3.0
1986	8	8	23	42	9.8	-29.800	25.100	10.0	2.4
1986	8	11	4	59	12.3	-26.900	26.600	2.0	4.3
1986	8	29	17	43	2.1	-26.440	31.720	10.0	3.5
1986	9	9	13	43	46.6	-28.700	24.900	5.0	2.1
1986	9	13	11	5	56.1	-30.890	23.780	10.0	3.8
1986	9	15	7	6	32.3	-26.300	27.300	2.0	4.1
1986	9	27	15	42	52.0	-23.100	26.100	0.0	3.4
1986	10	5	18	53	21.0	-30.529	28.841	10.0	5.3
1986	10	5	22	30	39.9	-29.600	27.000	10.0	2.0
1986	10	6	0	15	28.6	-29.600	27.500	10.0	2.1
1986	10	6	3	7	33.1	-29.000	27.000	2.0	2.6
1986	10	6	10	4	4.2	-30.030	28.610	10.0	3.2
1986	10	8	17	3	32.0	-17.900	24.900		3.8

1986	10	9	3	3	31.0	-17.900	24.900		3.8
1986	10	13	1	42	25.8	-30.200	27.600	5.0	3.6
1986	10	14	6	17	5.4	-26.300	27.500	2.0	3.6
1986	10	15	11	45	9.2	-28.400	25.700	2.0	2.2
1986	10	27	10	19	25.1	-29.300	27.500	5.0	2.7
1986	10	28	15	4	23.2	-26.900	26.700	2.0	4.8
1986	10	30	18	22	47.1	-26.400	27.400	2.0	3.6
1986	11	8	9	47	52.7	-23.200	25.800	5.0	3.8
1986	11	13	11	11	18.4	-26.910	26.800	2.0	4.4
1986	11	19	10	57	51.0	-18.600	26.300		3.6
1986	11	19	14	40	5.7	-26.800	26.700	2.0	4.0
1986	12	4	18	28	19.2	-28.600	27.900	5.0	2.6
1986	12	18	23	32	15.0	-18.600	26.500		4.0
1986	12	29	6	42	8.7	-29.980	27.610	2.0	3.1
1986	12	29	20	41	59.4	-26.304	27.468	5.0	5.1
1986	12	29	20	42	1.9	-26.400	27.500	2.0	3.6
1987	1	9	8	18	34.0	-18.400	26.400		3.4
1987	2	14	6	21	35.0	-29.400	24.700	10.0	4.1
1987	2	17	11	0	22.6	-17.227	24.950	10.0	5.2
1987	3	5	22	24	53.0	-33.090	17.482	10.0	3.4
1987	3	6	23	0	18.5	-30.000	18.800	10.0	2.5
1987	3	14	0	27	45.7	-30.300	27.000	10.0	2.5
1987	3	21	5	24	49.3	-28.700	24.600	10.0	2.1
1987	3	31	6	31	25.6	-31.300	21.800	10.0	2.8
1987	4	14	9	39	53.5	-26.692	26.614	13.0	5.2
1987	4	21	22	20	55.1	-29.700	19.804	10.0	4.0
1987	4	26	20	9	15.3	-30.345	20.211	10.0	4.6
1987	4	27	6	52	59.8	-29.900	19.700	10.0	4.6
1987	4	27	6	53	7.7	-30.479	20.982	10.0	4.7
1987	4	29	17	42	45.0	-17.000	12.300		4.5
1987	5	1	19	15	24.8	-26.300	28.388	5.0	4.6
1987	5	18	7	55	25.5	-29.200	27.300	10.0	2.7

1987	5	29	11	35	53.2	-26.906	26.634	5.0	5.2
1987	5	30	0	26	15.0	-29.700	25.100	10.0	2.6
1987	5	30	14	18	52.9	-29.400	25.100	10.0	2.9
1987	5	31	9	47	24.1	-31.110	29.710	5.0	4.0
1987	5	31	9	47	36.0	-30.400	30.400		4.4
1987	5	31	11	59	43.0	-30.400	30.400		4.1
1987	5	31	11	59	47.0	-30.098	28.062	5.0	3.6
1987	5	31	12	0	8.7	-29.200	27.400	10.0	2.9
1987	6	2	14	30	20.0	-19.400	26.500		3.9
1987	6	8	5	40	50.7	-27.900	26.700	2.0	4.1
1987	6	8	16	39	30.9	-30.010	27.120	5.0	3.3
1987	6	25	7	15	54.6	-26.876	28.583	5.0	4.2
1987	7	30	12	46	27.3	-26.849	26.536	5.0	4.2
1987	8	1	18	43	27.9	-30.300	28.300	5.0	4.2
1987	8	1	19	39	46.7	-30.600	28.100	5.0	3.7
1987	8	4	19	53	52.9	-26.700	30.900	10.0	4.7
1987	8	6	8	59	10.3	-28.000	22.400	10.0	2.2
1987	8	7	12	1	5.0	-33.300	19.300	10.0	2.7
1987	8	7	14	46	22.0	-33.400	19.300	10.0	2.3
1987	8	7	15	21	33.2	-33.400	19.300	10.0	2.0
1987	8	7	15	26	7.8	-33.300	19.300	10.0	2.1
1987	8	7	17	56	47.2	-33.300	19.300	10.0	2.2
1987	8	13	1	30	38.1	-33.400	18.800	10.0	2.1
1987	8	15	16	7	56.0	-20.500	12.700		4.3
1987	8	15	16	8	12.5	-17.520	13.770	10.0	3.8
1987	8	22	15	57	48.8	-33.300	19.300	10.0	1.5
1987	8	23	5	12	26.5	-33.300	19.300	10.0	1.4
1987	8	26	6	31	29.0	-29.480	25.030	5.0	3.5
1987	9	18	2	5	1.7	-17.749	25.561	10.0	4.6
1987	9	26	17	5	46.3	-30.300	18.620	10.0	3.4
1987	9	26	17	6	5.0	-31.263	18.707	10.0	4.2
1987	9	30	7	37	38.7	-26.900	26.700	2.0	4.5

1987	10	2	8	19	5.4	-33.800	18.900	10.0	2.1
1987	10	2	17	46	43.6	-30.069	22.183	10.0	3.4
1987	10	4	4	45	40.6	-33.700	18.400	10.0	2.1
1987	10	13	18	58	44.9	-29.580	25.430	10.0	3.2
1987	10	15	3	33	41.1	-23.950	15.810	10.0	3.6
1987	10	23	11	46	6.0	-29.600	23.200	10.0	2.9
1987	10	24	11	45	48.5	-30.756	29.029	5.0	4.3
1987	10	27	2	33	0.2	-33.300	19.300	10.0	2.4
1987	11	1	13	53	22.8	-29.400	25.000	10.0	2.4
1987	11	15	13	58	22.2	-29.500	25.100	10.0	4.6
1987	11	26	4	54	3.8	-16.950	13.314	10.0	4.8
1987	12	8	8	47	1.0	-21.000	26.400		3.8
1987	12	11	1	49	23.2	-29.543	19.860	10.0	3.7
1987	12	11	18	46	51.0	-26.325	27.336	5.0	4.0
1987	12	16	15	52	3.8	-22.650	17.500	10.0	3.8
1987	12	17	6	59	8.3	-27.400	30.900	10.0	2.7
1988	1	5	6	41	16.9	-26.807	26.639	5.0	4.0
1988	1	21	11	31	30.0	-22.700	28.000		3.4
1988	1	30	2	11	15.3	-25.900	25.800	10.0	2.9
1988	2	4	21	41	10.1	-26.300	26.300	10.0	2.9
1988	2	11	0	26	32.7	-25.900	26.000	10.0	2.5
1988	2	12	17	54	13.4	-31.711	29.766	10.0	4.9
1988	2	12	17	54	38.7	-30.200	28.500	10.0	4.3
1988	2	12	19	30	34.0	-30.100	28.300	10.0	4.0
1988	2	15	19	31	25.0	-29.886	22.101	10.0	3.0
1988	2	15	19	31	34.0	-30.300	20.900	10.0	2.6
1988	2	16	23	5	52.0	-29.200	25.200	10.0	3.2
1988	2	17	19	12	30.4	-29.100	25.200	10.0	2.9
1988	2	26	13	56	23.3	-26.997	26.551	5.0	4.4
1988	3	10	7	24	16.6	-17.188	13.470	5.0	5.0
1988	3	29	13	17	16.0	-33.900	19.500	10.0	2.0
1988	5	1	6	30	59.6	-26.200	26.200	2.0	2.4

1988	6	16	9	4	48.9	-26.840	26.700	2.0	4.0
1988	6	21	15	0	27.9	-29.500	27.400	10.0	2.2
1988	7	15	23	56	10.5	-29.600	25.500	10.0	2.9
1988	7	21	16	32	36.1	-30.800	29.400	10.0	2.7
1988	7	30	3	42	12.1	-30.900	28.300	10.0	2.9
1988	8	5	5	0	49.8	-28.782	20.044	10.0	3.9
1988	8	9	2	12	32.1	-32.300	28.300	10.0	2.9
1988	8	11	2	8	7.9	-22.080	30.660	10.0	4.4
1988	8	20	8	43	3.5	-29.400	30.100	10.0	3.6
1988	8	28	5	28	6.0	-31.107	17.753	5.0	3.2
1988	8	31	2	8	7.9	-22.000	30.600	10.0	4.4
1988	8	31	14	45	57.0	-28.400	25.600	10.0	2.4
1988	9	12	2	32	23.0	-26.900	26.700	2.0	4.4
1988	9	13	23	44	11.9	-33.000	24.700	5.0	2.1
1988	9	15	22	51	40.7	-27.700	29.500	10.0	2.4
1988	9	16	10	2	2.7	-29.520	27.560	5.0	3.2
1988	9	18	2	59	58.3	-29.500	25.500	5.0	2.2
1988	9	19	15	20	25.5	-30.100	25.200	10.0	2.6
1988	9	21	5	34	9.3	-29.600	25.000	5.0	2.7
1988	9	21	22	40	19.9	-31.030	28.690	10.0	3.0
1988	9	22	12	57	28.5	-30.610	28.890	10.0	3.1
1988	10	7	11	47	39.8	-27.510	21.540	10.0	3.1
1988	11	5	14	0	36.9	-28.900	26.800	2.0	3.8
1988	11	24	15	21	31.0	-26.000	32.300		4.2
1988	11	25	11	59	9.3	-29.200	25.400	5.0	2.1
1988	11	28	12	13	6.1	-27.001	26.708	5.0	4.0
1988	12	15	14	31	52.9	-26.828	26.789	5.0	5.0
1988	12	22	12	23	43.9	-26.907	26.637	5.0	4.9
1988	12	31	12	49	59.8	-26.829	26.709	5.0	5.3
1988	12	31	12	50	1.7	-26.800	26.700	2.0	4.0
1989	1	1	19	55	48.6	-29.000	25.000	5.0	2.6
1989	1	24	19	34	35.2	-31.900	27.500	5.0	2.9

1989	1	25	10	14	35.2	-27.900	26.700	2.0	4.5
1989	2	17	8	22	13.5	-29.027	20.522	10.0	3.5
1989	2	23	6	50	21.6	-28.000	26.000	10.0	3.5
1989	2	28	20	55	7.8	-30.820	28.220	10.0	3.4
1989	3	14	10	26	38.9	-30.090	28.800	10.0	3.0
1989	3	15	2	24	52.6	-30.030	28.040	10.0	3.0
1989	3	30	3	40	59.5	-26.649	26.774	5.0	5.1
1989	3	30	3	41	0.2	-26.800	26.700	2.0	4.4
1989	4	30	9	39	6.7	-30.500	29.000	10.0	3.3
1989	5	3	23	26	45.1	-26.800	26.800	2.0	4.1
1989	5	13	9	51	27.7	-29.400	27.300	10.0	2.7
1989	5	15	18	2	59.2	-31.500	28.400	10.0	3.5
1989	5	19	13	41	4.1	-22.500	17.600	10.0	3.8
1989	5	19	19	13	51.5	-22.540	17.190	10.0	3.5
1989	6	17	2	55	40.7	-29.740	27.140	10.0	3.8
1989	6	18	15	37	13.0	-19.200	13.700		4.9
1989	6	19	17	27	24.9	-29.100	27.200	10.0	2.6
1989	6	19	17	55	5.2	-29.800	27.100	10.0	3.1
1989	6	28	15	5	10.0	-26.400	27.400	2.0	4.0
1989	7	3	3	4	33.3	-29.300	26.900	5.0	2.3
1989	7	6	15	41	59.1	-28.600	25.500	5.0	2.7
1989	7	22	21	13	37.9	-26.400	27.300	2.0	4.0
1989	8	21	19	57	52.2	-29.470	30.580	10.0	3.9
1989	9	4	2	35	46.8	-29.100	27.500	10.0	3.3
1989	9	14	10	10	10.4	-26.330	27.208	5.0	4.2
1989	9	15	22	26	1.1	-30.600	28.700	10.0	2.9
1989	9	21	3	44	53.2	-30.200	27.400	10.0	2.8
1989	9	29	6	16	31.0	-30.602	28.702	10.0	4.8
1989	9	29	17	37	13.7	-30.700	28.900	10.0	3.1
1989	10	2	15	2	22.0	-29.980	28.040	10.0	3.7
1989	10	7	23	12	39.8	-26.870	26.750	2.0	4.1
1989	10	8	1	37	10.2	-26.890	26.800	2.0	4.2

1989	10	11	19	44	29.8	-28.000	25.900	10.0	2.8
1989	11	6	4	59	35.8	-29.200	25.300	10.0	4.1
1989	11	6	18	6	21.1	-29.100	25.300	10.0	2.9
1989	11	20	22	29	26.1	-29.600	24.100	10.0	2.8
1989	12	7	16	11	41.0	-30.500	28.300	5.0	2.8
1989	12	11	0	49	8.3	-30.400	29.900	10.0	2.7
1990	2	14	12	27	14.4	-26.286	27.507	5.0	4.9
1990	2	27	16	17	9.9	-26.872	26.736	5.0	4.9
1990	3	17	0	41	1.0	-28.077	26.742	5.0	4.9
1990	3	22	17	35	57.9	-28.060	30.560	10.0	3.7
1990	5	1	15	15	47.3	-29.820	26.690	10.0	3.9
1990	6	8	4	28	9.9	-24.960	25.940	10.0	3.3
1990	6	24	11	57	57.0	-20.500	26.800	33.0	4.7
1990	7	18	11	3	32.3	-26.811	26.701	5.0	5.0
1990	8	21	23	20	33.1	-30.251	28.930	5.0	3.1
1990	9	5	8	27	19.7	-26.400	27.550	2.0	4.0
1990	9	26	23	8	23.2	-28.100	27.100	3.0	5.0
1990	10	18	9	30	44.4	-26.390	27.349	5.0	4.4
1990	11	14	0	31	39.4	-28.122	26.789	5.0	5.1
1990	12	6	16	2	20.5	-26.397	27.343	5.0	4.9
1991	1	25	17	55	46.5	-30.090	22.500	5.0	3.2
1991	5	10	1	12	32.0	-20.200	19.000	33.0	5.0
1991	5	10	1	12	38.4	-17.352	25.016	10.0	5.3
1991	6	3	14	13	47.5	-33.450	19.240	10.0	3.1
1991	6	10	13	28	4.4	-26.842	26.724	5.0	5.1
1991	6	18	17	12	1.3	-29.970	22.460	10.0	3.6
1991	6	24	12	34	40.1	-30.090	18.680	10.0	3.5
1991	7	26	12	42	35.7	-30.650	30.429	5.0	4.3
1991	8	11	22	12	15.1	-29.940	18.340	10.0	4.0
1991	8	17	23	41	14.6	-29.480	22.050	10.0	3.7
1991	8	22	19	47	35.9	-28.050	26.821	5.0	4.9
1991	9	17	5	26	44.4	-29.920	26.170	10.0	3.0

1991	10	31	13	36	30.0	-33.350	19.160	10.0	4.8
1991	11	3	18	28	55.4	-26.895	26.700	5.0	5.4
1991	12	1	20	3	10.5	-26.878	26.664	9.7	5.3
1991	12	2	14	37	58.7	-19.659	23.585	10.0	4.5
1992	1	14	15	18	46.0	-20.100	27.200		3.5
1992	1	18	23	51	50.5	-26.846	26.816	5.0	4.9
1992	2	10	15	47	21.4	-27.976	26.633	5.0	4.7
1992	2	16	2	28	39.5	-28.330	17.420	10.0	3.7
1992	3	7	0	43	3.6	-26.512	27.353	10.1	5.2
1992	4	15	13	9	14.9	-25.671	27.780	5.0	4.8
1992	4	21	10	58	1.0	-25.100	24.700		4.0
1992	6	6	18	33	56.0	-29.700	25.800		4.7
1992	6	6	18	34	0.7	-28.020	26.753	9.5	5.5
1992	6	21	2	25	41.5	-26.443	27.382	5.0	4.7
1992	8	22	0	58	41.9	-26.339	27.464	5.0	4.7
1992	8	26	15	15	40.1	-26.412	27.208	5.0	4.4
1992	10	1	12	15	43.9	-23.410	18.260	10.0	4.3
1992	10	24	1	46	42.8	-30.020	25.410	10.0	3.1
1992	11	2	10	55	25.9	-31.340	23.620	10.0	3.6
1992	11	18	11	43	47.0	-22.600	25.300		3.7
1992	11	19	8	32	1.6	-30.432	23.911	10.0	4.4
1992	11	28	12	8	49.7	-26.920	26.610	2.0	4.1
1992	12	23	6	56	4.8	-23.590	17.290	10.0	4.4
1992	12	23	10	54	52.9	-23.754	17.410	10.0	5.4
1993	1	11	13	40	7.0	-25.100	25.500		3.6
1993	2	10	5	1	3.9	-23.697	26.442	33.0	4.1
1993	2	16	4	1	11.3	-23.830	17.150	33.0	3.0
1993	2	23	5	12	44.1	-26.314	27.384	5.0	4.6
1993	2	24	6	2	21.4	-26.882	26.696	5.0	4.4
1993	3	11	20	5	50.9	-29.530	18.340	10.0	4.7
1993	4	6	17	23	47.4	-26.334	27.373	5.0	5.0
1993	4	14	8	5	49.5	-26.319	27.230	5.0	4.4

1993	4	17	14	23	0.6	-29.800	26.700	5.0	2.9
1993	4	17	21	29	57.6	-25.400	30.920	10.0	2.9
1993	4	28	12	52	14.4	-26.854	26.670	5.0	4.8
1993	5	6	11	40	0.4	-23.490	17.720	10.0	3.1
1993	5	6	11	54	45.2	-23.470	16.390	10.0	2.9
1993	5	6	14	32	3.6	-23.420	17.470	10.0	2.6
1993	5	7	13	23	26.5	-23.610	17.340	10.0	3.7
1993	5	7	13	37	41.4	-23.010	18.060	10.0	2.4
1993	5	9	2	19	47.0	-22.660	17.890	10.0	2.1
1993	5	11	3	57	43.1	-26.820	26.720	5.0	4.0
1993	5	26	16	46	50.6	-26.391	27.499	5.0	4.4
1993	5	28	20	3	24.9	-26.400	27.400	5.0	4.0
1993	6	1	21	5	19.5	-26.840	26.630	5.0	4.3
1993	6	3	4	45	20.1	-29.671	18.112	10.0	4.2
1993	6	10	1	5	5.7	-29.790	27.130	5.0	2.7
1993	7	22	7	34	2.8	-18.552	23.457	10.0	3.6
1993	7	22	13	44	52.0	-26.865	26.658	5.0	4.1
1993	7	31	22	38	1.3	-29.670	27.770	10.0	3.8
1993	8	12	6	58	9.0	-21.770	17.970	10.0	3.5
1993	8	18	9	2	12.3	-26.883	26.817	6.6	4.9
1993	10	5	23	14	9.0	-24.000	22.900		3.8
1993	10	10	19	22	15.0	-21.100	25.100		3.2
1993	10	11	14	6	54.8	-28.560	30.610	5.0	3.3
1993	10	12	12	57	6.0	-23.300	21.700		3.8
1993	10	13	12	14	58.0	-22.300	27.900		3.0
1993	10	26	4	34	44.2	-26.203	27.443	5.0	4.7
1993	11	20	9	20	52.6	-29.629	19.382	10.0	3.7
1993	11	26	2	28	39.7	-23.940	16.180	10.0	3.7
1993	12	7	14	52	34.6	-30.815	17.208	10.0	3.2
1993	12	10	19	25	38.3	-26.910	26.750	2.0	4.0
1993	12	19	11	45	54.2	-31.630	21.095	10.0	2.9
1993	12	20	19	15	24.9	-26.921	26.655	5.0	5.1

1993	12	20	20	22	34.1	-26.913	26.699	5.0	5.0
1993	12	21	20	18	58.0	-23.390	17.540	10.0	3.4
1994	1	4	12	39	26.7	-26.840	26.708	5.0	4.9
1994	1	9	17	1	36.0	-29.500	30.200	5.0	3.6
1994	1	27	5	26	55.8	-30.780	28.940	5.0	3.4
1994	2	3	3	59	5.7	-29.930	27.830	10.0	2.6
1994	3	5	9	33	16.0	-18.700	26.800		3.0
1994	3	22	18	44	28.7	-29.580	25.230	10.0	3.4
1994	4	1	20	27	33.6	-26.890	26.710	2.0	4.1
1994	4	8	17	21	21.2	-30.600	30.890	10.0	3.4
1994	4	18	21	4	59.4	-28.150	28.900	10.0	3.1
1994	5	3	16	53	58.2	-26.420	27.390	2.0	4.0
1994	6	13	21	59	38.2	-21.320	24.930	10.0	4.6
1994	6	27	4	11	21.3	-28.010	26.720	5.0	4.1
1994	7	27	14	39	8.5	-26.880	26.800	5.0	4.2
1994	7	31	6	21	15.3	-26.880	26.760	5.0	4.3
1994	8	20	16	37	33.3	-26.550	17.120	10.0	3.7
1994	8	29	20	23	51.6	-20.420	24.230	10.0	3.3
1994	9	6	4	4	41.0	-26.849	26.707	5.0	4.4
1994	9	13	5	11	8.8	-30.390	29.110	10.0	3.2
1994	10	7	1	8	33.9	-27.855	26.538	5.0	4.7
1994	10	7	1	56	2.5	-27.868	26.680	5.0	4.8
1994	10	7	6	43	3.1	-24.800	31.530	10.0	2.8
1994	10	13	1	6	30.2	-26.990	26.730	5.0	4.0
1994	10	30	6	6	27.4	-28.030	26.740	5.0	5.1
1994	11	1	13	12	43.5	-27.950	26.670	5.0	4.2
1994	11	19	22	59	2.1	-27.976	26.728	5.0	4.5
1994	11	30	17	35	27.9	-26.830	26.710	5.0	4.1
1994	12	31	22	9	58.9	-30.350	20.849	10.0	5.1
1995	1	2	15	16	2.2	-26.357	27.220	5.0	4.7
1995	1	18	15	6	19.2	-26.391	27.253	5.0	4.9
1995	2	8	23	26	16.1	-29.960	27.770	5.0	3.7

1995	2	10	1	56	23.4	-26.840	26.670	5.0	4.3
1995	2	11	17	37	30.7	-30.460	30.260	10.0	3.3
1995	2	27	8	14	59.9	-29.440	18.590	5.0	3.8
1995	2	27	8	15	4.8	-29.317	18.653	10.0	4.1
1995	5	19	5	48	50.8	-28.038	26.760	5.0	5.0
1995	5	20	4	18	59.8	-26.938	26.665	5.0	5.0
1995	7	4	6	38	13.9	-27.946	26.718	5.0	4.6
1995	8	8	9	46	27.2	-28.520	28.350	10.0	2.6
1995	8	11	11	52	58.6	-26.360	27.399	5.0	4.6
1995	9	3	8	12	23.0	-26.873	26.666	10.0	4.8
1995	9	12	13	11	44.2	-27.843	26.655	5.0	4.7
1995	9	24	20	23	22.1	-26.857	26.697	5.0	4.1
1995	10	28	18	38	45.3	-26.332	27.548	5.0	5.0
1995	11	10	23	55	5.2	-26.907	26.710	5.0	4.5
1995	11	25	4	5	3.2	-26.930	26.740	0.0	5.0
1995	11	27	17	46	30.3	-26.411	27.379	5.0	4.5
1995	12	17	22	31	30.4	-27.958	26.576	5.0	4.2
1996	1	3	20	27	47.1	-29.230	28.490	1.0	3.0
1996	2	4	20	52	56.3	-29.443	17.957	5.0	4.4
1996	2	25	6	18	15.8	-26.946	26.624	5.0	4.7
1996	3	1	5	34	28.3	-26.127	28.240	10.0	4.8
1996	3	12	18	49	0.5	-26.826	26.501	5.0	4.9
1996	4	5	4	1	59.3	-27.012	26.671	5.0	4.8
1996	4	26	9	31	15.3	-29.550	17.860	10.0	3.7
1996	4	29	21	7	17.8	-26.370	27.330	0.0	4.6
1996	5	5	1	14	38.4	-26.340	27.170	0.0	4.8
1996	5	6	17	17	33.1	-26.930	26.900	0.0	4.2
1996	5	7	5	32	34.0	-21.980	11.670		4.6
1996	5	16	22	8	57.2	-27.100	16.620	0.0	4.0
1996	5	24	3	1	33.8	-30.080	27.360	2.0	3.1
1996	6	20	1	27	44.8	-29.580	25.200	10.0	3.0
1996	6	29	20	21	8.4	-26.899	26.637	5.0	4.7

1996	7	21	1	16	42.4	-30.380	27.460	10.0	2.9
1996	8	22	16	16	35.9	-30.450	27.630	10.0	2.8
1996	9	15	20	36	57.7	-29.667	18.907	10.0	5.7
1996	9	15	20	37	2.4	-30.050	19.240	10.0	5.1
1996	9	16	13	23	47.0	-26.713	26.660	5.0	4.9
1996	9	29	23	27	7.8	-26.344	27.485	5.0	4.8
1996	10	1	23	27	26.3	-26.770	26.410	0.0	3.9
1996	10	9	23	33	9.4	-25.444	26.649	2.0	3.7
1996	10	10	2	1	17.3	-29.200	30.630	5.0	3.4
1996	10	10	2	49	8.6	-26.706	25.945	2.0	3.1
1996	10	15	0	0	19.0	-24.944	26.651	2.0	2.9
1996	10	16	13	38	58.6	-24.771	26.228	2.0	3.7
1996	10	17	0	24	28.2	-21.996	21.317	10.0	4.6
1996	10	22	20	25	53.1	-30.500	29.074	10.0	3.6
1996	10	23	18	18	29.5	-26.930	26.770	2.0	4.0
1996	11	7	6	56	6.9	-26.992	26.848	2.0	4.3
1996	11	23	9	44	7.6	-27.105	25.409	2.0	2.2
1996	11	24	0	36	46.5	-24.860	26.472	2.0	2.7
1996	11	24	13	31	22.4	-26.608	24.304	2.0	2.9
1996	11	25	18	14	38.4	-24.360	26.497	2.0	2.8
1996	11	27	16	42	33.7	-29.151	28.633	10.0	2.6
1996	12	2	10	26	32.2	-24.877	25.784	2.0	2.9
1996	12	4	0	9	12.3	-26.893	26.672	2.0	4.1
1996	12	11	12	50	10.2	-28.011	26.772	2.0	4.2
1996	12	25	12	20	48.5	-26.873	26.694	2.0	4.2
1996	12	25	18	23	42.2	-26.877	26.580	5.0	4.7
1996	12	27	11	7	51.4	-31.018	30.459	10.0	3.9
1997	1	3	3	23	24.2	-26.640	28.150	0.0	4.6
1997	1	3	8	21	59.4	-26.361	27.471	2.0	4.1
1997	1	4	2	16	15.7	-26.230	27.000	0.0	4.2
1997	1	9	14	7	35.7	-26.380	27.450	2.0	4.1
1997	1	17	12	37	16.6	-25.710	26.099	2.0	2.4

1997	1	20	6	47	16.6	-26.956	26.607	2.0	4.0
1997	1	24	9	23	46.8	-25.839	26.144	2.0	2.6
1997	2	10	11	9	57.9	-24.762	26.266	2.0	2.1
1997	2	10	14	53	37.8	-25.835	26.095	2.0	2.6
1997	2	10	16	9	28.2	-26.880	26.720	2.0	4.1
1997	2	10	16	10	28.6	-27.022	26.702	5.0	5.4
1997	2	12	13	50	3.8	-24.827	26.381	2.0	2.5
1997	2	12	20	19	8.4	-25.488	26.106	2.0	3.1
1997	2	25	13	33	55.4	-26.810	26.840	2.0	4.3
1997	3	1	20	10	41.3	-26.120	26.310	0.0	3.7
1997	3	9	22	51	31.3	-29.775	25.479	2.0	2.4
1997	3	20	7	44	59.7	-26.807	26.358	5.0	4.9
1997	3	20	7	45	1.2	-27.054	26.727	0.2	4.1
1997	3	24	13	1	42.4	-25.166	25.813	2.0	3.8
1997	3	29	20	37	58.0	-27.055	24.828	2.0	3.0
1997	4	16	12	34	4.9	-26.518	29.465	0.0	3.2
1997	4	17	20	8	49.6	-24.066	26.324	2.0	3.0
1997	4	18	20	1	14.1	-25.208	26.308	2.0	3.6
1997	5	4	18	54	28.1	-25.140	26.019	2.0	3.5
1997	5	13	13	9	43.1	-29.286	25.160	2.0	2.0
1997	5	23	11	16	29.6	-26.940	26.829	5.0	4.1
1997	5	23	16	13	52.9	-26.850	26.690	2.0	4.0
1997	5	23	17	49	9.4	-24.811	26.534	2.0	2.5
1997	5	24	3	19	58.9	-24.821	26.378	2.0	1.9
1997	5	26	13	28	39.0	-24.817	26.474	2.0	2.7
1997	5	29	13	39	8.4	-24.810	26.320	2.0	1.8
1997	5	29	16	8	30.0	-24.822	26.374	2.0	2.2
1997	6	17	12	32	14.2	-26.063	28.961	0.0	3.0
1997	6	19	5	6	27.9	-24.708	26.602	2.0	2.7
1997	6	24	17	28	19.1	-26.052	25.835	2.0	3.0
1997	6	28	3	35	28.8	-26.420	27.330	2.0	4.1
1997	6	29	8	24	49.8	-26.349	26.966	0.0	4.1

1997	6	29	17	32	9.4	-20.538	26.292	0.0	4.6
1997	7	1	0	10	4.9	-29.728	27.231	2.0	2.4
1997	7	10	7	23	6.9	-27.247	28.539	2.0	3.6
1997	7	21	8	45	49.1	-26.857	26.619	5.0	4.0
1997	7	25	1	59	43.7	-29.380	27.790	5.0	3.2
1997	7	29	11	25	5.0	-27.894	26.703	5.0	4.0
1997	8	1	2	17	26.9	-27.943	26.583	10.0	4.1
1997	8	4	15	34	43.9	-25.865	26.209	2.0	2.5
1997	8	25	8	56	45.5	-27.975	28.217	2.0	2.8
1997	9	13	22	43	36.1	-27.110	26.700	2.0	4.0
1997	9	25	0	5	23.2	-26.367	27.406	5.0	5.0
1997	10	19	8	56	12.0	-28.360	31.830	5.0	3.5
1997	10	20	19	20	41.6	-26.337	27.416	5.0	4.9
1997	11	2	20	3	45.8	-25.078	26.482	2.0	2.9
1997	11	28	20	17	53.4	-25.951	26.015	2.0	2.3
1997	12	2	22	26	41.0	-25.767	25.339	2.0	2.9
1997	12	10	16	14	35.1	-25.886	26.184	2.0	3.4
1997	12	11	5	29	45.2	-26.907	26.630	5.0	4.2
1997	12	11	15	28	20.6	-26.328	26.238	2.0	2.7
1997	12	12	16	42	46.5	-26.865	26.498	5.0	4.3
1997	12	16	11	13	17.7	-24.708	28.556	0.0	2.2
1997	12	17	10	11	53.5	-25.028	26.555	25.0	3.1
1997	12	19	12	58	45.8	-24.908	26.630	25.0	2.4
1998	1	14	9	27	3.7	-25.763	25.954	2.0	3.6
1998	1	14	21	48	39.6	-25.070	25.451	2.0	2.9
1998	1	15	13	18	37.5	-25.086	25.700	2.0	4.0
1998	1	16	1	59	54.0	-25.119	25.511	2.0	3.6
1998	1	17	13	6	44.8	-26.860	26.628	0.0	4.2
1998	1	22	23	34	40.5	-25.653	25.544	2.0	3.6
1998	1	27	20	33	33.0	-27.780	32.020	5.0	3.7
1998	2	2	22	59	41.5	-27.324	25.467	2.0	2.7
1998	2	6	15	18	20.9	-29.889	27.410	2.0	3.8

1998	2	11	18	28	7.5	-25.579	25.363	2.0	3.4
1998	2	18	7	47	17.3	-26.950	26.830	2.0	4.0
1998	2	21	23	19	39.7	-24.903	26.420	2.0	2.8
1998	3	2	8	21	46.4	-25.010	26.538	2.0	2.7
1998	3	5	8	36	42.9	-26.870	26.836	2.0	4.1
1998	3	5	8	47	23.2	-25.422	25.429	2.0	3.7
1998	3	9	11	54	56.8	-24.780	26.300	2.0	3.3
1998	3	14	4	37	29.7	-24.955	25.855	2.0	3.5
1998	3	14	8	17	1.6	-25.682	25.487	2.0	3.2
1998	3	20	20	52	24.7	-25.589	22.870	2.0	4.3
1998	3	23	15	19	14.3	-25.869	25.588	2.0	3.4
1998	4	4	0	54	33.4	-26.913	26.830	2.0	4.2
1998	4	22	16	8	14.8	-26.313	26.079	2.0	2.8
1998	4	24	11	44	14.6	-28.213	20.364	5.0	4.3
1998	4	26	0	50	23.2	-25.986	27.987	5.0	4.9
1998	5	15	14	46	19.5	-25.969	25.688	2.0	2.7
1998	5	17	5	14	3.0	-25.328	25.586	2.0	4.2
1998	5	17	5	14	13.4	-26.870	26.688	0.0	4.2
1998	5	21	16	13	24.7	-25.750	25.740	2.0	3.3
1998	5	22	7	56	30.3	-21.440	24.760	5.0	4.8
1998	5	25	17	51	22.3	-27.113	24.285	2.0	3.0
1998	6	2	1	46	29.8	-28.284	27.320	2.0	2.8
1998	6	19	11	47	42.7	-28.345	27.900	0.0	4.4
1998	6	19	11	47	56.9	-25.430	26.538	2.0	3.4
1998	6	19	14	23	30.5	-28.269	28.273	2.0	2.6
1998	6	22	11	33	36.0	-31.877	23.359	5.0	3.5
1998	6	22	11	36	8.7	-28.486	28.890	5.0	2.7
1998	7	5	17	19	56.1	-29.730	26.255	5.0	3.0
1998	7	6	17	7	29.3	-24.066	26.324	2.0	3.5
1998	7	6	19	55	37.2	-25.742	26.107	2.0	2.6
1998	7	11	0	31	33.7	-20.620	21.900	10.0	4.6
1998	7	11	0	32	55.3	-22.832	25.069	10.0	3.2

1998	7	12	7	6	8.4	-30.676	27.324	5.0	3.9
1998	7	13	7	5	4.9	-27.940	26.871	10.0	5.2
1998	7	15	22	53	28.1	-30.080	24.409	5.0	3.4
1998	7	18	14	8	17.1	-26.105	25.688	2.0	3.0
1998	7	19	14	45	15.4	-26.174	26.423	2.0	2.7
1998	7	22	4	3	15.0	-26.524	26.264	2.0	2.7
1998	7	23	2	20	38.8	-26.226	25.720	2.0	2.9
1998	7	27	12	40	2.5	-25.611	29.025	0.0	2.9
1998	7	29	5	33	59.0	-27.999	26.788	0.0	3.5
1998	7	30	14	12	7.8	-24.967	26.524	2.0	2.5
1998	7	31	15	4	17.9	-24.897	28.228	2.0	2.4
1998	8	1	6	33	23.8	-26.320	28.486	0.0	4.0
1998	8	2	4	27	34.6	-26.162	25.560	2.0	2.8
1998	8	2	15	0	42.4	-25.738	26.172	2.0	2.5
1998	8	11	9	38	55.5	-29.359	27.690	5.0	3.1
1998	8	12	12	39	9.3	-25.215	28.797	2.0	2.9
1998	8	17	15	52	51.9	-26.247	25.620	2.0	2.6
1998	8	21	0	0	1.7	-26.915	26.734	2.0	4.4
1998	8	21	16	10	24.6	-26.929	26.801	2.0	4.2
1998	8	28	9	11	2.9	-28.204	22.510	5.0	2.9
1998	9	3	11	13	30.8	-26.418	27.377	0.0	4.1
1998	9	6	20	16	27.0	-30.509	26.567	5.0	4.1
1998	9	9	16	9	13.6	-27.764	27.465	2.0	2.6
1998	9	12	12	13	1.6	-26.072	26.352	2.0	2.2
1998	9	18	0	0	0.0	-25.726	24.896	2.0	3.0
1998	9	25	15	51	32.5	-26.893	26.836	2.0	4.1
1998	10	1	14	7	45.5	-26.749	25.548	5.0	2.4
1998	10	2	10	17	52.7	-26.429	27.343	5.0	4.9
1998	10	2	12	22	39.8	-28.364	25.903	5.0	2.3
1998	10	5	22	40	12.3	-30.267	20.510	5.0	4.8
1998	10	5	22	40	18.6	-31.738	22.001	5.0	3.9
1998	10	7	4	51	2.4	-26.448	27.471	0.0	4.4

1998	10	13	13	38	41.1	-24.550	26.589	2.0	3.0
1998	10	16	0	17	17.5	-27.438	27.326	5.0	2.8
1998	10	24	19	29	10.7	-24.263	26.329	2.0	3.0
1998	10	25	15	23	8.8	-24.248	26.370	2.0	3.0
1998	11	4	0	0	31.6	-25.912	25.723	2.0	2.7
1998	11	14	16	11	13.6	-25.613	25.249	2.0	3.2
1998	11	17	20	17	58.5	-26.802	26.763	2.0	4.4
1998	11	18	16	30	5.7	-27.016	26.771	2.0	4.1
1998	12	5	4	52	44.8	-26.346	27.536	2.0	4.3
1998	12	14	12	42	10.5	-24.888	26.271	2.0	2.8
1998	12	21	21	56	15.7	-24.733	26.601	2.0	3.2
1999	1	7	10	41	34.2	-29.527	25.348	5.0	2.7
1999	1	7	15	18	56.4	-26.948	26.680	5.0	4.2
1999	1	12	2	50	22.5	-26.469	27.273	0.0	3.7
1999	1	19	11	9	34.2	-26.982	26.662	0.0	3.6
1999	1	23	8	47	33.3	-26.923	26.697	5.0	4.4
1999	1	27	21	56	35.5	-22.221	16.291	5.0	5.3
1999	1	27	21	56	44.9	-22.614	17.196	5.0	5.4
1999	2	2	10	33	20.1	-26.570	27.799	0.0	4.3
1999	2	4	2	2	13.5	-30.123	24.781	5.0	4.5
1999	2	14	12	23	39.4	-19.270	21.256	5.0	4.5
1999	2	14	19	46	37.0	-30.221	29.367	5.0	4.1
1999	2	19	11	45	38.6	-30.120	27.032	5.0	2.7
1999	2	26	9	27	46.2	-26.427	27.629	0.0	4.3
1999	3	4	22	45	56.0	-17.480	14.280		4.3
1999	3	31	8	19	0.0	-27.460	16.520		5.0
1999	4	1	7	13	10.0	-23.720	20.900		4.1
1999	4	1	22	18	24.0	-18.930	12.430		4.5
1999	4	13	20	41	55.5	-17.655	21.219	5.0	5.4
1999	4	22	22	19	39.1	-27.796	26.638	2.0	5.1
1999	4	30	20	1	16.6	-21.932	31.947	5.0	4.4
1999	5	10	19	55	44.2	-26.814	26.796	2.0	4.1

1999	6	21	9	18	21.3	-29.581	25.302	5.0	3.3
1999	6	24	22	10	30.3	-28.018	26.864	2.0	4.1
1999	6	30	3	34	46.3	-27.868	26.724	2.0	4.4
1999	7	3	20	53	1.1	-29.365	24.583	5.0	4.5
1999	7	21	4	46	11.0	-19.820	12.190		4.6
1999	7	21	10	58	41.0	-19.300	11.800		4.5
1999	9	6	13	45	10.8	-26.927	26.815	2.0	4.0
1999	9	8	21	18	16.9	-21.979	31.192	5.0	4.6
1999	9	14	17	29	38.6	-26.757	26.530	2.0	4.2
1999	10	6	1	28	27.1	-26.509	27.775	5.0	4.5
1999	10	11	14	24	20.1	-26.845	26.782	2.0	4.0
1999	11	15	4	56	51.8	-30.594	26.474	5.0	3.0
1999	12	4	19	59	39.7	-24.865	31.310	5.0	4.3
1999	12	21	17	25	12.6	-27.918	26.673	5.0	4.9
1999	12	31	6	18	54.2	-25.700	16.817	5.0	5.3
2000	1	24	5	8	55.1	-19.344	22.895	5.0	4.0
2000	1	25	5	8	55.1	-19.340	22.890	5.0	4.0
2000	1	26	3	0	1.9	-27.039	27.182	5.0	5.0
2000	2	7	19	34	57.0	-26.288	30.888	5.0	4.9
2000	2	7	19	35	2.9	-26.203	30.876	5.0	4.3
2000	2	8	0	26	55.1	-26.728	30.582	5.0	3.4
2000	2	8	13	30	21.9	-26.476	27.402	5.0	4.9
2000	2	29	21	48	26.7	-20.837	20.765	5.0	4.3
2000	3	7	19	22	2.1	-26.260	27.125	0.0	4.1
2000	3	8	17	4	35.6	-28.280	17.959	5.0	3.3
2000	3	16	9	26	58.5	-22.170	23.320	5.0	4.7
2000	4	7	18	29	42.6	-26.880	26.674	10.0	4.9
2000	4	12	13	32	47.6	-24.703	29.596	5.0	2.6
2000	4	29	1	36	52.5	-26.860	26.812	0.0	3.5
2000	4	29	7	29	46.2	-26.884	26.831	2.0	4.0
2000	5	30	13	7	1.0	-27.965	26.669	2.0	4.3
2000	6	3	17	21	40.1	-18.400	22.700	5.0	4.4

2000	6	11	19	37	55.2	-31.359	29.851	5.0	4.1
2000	6	16	19	13	36.4	-26.418	27.422	2.0	4.1
2000	6	20	14	40	21.9	-26.938	26.621	0.0	4.0
2000	6	25	2	33	49.4	-29.330	27.312	5.0	3.2
2000	6	25	13	59	4.4	-26.893	26.751	5.0	4.3
2000	7	12	3	46	33.5	-32.327	23.799	5.0	3.4
2000	7	13	13	17	47.3	-29.521	28.023	10.0	2.8
2000	7	13	20	35	29.3	-26.377	27.584	10.0	5.0
2000	7	15	23	2	6.0	-24.990	13.400		4.1
2000	7	21	23	34	27.2	-29.691	27.274	5.0	3.1
2000	7	28	15	13	23.9	-27.001	26.785	10.0	4.7
2000	7	29	0	4	31.0	-27.835	26.663	2.0	4.0
2000	8	6	21	38	28.5	-26.387	27.603	5.0	5.2
2000	8	24	10	42	0.6	-19.160	25.110	5.0	4.0
2000	8	24	11	17	32.0	-27.970	13.190		4.4
2000	8	27	19	34	59.0	-28.874	19.737	5.0	3.9
2000	9	7	2	24	22.0	-22.410	12.320		4.4
2000	9	11	22	3	57.2	-27.334	29.316	5.0	3.2
2000	9	17	14	10	1.6	-26.986	26.597	5.0	4.9
2000	9	24	13	19	11.4	-26.943	26.778	5.0	4.5
2000	10	3	21	54	59.8	-30.135	28.156	5.0	3.4
2000	10	6	3	28	42.2	-29.811	24.256	5.0	2.4
2000	10	9	11	33	7.1	-29.540	24.779	5.0	2.1
2000	10	11	17	57	31.0	-28.090	12.690		4.4
2000	10	26	16	57	57.5	-23.912	26.311	5.0	2.7
2000	10	27	1	6	13.9	-33.362	19.292	5.0	0.6
2000	10	28	0	1	14.2	-33.362	19.293	5.0	0.4
2000	11	2	6	29	19.4	-33.363	19.293	0.0	0.9
2000	11	3	23	3	36.0	-17.480	14.160		4.0
2000	11	4	23	15	16.0	-26.724	24.720	0.0	4.2
2000	11	6	8	8	53.8	-30.457	25.108	5.0	2.7
2000	11	13	8	18	20.9	-27.620	27.760	2.0	2.5

2000	11	15	1	26	9.4	-33.296	19.382	5.0	1.2
2000	11	15	3	44	10.4	-33.163	19.372	15.0	2.4
2000	11	16	7	23	3.4	-27.416	29.436	2.0	3.0
2000	11	16	7	23	45.2	-27.669	27.422	2.0	2.4
2000	11	19	12	50	23.7	-33.300	19.485	5.0	1.9
2000	11	22	1	14	39.6	-23.171	30.788	5.0	3.7
2000	11	24	18	10	0.3	-28.533	28.562	5.0	3.6
2000	11	25	18	19	1.3	-21.800	24.180	5.0	5.1
2000	12	3	0	35	49.0	-18.260	12.830		4.1
2000	12	18	18	35	27.0	-21.320	11.340		4.1
2000	12	18	18	39	15.0	-20.990	11.570		4.1
2000	12	24	0	0	12.6	-26.163	28.249	2.0	4.1
2000	12	24	14	46	5.6	-25.425	28.446	2.0	4.3
2000	12	24	14	46	11.8	-26.318	28.220	5.0	4.1
2001	1	8	19	3	8.7	-28.530	27.215	0.0	3.8
2001	1	8	19	3	17.0	-29.967	25.418	2.0	3.9
2001	1	12	22	59	48.8	-20.160	25.790	5.0	3.9
2001	1	13	12	48	27.0	-33.361	19.294	5.0	0.9
2001	1	14	12	49	58.6	-33.366	19.290	5.0	0.7
2001	1	24	7	59	24.8	-33.362	19.293	5.0	0.9
2001	1	25	9	20	47.1	-26.883	26.820	2.0	4.2
2001	1	29	9	58	49.5	-33.367	19.294	5.0	1.0
2001	1	31	15	17	59.0	-17.150	14.060	10.0	4.4
2001	2	5	8	16	3.7	-33.363	19.294	5.0	0.6
2001	2	10	13	41	22.8	-33.362	19.292	5.0	0.4
2001	2	20	12	42	45.4	-24.698	26.675	2.0	3.0
2001	3	2	11	52	38.1	-25.175	25.552	2.0	3.5
2001	3	14	11	42	24.0	-27.860	13.260	10.0	4.4
2001	3	24	20	40	41.6	-29.831	18.982	5.0	4.5
2001	3	30	0	57	47.0	-20.420	11.520	10.0	4.5
2001	3	31	5	9	2.1	-26.986	26.765	5.0	3.9
2001	3	31	17	26	30.9	-33.373	19.293	5.0	1.2

2001	4	6	19	42	37.8	-29.872	19.401	5.0	5.2
2001	4	6	20	58	58.3	-28.349	19.927	5.0	4.4
2001	4	9	1	3	26.0	-17.340	14.150	10.0	4.5
2001	4	9	19	56	1.0	-17.260	14.070	10.0	4.5
2001	4	11	13	0	23.2	-33.363	19.295	5.0	0.5
2001	4	21	13	16	29.3	-33.360	19.293	5.0	0.5
2001	4	24	16	47	14.0	-33.361	19.293	5.0	1.0
2001	5	18	9	14	8.2	-25.689	25.874	5.0	4.6
2001	6	3	18	7	11.5	-33.318	19.442	5.0	0.4
2001	6	7	8	12	24.6	-33.506	18.908	5.0	1.3
2001	6	11	12	16	19.1	-24.905	29.176	5.0	2.9
2001	6	11	17	42	53.8	-25.827	26.196	2.0	2.4
2001	6	14	2	21	16.8	-26.343	28.302	10.0	3.0
2001	6	14	13	43	5.4	-27.020	26.861	5.0	3.9
2001	6	19	13	43	51.8	-33.821	19.265	5.0	2.0
2001	6	21	20	44	11.9	-33.376	19.315	5.0	0.7
2001	6	21	22	19	24.6	-33.375	19.317	5.0	0.3
2001	6	26	20	31	52.3	-26.379	27.436	5.0	4.0
2001	7	4	21	53	46.1	-26.853	26.645	0.0	4.0
2001	7	8	8	28	29.3	-33.342	19.337	5.0	0.3
2001	7	9	18	57	54.2	-33.324	19.429	5.0	0.8
2001	7	10	1	32	1.3	-33.514	19.112	5.0	1.2
2001	7	18	10	27	51.6	-33.351	19.332	5.0	0.7
2001	7	18	11	3	39.9	-33.358	19.298	5.0	0.3
2001	7	24	19	11	36.6	-28.090	27.004	5.0	3.7
2001	7	27	11	43	10.0	-21.650	10.950	10.0	4.1
2001	7	31	22	22	22.9	-26.909	26.800	2.0	5.0
2001	8	1	13	32	23.0	-28.770	12.430		4.4
2001	8	1	13	51	35.0	-33.344	19.432	5.0	2.5
2001	8	14	1	52	43.1	-26.890	26.783	0.0	3.9
2001	8	20	0	4	8.0	-30.399	29.577	5.0	3.1
2001	8	24	4	39	12.9	-33.224	19.624	5.0	1.2

2001	8	27	12	43	12.3	-33.357	19.292	5.0	0.4
2001	9	1	22	5	53.1	-33.735	23.991	5.0	3.7
2001	9	3	20	2	59.8	-33.352	19.331	5.0	0.5
2001	9	5	18	25	27.1	-33.327	19.359	5.0	0.9
2001	9	10	10	16	33.3	-33.264	19.623	5.0	1.4
2001	9	14	13	2	14.2	-33.337	19.368	5.0	0.9
2001	9	20	21	23	48.2	-26.968	26.967	10.0	4.7
2001	9	21	19	21	42.0	-30.647	27.134	5.0	2.7
2001	9	29	8	26	56.3	-17.519	25.296	5.0	4.7
2001	10	2	9	10	23.7	-33.362	19.294	5.0	0.2
2001	10	24	21	9	25.0	-22.360	10.530		4.8
2001	10	28	22	48	31.6	-33.871	22.443	5.0	4.4
2001	10	30	13	53	8.4	-26.982	26.780	5.0	4.5
2001	11	10	20	57	34.6	-23.951	30.668	5.0	3.1
2001	11	17	17	9	14.5	-26.349	27.625	2.0	4.0
2001	11	19	1	31	56.0	-24.210	13.690		4.4
2001	11	24	9	28	9.0	-26.827	26.805	2.0	4.0
2001	12	8	15	28	56.1	-27.873	26.648	0.0	4.7
2001	12	29	17	42	6.0	-19.060	12.130		4.4
2001	12	30	2	0	28.7	-26.478	27.709	5.0	4.5
2002	1	8	5	32	19.3	-29.268	24.112	5.0	4.5
2002	1	27	21	50	10.2	-29.850	27.774	10.0	4.7
2002	1	27	22	9	52.3	-29.939	28.022	10.0	4.7
2002	1	27	22	10	1.7	-29.555	27.672	5.0	4.6
2002	1	31	2	39	33.1	-27.020	27.364	0.0	4.3
2002	2	2	21	43	5.0	-26.463	27.472	5.0	4.8
2002	2	11	21	32	50.0	-25.147	31.108	5.0	3.3
2002	2	14	23	59	47.7	-29.203	18.538	5.0	4.3
2002	2	23	3	28	46.4	-26.944	26.654	5.0	4.0
2002	2	28	3	5	16.9	-27.982	26.789	5.0	5.1
2002	3	21	16	5	31.7	-26.496	27.346	5.0	4.9
2002	3	23	0	52	7.3	-26.877	26.574	5.0	4.6

2002	3	30	2	10	40.9	-27.015	27.385	5.0	4.8
2002	4	11	12	58	1.5	-32.818	28.123	5.0	4.1
2002	4	19	15	48	47.4	-23.306	26.115	10.0	4.3
2002	5	4	1	16	3.2	-29.194	18.919	5.0	2.8
2002	5	18	22	21	16.0	-29.237	17.821	5.0	2.1
2002	5	19	15	38	24.0	-19.308	23.149	0.0	1.1
2002	5	27	16	22	36.4	-26.962	26.715	5.0	4.1
2002	6	1	13	49	33.9	-28.335	18.900	5.0	2.4
2002	6	9	9	40	5.0	-26.403	27.433	2.0	4.1
2002	6	25	3	3	39.5	-29.908	27.041	5.0	3.5
2002	6	28	3	18	28.1	-28.084	31.099	5.0	3.7
2002	6	28	3	26	15.9	-26.594	32.661	5.0	4.7
2002	6	30	20	46	47.1	-29.757	18.583	5.0	2.2
2002	7	2	19	47	7.9	-28.315	18.461	5.0	2.6
2002	7	11	14	55	8.1	-29.584	17.950	5.0	0.5
2002	7	12	3	16	55.4	-26.412	29.015	5.0	5.0
2002	7	15	15	22	24.8	-29.648	17.632	5.0	1.0
2002	7	16	10	10	40.3	-28.427	16.948	5.0	1.7
2002	7	18	23	37	34.9	-28.314	18.514	5.0	2.1
2002	7	23	14	27	4.4	-28.413	17.074	5.0	2.1
2002	7	26	21	35	42.9	-26.951	26.837	5.0	4.8
2002	8	8	0	20	2.1	-27.147	16.543	5.0	3.3
2002	8	28	10	56	43.1	-29.592	17.957	5.0	1.9
2002	9	7	18	17	53.6	-29.676	17.946	5.0	0.7
2002	9	28	0	20	18.1	-29.447	17.958	5.0	0.9
2002	10	5	7	27	0.0	-33.946	22.263	5.0	4.3
2002	11	1	10	20	32.9	-33.750	19.779	5.0	2.8
2002	11	6	8	20	46.3	-30.578	25.229	5.0	1.3
2002	11	18	6	59	32.2	-33.217	19.620	5.0	3.1
2002	11	18	7	9	51.7	-33.310	19.326	5.0	2.2
2002	11	18	14	13	23.4	-32.864	20.834	5.0	3.5
2002	11	26	16	37	52.5	-33.358	19.291	5.0	2.5

2003	1	2	15	5	4.8	-33.376	19.252	5.0	2.4
2003	1	3	14	34	42.9	-26.375	27.283	10.0	4.8
2003	1	4	17	29	42.6	-33.339	19.275	5.0	2.4
2003	1	25	3	14	39.8	-19.443	23.305	0.0	1.8
2003	2	13	12	13	22.3	-19.808	22.928	0.0	1.4
2003	2	16	5	18	24.0	-33.361	19.291	5.0	1.5
2003	3	3	21	17	44.8	-33.332	19.335	5.0	1.8
2003	3	6	3	32	53.0	-33.270	19.386	5.0	2.4
2003	3	8	2	4	44.2	-33.308	19.522	5.0	2.0
2003	3	15	17	37	52.6	-33.251	19.343	5.0	2.1
2003	4	2	5	39	59.0	-30.550	25.615	5.0	2.1
2003	4	3	4	37	55.5	-31.941	27.244	5.0	1.9
2003	4	5	14	46	56.8	-27.830	27.228	0.0	4.7
2003	4	5	14	47	4.2	-26.439	27.312	2.0	4.2
2003	4	11	21	25	2.1	-33.362	19.298	5.0	1.8
2003	4	14	23	6	20.4	-33.340	19.338	5.0	2.0
2003	4	19	14	26	21.0	-33.265	19.353	5.0	2.3
2003	4	21	5	12	26.7	-20.039	24.045	0.0	1.4
2003	4	25	15	23	28.2	-30.804	25.659	5.0	2.1
2003	5	4	2	58	45.2	-29.509	25.300	5.0	2.8
2003	5	4	4	19	4.7	-29.614	24.938	5.0	2.4
2003	5	7	15	11	54.1	-30.768	25.666	5.0	1.8
2003	5	8	21	26	14.4	-29.852	24.617	5.0	2.6
2003	5	12	13	10	0.9	-29.379	25.729	5.0	3.5
2003	5	13	14	20	23.3	-28.988	24.139	5.0	3.4
2003	5	16	0	9	17.6	-33.362	19.293	5.0	1.6
2003	5	19	7	0	54.1	-33.800	18.670	5.0	3.3
2003	5	19	7	1	12.3	-32.851	19.664	5.0	3.3
2003	5	22	1	36	3.1	-33.401	19.262	5.0	2.4
2003	5	23	14	1	7.4	-30.572	25.622	5.0	1.3
2003	6	1	7	23	15.5	-30.713	25.983	5.0	2.0
2003	6	7	12	18	19.5	-33.551	25.463	5.0	1.1

2003	6	13	17	34	39.5	-21.074	24.296	0.0	2.0
2003	6	26	8	5	52.7	-32.159	28.222	5.0	1.7
2003	6	28	13	34	45.8	-18.825	23.836	0.0	1.7
2003	7	2	23	46	24.8	-29.812	27.125	5.0	3.0
2003	7	4	13	17	10.7	-30.003	27.097	5.0	3.3
2003	7	4	14	10	9.8	-30.000	27.044	5.0	3.0
2003	7	4	14	12	58.0	-33.388	19.325	5.0	2.0
2003	7	5	1	21	59.5	-33.362	19.315	5.0	2.3
2003	7	7	7	9	52.3	-30.604	25.481	5.0	0.1
2003	7	7	23	39	35.3	-29.844	27.033	5.0	2.8
2003	7	10	7	13	30.6	-32.281	26.970	5.0	2.0
2003	7	11	3	3	13.5	-30.186	26.937	5.0	2.8
2003	7	14	11	21	43.2	-32.736	26.027	5.0	1.3
2003	7	15	20	35	48.5	-28.524	28.579	5.0	3.4
2003	7	16	18	31	55.4	-33.395	19.319	5.0	1.4
2003	7	19	0	2	35.0	-33.375	19.307	5.0	2.0
2003	7	19	23	5	2.9	-26.379	27.490	2.0	4.2
2003	7	23	11	32	28.3	-32.462	25.629	5.0	1.4
2003	7	24	13	54	5.8	-33.243	19.106	5.0	3.0
2003	7	26	11	26	13.0	-32.589	25.750	5.0	1.1
2003	7	31	8	13	2.9	-33.369	19.303	5.0	2.1
2003	8	2	20	48	21.4	-30.216	24.431	5.0	2.8
2003	8	5	11	16	22.7	-26.924	28.752	0.0	2.0
2003	8	7	10	38	41.0	-26.645	31.126	5.0	3.2
2003	8	13	14	55	23.2	-25.106	28.627	0.0	2.8
2003	8	14	7	36	14.6	-26.875	26.737	2.0	4.0
2003	8	15	1	42	42.1	-29.608	17.973	5.0	0.4
2003	8	15	18	44	10.4	-27.017	28.927	0.0	3.4
2003	8	18	5	22	14.1	-26.306	18.056	5.0	2.8
2003	8	20	1	45	20.6	-30.852	25.126	5.0	2.7
2003	8	20	2	28	59.2	-27.417	28.978	5.0	3.3
2003	8	22	7	11	36.9	-26.550	30.712	0.0	3.6

2003	8	23	11	16	48.5	-32.387	26.728	5.0	1.4
2003	8	24	19	26	40.3	-33.362	19.299	5.0	2.2
2003	8	27	14	20	32.3	-27.046	28.848	0.0	3.4
2003	8	28	12	15	45.4	-26.557	30.380	0.0	4.0
2003	8	29	12	35	26.5	-27.348	29.490	0.0	2.6
2003	8	30	15	19	39.9	-27.084	28.992	0.0	2.8
2003	8	30	16	34	56.3	-28.279	28.265	5.0	3.5
2003	9	3	7	36	7.9	-31.547	23.820	5.0	3.6
2003	9	3	11	20	23.9	-32.925	23.466	5.0	2.1
2003	9	3	16	3	5.7	-28.085	28.528	5.0	3.5
2003	9	4	13	48	14.2	-33.365	19.294	5.0	2.0
2003	9	7	15	8	36.8	-27.524	17.369	5.0	2.5
2003	9	7	16	57	51.6	-31.031	19.993	5.0	2.2
2003	9	9	1	5	51.1	-28.399	19.925	5.0	2.6
2003	9	10	14	11	28.5	-29.592	17.957	5.0	0.6
2003	9	11	19	40	4.7	-30.136	24.848	5.0	2.2
2003	9	12	7	5	51.4	-29.582	18.013	5.0	0.6
2003	9	12	10	51	6.4	-33.372	20.451	5.0	3.2
2003	9	12	10	54	25.9	-33.357	19.311	5.0	2.6
2003	9	12	17	17	19.4	-33.359	19.286	5.0	2.4
2003	9	12	21	32	45.3	-33.327	19.269	5.0	2.0
2003	9	16	7	25	47.9	-29.450	17.908	5.0	1.3
2003	9	17	16	40	53.5	-33.234	19.144	5.0	2.5
2003	9	17	19	10	20.7	-33.355	19.301	5.0	1.8
2003	9	19	1	6	46.8	-33.390	19.331	5.0	2.5
2003	9	19	13	28	49.3	-29.557	17.786	5.0	0.7
2003	9	21	13	18	43.5	-33.352	19.289	5.0	1.7
2003	9	22	23	13	16.2	-29.511	18.007	5.0	0.6
2003	9	23	4	23	42.4	-33.201	19.186	5.0	1.5
2003	9	25	3	28	30.0	-23.991	30.536	5.0	3.3
2003	9	25	18	45	10.6	-33.454	19.436	5.0	3.9
2003	9	27	11	46	21.2	-30.057	24.041	5.0	2.7

2003	9	28	8	10	40.0	-30.811	24.200	5.0	2.7
2003	9	29	11	3	49.3	-33.384	19.319	5.0	1.8
2003	9	29	11	54	42.9	-34.138	25.711	5.0	1.2
2003	9	30	0	50	19.7	-30.104	19.904	5.0	3.1
2003	10	1	0	50	41.4	-19.455	23.459	0.0	1.7
2003	10	1	11	22	46.1	-32.554	27.078	5.0	1.1
2003	10	3	2	2	50.3	-29.770	27.452	5.0	3.6
2003	10	3	13	24	14.1	-29.695	18.043	5.0	0.7
2003	10	5	12	24	10.8	-33.284	19.370	5.0	2.4
2003	10	8	11	23	25.9	-32.663	27.119	5.0	1.1
2003	10	9	13	51	43.8	-33.211	19.121	5.0	2.6
2003	10	11	11	32	44.6	-27.825	26.679	5.0	4.2
2003	10	11	11	51	56.8	-33.362	19.303	5.0	2.8
2003	10	14	11	36	31.6	-32.436	26.618	5.0	1.8
2003	10	14	12	36	23.0	-33.362	19.292	5.0	1.8
2003	10	17	16	11	2.2	-33.361	19.309	5.0	2.3
2003	10	17	21	52	11.0	-30.186	27.723	5.0	2.6
2003	10	21	20	58	13.2	-33.353	19.274	5.0	2.6
2003	10	22	9	4	4.3	-33.346	19.169	5.0	3.6
2003	10	22	21	36	55.5	-28.732	24.997	5.0	3.2
2003	10	25	3	14	10.4	-33.284	19.371	5.0	2.1
2003	10	25	15	1	52.7	-33.335	19.307	5.0	3.1
2003	10	26	5	6	24.2	-33.346	19.353	5.0	2.9
2003	10	26	5	14	29.3	-33.395	19.310	5.0	2.0
2003	10	30	6	11	27.1	-33.347	19.435	5.0	2.5
2003	10	30	11	21	42.2	-32.232	26.320	5.0	1.4
2003	11	1	2	44	32.1	-30.397	28.154	5.0	3.0
2003	11	5	15	55	10.1	-33.712	24.897	5.0	1.4
2003	11	6	11	17	11.1	-32.601	26.995	5.0	1.8
2003	11	6	12	35	0.1	-30.103	27.819	5.0	2.4
2003	11	8	22	32	34.1	-33.876	24.629	5.0	2.9
2003	11	9	7	26	3.7	-28.298	18.272	5.0	2.3

2003	11	10	3	3	22.5	-32.477	27.761	5.0	1.6
2003	11	10	12	46	45.3	-29.900	17.464	5.0	1.3
2003	11	10	17	0	9.8	-30.293	25.698	5.0	2.7
2003	11	10	18	36	3.2	-33.437	19.436	5.0	2.8
2003	11	10	18	37	53.9	-33.226	19.149	5.0	2.1
2003	11	11	10	33	3.5	-28.335	17.231	5.0	1.9
2003	11	12	0	15	50.8	-30.555	27.703	5.0	3.0
2003	11	12	12	35	2.6	-29.446	27.677	5.0	2.8
2003	11	12	13	5	13.7	-29.750	17.541	5.0	1.2
2003	11	12	14	1	0.3	-27.492	24.764	5.0	2.8
2003	11	14	9	38	42.5	-29.707	17.514	5.0	0.8
2003	11	26	11	26	10.0	-19.609	23.758	0.0	1.3
2003	11	27	10	21	11.5	-26.930	26.820	2.0	4.0
2003	11	29	14	23	57.1	-24.502	28.374	5.0	2.8
2003	12	6	17	25	38.3	-28.563	26.354	5.0	3.0
2003	12	9	16	39	14.9	-29.592	17.957	5.0	1.8
2003	12	10	1	26	36.7	-30.317	27.671	5.0	3.7
2003	12	11	22	23	28.9	-29.971	18.707	5.0	2.5
2003	12	12	19	18	2.5	-33.193	19.190	5.0	2.4
2003	12	12	19	44	38.2	-33.179	19.226	5.0	3.2
2003	12	12	19	44	50.1	-31.221	18.343	5.0	1.7
2003	12	17	13	25	29.3	-24.710	28.670	5.0	3.0
2003	12	18	7	9	44.8	-29.500	17.996	5.0	1.3
2003	12	18	23	27	47.1	-19.508	23.778	0.0	1.0
2004	1	1	22	44	38.3	-23.905	28.550	5.0	2.2
2004	1	2	10	16	32.3	-19.350	23.728	0.0	1.9
2004	1	2	15	58	18.1	-24.781	29.542	5.0	2.4
2004	1	3	10	10	37.5	-33.361	19.270	5.0	1.7
2004	1	3	10	23	15.3	-33.355	19.297	5.0	1.4
2004	1	4	5	28	24.3	-29.849	17.424	5.0	2.2
2004	1	5	5	24	40.3	-33.355	19.288	5.0	1.9
2004	1	6	6	58	32.1	-33.356	19.288	5.0	2.3

2004	1	6	7	55	48.0	-33.384	19.275	5.0	1.9
2004	1	13	2	9	36.7	-26.952	26.837	2.0	4.0
2004	1	14	12	2	6.8	-24.421	29.593	5.0	2.2
2004	1	15	16	48	59.6	-19.451	23.909	0.0	1.6
2004	1	17	11	38	51.2	-33.382	19.306	5.0	1.3
2004	1	20	18	42	52.2	-30.441	25.797	5.0	0.3
2004	1	23	13	13	49.4	-29.818	17.938	5.0	1.4
2004	1	24	7	56	54.4	-19.305	24.170	0.0	1.7
2004	1	27	23	34	8.6	-33.401	19.305	5.0	1.8
2004	1	28	8	23	4.4	-32.562	25.280	5.0	1.7
2004	1	30	9	29	16.3	-30.014	18.253	5.0	2.1
2004	2	6	6	11	55.3	-23.641	28.272	5.0	2.2
2004	2	12	0	22	0.3	-33.365	19.308	5.0	1.6
2004	2	12	6	9	14.3	-33.362	19.344	5.0	1.3
2004	2	13	21	25	17.4	-21.378	24.215	5.0	4.0
2004	2	13	23	25	26.2	-21.096	23.866	0.0	2.0
2004	2	15	22	47	40.4	-19.309	23.327	0.0	1.8
2004	2	23	15	12	18.4	-33.284	19.371	5.0	2.0
2004	2	27	11	24	12.4	-23.293	29.643	5.0	3.0
2004	2	27	21	15	41.5	-23.875	31.138	5.0	2.9
2004	3	1	19	34	11.6	-33.328	19.364	5.0	1.9
2004	3	2	14	14	32.6	-22.978	29.875	5.0	2.5
2004	3	3	10	42	28.6	-22.909	29.880	5.0	1.8
2004	3	3	18	47	12.7	-33.366	19.302	5.0	1.6
2004	3	3	21	52	1.0	-33.362	19.291	5.0	1.7
2004	3	6	1	36	44.3	-25.094	26.627	5.0	1.8
2004	3	6	4	45	59.0	-33.250	26.810	5.0	0.3
2004	3	7	15	51	21.7	-23.180	29.544	5.0	2.4
2004	3	7	15	52	9.8	-22.471	29.446	5.0	2.6
2004	3	9	21	8	26.1	-23.941	30.365	5.0	2.6
2004	3	10	12	18	31.9	-29.518	17.883	5.0	0.6
2004	3	11	5	37	41.1	-22.463	29.363	5.0	2.1

2004	3	11	6	58	33.8	-22.336	29.390	5.0	2.2
2004	3	13	5	54	25.1	-22.847	29.348	5.0	2.5
2004	3	13	10	34	17.5	-22.992	28.844	5.0	2.8
2004	3	14	0	10	31.3	-24.546	26.672	5.0	2.6
2004	3	14	14	10	47.4	-22.854	29.719	5.0	1.7
2004	3	17	16	28	51.4	-22.963	30.171	5.0	2.2
2004	3	18	14	23	11.2	-25.769	27.679	0.0	4.5
2004	3	19	14	25	49.5	-33.122	26.373	5.0	2.5
2004	3	20	9	12	47.0	-33.396	19.356	5.0	0.5
2004	3	23	11	35	37.7	-22.770	29.320	5.0	2.6
2004	3	23	20	54	59.2	-26.946	26.768	2.0	4.1
2004	3	25	10	48	32.4	-22.515	29.317	5.0	2.6
2004	3	26	14	25	21.7	-33.147	26.366	5.0	2.7
2004	3	26	14	25	21.7	-33.147	26.366	5.0	2.7
2004	3	27	10	14	12.2	-22.475	29.339	5.0	2.3
2004	3	27	23	34	43.3	-22.488	30.640	5.0	1.8
2004	3	29	5	45	18.0	-33.374	19.282	5.0	1.0
2004	3	29	15	36	9.0	-22.592	29.434	5.0	1.9
2004	3	30	15	37	9.8	-33.346	19.323	5.0	1.9
2004	3	30	21	32	43.6	-33.414	19.298	5.0	1.1
2004	4	1	13	9	57.3	-22.889	30.368	5.0	1.8
2004	4	3	10	19	7.5	-22.488	30.692	5.0	2.0
2004	4	3	21	42	47.9	-21.924	30.186	5.0	1.7
2004	4	5	5	18	21.1	-22.273	29.417	5.0	1.5
2004	4	6	13	52	32.8	-22.802	29.565	5.0	2.6
2004	4	10	5	42	53.1	-22.323	30.780	5.0	2.5
2004	4	10	15	49	8.0	-22.885	27.255	5.0	2.8
2004	4	11	4	7	24.3	-23.464	30.968	5.0	1.1
2004	4	11	5	12	30.2	-33.357	19.300	5.0	0.8
2004	4	11	13	48	7.6	-31.913	18.922	5.0	1.1
2004	4	11	22	18	25.3	-30.989	18.707	5.0	1.3
2004	4	12	10	19	26.8	-22.950	29.809	5.0	1.9

2004	4	12	11	34	45.7	-29.353	24.941	5.0	3.1
2004	4	12	13	33	56.5	-29.969	18.820	5.0	1.3
2004	4	13	11	14	20.6	-22.987	29.566	5.0	2.5
2004	4	14	0	23	48.2	-34.268	18.317	5.0	1.4
2004	4	14	23	5	7.3	-33.338	19.297	5.0	0.9
2004	4	15	9	53	53.1	-23.891	31.117	5.0	2.8
2004	4	15	14	35	55.9	-33.372	19.323	5.0	1.5
2004	4	15	17	11	46.7	-25.089	28.805	0.0	2.8
2004	4	16	11	59	2.2	-24.078	30.175	5.0	2.2
2004	4	16	16	23	6.0	-22.849	29.719	5.0	2.4
2004	4	17	3	4	40.6	-31.023	19.619	5.0	0.5
2004	4	17	4	8	4.8	-32.153	18.529	5.0	1.3
2004	4	17	4	17	3.2	-33.116	20.513	5.0	0.8
2004	4	17	5	23	28.5	-22.743	29.482	5.0	2.2
2004	4	17	6	14	58.0	-32.194	18.584	5.0	1.5
2004	4	17	7	48	45.3	-33.023	20.472	5.0	1.1
2004	4	17	12	31	4.5	-32.801	20.141	5.0	1.0
2004	4	17	21	39	13.7	-33.840	18.631	5.0	1.2
2004	4	18	2	58	38.4	-32.349	18.889	5.0	0.6
2004	4	18	4	36	32.6	-32.521	18.599	5.0	1.0
2004	4	18	14	30	53.2	-32.576	18.870	5.0	0.9
2004	4	18	23	26	17.2	-33.359	19.316	5.0	1.3
2004	4	21	1	53	20.0	-31.276	18.349	5.0	1.6
2004	4	21	11	43	32.0	-22.408	30.872	5.0	2.4
2004	4	22	5	10	54.6	-22.744	29.450	5.0	2.4
2004	4	22	14	18	7.3	-33.158	19.182	5.0	0.8
2004	4	23	23	17	41.1	-34.551	20.887	5.0	3.0
2004	4	24	11	53	59.7	-22.659	29.342	5.0	2.1
2004	4	26	23	46	6.4	-33.382	19.305	5.0	0.4
2004	4	27	11	32	52.9	-33.193	19.121	5.0	0.3
2004	4	27	11	36	32.1	-33.307	19.286	5.0	0.2
2004	4	27	13	0	33.4	-22.959	29.752	5.0	2.1

2004	4	28	5	23	50.9	-22.455	29.410	5.0	2.3
2004	4	29	15	59	16.7	-22.370	29.364	5.0	1.9
2004	4	30	19	47	37.6	-27.853	26.685	2.0	4.1
2004	5	1	5	9	58.0	-22.512	29.406	5.0	2.0
2004	5	2	16	29	53.8	-22.368	29.311	5.0	1.8
2004	5	3	5	6	2.9	-22.667	29.488	5.0	1.9
2004	5	3	23	54	33.5	-31.848	21.211	5.0	1.4
2004	5	4	4	6	18.0	-30.273	21.615	5.0	1.8
2004	5	4	15	16	9.8	-23.005	30.074	5.0	1.9
2004	5	5	7	32	22.8	-22.498	31.594	5.0	1.9
2004	5	6	11	17	52.4	-22.704	29.552	5.0	1.7
2004	5	6	19	12	45.7	-22.598	28.466	5.0	2.2
2004	5	7	7	35	31.3	-24.013	29.825	5.0	2.1
2004	5	7	12	7	47.9	-23.575	31.730	5.0	1.6
2004	5	7	14	13	19.5	-23.507	30.375	5.0	2.5
2004	5	7	15	1	42.5	-22.636	29.200	5.0	2.0
2004	5	7	18	27	26.0	-24.616	31.755	5.0	1.7
2004	5	7	18	32	34.9	-32.084	30.356	5.0	3.7
2004	5	8	3	25	34.6	-33.379	19.304	5.0	1.1
2004	5	8	5	16	43.6	-23.840	30.259	5.0	2.2
2004	5	8	7	28	7.4	-23.507	31.860	5.0	1.9
2004	5	8	7	43	52.2	-23.593	31.070	5.0	0.8
2004	5	8	7	56	51.4	-23.700	31.113	5.0	1.0
2004	5	8	9	18	50.5	-23.549	30.712	5.0	1.4
2004	5	8	13	52	31.2	-23.670	30.765	5.0	1.3
2004	5	9	8	17	3.0	-23.421	30.181	5.0	1.8
2004	5	9	16	8	12.1	-23.661	30.128	5.0	1.5
2004	5	10	0	0	32.7	-29.747	21.468	5.0	1.6
2004	5	10	4	9	13.0	-23.627	32.045	5.0	1.3
2004	5	10	5	25	16.3	-33.297	19.384	5.0	1.3
2004	5	10	8	19	17.7	-23.429	32.079	5.0	1.7
2004	5	10	8	28	55.3	-23.497	31.103	5.0	1.3

2004	5	10	10	35	33.8	-21.966	30.537	5.0	1.7
2004	5	10	11	32	19.9	-31.716	18.585	5.0	0.7
2004	5	11	10	18	43.5	-22.939	29.635	5.0	2.2
2004	5	12	10	17	12.0	-23.010	30.548	5.0	2.4
2004	5	12	10	30	53.6	-22.653	31.178	5.0	2.4
2004	5	12	15	22	52.2	-22.472	30.687	5.0	2.0
2004	5	12	22	52	28.1	-21.666	29.772	5.0	1.7
2004	5	13	5	21	7.2	-22.738	31.226	5.0	2.4
2004	5	13	8	24	39.2	-23.521	30.844	5.0	1.5
2004	5	13	8	39	1.5	-22.304	29.027	5.0	2.0
2004	5	13	13	53	0.1	-23.792	29.772	5.0	2.6
2004	5	13	18	51	18.9	-25.007	26.694	5.0	2.5
2004	5	14	9	18	52.4	-31.254	20.318	5.0	1.2
2004	5	14	10	36	0.4	-30.756	18.529	5.0	1.5
2004	5	14	11	55	4.9	-32.346	25.758	5.0	1.1
2004	5	14	16	7	26.2	-30.190	20.405	5.0	1.4
2004	5	15	6	59	31.4	-23.651	31.764	5.0	1.0
2004	5	15	9	43	4.5	-23.215	29.951	5.0	2.4
2004	5	15	11	18	37.4	-23.538	30.845	5.0	1.2
2004	5	15	11	24	26.0	-33.296	19.349	5.0	1.4
2004	5	15	11	30	49.7	-34.096	27.511	5.0	1.5
2004	5	15	11	38	50.3	-22.006	30.539	5.0	2.1
2004	5	15	13	18	2.6	-28.955	29.917	5.0	2.0
2004	5	15	16	55	46.2	-33.378	19.303	5.0	0.9
2004	5	15	18	16	46.9	-23.829	30.238	5.0	1.1
2004	5	15	23	40	56.2	-33.368	19.307	5.0	1.2
2004	5	16	0	33	4.7	-24.041	31.324	5.0	2.5
2004	5	16	7	26	59.8	-23.586	32.036	5.0	1.3
2004	5	16	8	25	43.9	-23.565	30.584	5.0	1.5
2004	5	16	16	13	59.4	-23.584	31.809	5.0	1.2
2004	5	16	16	43	2.2	-23.663	32.006	5.0	1.3
2004	5	16	17	42	23.8	-23.391	30.495	5.0	1.2

2004	5	16	19	5	47.8	-23.600	30.014	5.0	1.7
2004	5	16	19	20	47.7	-23.596	29.251	5.0	2.0
2004	5	16	23	30	42.5	-23.556	30.650	5.0	1.3
2004	5	16	23	32	35.2	-23.621	30.570	5.0	1.4
2004	5	17	4	30	20.1	-23.586	30.664	5.0	1.4
2004	5	17	4	31	54.7	-23.556	30.844	5.0	1.4
2004	5	17	5	4	31.1	-23.564	32.024	5.0	0.9
2004	5	17	5	23	40.5	-24.090	30.166	5.0	1.7
2004	5	17	5	29	22.0	-23.631	30.050	5.0	1.5
2004	5	17	6	22	50.2	-23.578	30.344	5.0	2.8
2004	5	17	6	29	57.0	-23.557	29.511	5.0	2.1
2004	5	17	7	34	0.1	-23.628	31.891	5.0	1.3
2004	5	17	7	49	38.9	-23.525	31.954	5.0	1.5
2004	5	17	10	18	11.5	-21.986	30.570	5.0	2.1
2004	5	17	10	57	59.0	-23.517	32.045	5.0	1.8
2004	5	17	11	18	28.5	-23.590	29.898	5.0	1.8
2004	5	17	11	20	50.8	-33.929	25.381	5.0	1.2
2004	5	17	11	38	41.2	-23.553	32.087	5.0	1.3
2004	5	17	12	7	23.1	-23.573	30.939	5.0	1.0
2004	5	17	12	36	6.1	-32.115	28.751	5.0	1.9
2004	5	17	12	59	28.9	-23.723	31.867	5.0	1.0
2004	5	17	13	2	49.2	-23.601	30.803	5.0	1.2
2004	5	17	14	28	29.5	-23.578	30.945	5.0	1.0
2004	5	17	14	43	52.7	-23.438	28.924	5.0	2.4
2004	5	17	15	53	25.8	-23.522	31.761	5.0	0.9
2004	5	17	15	58	43.0	-23.742	29.645	5.0	1.6
2004	5	17	16	9	17.0	-23.454	30.622	5.0	1.3
2004	5	17	18	17	48.9	-23.494	31.981	5.0	0.5
2004	5	18	0	45	43.2	-30.745	18.548	5.0	1.1
2004	5	18	4	27	44.0	-23.549	30.312	5.0	1.7
2004	5	18	4	30	32.3	-23.568	31.845	5.0	0.9
2004	5	18	7	12	7.2	-23.624	29.884	5.0	1.9

2004	5	18	7	47	50.4	-23.483	30.170	5.0	1.6
2004	5	18	8	18	5.0	-23.513	32.060	5.0	1.5
2004	5	18	8	43	37.8	-23.728	31.224	5.0	1.0
2004	5	18	8	51	4.1	-23.592	30.790	5.0	1.2
2004	5	18	8	53	48.7	-23.411	30.966	5.0	1.2
2004	5	18	9	38	13.8	-23.739	31.750	5.0	1.3
2004	5	18	11	11	56.5	-23.533	30.444	5.0	1.6
2004	5	18	11	18	31.6	-22.289	30.821	5.0	1.9
2004	5	18	11	55	15.8	-23.530	31.042	5.0	1.2
2004	5	18	14	7	9.6	-23.891	31.840	5.0	1.4
2004	5	18	14	21	34.4	-23.536	32.095	5.0	1.5
2004	5	18	16	42	55.2	-23.570	31.885	5.0	1.4
2004	5	19	4	4	13.2	-23.446	30.664	5.0	1.2
2004	5	19	4	30	0.7	-23.539	32.068	5.0	1.4
2004	5	19	4	51	34.8	-23.434	31.063	5.0	0.9
2004	5	19	7	19	19.1	-33.360	19.298	5.0	1.4
2004	5	19	7	55	42.4	-33.358	19.278	5.0	1.3
2004	5	19	11	24	9.6	-34.440	26.276	5.0	1.7
2004	5	19	12	3	40.0	-23.621	28.531	5.0	2.3
2004	5	19	13	53	9.6	-32.516	18.602	5.0	1.7
2004	5	19	14	18	20.8	-23.536	30.375	5.0	1.6
2004	5	19	15	20	0.7	-23.718	30.196	5.0	1.7
2004	5	19	18	18	27.0	-23.402	29.545	5.0	1.8
2004	5	20	4	48	40.0	-23.211	31.815	5.0	1.3
2004	5	20	5	19	38.1	-22.457	28.884	5.0	2.0
2004	5	20	7	1	59.1	-23.524	30.248	5.0	1.7
2004	5	20	7	49	21.0	-23.549	31.922	5.0	1.3
2004	5	20	11	23	56.4	-34.344	25.967	5.0	1.7
2004	5	20	12	31	42.7	-23.541	29.725	5.0	2.1
2004	5	20	14	2	35.5	-23.503	30.174	5.0	1.7
2004	5	20	15	24	17.1	-23.490	30.661	5.0	1.5
2004	5	20	15	32	10.9	-23.585	30.252	5.0	1.7

2004	5	20	16	15	41.8	-23.530	32.007	5.0	1.3
2004	5	20	19	44	48.8	-33.372	19.301	5.0	1.6
2004	5	20	21	54	1.0	-33.355	19.296	5.0	1.2
2004	5	21	4	48	10.0	-33.365	19.305	5.0	2.0
2004	5	21	9	53	37.5	-32.813	19.983	5.0	1.6
2004	5	21	14	24	37.0	-24.171	32.287	5.0	2.2
2004	5	22	15	18	29.6	-21.103	28.132	5.0	2.7
2004	5	22	16	9	28.7	-30.582	18.903	5.0	1.1
2004	5	22	16	22	9.4	-23.752	31.358	5.0	0.9
2004	5	22	17	29	13.6	-24.224	30.084	5.0	2.5
2004	5	24	9	16	50.2	-27.636	25.574	5.0	3.1
2004	5	26	0	7	1.3	-33.334	19.322	5.0	0.8
2004	5	26	11	26	32.1	-22.179	30.576	5.0	1.9
2004	5	26	14	38	56.8	-30.103	18.880	5.0	1.5
2004	5	27	10	58	57.8	-23.488	31.989	5.0	1.5
2004	5	27	13	58	35.0	-22.492	29.429	5.0	1.0
2004	5	28	21	44	43.2	-33.352	19.299	5.0	1.0
2004	5	30	3	18	15.3	-22.462	28.703	5.0	1.3
2004	5	30	3	58	23.0	-32.587	18.677	5.0	1.5
2004	5	30	15	14	22.9	-22.386	28.952	5.0	2.3
2004	5	30	19	30	8.9	-33.421	19.252	5.0	0.6
2004	5	31	11	27	51.9	-33.379	27.950	5.0	1.8
2004	6	1	4	40	57.3	-34.232	25.491	5.0	1.4
2004	6	1	5	27	25.5	-23.815	31.832	5.0	1.2
2004	6	1	10	32	32.2	-33.430	18.961	5.0	0.6
2004	6	1	10	49	15.0	-33.404	18.852	5.0	1.3
2004	6	1	15	55	33.7	-22.076	29.164	5.0	2.0
2004	6	1	16	37	43.3	-33.392	19.306	5.0	1.0
2004	6	2	9	8	3.9	-23.518	31.390	5.0	1.5
2004	6	2	9	32	9.3	-23.604	32.087	5.0	1.5
2004	6	2	10	2	42.5	-23.523	31.390	5.0	1.5
2004	6	2	10	49	59.0	-23.511	31.390	5.0	1.2

2004	6	2	20	11	30.1	-33.367	19.296	5.0	0.1
2004	6	3	7	41	10.5	-33.367	19.724	5.0	0.7
2004	6	3	11	50	26.9	-21.742	30.794	5.0	2.6
2004	6	3	20	5	51.4	-32.132	18.107	5.0	1.2
2004	6	4	4	33	55.3	-23.518	31.860	5.0	1.1
2004	6	4	4	51	51.1	-33.365	25.485	5.0	1.2
2004	6	4	9	21	30.0	-33.180	19.616	5.0	0.8
2004	6	4	11	33	12.0	-32.382	26.071	5.0	0.9
2004	6	4	15	42	58.5	-23.640	31.993	5.0	1.2
2004	6	4	16	16	55.5	-23.566	31.135	5.0	1.0
2004	6	5	8	57	9.7	-33.340	19.325	5.0	1.1
2004	6	5	15	8	23.5	-32.366	26.812	5.0	1.6
2004	6	6	0	0	1.5	-25.162	31.744	5.0	2.0
2004	6	6	0	0	9.3	-33.392	19.327	5.0	1.1
2004	6	6	0	0	37.4	-31.135	18.376	5.0	0.5
2004	6	7	0	0	57.9	-22.390	28.618	5.0	1.8
2004	6	7	1	45	31.4	-33.362	19.291	5.0	0.4
2004	6	7	7	47	23.3	-33.357	19.281	5.0	1.2
2004	6	8	0	0	31.1	-21.388	29.224	5.0	1.5
2004	6	8	0	0	32.8	-32.877	19.557	5.0	1.0
2004	6	8	12	52	40.5	-24.221	30.736	5.0	2.9
2004	6	9	11	46	14.0	-22.000	30.514	5.0	1.7
2004	6	9	16	15	25.9	-23.393	30.804	5.0	1.2
2004	6	9	22	11	11.3	-33.355	19.303	5.0	0.9
2004	6	10	0	0	47.0	-24.472	31.526	5.0	1.7
2004	6	10	4	59	24.0	-23.553	31.885	5.0	1.4
2004	6	10	13	34	12.2	-30.112	28.099	2.0	3.4
2004	6	10	13	36	58.0	-30.294	20.495	5.0	1.2
2004	6	10	19	45	32.5	-23.295	31.902	5.0	1.2
2004	6	11	1	9	16.8	-30.191	27.939	2.0	3.0
2004	6	12	10	51	43.2	-22.478	31.933	5.0	1.7
2004	6	12	11	21	18.5	-23.895	31.784	5.0	1.2

2004	6	12	14	8	38.8	-23.831	31.725	5.0	1.2
2004	6	12	15	59	55.2	-23.872	31.748	5.0	1.1
2004	6	12	16	4	57.3	-22.866	29.973	5.0	1.6
2004	6	13	8	30	59.4	-23.625	31.703	5.0	0.8
2004	6	13	11	52	13.4	-26.913	32.064	5.0	3.0
2004	6	13	12	47	13.5	-23.674	29.537	5.0	2.7
2004	6	13	15	27	16.5	-22.292	31.258	5.0	2.6
2004	6	14	0	0	18.4	-33.374	19.299	5.0	0.9
2004	6	14	3	54	53.5	-24.048	31.958	5.0	1.6
2004	6	14	8	4	53.0	-24.266	31.128	5.0	1.4
2004	6	14	13	6	21.3	-21.786	25.607	5.0	3.1
2004	6	14	16	13	18.4	-23.285	31.945	5.0	1.4
2004	6	15	5	8	15.0	-22.924	29.862	5.0	1.7
2004	6	15	15	9	57.9	-23.696	31.963	5.0	1.0
2004	6	16	0	0	29.2	-23.513	31.390	5.0	1.4
2004	6	16	9	56	37.5	-24.093	31.797	5.0	1.5
2004	6	16	11	20	2.8	-32.768	25.291	5.0	1.8
2004	6	16	11	36	48.1	-23.518	31.390	5.0	1.2
2004	6	16	16	28	49.2	-33.397	19.288	5.0	1.0
2004	6	17	0	14	43.0	-29.528	19.855	5.0	1.6
2004	6	17	1	48	53.0	-30.262	18.549	5.0	0.9
2004	6	17	10	16	13.8	-23.891	29.049	5.0	2.0
2004	6	17	14	49	26.5	-25.001	31.176	5.0	2.0
2004	6	17	18	19	6.2	-28.775	20.131	5.0	2.6
2004	6	18	0	0	41.4	-24.946	32.163	5.0	1.7
2004	6	18	3	1	30.2	-33.313	19.415	5.0	2.1
2004	6	18	6	2	10.3	-33.435	19.551	5.0	1.4
2004	6	18	12	37	7.5	-32.075	28.854	5.0	2.0
2004	6	18	15	38	33.6	-22.935	29.639	5.0	2.4
2004	6	18	19	7	17.2	-34.199	26.297	5.0	0.9
2004	6	19	2	48	57.0	-30.324	21.866	5.0	1.2
2004	6	19	2	50	44.0	-30.232	21.626	5.0	1.5

2004	6	19	8	14	8.0	-33.495	19.313	5.0	1.2
2004	6	19	16	32	25.7	-29.994	27.192	5.0	3.2
2004	6	19	16	54	7.7	-34.152	27.012	5.0	1.2
2004	6	19	23	48	5.4	-33.671	27.227	5.0	1.3
2004	6	20	0	0	17.4	-23.838	29.784	5.0	2.0
2004	6	20	3	54	24.7	-33.395	27.764	5.0	1.4
2004	6	20	10	33	58.7	-22.787	29.954	5.0	1.7
2004	6	20	10	47	30.8	-33.528	25.133	5.0	1.1
2004	6	20	10	53	48.8	-31.006	25.970	5.0	3.4
2004	6	20	11	5	34.9	-24.961	31.492	5.0	1.8
2004	6	20	12	0	51.9	-34.844	26.710	5.0	2.1
2004	6	20	19	8	25.7	-23.805	30.947	5.0	2.4
2004	6	21	0	0	48.1	-32.289	18.948	5.0	1.2
2004	6	21	11	44	34.7	-33.218	26.601	5.0	1.0
2004	6	22	7	52	26.1	-23.519	30.590	5.0	1.8
2004	6	23	0	0	27.7	-22.924	29.699	5.0	1.9
2004	6	23	8	4	16.1	-22.878	31.729	5.0	1.6
2004	6	23	14	25	58.7	-34.342	25.968	5.0	2.0
2004	6	24	10	49	49.6	-24.006	32.094	5.0	1.6
2004	6	24	12	33	59.9	-30.691	28.318	5.0	2.3
2004	6	25	0	0	50.7	-33.040	25.553	5.0	1.9
2004	6	26	0	0	24.4	-30.361	21.005	5.0	1.9
2004	6	26	10	17	53.8	-22.529	30.620	5.0	2.4
2004	6	26	11	57	27.5	-34.044	25.394	5.0	2.1
2004	6	26	21	35	4.5	-34.263	18.273	5.0	1.4
2004	6	26	22	35	25.1	-33.157	18.729	5.0	1.4
2004	6	27	0	0	19.1	-33.152	21.832	5.0	4.2
2004	6	27	0	0	33.0	-23.167	28.003	5.0	2.4
2004	6	27	5	36	2.5	-33.366	19.325	5.0	0.7
2004	6	28	0	0	22.8	-21.966	29.648	5.0	1.6
2004	6	28	11	46	44.9	-32.081	26.551	5.0	2.2
2004	6	28	19	6	20.0	-33.364	19.295	5.0	1.6

2004	6	29	0	0	24.8	-22.323	30.690	5.0	2.3
2004	6	29	0	0	39.9	-22.293	29.368	5.0	2.0
2004	6	29	0	0	51.2	-29.842	19.386	5.0	1.4
2004	6	29	15	49	12.4	-27.574	20.576	5.0	1.2
2004	6	30	0	0	33.5	-31.489	18.280	5.0	1.2
2004	6	30	6	57	14.5	-30.704	18.514	5.0	1.9
2004	7	1	0	45	25.7	-26.757	22.081	5.0	2.5
2004	7	1	4	4	25.5	-30.200	21.419	5.0	2.9
2004	7	1	9	42	31.5	-31.833	27.211	5.0	1.6
2004	7	1	10	41	19.2	-29.860	20.679	5.0	1.8
2004	7	1	11	0	22.1	-27.335	19.853	5.0	1.6
2004	7	1	12	51	21.6	-29.810	20.114	5.0	1.4
2004	7	1	15	32	54.8	-33.606	19.262	5.0	0.4
2004	7	1	19	19	17.7	-33.284	19.370	5.0	0.1
2004	7	1	21	43	1.3	-33.446	19.500	5.0	0.1
2004	7	2	2	25	54.1	-33.272	19.385	5.0	0.1
2004	7	2	8	8	22.8	-21.685	26.644	5.0	2.9
2004	7	2	8	55	15.1	-24.208	30.403	5.0	2.7
2004	7	2	9	4	30.0	-23.578	31.351	5.0	2.6
2004	7	2	9	6	23.6	-23.879	30.779	5.0	2.7
2004	7	2	11	18	12.7	-30.323	18.463	5.0	1.4
2004	7	3	3	47	46.5	-26.640	22.076	5.0	1.1
2004	7	3	4	16	17.7	-33.322	19.247	5.0	0.1
2004	7	3	8	44	1.7	-33.430	19.281	5.0	0.3
2004	7	3	9	37	2.5	-25.375	32.320	5.0	3.0
2004	7	3	14	2	54.1	-33.401	19.282	5.0	0.1
2004	7	3	14	51	54.7	-29.727	17.590	5.0	0.5
2004	7	3	15	6	58.3	-34.465	27.122	5.0	1.3
2004	7	4	23	44	3.3	-33.299	19.386	5.0	0.1
2004	7	5	8	19	32.3	-31.777	20.097	5.0	0.8
2004	7	5	15	37	5.1	-33.538	19.384	5.0	0.3
2004	7	6	12	4	13.2	-33.376	19.265	5.0	0.2

2004	7	6	12	24	14.7	-33.128	19.406	5.0	0.8
2004	7	6	13	26	8.5	-33.369	19.287	5.0	0.4
2004	7	6	13	43	5.9	-29.926	21.819	5.0	2.2
2004	7	6	15	9	20.0	-34.222	19.664	5.0	1.0
2004	7	6	15	51	44.6	-23.736	29.757	5.0	2.2
2004	7	6	15	58	43.7	-23.114	29.499	5.0	2.2
2004	7	6	23	26	8.8	-30.792	18.815	5.0	0.6
2004	7	7	11	47	49.1	-33.631	19.347	5.0	1.0
2004	7	7	12	58	22.5	-31.198	20.962	5.0	1.1
2004	7	7	21	48	47.6	-33.353	19.302	5.0	0.8
2004	7	7	23	59	50.2	-33.643	16.620	5.0	2.4
2004	7	8	9	2	20.0	-33.356	19.298	5.0	0.5
2004	7	8	11	48	47.9	-32.093	27.531	5.0	1.9
2004	7	8	12	56	55.7	-35.541	28.861	5.0	2.3
2004	7	8	18	52	46.6	-27.057	21.022	5.0	1.8
2004	7	8	19	2	27.3	-30.756	20.017	5.0	1.1
2004	7	9	10	5	10.6	-29.684	20.167	5.0	2.8
2004	7	9	11	15	18.9	-22.643	29.274	5.0	2.6
2004	7	9	12	50	2.2	-32.397	25.344	5.0	1.4
2004	7	9	13	47	49.4	-23.457	30.496	5.0	1.9
2004	7	9	21	50	42.4	-29.045	20.191	5.0	1.7
2004	7	9	22	24	34.3	-29.702	20.315	5.0	1.7
2004	7	10	4	10	57.9	-31.942	21.960	5.0	1.6
2004	7	10	4	44	49.7	-30.198	18.657	5.0	1.6
2004	7	10	6	34	1.6	-24.754	32.447	5.0	1.9
2004	7	10	22	7	33.4	-30.208	20.109	5.0	1.6
2004	7	11	4	35	44.5	-23.904	31.990	5.0	1.5
2004	7	11	11	45	25.0	-22.974	29.685	5.0	2.0
2004	7	11	14	43	53.8	-23.607	29.363	5.0	2.0
2004	7	12	12	35	6.9	-35.682	27.966	5.0	2.1
2004	7	13	11	23	53.2	-32.412	25.642	5.0	1.3
2004	7	13	11	58	23.7	-33.390	19.323	5.0	0.9

2004	7	13	13	22	17.1	-31.333	21.097	5.0	1.7
2004	7	13	13	27	17.2	-32.988	17.750	5.0	1.9
2004	7	13	15	22	55.5	-22.477	30.611	5.0	2.4
2004	7	13	17	27	29.4	-33.336	19.265	5.0	1.0
2004	7	13	20	25	17.6	-33.389	19.321	5.0	0.7
2004	7	14	2	14	16.6	-33.364	19.294	5.0	0.5
2004	7	14	4	36	28.4	-31.403	18.363	5.0	1.7
2004	7	14	6	24	40.8	-23.969	31.122	5.0	3.4
2004	7	15	3	38	2.1	-33.268	19.386	5.0	0.6
2004	7	15	4	46	43.4	-23.646	28.775	5.0	3.6
2004	7	15	6	40	57.3	-33.355	19.297	5.0	0.4
2004	7	15	10	28	45.9	-33.335	19.436	5.0	0.2
2004	7	15	11	54	30.1	-23.474	29.290	5.0	2.4
2004	7	15	13	26	28.9	-29.239	24.266	5.0	1.3
2004	7	16	13	35	44.1	-29.246	24.260	5.0	2.1
2004	7	16	13	52	37.9	-33.218	24.146	5.0	2.4
2004	7	16	15	18	8.0	-22.774	29.593	5.0	2.5
2004	7	16	22	46	24.7	-34.949	25.704	5.0	1.0
2004	7	17	0	1	58.0	-30.007	21.457	5.0	1.9
2004	7	17	0	21	5.8	-33.164	27.764	5.0	1.3
2004	7	17	3	55	45.6	-31.662	23.994	5.0	2.9
2004	7	17	4	16	42.2	-29.235	17.722	5.0	2.0
2004	7	17	8	41	16.7	-33.350	19.232	5.0	0.8
2004	7	17	10	50	36.8	-29.200	22.644	5.0	1.4
2004	7	17	12	59	34.4	-29.096	21.281	5.0	1.6
2004	7	17	15	2	50.3	-24.347	31.913	5.0	2.3
2004	7	17	15	17	26.8	-23.796	31.070	5.0	1.2
2004	7	17	18	51	18.2	-30.603	19.039	5.0	1.3
2004	7	18	2	59	5.6	-33.284	19.370	5.0	0.6
2004	7	18	3	11	38.3	-29.713	19.744	5.0	2.1
2004	7	18	13	25	1.3	-23.239	29.812	5.0	2.4
2004	7	18	13	53	5.5	-26.383	27.350	0.0	4.4

2004	7	18	14	8	21.5	-33.523	19.299	5.0	0.8
2004	7	19	20	40	31.1	-23.805	31.599	5.0	1.0
2004	7	20	18	2	36.9	-32.204	27.403	5.0	1.6
2004	7	20	18	32	33.2	-33.834	25.172	5.0	1.3
2004	7	20	19	19	53.7	-32.246	27.047	5.0	1.6
2004	7	20	20	4	0.6	-31.718	26.325	5.0	1.8
2004	7	21	0	57	40.0	-34.440	26.553	5.0	1.6
2004	7	21	1	3	21.5	-33.387	19.532	5.0	0.4
2004	7	21	3	25	57.3	-30.965	18.314	5.0	1.6
2004	7	21	5	45	50.6	-32.545	25.760	5.0	1.6
2004	7	21	13	55	50.0	-31.413	19.512	5.0	2.2
2004	7	21	15	5	59.8	-32.586	21.123	5.0	1.7
2004	7	21	17	37	0.2	-33.286	20.321	5.0	2.0
2004	7	22	2	9	20.0	-33.268	19.354	5.0	0.4
2004	7	22	3	0	21.8	-32.446	27.873	5.0	2.2
2004	7	22	8	40	56.5	-29.612	18.726	5.0	2.2
2004	7	22	16	19	1.9	-22.227	31.034	5.0	2.8
2004	7	22	18	38	50.5	-35.464	18.863	5.0	1.4
2004	7	22	22	24	4.6	-31.281	18.435	5.0	0.6
2004	7	23	0	58	40.4	-32.360	25.175	5.0	1.9
2004	7	23	10	42	56.5	-32.636	18.677	5.0	1.8
2004	7	23	11	38	43.9	-23.438	29.769	5.0	2.6
2004	7	23	12	37	6.7	-33.185	29.421	5.0	2.2
2004	7	23	12	58	26.8	-23.406	29.783	5.0	2.1
2004	7	23	13	37	37.6	-33.231	19.262	5.0	0.8
2004	7	23	18	33	43.4	-33.298	19.385	5.0	0.7
2004	7	24	2	42	26.9	-29.754	18.768	5.0	1.9
2004	7	24	2	55	50.4	-30.602	19.331	5.0	2.0
2004	7	24	16	9	7.0	-34.437	25.979	5.0	1.4
2004	7	24	18	10	51.5	-31.260	16.728	5.0	1.6
2004	7	24	20	0	44.5	-33.221	19.479	5.0	0.8
2004	7	25	14	18	15.6	-22.441	29.244	5.0	2.3

2004	7	25	16	17	37.2	-33.305	19.392	5.0	0.5
2004	7	25	16	46	36.7	-20.064	23.626	0.0	0.8
2004	7	25	19	42	53.3	-31.746	21.944	5.0	1.5
2004	7	26	11	45	44.9	-33.366	19.296	5.0	0.4
2004	7	27	1	52	54.1	-19.697	23.848	0.0	1.5
2004	7	27	9	44	9.1	-23.794	30.075	5.0	2.7
2004	7	27	11	30	24.5	-30.667	15.489	5.0	2.3
2004	7	27	11	30	38.8	-34.307	19.540	5.0	2.2
2004	7	27	12	49	27.6	-32.762	19.130	5.0	2.3
2004	7	27	13	40	23.5	-31.838	19.953	5.0	0.8
2004	7	27	15	1	28.3	-34.527	18.618	5.0	1.4
2004	7	27	15	25	57.6	-34.048	18.513	5.0	1.2
2004	7	27	19	12	20.4	-33.401	19.290	5.0	0.4
2004	7	27	21	59	14.4	-22.524	28.926	5.0	2.1
2004	7	28	0	3	47.2	-33.711	19.430	5.0	0.5
2004	7	28	2	24	58.5	-33.178	19.446	5.0	0.6
2004	7	28	3	13	17.1	-30.903	21.006	5.0	1.8
2004	7	28	7	50	29.0	-33.361	19.295	5.0	1.7
2004	7	28	7	54	5.7	-33.658	19.146	5.0	1.5
2004	7	28	11	39	30.9	-22.396	26.992	5.0	2.1
2004	7	28	11	43	45.8	-22.442	29.419	5.0	2.1
2004	7	29	3	54	31.5	-29.680	17.905	5.0	2.4
2004	7	29	8	13	10.3	-33.024	19.925	5.0	1.3
2004	7	29	11	48	6.3	-23.429	30.316	5.0	2.1
2004	7	29	12	33	24.1	-32.884	28.859	5.0	1.8
2004	7	29	18	5	3.9	-32.708	20.680	5.0	1.2
2004	7	29	18	34	57.0	-33.386	19.327	5.0	0.2
2004	7	29	22	31	18.4	-33.366	19.291	5.0	0.4
2004	7	30	12	17	15.1	-32.669	17.497	5.0	2.7
2004	7	30	12	40	38.8	-30.761	19.653	5.0	1.7
2004	7	30	12	55	5.8	-31.014	18.731	5.0	2.9
2004	7	30	14	10	8.2	-21.561	29.639	5.0	1.8

2004	7	31	1	16	55.7	-33.299	19.386	5.0	1.0
2004	7	31	1	25	32.6	-33.000	24.973	5.0	2.1
2004	7	31	3	50	31.7	-34.814	26.075	5.0	1.8
2004	7	31	4	11	13.7	-30.901	20.808	5.0	1.9
2004	7	31	11	38	27.6	-31.253	22.071	5.0	2.3
2004	7	31	11	45	10.4	-29.067	18.146	5.0	2.1
2004	7	31	15	34	50.6	-32.505	26.397	5.0	1.5
2004	8	1	4	1	12.4	-34.099	27.301	5.0	0.8
2004	8	1	5	3	12.4	-33.359	19.283	5.0	0.5
2004	8	2	11	56	37.3	-29.673	19.441	5.0	1.2
2004	8	2	19	53	58.4	-29.954	19.142	5.0	1.7
2004	8	2	22	46	54.2	-33.415	19.308	5.0	1.0
2004	8	3	4	51	28.8	-31.871	21.347	5.0	1.6
2004	8	3	5	29	47.3	-32.710	19.772	5.0	1.3
2004	8	3	5	46	33.2	-33.775	25.214	5.0	1.0
2004	8	3	7	13	22.3	-31.983	20.777	5.0	0.8
2004	8	3	10	1	16.5	-31.082	18.349	5.0	1.1
2004	8	3	11	4	32.4	-29.954	18.337	5.0	2.6
2004	8	3	14	28	18.8	-26.919	26.840	5.0	4.8
2004	8	3	18	51	13.2	-33.362	19.271	5.0	1.4
2004	8	4	4	2	51.4	-30.476	25.221	5.0	3.2
2004	8	5	1	15	8.3	-32.138	18.581	5.0	1.2
2004	8	5	12	34	30.1	-32.916	23.332	5.0	2.1
2004	8	7	3	5	53.7	-29.931	18.788	5.0	1.2
2004	8	8	0	49	31.6	-30.335	20.533	5.0	1.0
2004	8	9	1	45	54.0	-19.285	25.924	0.0	2.1
2004	8	9	4	2	57.6	-32.809	19.510	5.0	0.6
2004	8	9	7	39	2.8	-31.303	19.669	5.0	3.2
2004	8	10	1	35	42.2	-31.253	19.847	5.0	0.9
2004	8	10	13	57	7.6	-29.981	18.919	5.0	1.4
2004	8	11	6	52	12.8	-33.373	19.290	5.0	1.1
2004	8	12	6	2	18.1	-32.377	19.440	5.0	1.4

2004	8	12	10	1	4.4	-33.710	19.182	5.0	1.4
2004	8	12	13	37	12.7	-32.598	18.521	5.0	1.7
2004	8	13	15	7	59.1	-32.311	28.642	5.0	2.0
2004	8	14	8	49	42.4	-32.140	21.538	5.0	2.3
2004	8	14	11	27	33.9	-32.532	27.531	5.0	0.9
2004	8	15	16	8	44.0	-32.419	21.696	5.0	1.4
2004	8	16	11	31	22.0	-29.229	20.918	5.0	1.2
2004	8	16	13	26	11.2	-27.312	22.422	5.0	2.0
2004	8	18	0	28	1.9	-33.284	19.371	5.0	0.9
2004	8	18	12	42	4.4	-33.820	19.290	5.0	1.2
2004	8	19	5	56	0.7	-33.856	19.631	5.0	1.0
2004	8	19	12	46	19.9	-29.828	20.189	5.0	1.7
2004	8	19	15	50	21.6	-32.531	19.146	5.0	1.1
2004	8	19	20	18	32.4	-33.344	19.292	5.0	1.4
2004	8	20	12	0	18.0	-28.222	19.660	5.0	1.5
2004	8	21	4	31	33.2	-29.876	18.990	5.0	1.8
2004	8	21	18	17	34.1	-29.672	17.512	5.0	1.1
2004	8	21	21	54	9.5	-30.943	19.648	5.0	0.8
2004	8	22	22	1	58.4	-26.473	27.202	0.0	3.4
2004	8	23	11	45	1.2	-23.423	27.712	0.0	2.1
2004	8	23	15	29	58.0	-34.539	26.545	5.0	1.2
2004	8	23	19	41	26.2	-33.374	19.327	5.0	0.3
2004	8	24	6	43	4.1	-28.592	19.575	5.0	2.1
2004	8	24	9	43	34.4	-29.866	21.241	5.0	1.9
2004	8	24	16	37	4.6	-28.534	20.617	5.0	2.3
2004	8	24	17	20	57.6	-33.356	19.295	5.0	1.7
2004	8	25	11	25	13.7	-33.813	25.249	5.0	0.9
2004	8	25	11	43	33.1	-24.067	31.811	5.0	1.2
2004	8	25	15	38	55.1	-29.389	21.160	5.0	1.9
2004	8	25	23	20	48.9	-33.340	19.288	5.0	1.0
2004	8	26	10	40	40.2	-34.032	19.649	5.0	1.0
2004	8	26	10	43	8.0	-19.460	23.861	0.0	1.4

2004	8	26	12	40	43.7	-31.525	29.918	5.0	2.7
2004	8	26	12	58	9.0	-33.341	19.298	5.0	0.6
2004	8	27	0	8	6.5	-33.300	19.387	5.0	1.0
2004	8	27	12	26	16.1	-31.696	21.249	5.0	1.5
2004	8	28	7	27	8.9	-30.120	22.645	5.0	0.2
2004	8	28	19	50	49.7	-33.355	19.305	5.0	1.2
2004	8	29	6	49	0.8	-33.337	19.298	5.0	1.2
2004	8	30	0	0	49.1	-30.599	18.594	5.0	0.8
2004	8	30	11	29	46.1	-34.515	26.873	5.0	1.1
2004	8	30	17	13	29.6	-31.155	24.151	5.0	2.5
2004	8	30	19	49	39.1	-31.854	19.053	5.0	1.0
2004	8	31	5	55	5.4	-30.248	21.737	5.0	2.1
2004	8	31	6	34	7.6	-30.110	17.799	5.0	2.1
2004	9	1	9	55	29.2	-31.034	19.135	5.0	3.0
2004	9	1	10	12	21.2	-33.197	20.429	5.0	1.2
2004	9	1	13	43	50.3	-29.473	20.355	5.0	1.8
2004	9	1	14	45	36.5	-29.353	21.359	5.0	1.8
2004	9	1	19	30	53.6	-33.457	25.328	5.0	1.7
2004	9	2	1	51	59.5	-33.839	24.526	5.0	1.3
2004	9	2	4	54	22.6	-32.039	27.009	5.0	2.0
2004	9	2	8	51	10.4	-30.596	23.559	5.0	1.9
2004	9	2	10	6	34.6	-27.679	22.024	5.0	3.0
2004	9	2	12	21	42.4	-30.550	20.946	5.0	1.5
2004	9	2	13	19	40.0	-26.216	26.105	5.0	2.1
2004	9	2	16	49	30.2	-33.351	19.289	5.0	1.0
2004	9	2	21	46	5.0	-33.860	20.048	5.0	1.3
2004	9	2	22	34	43.4	-28.699	16.692	5.0	2.8
2004	9	3	3	19	24.1	-29.732	19.384	5.0	2.3
2004	9	3	6	32	28.0	-22.547	29.359	5.0	2.4
2004	9	3	9	54	35.4	-30.339	18.559	5.0	2.0
2004	9	3	16	0	19.4	-22.955	29.454	5.0	2.6
2004	9	3	17	5	43.0	-33.372	19.294	5.0	1.4

2004	9	4	3	3	26.0	-33.580	27.309	5.0	1.6
2004	9	4	7	39	21.5	-23.936	31.806	5.0	1.2
2004	9	5	7	33	54.1	-23.467	31.731	5.0	1.7
2004	9	5	13	58	14.7	-25.903	25.239	5.0	3.2
2004	9	6	7	17	24.0	-23.653	31.783	5.0	1.1
2004	9	6	8	7	36.2	-33.462	18.109	5.0	1.6
2004	9	6	8	27	17.1	-23.735	32.046	5.0	0.9
2004	9	6	8	42	18.9	-30.678	20.230	5.0	2.3
2004	9	6	10	44	37.1	-26.969	26.715	2.0	4.9
2004	9	6	15	52	57.9	-26.398	27.405	2.0	4.0
2004	9	7	13	21	22.3	-27.883	21.908	5.0	1.4
2004	9	7	15	57	33.9	-29.612	22.682	5.0	1.8
2004	9	7	23	12	35.3	-33.343	19.287	5.0	1.1
2004	9	8	2	51	56.8	-33.365	19.304	5.0	0.9
2004	9	8	10	17	28.3	-22.553	29.201	5.0	2.7
2004	9	8	14	44	35.8	-33.180	27.497	5.0	1.5
2004	9	9	11	40	23.8	-33.392	27.959	5.0	1.0
2004	9	10	0	1	35.0	-33.353	19.296	5.0	1.4
2004	9	10	1	27	40.8	-33.361	19.270	5.0	0.9
2004	9	10	20	42	2.1	-23.758	26.716	5.0	3.3
2004	9	11	11	23	48.5	-34.444	26.166	5.0	1.6
2004	9	12	8	29	52.9	-33.351	19.298	5.0	1.0
2004	9	12	22	31	10.3	-33.307	19.435	5.0	1.0
2004	9	13	23	56	7.3	-22.674	31.898	5.0	2.0
2004	9	15	16	26	48.0	-29.533	22.793	5.0	1.7
2004	9	15	22	38	20.4	-33.372	19.294	5.0	1.2
2004	9	16	1	55	1.0	-30.985	19.959	5.0	0.8
2004	9	16	10	45	4.3	-30.071	20.976	5.0	3.2
2004	9	17	13	21	3.7	-31.003	21.939	5.0	2.6
2004	9	17	18	29	8.4	-31.449	21.055	5.0	3.1
2004	9	18	15	29	48.6	-22.709	30.533	5.0	2.3
2004	9	18	18	5	1.1	-30.744	21.137	5.0	2.6

2004	9	19	20	24	32.4	-33.366	19.300	5.0	1.6
2004	9	20	15	9	16.0	-30.125	18.710	5.0	1.7
2004	9	21	0	29	52.2	-31.131	18.895	5.0	1.8
2004	9	21	4	20	36.5	-28.447	22.245	5.0	1.5
2004	9	21	16	31	28.2	-31.451	18.387	5.0	2.0
2004	9	22	8	3	51.1	-27.834	21.671	5.0	2.5
2004	9	24	23	53	16.5	-33.372	19.290	5.0	1.3
2004	9	25	7	19	58.5	-29.180	19.880	5.0	1.9
2004	9	26	4	38	8.8	-31.986	18.132	5.0	1.9
2004	9	27	7	2	12.8	-33.294	19.314	5.0	2.2
2004	9	28	12	42	41.4	-22.986	30.001	5.0	2.4
2004	9	29	11	26	18.9	-33.183	27.987	5.0	1.0
2004	10	1	10	13	11.4	-31.602	18.123	5.0	1.8
2004	10	2	10	13	2.3	-28.322	21.057	5.0	1.9
2004	10	2	11	47	56.6	-31.365	24.302	5.0	2.2
2004	10	4	4	37	39.7	-33.370	19.288	5.0	1.4
2004	10	4	11	39	38.7	-30.995	21.890	5.0	2.3
2004	10	4	12	44	17.0	-33.040	19.093	5.0	0.8
2004	10	4	13	1	3.8	-33.042	19.031	5.0	1.0
2004	10	5	11	37	55.7	-34.428	26.295	5.0	2.3
2004	10	5	13	16	58.9	-30.686	21.750	5.0	2.0
2004	10	6	9	10	30.7	-32.764	20.409	5.0	1.4
2004	10	6	13	54	55.0	-24.092	28.053	5.0	2.8
2004	10	7	3	30	33.8	-32.824	19.977	5.0	2.2
2004	10	7	10	49	8.6	-22.458	30.594	5.0	2.7
2004	10	7	19	11	28.5	-29.997	21.719	5.0	2.5
2004	10	7	19	13	57.3	-29.752	23.804	5.0	2.1
2004	10	8	4	7	58.1	-30.144	20.443	5.0	1.9
2004	10	8	9	55	0.1	-29.313	22.854	5.0	2.2
2004	10	8	11	8	49.8	-22.913	29.817	5.0	2.8
2004	10	8	14	7	56.4	-29.975	20.378	5.0	3.3
2004	10	10	5	30	42.8	-32.712	18.187	5.0	3.6

2004	10	10	8	17	11.6	-28.142	19.776	5.0	1.5
2004	10	11	4	5	23.4	-23.001	31.295	5.0	2.5
2004	10	11	10	7	31.3	-33.120	19.553	5.0	1.6
2004	10	11	11	42	55.0	-30.009	21.343	5.0	1.8
2004	10	12	8	14	11.7	-26.871	21.215	5.0	1.9
2004	10	13	0	32	48.6	-31.365	23.393	5.0	2.8
2004	10	13	10	43	36.5	-32.240	22.487	5.0	3.2
2004	10	13	12	46	40.1	-30.611	25.165	5.0	2.0
2004	10	13	15	12	5.6	-22.905	29.686	5.0	2.7
2004	10	14	3	53	21.2	-33.248	19.365	5.0	2.2
2004	10	14	10	44	21.4	-31.500	18.415	5.0	2.5
2004	10	14	14	42	32.5	-27.612	19.565	5.0	1.7
2004	10	15	4	56	18.4	-33.340	19.291	5.0	1.7
2004	10	15	8	55	22.1	-30.613	20.905	5.0	1.9
2004	10	15	11	4	34.8	-22.907	29.628	5.0	3.2
2004	10	15	12	51	32.4	-33.354	19.291	5.0	1.9
2004	10	15	15	29	17.1	-33.350	19.295	5.0	2.4
2004	10	15	16	50	26.8	-33.352	19.296	5.0	2.0
2004	10	16	10	34	51.0	-23.006	29.873	5.0	3.0
2004	10	17	19	33	30.6	-33.274	19.451	5.0	1.5
2004	10	18	9	35	47.0	-31.044	21.076	5.0	3.0
2004	10	18	11	41	22.4	-30.495	23.989	5.0	2.1
2004	10	19	0	49	55.1	-30.023	18.426	5.0	2.5
2004	10	21	3	54	58.6	-31.228	18.713	5.0	2.1
2004	10	21	8	8	12.0	-33.352	19.300	5.0	2.6
2004	10	21	10	14	17.2	-29.664	21.527	5.0	2.6
2004	10	21	12	15	21.7	-22.353	29.318	5.0	2.9
2004	10	22	4	29	1.6	-24.257	29.209	5.0	3.0
2004	10	22	21	24	23.4	-33.779	21.053	5.0	3.7
2004	10	24	2	45	9.9	-31.586	20.487	5.0	2.0
2004	10	24	19	43	55.2	-33.382	19.246	5.0	1.4
2004	10	25	7	31	51.6	-33.184	19.414	5.0	1.8

2004	10	26	10	55	31.2	-22.395	30.845	5.0	2.9
2004	10	27	3	43	47.1	-33.353	19.297	5.0	1.9
2004	10	27	10	21	11.9	-33.253	19.046	5.0	3.3
2004	10	27	15	44	5.1	-33.408	19.658	5.0	2.7
2004	10	28	11	39	14.8	-29.667	21.822	5.0	2.9
2004	10	28	12	11	54.5	-33.521	18.900	5.0	2.4
2004	10	29	8	54	14.1	-29.664	24.000	5.0	2.5
2004	10	29	16	12	25.0	-22.422	29.357	5.0	2.9
2004	10	29	19	55	33.8	-33.755	24.509	5.0	3.1
2004	10	29	21	43	16.9	-34.797	25.581	5.0	2.6
2004	10	29	23	50	32.7	-33.405	19.284	5.0	1.7
2004	10	30	8	35	29.8	-31.895	29.482	5.0	3.4
2004	10	30	9	42	35.4	-33.356	19.292	5.0	2.1
2004	10	30	22	34	9.0	-32.113	17.543	5.0	2.8
2004	10	31	12	12	35.4	-33.167	28.525	5.0	3.1
2004	10	31	19	37	54.1	-33.330	19.296	5.0	1.3
2004	11	1	2	47	23.9	-33.377	19.308	5.0	1.0
2004	11	2	21	56	47.3	-29.648	19.905	5.0	1.3
2004	11	3	10	14	57.6	-29.651	21.610	5.0	1.6
2004	11	4	2	5	24.5	-33.288	24.754	5.0	2.9
2004	11	4	3	5	42.4	-32.603	20.332	5.0	2.9
2004	11	5	13	2	32.4	-22.312	30.717	5.0	2.6
2004	11	6	1	16	21.4	-32.350	19.302	5.0	2.3
2004	11	6	3	51	36.6	-30.849	18.498	5.0	3.0
2004	11	6	14	49	12.5	-32.311	19.821	5.0	2.2
2004	11	6	20	55	1.2	-33.372	19.321	5.0	1.8
2004	11	7	11	51	18.7	-22.887	31.340	5.0	2.3
2004	11	7	12	31	50.4	-33.361	19.293	5.0	1.3
2004	11	8	11	54	14.4	-33.361	19.294	5.0	1.3
2004	11	8	12	33	33.6	-30.396	20.666	5.0	3.0
2004	11	9	1	13	58.6	-26.027	21.488	5.0	1.9
2004	11	10	2	17	6.2	-24.035	28.742	5.0	2.2

2004	11	10	10	55	29.5	-33.384	19.320	5.0	1.6
2004	11	10	13	4	23.6	-27.851	20.620	5.0	1.3
2004	11	11	11	38	31.8	-33.667	19.256	5.0	2.0
2004	11	11	13	10	41.7	-28.724	19.682	5.0	1.7
2004	11	11	20	29	48.7	-33.092	26.284	5.0	1.9
2004	11	12	12	52	51.8	-22.434	30.710	5.0	3.1
2004	11	12	13	5	38.1	-30.611	21.452	5.0	2.4
2004	11	13	12	26	25.0	-33.260	25.600	5.0	2.5
2004	11	15	14	41	46.2	-30.098	20.434	5.0	2.5
2004	11	15	20	30	5.6	-33.333	19.429	5.0	1.8
2004	11	17	9	16	13.4	-30.205	20.709	5.0	2.1
2004	11	17	11	24	43.6	-32.122	26.698	5.0	2.7
2004	11	17	12	2	26.5	-33.356	19.286	5.0	2.2
2004	11	18	6	7	48.4	-24.666	28.031	5.0	4.1
2004	11	18	11	26	46.7	-32.440	25.479	5.0	2.1
2004	11	18	12	34	45.0	-32.925	29.048	5.0	3.2
2004	11	18	13	1	35.5	-31.066	23.662	5.0	2.3
2004	11	18	14	36	41.2	-29.932	21.171	5.0	2.3
2004	11	18	14	45	23.5	-22.199	30.797	5.0	2.7
2004	11	19	4	15	8.4	-30.708	23.566	5.0	1.6
2004	11	19	6	30	24.6	-33.357	19.293	5.0	2.2
2004	11	19	11	40	11.7	-31.147	22.643	5.0	2.1
2004	11	19	16	20	49.8	-22.345	30.838	5.0	2.7
2004	11	20	2	30	1.6	-22.913	28.591	5.0	2.3
2004	11	20	7	58	52.9	-33.358	19.287	5.0	1.5
2004	11	20	11	26	25.3	-33.982	24.991	5.0	2.9
2004	11	22	13	43	21.7	-33.982	19.178	5.0	2.2
2004	11	22	19	26	35.6	-31.860	19.165	5.0	3.4
2004	11	23	13	35	19.8	-29.347	21.195	5.0	1.9
2004	11	23	14	20	4.2	-22.377	30.042	5.0	1.9
2004	11	23	14	43	25.1	-33.795	19.193	5.0	1.9
2004	11	25	16	3	52.2	-32.872	25.240	5.0	3.6

2004	11	27	3	9	40.1	-33.372	19.305	5.0	1.4
2004	11	27	6	1	23.2	-33.534	19.785	5.0	2.4
2004	11	28	1	28	31.0	-22.563	31.953	5.0	2.6
2004	11	28	2	14	19.4	-22.409	28.641	5.0	2.2
2004	11	30	5	57	53.2	-29.495	24.999	5.0	4.7
2004	11	30	6	19	14.3	-34.367	19.773	5.0	3.0
2004	11	30	14	0	20.0	-33.684	19.600	5.0	2.3
2004	11	30	16	53	52.7	-33.008	19.186	5.0	2.7
2004	12	1	13	7	45.3	-28.965	16.690	5.0	2.6
2004	12	1	13	41	10.0	-23.269	27.530	5.0	1.8
2004	12	1	19	46	21.0	-33.376	19.251	5.0	1.4
2004	12	2	8	11	38.3	-23.414	28.173	5.0	1.3
2004	12	2	10	22	0.5	-33.582	18.567	5.0	2.5
2004	12	2	16	38	48.9	-33.142	19.175	5.0	1.8
2004	12	6	21	23	6.8	-30.746	25.305	5.0	0.7
2004	12	7	1	45	28.2	-33.368	19.293	5.0	1.0
2004	12	7	4	49	17.0	-33.352	19.300	5.0	1.8
2004	12	7	10	55	50.0	-33.053	20.097	5.0	3.0
2004	12	7	17	58	21.4	-32.871	19.871	5.0	1.7
2004	12	7	21	46	50.7	-33.357	19.295	5.0	2.0
2004	12	8	10	17	16.4	-23.413	29.854	5.0	2.6
2004	12	8	16	44	24.4	-32.641	26.524	5.0	2.3
2004	12	9	0	19	41.3	-26.389	26.957	0.0	4.2
2004	12	10	9	24	4.1	-33.059	19.579	5.0	2.2
2004	12	11	1	5	53.6	-33.320	19.322	5.0	1.6
2004	12	11	18	21	29.3	-33.375	19.302	5.0	1.6
2004	12	11	22	25	15.0	-33.042	19.011	5.0	1.7
2004	12	12	18	46	55.8	-33.411	19.334	5.0	1.6
2004	12	13	20	49	30.6	-33.342	19.296	5.0	0.7
2004	12	14	12	15	54.5	-33.388	19.313	5.0	1.9
2004	12	14	22	13	24.6	-33.340	19.374	5.0	1.0
2004	12	19	22	56	1.3	-33.482	20.024	5.0	1.9

2004	12	20	4	35	32.6	-33.247	19.297	5.0	2.1
2004	12	22	7	46	20.2	-31.771	19.351	5.0	2.1
2004	12	24	5	9	54.9	-22.811	29.498	5.0	2.2
2004	12	24	13	46	37.3	-23.249	29.218	5.0	2.5
2004	12	25	6	48	30.9	-23.090	31.700	5.0	1.1
2004	12	29	21	43	41.1	-33.410	19.304	5.0	0.9
2005	1	1	10	59	18.4	-33.365	19.290	5.0	2.0
2005	1	2	16	16	33.8	-22.686	27.814	5.0	2.7
2005	1	2	23	9	14.6	-33.295	19.382	5.0	1.8
2005	1	2	23	49	22.1	-33.284	19.370	5.0	1.5
2005	1	4	2	53	39.4	-33.385	19.293	5.0	0.3
2005	1	5	4	37	21.2	-33.369	19.293	5.0	2.0
2005	1	5	12	39	0.4	-33.095	19.528	5.0	2.4
2005	1	7	12	24	33.8	-24.057	29.627	5.0	2.7
2005	1	7	16	25	10.2	-29.964	27.299	5.0	4.2
2005	1	8	4	1	22.0	-28.061	26.724	2.0	4.2
2005	1	9	21	16	24.8	-29.519	25.094	5.0	3.9
2005	1	10	0	27	37.1	-33.394	19.318	5.0	1.9
2005	1	10	22	57	41.2	-33.284	19.370	5.0	1.5
2005	1	11	5	44	29.7	-33.362	19.294	5.0	2.0
2005	1	11	6	6	34.5	-33.207	19.108	5.0	1.7
2005	1	11	6	9	51.6	-27.140	15.250	5.0	4.2
2005	1	12	11	26	25.4	-32.160	26.765	5.0	2.5
2005	1	13	15	51	6.2	-33.350	19.294	5.0	2.7
2005	1	13	19	2	51.8	-30.570	25.583	5.0	0.8
2005	1	15	4	25	15.2	-33.354	19.295	5.0	0.9
2005	1	15	12	13	20.5	-22.648	29.410	5.0	2.4
2005	1	15	20	54	19.0	-33.395	19.323	5.0	2.7
2005	1	16	5	10	28.1	-33.351	19.284	5.0	1.7
2005	1	16	16	51	37.2	-28.001	29.538	5.0	3.5
2005	1	16	18	3	25.8	-33.358	19.289	5.0	0.4
2005	1	17	6	8	41.1	-29.757	19.931	5.0	2.5

2005	1	17	11	52	34.5	-31.246	20.664	5.0	3.1
2005	1	17	18	13	58.9	-33.157	19.208	5.0	1.8
2005	1	18	4	29	16.3	-33.336	19.438	5.0	1.5
2005	1	18	11	25	44.9	-34.355	27.177	5.0	2.1
2005	1	18	12	10	6.8	-34.106	25.529	5.0	2.6
2005	1	22	17	8	55.4	-32.784	26.818	5.0	2.2
2005	1	22	17	57	14.7	-30.585	25.523	5.0	0.8
2005	1	24	11	24	59.6	-32.280	27.065	5.0	2.5
2005	1	25	18	10	34.1	-26.923	26.717	2.0	4.2
2005	1	26	9	32	56.4	-31.799	18.859	5.0	2.4
2005	1	26	11	34	10.1	-33.520	27.846	5.0	2.3
2005	1	26	14	3	50.3	-23.105	29.777	5.0	2.9
2005	1	27	11	26	17.6	-32.134	26.276	5.0	2.7
2005	1	28	10	30	48.2	-21.719	29.811	5.0	2.9
2005	1	28	17	16	30.9	-27.479	27.365	5.0	2.7
2005	1	29	5	41	45.3	-21.368	28.987	5.0	2.9
2005	1	31	11	55	48.5	-22.511	28.676	5.0	2.3
2005	2	1	11	40	37.3	-34.269	25.725	5.0	2.3
2005	2	2	15	30	34.4	-22.769	29.617	5.0	2.4
2005	2	6	0	35	43.4	-23.952	29.243	5.0	2.3
2005	2	6	5	1	30.2	-33.364	19.290	5.0	1.1
2005	2	6	6	5	16.0	-33.367	19.293	5.0	2.1
2005	2	6	20	10	18.7	-32.783	19.932	5.0	2.6
2005	2	8	14	57	2.2	-33.197	19.392	5.0	2.0
2005	2	8	18	39	54.1	-33.392	19.317	5.0	1.0
2005	2	9	12	28	1.9	-34.262	25.816	5.0	2.1
2005	2	11	8	34	56.5	-25.124	28.785	0.0	2.7
2005	2	11	17	46	40.6	-33.356	19.299	5.0	1.0
2005	2	16	12	5	17.8	-33.049	19.143	5.0	1.8
2005	2	17	23	8	46.9	-26.915	26.546	5.0	4.3
2005	2	18	21	10	57.1	-29.698	19.405	5.0	3.4
2005	2	19	20	59	48.8	-33.365	19.298	5.0	2.2

2005	2	20	2	48	51.9	-32.298	17.818	5.0	3.4
2005	2	21	0	49	37.8	-33.375	19.304	5.0	2.2
2005	2	21	19	51	43.3	-33.369	19.268	5.0	0.8
2005	2	23	0	4	39.2	-33.399	19.314	5.0	2.8
2005	2	23	13	49	34.1	-33.356	19.288	5.0	2.7
2005	2	23	16	36	41.4	-22.813	29.865	5.0	2.3
2005	2	25	18	45	42.2	-33.361	19.292	5.0	1.3
2005	2	25	22	45	14.1	-33.743	19.386	5.0	1.6
2005	2	27	0	54	38.2	-33.411	19.669	5.0	3.3
2005	2	27	11	11	52.7	-33.390	19.312	5.0	1.6
2005	3	1	18	22	29.9	-33.247	19.211	5.0	1.7
2005	3	1	19	6	42.1	-19.596	23.518	0.0	1.8
2005	3	2	1	32	22.0	-33.395	19.300	5.0	0.8
2005	3	2	22	16	29.9	-31.531	20.906	5.0	2.8
2005	3	2	23	7	36.3	-31.399	21.202	5.0	1.9
2005	3	3	1	34	51.0	-33.386	19.306	5.0	0.8
2005	3	4	9	25	27.3	-32.766	20.634	5.0	1.7
2005	3	5	0	18	26.9	-19.025	24.165	0.0	1.7
2005	3	5	15	52	8.5	-33.369	19.301	5.0	0.2
2005	3	6	5	27	1.6	-31.743	21.865	5.0	1.2
2005	3	6	12	41	18.0	-33.394	19.304	5.0	1.0
2005	3	6	15	10	36.3	-21.955	30.598	5.0	2.5
2005	3	9	10	15	29.7	-26.912	26.735	2.0	5.3
2005	3	9	10	15	31.8	-26.910	26.790	5.0	5.3
2005	3	9	16	47	25.7	-26.927	26.986	5.0	4.6
2005	3	11	10	55	51.5	-33.321	19.266	5.0	0.7
2005	3	13	15	16	38.2	-32.045	19.434	5.0	1.2
2005	3	18	19	28	0.8	-33.295	19.331	5.0	1.6
2005	3	23	11	38	30.2	-33.386	19.286	5.0	1.0
2005	3	24	16	9	49.5	-22.344	29.266	5.0	2.1
2005	3	25	11	3	7.6	-30.996	21.326	5.0	2.2
2005	3	25	21	0	56.3	-33.173	19.033	5.0	0.3

2005	3	29	18	0	35.4	-19.642	24.180	0.0	1.7
2005	3	30	6	33	45.9	-28.898	24.380	5.0	2.3
2005	4	1	8	57	21.4	-33.065	19.524	5.0	1.0
2005	4	1	13	33	31.9	-33.753	19.942	5.0	0.9
2005	4	2	23	40	12.7	-18.922	23.783	0.0	1.7
2005	4	3	11	7	24.9	-21.873	29.325	5.0	2.7
2005	4	4	1	9	4.5	-33.362	19.302	5.0	1.2
2005	4	4	23	21	25.8	-30.008	19.881	5.0	2.8
2005	4	5	10	19	54.5	-19.390	23.394	0.0	1.6
2005	4	5	11	49	17.6	-23.497	29.993	5.0	2.8
2005	4	6	10	54	52.1	-33.123	19.259	5.0	1.6
2005	4	6	21	12	4.2	-33.390	19.336	5.0	0.7
2005	4	7	19	23	52.9	-23.766	31.603	5.0	2.7
2005	4	7	19	23	53.1	-23.674	31.686	5.0	2.7
2005	4	9	9	36	35.3	-33.362	19.296	5.0	0.3
2005	4	9	13	38	31.9	-33.371	19.295	5.0	0.6
2005	4	11	9	12	36.7	-33.166	19.608	5.0	1.1
2005	4	11	12	33	29.1	-33.412	21.978	5.0	3.0
2005	4	11	13	27	7.5	-33.700	19.323	5.0	1.3
2005	4	11	13	59	0.0	-33.020	19.562	5.0	1.4
2005	4	13	4	10	44.0	-26.873	26.841	2.0	4.1
2005	4	15	13	35	4.1	-26.130	26.169	5.0	2.1
2005	4	15	16	3	18.2	-22.738	29.510	5.0	2.4
2005	4	16	5	40	2.6	-22.015	29.295	5.0	2.2
2005	4	16	16	5	51.2	-29.748	27.339	5.0	3.2
2005	4	16	16	5	53.3	-29.749	27.327	5.0	3.2
2005	4	17	13	39	7.2	-33.350	19.285	5.0	0.2
2005	4	20	0	38	35.7	-33.384	19.310	5.0	1.4
2005	4	20	6	2	13.5	-22.881	29.669	5.0	2.7
2005	4	28	22	59	56.3	-33.357	19.301	5.0	0.0
2005	5	8	11	50	7.5	-33.278	19.426	5.0	0.3
2005	5	10	1	58	24.2	-33.350	19.285	5.0	1.2

2005	5	11	4	43	33.1	-33.357	19.292	5.0	1.2
2005	5	12	14	9	21.7	-33.192	19.123	5.0	0.6
2005	5	18	7	0	26.8	-29.544	28.213	5.0	3.6
2005	5	18	8	54	28.1	-29.734	27.849	5.0	3.3
2005	5	20	0	44	36.5	-29.422	27.576	5.0	2.7
2005	5	23	6	9	13.1	-26.348	27.436	5.0	4.3
2005	5	25	15	24	55.5	-32.899	19.318	5.0	1.3
2005	5	26	13	1	29.5	-33.232	19.715	5.0	1.1
2005	6	1	8	52	9.9	-33.393	19.478	5.0	0.9
2005	6	3	15	13	0.6	-33.374	19.279	5.0	0.7
2005	6	5	2	40	32.4	-33.142	19.352	5.0	0.6
2005	6	6	15	26	10.1	-33.053	19.175	5.0	1.2
2005	6	7	13	34	21.2	-33.342	19.269	5.0	1.2
2005	6	7	18	25	18.8	-33.402	19.546	5.0	1.0
2005	6	8	2	17	50.9	-33.548	19.205	5.0	1.0
2005	6	10	19	50	52.2	-26.049	32.153	5.0	3.2
2005	6	11	10	6	23.7	-29.811	19.788	5.0	2.7
2005	6	21	11	25	59.7	-33.295	19.382	5.0	0.4
2005	6	23	0	33	46.9	-30.196	29.698	5.0	3.2
2005	6	23	22	11	6.6	-33.362	19.293	5.0	1.2
2005	6	25	14	27	35.8	-33.367	19.295	5.0	1.3
2005	6	27	8	59	37.8	-19.440	23.368	0.0	1.4
2005	7	1	10	11	6.6	-31.411	21.181	5.0	2.8
2005	7	3	8	1	48.2	-28.160	28.818	5.0	2.0
2005	7	4	14	48	36.5	-34.560	18.988	5.0	1.4
2005	7	7	15	52	10.7	-33.415	19.557	5.0	0.8
2005	7	8	4	36	35.3	-33.283	17.946	5.0	1.8
2005	7	8	15	52	6.8	-27.840	29.191	5.0	1.9
2005	7	9	3	49	29.6	-29.742	26.383	5.0	3.5
2005	7	13	14	51	57.6	-26.385	27.349	2.0	4.3
2005	7	14	11	6	30.1	-33.548	19.602	5.0	1.2
2005	7	14	11	10	53.2	-33.253	19.243	5.0	0.6

2005	7	14	21	59	17.5	-33.124	19.227	5.0	0.3
2005	7	16	6	57	32.0	-26.422	27.378	2.0	4.0
2005	7	16	13	4	24.5	-33.284	19.371	5.0	0.7
2005	7	20	23	28	37.0	-26.362	27.661	5.0	4.7
2005	7	23	14	31	31.9	-22.879	29.314	5.0	2.7
2005	7	24	13	36	9.0	-33.369	19.263	5.0	0.7
2005	7	24	13	43	10.2	-33.385	19.344	5.0	0.7
2005	7	25	19	4	3.2	-34.682	18.230	5.0	1.5
2005	7	27	23	22	49.8	-33.958	16.664	5.0	1.9
2005	7	28	5	58	12.0	-32.701	18.901	5.0	1.7
2005	7	28	15	3	34.4	-22.996	29.687	5.0	2.6
2005	7	28	19	43	33.5	-33.364	19.281	5.0	1.0
2005	7	30	15	2	9.8	-27.752	28.135	5.0	2.3
2005	7	30	17	38	19.8	-32.738	19.338	5.0	1.1
2005	7	31	5	41	13.1	-33.128	19.769	5.0	0.4
2005	7	31	17	5	21.6	-33.657	20.643	5.0	1.3
2005	8	3	12	9	9.2	-33.323	19.349	5.0	0.3
2005	8	4	2	53	43.6	-33.327	19.317	5.0	0.7
2005	8	4	13	24	1.8	-30.399	21.778	5.0	1.8
2005	8	4	20	33	51.8	-33.336	19.254	5.0	0.6
2005	8	5	3	15	33.5	-33.284	19.370	5.0	0.2
2005	8	5	7	56	7.0	-33.284	19.371	5.0	1.1
2005	8	6	14	15	39.1	-22.945	29.838	5.0	2.0
2005	8	6	14	20	42.4	-30.173	28.831	5.0	0.7
2005	8	7	2	51	47.0	-33.370	19.276	5.0	0.7
2005	8	7	10	31	56.7	-33.349	19.260	5.0	0.2
2005	8	8	18	27	49.8	-30.213	29.315	5.0	0.5
2005	8	11	15	38	42.3	-22.586	29.409	5.0	2.5
2005	8	12	14	27	54.1	-30.452	23.803	5.0	2.0
2005	8	13	2	42	25.0	-30.203	23.389	5.0	1.6
2005	8	16	5	52	43.9	-32.986	18.975	5.0	0.9
2005	8	16	8	4	8.1	-33.533	19.566	5.0	0.6

2005	8	16	10	23	37.8	-33.077	19.500	5.0	0.9
2005	8	16	11	20	19.1	-28.150	22.355	5.0	2.0
2005	8	16	12	36	42.2	-33.204	19.331	5.0	0.3
2005	8	16	19	53	15.4	-33.336	19.508	5.0	0.2
2005	8	17	12	11	2.8	-25.074	26.222	5.0	2.5
2005	8	17	12	23	27.0	-31.572	18.603	5.0	1.6
2005	8	17	13	32	13.8	-29.544	24.267	5.0	2.1
2005	8	19	9	59	13.0	-29.348	25.414	5.0	2.5
2005	8	22	6	38	5.5	-30.317	20.114	5.0	2.3
2005	8	22	15	7	58.4	-26.124	25.428	5.0	2.1
2005	8	22	22	16	32.4	-26.713	24.078	5.0	1.8
2005	8	23	3	3	34.5	-33.089	26.534	5.0	3.1
2005	8	23	4	18	8.8	-30.170	24.247	5.0	1.9
2005	8	23	12	55	28.8	-33.158	19.069	5.0	1.1
2005	8	23	15	23	43.3	-29.543	25.132	5.0	3.6
2005	8	23	19	43	1.9	-33.332	19.317	5.0	1.2
2005	8	24	16	7	43.2	-33.258	19.071	5.0	0.9
2005	8	25	18	13	31.5	-26.814	24.036	5.0	1.9
2005	8	27	7	37	49.8	-27.739	31.349	5.0	2.1
2005	8	27	9	14	47.5	-32.884	26.024	5.0	2.6
2005	8	29	4	9	48.2	-29.818	24.194	5.0	1.0
2005	8	29	13	16	7.2	-30.070	24.071	5.0	1.4
2005	8	30	4	51	35.5	-27.008	26.733	2.0	4.4
2005	8	30	11	6	28.7	-33.404	19.318	5.0	1.3
2005	8	30	23	3	37.8	-26.805	24.059	5.0	2.1
2005	9	1	10	30	4.3	-30.253	25.945	5.0	2.7
2005	9	1	15	40	14.3	-22.908	30.069	5.0	2.3
2005	9	3	13	16	14.3	-33.363	19.292	5.0	1.7
2005	9	3	20	42	59.2	-32.385	18.708	5.0	2.0
2005	9	4	1	37	4.1	-33.227	19.313	5.0	0.4
2005	9	4	20	17	53.7	-27.267	30.974	5.0	3.6
2005	9	5	7	42	27.0	-25.431	26.342	5.0	2.1

2005	9	5	10	54	55.4	-24.578	26.559	5.0	3.0
2005	9	7	1	45	51.8	-23.324	29.681	5.0	1.9
2005	9	7	12	43	31.2	-29.749	27.197	5.0	2.7
2005	9	7	16	22	9.5	-22.949	30.321	5.0	2.2
2005	9	9	0	40	56.7	-22.019	28.106	5.0	2.5
2005	9	10	0	15	39.8	-33.353	19.298	5.0	0.6
2005	9	10	16	10	9.1	-31.034	18.419	5.0	1.7
2005	9	10	23	31	55.2	-33.362	19.299	5.0	1.5
2005	9	11	0	25	37.3	-33.360	19.306	5.0	1.1
2005	9	11	1	2	44.7	-33.360	19.306	5.0	1.2
2005	9	11	1	16	41.4	-33.501	19.536	5.0	1.0
2005	9	11	1	22	58.1	-33.364	19.281	5.0	0.5
2005	9	11	1	40	36.3	-33.365	19.308	5.0	0.8
2005	9	11	3	28	8.8	-31.939	20.592	5.0	1.2
2005	9	11	12	15	17.0	-22.897	29.667	5.0	2.2
2005	9	11	21	51	2.6	-31.630	22.058	5.0	2.0
2005	9	12	11	59	26.9	-33.362	19.290	5.0	0.6
2005	9	12	21	46	41.1	-33.343	19.294	5.0	0.7
2005	9	13	10	40	33.4	-33.359	19.297	5.0	0.9
2005	9	13	22	55	37.5	-33.362	19.294	5.0	0.3
2005	9	14	10	33	58.2	-34.037	19.298	5.0	1.5
2005	9	15	12	14	57.9	-28.523	22.179	5.0	1.8
2005	9	15	15	36	44.6	-29.294	21.255	5.0	1.7
2005	9	15	16	14	2.8	-29.743	21.215	5.0	2.0
2005	9	16	3	52	38.7	-30.795	22.224	5.0	1.9
2005	9	16	23	24	10.3	-33.307	19.393	5.0	0.8
2005	9	17	4	24	19.9	-33.238	19.328	5.0	0.7
2005	9	17	8	18	16.9	-33.214	19.505	5.0	0.9
2005	9	18	18	23	59.6	-33.346	19.304	5.0	1.6
2005	9	18	21	45	28.1	-33.249	19.305	5.0	2.2
2005	9	19	4	4	10.3	-29.046	23.985	5.0	1.4
2005	9	19	8	20	54.9	-28.811	24.544	5.0	0.6

2005	9	19	13	57	44.0	-31.188	22.474	5.0	2.0
2005	9	19	22	21	16.3	-29.474	24.904	5.0	3.0
2005	9	20	4	3	47.5	-29.772	21.408	5.0	1.2
2005	9	20	11	40	53.9	-33.357	19.300	5.0	0.0
2005	9	21	10	13	18.7	-31.574	18.080	5.0	1.4
2005	9	21	19	25	32.1	-33.297	19.383	5.0	1.0
2005	9	22	11	47	10.7	-29.831	24.520	5.0	1.2
2005	9	23	3	49	26.7	-30.427	23.849	5.0	1.1
2005	9	23	9	48	15.8	-25.707	25.840	5.0	2.4
2005	9	24	1	34	26.0	-33.365	19.298	5.0	1.0
2005	9	24	11	54	30.8	-24.004	29.263	5.0	2.8
2005	9	25	1	23	49.5	-22.828	27.290	5.0	2.1
2005	9	25	16	12	28.5	-22.096	29.213	5.0	2.9
2005	9	26	10	47	58.2	-23.050	30.353	5.0	2.0
2005	9	26	21	2	3.6	-33.355	19.287	5.0	0.4
2005	9	27	0	41	11.4	-33.382	19.312	5.0	0.6
2005	9	27	11	59	25.6	-33.148	19.055	5.0	1.0
2005	9	27	15	40	44.1	-33.182	19.128	5.0	1.7
2005	9	28	18	46	12.8	-33.723	18.760	5.0	0.9
2005	9	29	15	38	44.9	-33.174	21.163	5.0	1.5
2005	9	30	10	6	52.7	-34.645	20.006	5.0	1.3
2005	10	1	8	12	25.4	-33.190	20.174	0.0	1.0
2005	10	9	11	21	3.3	-22.721	29.581	5.0	2.1
2005	10	12	4	54	34.0	-23.093	29.718	5.0	2.9
2005	10	12	14	10	35.2	-27.042	26.756	2.0	5.1
2005	10	12	14	17	52.5	-26.970	26.683	2.0	4.5
2005	10	13	12	40	35.2	-29.507	24.906	5.0	2.6
2005	10	17	12	6	1.4	-32.915	19.201	5.0	1.4
2005	10	19	10	59	24.9	-28.538	22.375	5.0	2.0
2005	10	19	11	0	2.2	-28.026	21.179	5.0	2.8
2005	10	20	0	30	51.0	-30.188	18.443	5.0	2.4
2005	10	20	12	58	43.3	-23.155	30.134	5.0	2.7

2005	10	25	21	33	18.1	-29.312	22.159	5.0	2.7
2005	11	1	14	58	40.6	-32.726	25.613	5.0	1.8
2005	11	2	9	21	44.2	-32.890	26.070	5.0	2.9
2005	11	3	15	42	41.3	-22.892	29.728	5.0	1.9
2005	11	3	16	58	42.6	-30.121	19.681	5.0	2.7
2005	11	15	10	34	42.9	-24.854	26.403	5.0	2.7
2005	11	15	16	3	2.7	-33.362	19.489	5.0	1.0
2005	11	16	9	18	46.3	-26.071	25.309	5.0	2.1
2005	11	18	7	22	15.6	-18.930	23.444	0.0	1.8
2005	11	21	10	47	55.2	-23.725	25.508	5.0	3.1
2005	11	25	14	53	10.1	-29.217	20.900	5.0	2.6
2005	11	27	16	14	43.6	-20.320	16.316	0.0	4.0
2005	11	28	6	14	44.0	-19.357	23.592	13.0	4.2
2005	11	28	8	14	46.6	-19.260	23.645	0.0	1.9
2005	11	30	20	25	31.9	-19.299	23.852	0.0	1.6
2005	12	1	13	52	22.1	-22.490	29.671	5.0	2.0
2005	12	2	3	55	3.8	-29.033	25.056	5.0	2.2
2005	12	3	23	49	8.7	-19.271	23.817	0.0	1.2
2005	12	6	13	43	50.6	-33.213	26.034	5.0	3.5
2005	12	6	13	43	50.6	-33.213	26.035	5.0	3.5
2005	12	8	13	25	18.1	-29.445	21.909	5.0	1.5
2005	12	9	5	15	37.9	-29.249	23.945	5.0	2.2
2005	12	9	22	26	47.4	-22.212	26.759	5.0	3.1
2005	12	15	6	22	43.6	-33.407	19.335	5.0	1.8
2005	12	15	14	15	30.0	-33.332	20.236	5.0	1.7
2005	12	16	8	9	10.6	-23.396	29.549	5.0	2.1
2005	12	17	19	8	1.3	-31.027	21.451	5.0	2.0
2005	12	18	8	51	17.4	-30.113	18.067	5.0	2.6
2005	12	19	7	6	53.2	-33.490	18.809	5.0	0.8
2005	12	21	10	53	1.7	-21.715	28.351	5.0	2.2
2005	12	21	15	52	33.8	-27.884	17.275	5.0	3.3
2005	12	23	11	29	43.9	-32.255	21.041	5.0	2.0

2005	12	29	12	16	9.0	-24.491	28.621	5.0	2.4
2006	1	11	12	5	18.5	-25.134	26.213	5.0	2.5
2006	1	13	11	47	21.6	-27.998	27.817	5.0	2.2
2006	1	13	18	18	38.1	-23.751	29.268	5.0	2.1
2006	1	18	11	43	9.8	-29.845	26.203	5.0	2.7
2006	1	19	12	31	51.9	-24.978	26.147	5.0	2.6
2006	1	19	13	5	54.0	-23.812	24.997	5.0	3.0
2006	1	26	10	16	25.9	-30.606	23.527	5.0	3.2
2006	1	26	23	56	17.1	-29.417	25.030	5.0	2.3
2006	1	27	11	10	7.5	-23.442	25.255	5.0	2.8
2006	1	29	10	1	16.8	-29.516	25.058	5.0	2.7
2006	1	29	13	5	32.3	-29.491	25.071	5.0	1.7
2006	1	29	23	55	6.7	-26.923	26.708	5.0	4.9
2006	1	31	4	2	27.8	-29.786	24.137	5.0	1.1
2006	2	4	0	18	59.6	-28.291	30.951	5.0	2.6
2006	2	23	2	22	1.5	-23.941	30.390	33.0	5.6
2006	2	26	1	39	9.3	-29.953	26.643	5.0	3.1
2006	3	7	0	36	45.0	-24.902	32.345	5.0	3.1
2006	3	10	20	42	54.3	-24.492	29.798	5.0	2.3
2006	3	15	22	4	47.4	-26.327	27.382	5.0	4.5
2006	3	19	11	23	4.7	-26.949	26.701	2.0	4.2
2006	3	19	16	23	30.6	-24.230	32.210	13.7	5.1
2006	3	19	23	43	6.6	-28.060	26.843	2.0	4.0
2006	3	23	3	30	28.1	-26.438	27.309	2.0	4.1
2006	3	29	12	18	34.9	-24.092	26.340	5.0	3.3
2006	3	30	14	22	59.9	-29.531	18.553	5.0	2.1
2006	4	6	18	48	12.9	-30.646	21.797	5.0	1.5
2006	4	8	23	58	17.0	-21.130	17.480	0.0	3.1
2006	4	11	20	53	22.2	-30.772	25.881	5.0	3.6
2006	4	13	16	55	41.6	-24.760	29.489	5.0	3.3
2006	4	14	18	6	48.7	-30.169	19.752	5.0	2.5
2006	4	29	20	48	34.2	-32.417	22.221	5.0	2.9

2006	4	29	20	57	35.3	-27.003	26.729	2.0	4.4
2006	5	2	22	2	15.0	-22.340	17.130	0.0	2.3
2006	5	10	11	57	18.1	-19.391	23.391	0.0	1.8
2006	5	14	10	49	28.0	-22.540	17.100	0.0	1.5
2006	5	16	23	19	45.6	-19.431	23.720	0.0	1.6
2006	5	17	16	51	3.2	-29.774	28.519	5.0	2.4
2006	5	29	22	44	36.7	-28.040	31.270	5.0	3.7
2006	5	30	1	24	12.9	-23.851	28.774	5.0	2.3
2006	5	31	19	36	46.8	-32.609	21.332	5.0	1.3
2006	6	2	7	51	6.6	-29.422	24.350	5.0	2.9
2006	6	7	4	20	1.1	-19.342	23.832	0.0	2.0
2006	6	10	15	16	9.4	-26.142	25.294	5.0	2.2
2006	6	11	19	51	13.5	-30.275	24.618	5.0	2.4
2006	6	12	13	24	42.0	-26.953	23.827	5.0	1.6
2006	6	13	9	13	51.1	-30.209	29.523	5.0	2.9
2006	6	18	15	38	42.0	-21.400	17.190	0.0	3.2
2006	6	19	3	34	53.3	-30.481	19.904	5.0	1.6
2006	6	20	15	18	58.4	-26.870	24.002	5.0	1.6
2006	6	22	1	43	50.6	-30.037	28.580	5.0	2.1
2006	6	22	10	53	24.0	-26.149	23.488	5.0	1.6
2006	6	24	4	25	5.6	-29.196	33.420	10.0	4.2
2006	6	25	15	39	56.2	-30.700	18.956	5.0	1.8
2006	6	26	13	42	55.3	-24.474	26.676	5.0	2.5
2006	6	26	14	55	38.3	-26.894	26.692	2.0	4.2
2006	6	28	13	38	35.5	-27.403	24.879	5.0	1.7
2006	6	28	13	38	35.5	-27.403	24.880	5.0	1.7
2006	7	3	11	41	56.9	-25.956	24.201	5.0	2.0
2006	7	7	20	57	5.6	-26.876	26.735	5.0	4.4
2006	7	8	12	56	56.8	-26.763	23.991	5.0	1.5
2006	7	8	15	4	31.6	-26.773	23.999	5.0	1.4
2006	7	8	17	32	28.6	-18.931	23.452	0.0	1.9
2006	7	8	18	17	38.8	-26.126	23.928	5.0	1.5

2006	7	11	17	10	12.2	-33.347	19.416	5.0	1.5
2006	7	13	15	7	45.3	-29.825	18.683	5.0	1.7
2006	7	28	10	50	39.3	-30.461	22.415	5.0	2.4
2006	7	28	18	3	38.0	-30.237	19.303	5.0	1.6
2006	7	29	12	8	44.4	-30.147	23.354	5.0	1.5
2006	7	31	16	42	11.2	-29.501	26.929	5.0	2.5
2006	8	4	11	7	43.0	-23.929	25.984	5.0	2.4
2006	8	5	11	13	16.3	-26.361	27.549	5.0	4.7
2006	8	7	1	18	42.2	-29.564	25.033	5.0	2.9
2006	8	8	15	46	31.5	-26.948	26.713	2.0	4.2
2006	8	11	6	30	20.7	-20.274	26.064	0.0	1.7
2006	8	19	21	58	28.2	-24.003	26.607	5.0	2.6
2006	8	23	4	56	31.7	-29.033	20.449	5.0	2.1
2006	8	28	18	11	20.8	-29.395	27.402	5.0	2.3
2006	8	31	1	35	37.5	-30.038	28.194	5.0	2.2
2006	8	31	3	59	28.1	-29.807	19.433	5.0	2.3
2006	9	1	18	24	28.0	-29.017	20.309	5.0	1.8
2006	9	9	8	18	17.8	-32.739	25.412	5.0	1.9
2006	9	10	2	39	21.4	-28.550	21.747	5.0	2.5
2006	9	11	11	30	17.7	-34.053	19.196	5.0	1.5
2006	9	17	6	50	51.7	-31.182	20.341	5.0	2.2
2006	9	22	3	16	21.6	-29.763	25.294	5.0	2.3
2006	9	23	5	14	57.9	-28.352	19.817	5.0	2.3
2006	9	24	14	46	41.4	-24.731	24.936	0.0	1.8
2006	9	24	15	27	40.4	-29.989	26.682	5.0	2.3
2006	9	24	21	19	13.7	-30.281	21.849	5.0	3.1
2006	9	27	7	45	47.6	-19.471	23.534	0.0	1.9
2006	9	27	21	53	21.6	-33.396	18.933	5.0	3.8
2006	9	28	13	52	36.1	-26.047	23.431	5.0	1.6
2006	9	29	10	33	22.5	-28.166	27.299	5.0	1.7
2006	10	1	3	35	9.8	-33.226	19.156	5.0	1.6
2006	10	1	9	32	0.1	-23.778	26.030	5.0	2.0

2006	10	4	18	8	33.2	-33.078	30.102	5.0	3.5
2006	10	5	8	34	6.5	-26.386	27.655	5.0	4.9
2006	10	5	9	19	19.6	-26.671	24.063	5.0	1.8
2006	10	5	10	58	14.2	-24.282	26.646	5.0	2.2
2006	10	6	14	9	20.5	-29.068	28.496	5.0	2.3
2006	10	7	8	32	38.6	-27.034	24.884	5.0	2.5
2006	10	10	16	29	14.2	-24.483	26.523	5.0	2.8
2006	10	11	2	17	30.0	-33.220	19.169	5.0	1.9
2006	10	12	1	9	49.8	-23.720	25.684	5.0	2.2
2006	10	12	2	3	17.0	-28.332	26.001	5.0	1.4
2006	10	12	15	42	49.1	-26.339	27.490	5.0	4.6
2006	10	12	19	47	57.5	-26.861	26.730	5.0	4.3
2006	10	14	12	23	44.1	-28.944	29.122	5.0	1.9
2006	10	14	14	21	9.9	-26.063	25.522	0.0	1.7
2006	10	15	14	56	25.7	-27.520	24.557	5.0	2.0
2006	10	16	11	2	6.7	-33.570	19.148	5.0	2.2
2006	10	16	14	10	58.2	-27.919	25.919	5.0	2.5
2006	10	16	20	27	59.7	-26.757	24.008	5.0	1.4
2006	10	16	22	57	10.7	-26.708	24.040	5.0	1.5
2006	10	17	13	8	43.2	-26.066	23.565	5.0	1.9
2006	10	17	13	37	45.2	-26.190	23.551	5.0	2.5
2006	10	17	16	14	44.8	-26.574	24.214	5.0	1.8
2006	10	18	10	13	6.0	-26.706	24.156	5.0	1.6
2006	10	19	10	10	24.8	-28.944	29.035	5.0	2.2
2006	10	20	13	57	43.1	-30.096	24.040	5.0	2.4
2006	10	26	13	38	42.3	-24.740	25.040	0.0	2.2
2006	10	26	14	55	45.5	-26.394	27.762	5.0	4.4
2006	11	1	14	5	3.4	-32.938	18.951	5.0	1.3
2006	11	1	16	16	48.3	-28.450	29.742	5.0	2.0
2006	11	4	7	13	28.7	-30.386	20.956	5.0	1.4
2006	11	4	12	56	44.3	-28.425	28.978	5.0	2.1
2006	11	5	20	2	0.5	-31.588	31.349	5.0	2.2

2006	11	6	2	48	37.1	-30.645	19.637	5.0	2.3
2006	11	7	14	30	36.0	-28.978	28.901	5.0	1.8
2006	11	10	0	21	36.0	-29.878	28.670	5.0	1.9
2006	11	10	11	53	58.5	-24.713	26.346	5.0	2.2
2006	11	10	12	43	41.9	-27.937	22.359	0.0	1.3
2006	11	12	5	48	17.4	-32.050	23.138	5.0	1.8
2006	11	12	12	19	16.4	-29.868	27.839	5.0	2.9
2006	11	12	15	46	49.1	-29.685	28.250	5.0	1.5
2006	11	13	13	56	35.2	-29.020	28.817	5.0	1.5
2006	11	16	10	7	42.4	-29.543	26.676	5.0	2.2
2006	11	16	16	3	6.1	-29.547	24.192	5.0	1.8
2006	11	17	9	2	13.9	-29.434	32.957	5.0	3.9
2006	11	17	14	54	25.2	-25.105	25.405	5.0	1.9
2006	11	22	10	15	50.3	-25.256	23.565	5.0	2.3
2006	11	23	12	41	42.5	-27.518	22.308	0.0	2.0
2006	11	24	9	12	22.0	-24.820	26.259	5.0	1.8
2006	11	24	11	2	1.9	-24.936	24.916	0.0	2.1
2006	11	24	12	19	46.9	-28.550	26.337	5.0	2.1
2006	11	24	16	25	58.7	-26.418	27.263	5.0	4.9
2006	11	25	0	0	42.1	-33.522	23.724	5.0	2.7
2006	11	27	20	5	0.1	-30.008	27.885	5.0	2.3
2006	11	29	1	50	9.4	-29.703	19.530	5.0	2.0
2006	12	4	4	25	31.5	-32.055	26.139	5.0	1.8
2006	12	4	19	32	52.7	-27.828	29.181	5.0	2.1
2006	12	8	10	31	38.8	-29.994	27.764	5.0	1.9
2006	12	8	19	21	2.2	-30.036	27.573	5.0	2.3
2006	12	10	3	41	39.1	-31.792	28.787	5.0	3.3
2006	12	15	16	0	54.5	-24.067	25.362	5.0	2.7
2006	12	19	12	25	34.0	-24.892	26.330	5.0	1.7
2006	12	22	9	21	30.6	-29.524	22.914	5.0	2.5
2006	12	23	15	4	27.4	-28.862	27.241	5.0	1.3
2006	12	24	3	4	45.7	-30.218	29.807	5.0	2.6

2006	12	24	19	27	16.8	-28.552	27.064	5.0	1.1
2006	12	26	17	42	13.7	-33.744	21.379	5.0	1.7
2006	12	28	19	58	14.2	-29.786	17.982	5.0	2.2
2006	12	29	8	0	10.9	-26.354	25.450	5.0	1.6
2007	1	2	12	50	58.0	-23.788	28.731	5.0	2.5
2007	1	3	6	26	41.7	-30.817	19.256	5.0	2.6
2007	1	3	17	29	54.0	-32.258	23.603	5.0	3.0
2007	1	5	13	48	53.8	-32.890	18.845	5.0	1.4
2007	1	6	11	53	50.6	-32.536	23.654	5.0	2.0
2007	1	8	2	48	58.1	-33.262	19.447	5.0	1.6
2007	1	8	8	19	44.2	-32.015	21.322	5.0	2.3
2007	1	8	14	45	26.9	-28.929	27.364	5.0	1.2
2007	1	9	13	8	0.7	-28.870	29.488	5.0	1.8
2007	1	12	11	12	4.1	-28.977	31.811	5.0	2.8
2007	1	13	22	46	48.6	-30.029	27.245	5.0	1.6
2007	1	15	0	58	6.9	-26.476	25.903	5.0	2.3
2007	1	15	20	39	30.5	-29.960	27.665	5.0	1.3
2007	1	16	20	23	19.1	-30.361	28.266	5.0	1.6
2007	1	17	12	11	49.9	-29.051	25.559	5.0	1.7
2007	1	17	19	50	23.6	-30.239	28.298	5.0	2.3
2007	1	17	21	41	56.5	-30.575	28.263	5.0	1.3
2007	1	19	6	38	35.8	-30.579	28.286	5.0	1.5
2007	1	19	8	24	16.4	-29.851	28.425	5.0	1.5
2007	1	19	8	35	54.0	-30.250	28.250	5.0	2.2
2007	1	19	9	7	26.3	-30.192	28.325	5.0	1.7
2007	1	19	9	28	34.9	-30.150	28.312	5.0	1.9
2007	1	19	10	49	6.1	-30.192	28.302	5.0	2.5
2007	1	19	11	43	12.1	-23.235	27.377	5.0	2.4
2007	1	19	17	47	37.4	-30.238	28.255	5.0	2.2
2007	1	19	19	1	19.3	-30.295	28.334	5.0	2.1
2007	1	19	21	23	8.3	-29.939	18.345	5.0	1.8
2007	1	20	1	42	8.3	-30.042	28.302	5.0	2.3

2007	1	20	4	31	12.6	-30.201	28.253	5.0	2.0
2007	1	20	5	59	24.6	-30.186	28.287	5.0	1.9
2007	1	20	8	4	56.6	-30.258	28.409	5.0	1.7
2007	1	20	11	35	16.5	-30.311	28.398	5.0	2.4
2007	1	20	12	40	25.2	-30.279	28.199	5.0	2.9
2007	1	20	16	10	48.7	-30.037	28.078	5.0	1.8
2007	1	20	20	45	4.3	-30.230	28.355	5.0	2.4
2007	1	21	0	7	27.2	-30.349	28.232	5.0	2.2
2007	1	21	1	35	8.0	-32.760	17.895	5.0	1.8
2007	1	21	5	6	42.5	-30.173	28.307	5.0	2.0
2007	1	21	5	23	21.3	-30.224	28.160	5.0	3.1
2007	1	21	9	18	33.6	-30.804	28.246	5.0	1.7
2007	1	21	16	21	53.7	-30.282	28.233	5.0	2.2
2007	1	21	16	23	50.0	-30.190	28.285	5.0	2.1
2007	1	21	16	25	36.8	-30.215	28.217	5.0	2.2
2007	1	21	16	37	46.3	-30.485	28.044	5.0	2.0
2007	1	21	20	59	21.9	-29.868	28.302	5.0	2.1
2007	1	22	0	38	17.6	-30.388	28.148	5.0	1.4
2007	1	22	21	10	22.9	-28.864	19.744	5.0	1.8
2007	1	24	0	4	58.2	-29.650	18.412	5.0	1.6
2007	1	24	20	32	22.1	-30.184	27.817	5.0	1.9
2007	1	24	22	23	51.6	-30.108	28.283	5.0	2.7
2007	1	25	0	17	53.7	-29.898	28.385	5.0	1.8
2007	1	25	1	24	53.6	-30.220	28.221	5.0	2.7
2007	1	25	13	55	12.9	-28.679	27.269	5.0	2.3
2007	1	25	18	8	26.4	-30.349	28.220	5.0	2.2
2007	1	25	18	30	28.0	-30.338	28.296	5.0	1.7
2007	1	26	13	54	10.0	-29.870	28.018	5.0	1.9
2007	1	26	21	36	51.8	-30.342	28.287	5.0	1.7
2007	1	27	3	26	13.4	-30.089	28.423	5.0	1.9
2007	1	29	3	23	40.2	-30.202	28.204	5.0	2.0
2007	1	29	12	47	7.1	-29.066	22.757	0.0	1.5

2007	1	31	6	30	47.7	-34.160	19.982	5.0	2.6
2007	1	31	15	35	19.9	-33.537	19.434	5.0	0.6
2007	2	1	11	22	44.2	-32.902	18.790	5.0	1.4
2007	2	2	10	54	14.6	-32.963	22.184	5.0	2.5
2007	2	5	2	18	15.3	-30.155	29.430	5.0	2.9
2007	2	5	3	11	51.8	-27.018	26.795	2.0	4.4
2007	2	7	7	4	2.7	-26.990	31.585	5.0	2.8
2007	2	7	14	45	18.0	-26.377	27.463	2.0	4.0
2007	2	8	14	29	40.9	-29.609	17.251	5.0	1.6
2007	2	8	17	26	16.6	-27.685	21.267	5.0	1.8
2007	2	8	17	38	8.4	-29.124	27.977	5.0	1.7
2007	2	9	11	47	43.6	-30.006	28.302	5.0	1.7
2007	2	9	17	0	1.2	-25.567	26.367	5.0	1.8
2007	2	14	11	39	17.5	-25.737	31.055	5.0	3.0
2007	2	14	14	32	55.6	-27.221	28.786	5.0	2.3
2007	2	15	9	31	37.1	-23.385	24.890	5.0	3.4
2007	2	15	14	8	34.6	-33.661	18.722	5.0	1.7
2007	2	16	11	4	32.1	-24.451	25.615	0.0	2.0
2007	2	18	21	39	6.5	-29.530	24.546	5.0	1.0
2007	2	19	1	29	58.1	-29.526	24.601	5.0	1.5
2007	2	21	15	12	1.6	-25.544	26.320	5.0	2.0
2007	2	22	15	39	53.4	-33.649	19.067	5.0	1.3
2007	2	24	17	36	3.3	-29.868	27.325	5.0	2.7
2007	2	25	13	1	6.2	-28.636	26.284	5.0	1.7
2007	2	27	20	53	12.5	-32.183	28.245	5.0	2.0
2007	3	1	16	30	3.3	-24.244	26.117	5.0	2.4
2007	3	2	4	18	50.8	-29.569	28.442	5.0	3.3
2007	3	2	5	9	53.5	-22.236	29.681	5.0	3.8
2007	3	2	13	3	58.4	-23.634	28.848	5.0	2.6
2007	3	4	2	45	21.7	-29.876	27.456	5.0	2.3
2007	3	5	4	7	35.5	-30.803	18.863	5.0	1.0
2007	3	6	8	45	9.0	-25.743	24.996	5.0	2.2

2007	3	6	10	42	54.8	-30.227	28.169	5.0	3.2
2007	3	6	13	3	29.9	-23.749	24.976	5.0	2.5
2007	3	6	15	40	42.3	-33.570	19.466	5.0	1.2
2007	3	7	8	58	20.9	-30.460	18.636	5.0	1.1
2007	3	10	2	37	28.6	-29.088	18.292	5.0	1.7
2007	3	14	1	43	7.9	-30.789	18.880	5.0	1.1
2007	3	19	11	28	43.2	-26.647	23.788	0.0	1.9
2007	3	20	22	39	56.4	-27.183	28.649	5.0	2.0
2007	3	23	11	14	45.3	-24.310	25.376	5.0	2.2
2007	3	25	19	43	40.9	-32.705	17.938	5.0	2.0
2007	3	29	10	24	15.9	-30.429	29.843	5.0	2.6
2007	3	30	12	23	30.1	-32.917	18.802	5.0	1.9
2007	3	31	11	41	17.0	-33.140	17.747	5.0	2.0
2007	4	1	0	29	34.3	-30.230	27.409	5.0	1.7
2007	4	1	8	59	23.9	-29.950	22.292	5.0	1.1
2007	4	5	15	1	56.1	-29.452	27.829	5.0	1.6
2007	4	9	11	0	56.9	-29.816	26.793	5.0	4.0
2007	4	10	8	43	13.6	-26.995	26.723	2.0	4.1
2007	4	12	13	1	38.1	-29.114	28.590	5.0	2.0
2007	4	21	12	15	29.7	-28.805	28.794	5.0	1.9
2007	4	22	4	20	2.5	-29.931	28.252	5.0	1.8
2007	4	22	13	11	18.5	-29.581	30.504	5.0	2.1
2007	4	22	22	7	51.2	-30.221	17.817	5.0	1.1
2007	4	22	22	28	38.4	-30.545	27.745	5.0	2.0
2007	4	23	17	45	40.6	-33.372	19.433	5.0	1.3
2007	4	23	17	45	41.5	-33.454	19.311	5.0	1.8
2007	4	30	3	58	45.7	-30.471	27.551	5.0	1.8
2007	4	30	14	48	55.1	-29.832	18.339	5.0	1.3
2007	5	1	5	30	18.2	-30.071	23.549	5.0	1.2
2007	5	1	7	5	22.6	-30.312	27.625	5.0	1.7
2007	5	1	8	9	18.5	-32.790	22.094	5.0	2.5
2007	5	2	16	10	33.3	-25.921	26.387	0.0	1.1

2007	5	2	22	19	54.8	-30.523	24.600	5.0	1.4
2007	5	4	5	37	0.7	-29.428	28.070	5.0	1.7
2007	5	4	8	36	25.8	-29.531	24.553	5.0	1.4
2007	5	4	14	40	5.8	-21.778	15.939	5.0	4.3
2007	5	7	4	53	16.8	-30.158	18.880	5.0	2.1
2007	5	9	13	6	37.9	-29.164	28.620	5.0	1.9
2007	5	11	12	8	19.3	-30.104	28.203	5.0	2.5
2007	5	11	12	29	33.8	-29.998	28.267	5.0	2.9
2007	5	11	19	28	0.9	-30.650	28.142	5.0	1.9
2007	5	11	19	50	35.8	-30.314	28.177	5.0	1.8
2007	5	12	1	45	43.8	-30.287	28.171	5.0	2.4
2007	5	12	3	41	20.5	-30.227	28.171	5.0	1.5
2007	5	12	7	11	37.3	-30.264	28.192	5.0	2.0
2007	5	14	15	2	54.5	-25.776	26.118	0.0	1.7
2007	5	15	4	4	52.0	-30.018	27.772	5.0	2.4
2007	5	15	8	42	35.6	-30.148	27.740	5.0	2.4
2007	5	15	14	51	46.9	-29.733	28.433	5.0	2.4
2007	5	16	20	22	40.4	-26.623	31.581	5.0	2.3
2007	5	21	19	44	14.1	-29.899	27.358	5.0	2.3
2007	5	24	19	36	26.3	-29.954	27.499	5.0	2.8
2007	5	25	19	7	57.8	-30.331	19.040	5.0	2.4
2007	5	27	3	26	54.3	-29.775	29.496	5.0	2.3
2007	5	29	9	51	1.4	-25.689	26.104	0.0	1.7
2007	5	29	11	17	18.8	-25.743	26.156	0.0	1.7
2007	5	31	4	56	22.5	-23.760	29.703	5.0	2.1
2007	6	3	22	58	24.3	-30.187	28.569	5.0	3.7
2007	6	9	8	8	58.6	-34.259	19.715	5.0	1.0
2007	6	9	8	29	50.9	-30.036	27.001	5.0	1.4
2007	6	9	14	31	48.7	-28.584	28.611	5.0	1.6
2007	6	12	7	0	30.4	-26.010	23.379	5.0	1.9
2007	6	13	14	49	53.1	-25.721	26.103	0.0	1.8
2007	6	13	21	57	4.3	-29.051	27.739	5.0	2.7

2007	6	16	13	40	1.8	-25.766	31.164	5.0	2.2
2007	6	22	8	4	31.4	-29.369	24.790	5.0	1.3
2007	6	22	14	22	30.7	-28.749	29.949	5.0	2.8
2007	6	23	6	20	56.9	-24.076	31.377	5.0	2.6
2007	6	24	5	26	27.2	-30.862	18.849	5.0	2.6
2007	6	24	10	51	48.6	-22.572	29.572	5.0	2.1
2007	6	24	13	9	26.8	-26.757	32.009	5.0	2.2
2007	6	26	9	52	44.9	-28.039	30.863	5.0	2.2
2007	6	26	19	11	54.7	-24.165	25.831	5.0	2.5
2007	6	27	13	18	23.7	-25.623	31.202	5.0	3.1
2007	6	30	13	3	57.8	-21.863	29.541	5.0	2.8
2007	7	1	7	28	26.4	-28.661	18.013	5.0	2.4
2007	7	1	16	21	22.3	-29.246	27.487	5.0	1.3
2007	7	2	15	27	46.8	-33.833	18.649	5.0	1.4
2007	7	5	0	50	42.5	-20.419	25.488	5.0	3.5
2007	7	5	1	13	13.6	-29.429	25.026	5.0	0.7
2007	7	6	17	20	22.3	-28.754	26.187	5.0	1.7
2007	7	8	5	25	25.4	-29.197	27.131	5.0	1.5
2007	7	10	12	21	19.1	-24.003	28.855	5.0	2.3
2007	7	10	15	53	8.0	-28.790	26.361	5.0	1.8
2007	7	11	17	17	3.4	-29.727	27.323	5.0	2.1
2007	7	15	11	44	3.5	-30.503	27.690	5.0	2.3
2007	7	19	11	10	57.8	-22.441	29.244	5.0	2.6
2007	7	20	10	17	11.1	-24.578	26.069	5.0	2.0
2007	7	20	22	8	32.0	-29.816	20.499	5.0	2.0
2007	7	20	22	49	26.8	-24.184	29.514	5.0	3.1
2007	7	24	12	35	24.8	-23.747	28.883	5.0	2.0
2007	7	30	13	37	20.6	-29.721	18.700	5.0	1.7
2007	8	4	4	50	9.5	-26.386	27.471	2.0	4.4
2007	8	8	10	36	49.0	-25.043	26.224	5.0	2.1
2007	8	18	15	39	51.4	-29.839	19.241	5.0	2.6
2007	8	19	6	53	37.0	-35.465	19.096	5.0	1.2

2007	8	20	19	17	43.1	-30.389	24.652	5.0	3.8
2007	9	1	13	34	38.1	-29.197	28.553	5.0	1.7
2007	9	4	11	16	52.1	-24.364	28.094	5.0	2.4
2007	9	5	14	36	18.3	-31.163	22.868	5.0	2.0
2007	9	5	19	9	54.7	-31.596	19.231	5.0	2.3
2007	9	8	7	20	29.7	-33.351	19.441	5.0	1.4
2007	9	9	4	40	58.4	-29.957	26.447	5.0	1.8
2007	9	9	10	24	19.3	-29.814	19.301	5.0	2.2
2007	9	11	10	27	9.1	-27.548	29.056	5.0	2.5
2007	9	13	5	22	11.5	-22.672	29.574	5.0	2.6
2007	9	13	8	0	42.0	-26.579	30.765	5.0	2.1
2007	9	15	3	15	45.2	-29.360	27.692	5.0	2.0
2007	9	17	16	21	54.7	-29.556	25.009	5.0	2.1
2007	9	17	16	45	0.7	-33.362	19.443	5.0	0.7
2007	9	17	20	3	33.7	-29.928	18.781	5.0	3.9
2007	9	18	14	59	26.3	-33.855	20.168	5.0	3.0
2007	9	19	23	52	59.1	-29.962	25.110	20.0	2.4
2007	9	20	10	32	53.7	-29.960	28.934	5.0	2.7
2007	9	21	22	26	5.4	-30.252	28.934	5.0	2.6
2007	9	26	12	28	49.9	-28.906	29.019	5.0	2.1
2007	9	26	15	34	57.7	-26.125	25.439	5.0	1.7
2007	9	29	12	58	17.4	-29.692	27.624	5.0	1.5
2007	9	30	14	35	37.0	-30.333	18.853	5.0	1.9
2007	10	1	4	36	6.1	-30.030	27.246	5.0	2.2
2007	10	3	21	32	41.0	-29.888	28.530	5.0	1.8
2007	10	4	16	38	38.1	-26.207	23.874	5.0	2.2
2007	10	6	14	29	12.0	-29.674	29.595	5.0	2.5
2007	10	6	23	55	59.7	-30.315	18.444	5.0	1.1
2007	10	9	14	2	2.8	-21.328	25.231	0.0	3.0
2007	10	12	9	17	58.9	-28.301	18.315	5.0	2.3
2007	10	12	15	24	25.3	-30.038	27.565	5.0	2.7
2007	10	19	14	39	50.2	-28.932	28.936	5.0	2.2

2007	10	19	15	17	31.8	-28.617	31.193	5.0	2.8
2007	10	20	21	18	6.3	-30.271	19.746	5.0	1.8
2007	10	21	23	19	31.1	-28.858	26.411	10.0	2.0
2007	10	23	21	51	3.9	-31.189	20.348	5.0	2.0
2007	10	27	0	9	33.2	-25.118	31.024	5.0	3.2
2007	10	27	2	58	48.3	-30.279	24.525	5.0	1.0
2007	10	27	5	42	37.2	-32.507	24.653	5.0	3.1
2007	10	27	12	26	44.8	-22.483	29.323	0.0	2.2
2007	10	27	22	49	0.9	-32.640	24.818	5.0	2.0
2007	10	28	0	26	26.7	-24.436	26.616	5.0	2.6
2007	10	28	1	18	47.4	-32.662	24.771	5.0	2.0
2007	10	29	7	34	46.4	-26.673	24.062	5.0	1.5
2007	10	30	14	34	46.3	-30.300	19.259	5.0	3.1
2007	10	31	13	55	55.4	-30.109	29.313	5.0	2.8
2007	10	31	14	35	29.2	-22.390	29.302	0.0	2.7
2007	11	1	7	47	39.3	-30.634	20.509	5.0	2.2
2007	11	3	9	3	53.6	-32.794	22.023	5.0	4.4
2007	11	5	14	17	8.3	-29.509	24.967	5.0	1.4
2007	11	6	22	8	31.0	-24.875	26.366	5.0	2.2
2007	11	11	19	13	42.8	-29.776	27.441	5.0	1.5
2007	11	14	5	20	52.3	-29.516	25.215	5.0	2.1
2007	11	16	0	22	36.0	-20.157	24.048	5.0	3.5
2007	11	17	17	19	29.3	-22.414	25.347	5.0	3.3
2007	11	18	14	14	49.8	-32.068	20.749	5.0	2.2
2007	11	18	15	5	0.5	-29.310	22.061	5.0	1.9
2007	11	20	15	28	6.5	-24.335	26.202	5.0	1.7
2007	11	22	22	18	28.5	-30.738	19.236	5.0	1.7
2007	11	26	20	54	0.8	-23.910	31.139	5.0	2.5
2007	11	30	14	38	39.2	-22.500	29.324	0.0	2.4
2007	12	2	3	53	5.8	-28.412	19.600	5.0	1.7
2007	12	2	17	1	34.4	-24.793	31.351	5.0	2.9
2007	12	3	12	27	35.4	-30.122	27.343	5.0	2.3

2007	12	3	15	41	8.2	-24.563	29.543	5.0	3.5
2007	12	4	14	28	7.7	-29.489	27.977	5.0	2.1
2007	12	6	15	0	58.1	-29.916	27.494	5.0	1.9
2007	12	7	2	55	46.2	-29.906	28.382	5.0	2.1
2007	12	11	15	10	21.5	-25.013	26.291	0.0	2.2
2007	12	11	15	37	12.2	-30.173	29.550	5.0	2.6
2007	12	13	9	32	30.7	-29.751	26.112	5.0	2.3
2007	12	14	7	42	36.6	-29.585	24.453	5.0	1.5
2007	12	14	13	12	19.4	-28.910	28.545	5.0	2.1
2007	12	18	2	53	0.5	-30.026	27.303	5.0	2.4
2007	12	20	2	35	38.7	-32.095	26.085	5.0	1.8
2007	12	20	9	7	42.8	-31.290	28.892	5.0	2.2
2007	12	20	13	24	53.0	-26.752	31.110	5.0	2.7
2007	12	21	17	16	52.9	-30.272	25.805	5.0	2.3
2007	12	22	8	16	26.7	-30.287	27.354	5.0	1.7
2007	12	24	1	41	11.3	-29.456	19.641	5.0	2.1
2007	12	26	11	2	24.8	-29.960	29.503	5.0	3.7
2007	12	26	11	8	45.2	-29.954	29.474	5.0	2.9
2007	12	26	13	14	50.6	-29.976	29.585	5.0	2.2
2007	12	27	22	9	52.2	-24.513	26.657	5.0	1.9
2007	12	28	5	59	39.0	-26.923	26.740	2.0	4.2
2007	12	29	9	34	41.9	-22.500	29.324	0.0	2.4
2008	1	2	12	4	7.4	-24.248	28.949	5.0	2.2
2008	1	4	12	29	8.1	-25.723	26.088	0.0	1.8
2008	1	4	13	33	1.4	-29.332	28.843	5.0	2.6
2008	1	4	14	22	11.1	-26.784	24.055	5.0	1.8
2008	1	4	19	6	32.0	-29.527	25.330	5.0	1.9
2008	1	7	9	11	14.9	-25.542	25.796	0.0	1.7
2008	1	8	9	5	18.6	-28.831	28.688	5.0	2.2
2008	1	14	22	48	37.3	-29.757	27.218	5.0	2.4
2008	1	14	23	19	53.0	-29.466	27.705	5.0	1.6
2008	1	17	17	15	59.3	-26.108	24.162	5.0	1.7

2008	1	19	8	53	7.1	-30.257	25.259	5.0	2.1
2008	1	21	13	0	17.0	-24.755	26.374	5.0	2.2
2008	1	26	9	42	21.5	-29.990	27.672	5.0	2.8
2008	1	26	12	36	41.3	-30.586	19.112	5.0	2.0
2008	1	27	13	53	3.4	-28.759	28.681	5.0	2.1
2008	1	28	20	43	23.7	-28.467	28.876	5.0	1.9
2008	1	29	12	36	42.5	-25.703	26.147	0.0	2.0
2008	1	30	11	39	25.6	-22.826	26.803	5.0	2.4
2008	1	31	18	3	30.5	-30.358	28.948	5.0	1.9
2008	2	2	14	58	50.5	-29.650	27.920	5.0	1.7
2008	2	3	16	23	29.7	-29.167	27.156	5.0	2.4
2008	2	5	23	51	59.3	-30.680	30.436	5.0	2.1
2008	2	6	7	28	16.9	-29.507	27.725	5.0	1.8
2008	2	14	3	49	12.6	-30.166	27.502	5.0	1.8
2008	2	19	20	15	8.7	-29.520	18.284	5.0	3.5
2008	2	20	11	22	50.1	-24.514	28.128	5.0	2.4
2008	2	21	1	1	20.7	-35.625	25.561	5.0	3.2
2008	2	21	14	53	32.4	-23.220	30.539	10.0	3.6
2008	2	25	0	58	33.5	-26.420	27.566	8.5	4.4
2008	2	25	4	6	26.4	-24.931	31.468	5.0	3.6
2008	2	26	13	27	51.1	-32.835	18.862	5.3	1.1
2008	2	28	4	16	49.1	-28.726	30.898	5.0	3.6
2008	3	3	15	44	26.6	-28.305	17.857	5.0	2.8
2008	3	4	2	38	13.7	-29.901	24.717	5.0	1.6
2008	3	6	17	28	46.2	-26.429	27.310	10.0	4.4
2008	3	8	4	20	12.1	-26.399	27.468	2.0	4.0
2008	3	11	13	15	54.3	-30.120	27.379	5.0	2.5
2008	3	11	21	4	1.8	-30.157	19.907	5.0	2.5
2008	3	15	2	26	17.3	-20.720	27.540	33.0	5.0
2008	3	15	5	21	28.6	-29.566	25.200	5.0	1.8
2008	3	16	15	0	3.9	-30.384	27.436	5.0	1.8
2008	3	16	17	20	1.2	-29.792	27.486	5.0	2.1

2008	3	17	21	43	57.3	-32.869	22.063	5.0	2.1
2008	3	18	19	28	0.2	-29.853	27.472	5.0	2.0
2008	3	22	3	56	57.7	-29.964	28.466	5.0	2.2
2008	3	25	17	13	19.5	-32.422	31.258	5.0	2.7
2008	3	29	14	46	32.5	-29.600	19.798	5.0	1.7
2008	3	29	16	46	7.0	-30.416	27.885	5.0	1.6
2008	4	4	12	13	3.1	-29.141	27.999	5.0	2.6
2008	4	5	13	26	35.9	-29.031	28.868	5.0	1.6
2008	4	6	18	12	27.9	-30.449	21.107	5.0	1.6
2008	4	9	18	33	39.2	-29.815	27.471	5.0	2.1
2008	4	11	13	28	30.8	-29.047	28.937	5.0	2.3
2008	4	12	0	28	45.3	-29.334	24.786	5.0	1.7
2008	4	15	12	42	38.4	-34.095	18.591	5.0	1.7
2008	4	17	0	5	10.6	-30.526	20.271	5.0	2.6
2008	4	18	16	37	56.5	-27.042	25.371	5.0	1.7
2008	4	21	9	55	35.4	-33.219	19.384	5.0	0.9
2008	4	21	15	10	54.6	-33.558	19.527	5.0	1.4
2008	4	22	6	41	45.9	-30.028	26.809	5.0	2.8
2008	4	23	13	6	44.1	-32.884	18.791	5.0	1.3
2008	4	24	14	35	36.4	-28.736	29.136	5.0	2.1
2008	4	26	2	40	30.3	-23.493	25.412	5.0	3.1
2008	4	26	14	48	47.1	-21.347	16.887	10.0	6.1
2008	4	26	16	11	19.3	-21.430	16.956	10.0	5.8
2008	4	27	2	2	32.2	-31.864	23.244	5.0	2.6
2008	4	27	11	5	19.4	-29.485	27.758	5.0	1.3
2008	4	28	7	45	38.6	-29.172	28.272	5.0	1.6
2008	4	28	8	15	28.7	-33.163	19.331	5.0	1.6
2008	5	1	1	5	10.6	-21.439	16.985	10.0	5.0
2008	5	11	4	48	56.7	-24.343	31.098	5.0	2.7
2008	5	13	15	44	54.6	-33.787	18.730	0.0	1.2
2008	5	13	15	52	8.1	-33.514	18.840	5.0	1.3
2008	5	17	0	27	8.0	-22.796	28.895	5.0	3.1

2008	5	19	9	16	18.6	-29.966	18.957	5.0	2.4
2008	5	19	11	42	56.0	-23.177	27.406	5.0	2.6
2008	5	21	8	55	41.5	-29.058	28.827	5.0	2.1
2008	5	31	13	25	29.3	-29.773	27.390	5.0	1.8
2008	6	1	12	53	52.0	-29.709	27.689	5.0	1.8
2008	6	1	17	56	36.4	-30.355	23.281	5.0	2.6
2008	6	9	11	11	0.8	-29.922	27.636	5.0	2.1
2008	6	11	19	58	33.1	-29.737	26.436	5.0	2.6
2008	6	15	2	12	5.6	-30.121	28.323	5.0	2.3
2008	6	19	3	17	20.7	-29.965	27.171	5.0	2.2
2008	6	21	1	34	50.4	-30.159	27.298	5.0	2.2
2008	6	24	17	40	15.9	-23.523	24.670	5.0	2.7
2008	6	26	2	47	32.9	-28.947	27.278	5.0	1.5
2008	6	26	10	55	3.8	-25.725	26.107	0.0	1.7
2008	6	26	13	8	33.5	-25.740	26.070	0.0	1.8
2008	6	26	20	59	7.6	-28.878	19.343	5.0	2.5
2008	6	27	4	24	15.4	-30.022	19.609	5.0	1.4
2008	6	27	5	39	13.1	-27.506	29.298	5.0	2.3
2008	6	27	18	20	24.1	-27.508	29.298	5.0	2.0
2008	6	28	0	29	8.6	-28.901	20.245	5.0	2.0
2008	6	30	6	6	36.4	-29.909	27.852	5.0	2.2
2008	7	4	12	29	34.6	-22.649	29.256	5.0	2.8
2008	7	7	14	14	7.5	-27.018	26.749	2.0	4.2
2008	7	9	12	27	0.1	-23.979	28.929	0.0	2.1
2008	7	9	15	1	22.6	-29.465	21.902	5.0	2.4
2008	7	13	17	36	22.0	-33.210	21.880	5.0	1.8
2008	7	18	9	1	26.0	-24.980	26.280	0.0	2.0
2008	7	20	5	30	24.6	-29.800	19.803	5.0	2.2
2008	7	23	19	58	9.7	-30.030	18.624	5.0	1.6
2008	8	1	12	40	2.4	-24.045	28.924	0.0	2.1
2008	8	1	16	1	39.1	-30.381	28.923	5.0	2.3
2008	8	2	8	35	52.6	-31.896	24.852	5.0	1.4

2008	8	2	12	45	30.4	-22.342	29.216	5.0	2.9
2008	8	4	17	50	46.0	-30.398	29.779	5.0	2.3
2008	8	4	19	47	29.6	-25.743	31.091	5.0	2.3
2008	8	8	22	30	10.4	-29.140	31.299	5.0	2.7
2008	8	10	9	52	14.7	-30.010	28.276	5.0	1.8
2008	8	11	11	41	33.9	-32.604	17.607	5.0	2.8
2008	8	14	3	22	37.8	-30.371	20.986	5.0	2.3
2008	8	14	14	50	28.1	-33.001	18.817	5.0	1.8
2008	8	14	18	38	50.1	-30.079	25.740	5.0	2.3
2008	8	16	20	21	44.0	-19.774	23.136	5.0	4.6
2008	8	23	13	42	48.9	-29.323	23.053	5.0	2.2
2008	8	24	19	57	10.4	-33.381	19.599	5.0	2.4
2008	8	25	20	25	57.2	-32.794	22.059	5.0	2.9
2008	8	25	20	32	15.6	-32.763	22.025	5.0	2.7
2008	8	25	22	17	8.1	-29.271	24.807	5.0	1.4
2008	8	26	18	22	28.5	-30.599	18.419	5.0	2.3
2008	8	27	13	7	38.6	-29.991	18.180	5.0	2.1
2008	8	30	15	16	24.4	-30.324	25.824	5.0	2.2
2008	8	31	12	6	55.8	-19.073	24.084	5.0	3.9
2008	9	2	22	25	50.3	-30.509	20.402	5.0	2.4
2008	9	8	14	33	34.0	-30.425	19.527	5.0	2.7
2008	9	8	23	51	59.2	-30.597	29.732	5.0	2.3
2008	9	10	19	17	4.3	-32.946	17.825	5.0	2.9
2008	9	11	10	28	53.0	-29.700	18.283	5.0	1.8
2008	9	12	12	44	0.8	-28.206	29.186	5.0	1.9
2008	9	12	22	31	10.8	-27.062	29.119	5.0	1.9
2008	9	12	23	54	38.9	-30.420	19.493	5.0	2.1
2008	9	13	22	44	15.0	-30.839	19.032	5.0	1.4
2008	9	15	1	56	17.9	-29.820	18.079	5.0	2.0
2008	9	17	20	3	51.1	-29.819	26.595	5.0	2.7
2008	9	20	20	18	10.9	-28.844	20.249	5.0	1.8
2008	9	22	2	8	23.5	-29.971	18.728	5.0	2.1

2008	9	26	16	59	0.8	-30.048	28.146	5.0	1.8
2008	9	27	10	35	4.0	-28.982	18.458	5.0	2.0
2008	9	28	12	38	15.4	-29.017	28.837	5.0	1.7
2008	9	30	2	39	58.8	-25.559	30.976	5.0	2.8
2008	9	30	11	21	16.6	-29.951	20.462	5.0	2.2
2008	10	3	22	22	43.2	-30.373	17.638	5.0	1.8
2008	10	4	8	59	47.6	-29.278	28.450	5.0	1.7
2008	10	4	11	18	8.0	-32.937	17.805	5.0	2.2
2008	10	6	8	8	51.0	-30.214	27.443	5.0	1.5
2008	10	9	16	51	48.8	-32.887	22.153	5.0	2.9
2008	10	13	3	41	43.4	-19.991	23.025	5.0	3.6
2008	10	13	4	14	34.1	-30.563	19.435	5.0	1.5
2008	10	13	14	37	8.4	-28.722	29.137	5.0	1.9
2008	10	14	21	3	29.5	-30.564	20.543	5.0	1.5
2008	10	15	9	27	24.7	-29.032	28.808	5.0	1.8
2008	10	17	12	21	35.0	-30.103	27.478	5.0	2.9
2008	10	18	20	5	48.0	-20.220	26.505	5.0	4.0
2008	10	19	21	13	18.0	-28.907	19.715	5.0	2.7
2008	10	20	5	32	47.4	-29.533	24.865	5.0	2.2
2008	10	23	14	28	55.2	-28.911	29.058	5.0	1.7
2008	10	25	3	1	51.9	-30.229	26.645	5.0	1.8
2008	10	26	5	25	24.1	-29.857	19.392	5.0	1.9
2008	10	30	6	20	35.0	-28.573	28.962	5.0	2.1
2008	10	30	7	32	16.0	-28.582	28.938	5.0	2.7
2008	10	30	11	25	38.9	-28.593	28.959	5.0	2.2
2008	10	30	13	30	53.9	-28.558	29.032	5.0	1.9
2008	11	3	7	17	12.0	-30.133	27.678	5.0	1.6
2008	11	5	13	6	27.1	-25.558	24.571	5.0	2.0
2008	11	6	11	26	17.6	-32.977	18.694	5.0	1.5
2008	11	7	2	19	48.4	-32.978	17.785	5.0	2.3
2008	11	9	0	33	11.6	-29.587	27.695	5.0	1.8
2008	11	10	6	45	17.2	-29.814	28.227	5.0	1.7

2008	11	15	2	27	26.6	-28.193	18.352	5.0	2.1
2008	11	19	10	5	22.4	-31.700	24.477	5.0	3.4
2008	11	20	3	58	11.8	-31.538	20.033	5.0	1.6
2008	11	20	13	5	59.2	-31.889	22.400	5.0	2.1
2008	11	20	21	2	42.2	-29.485	24.528	5.0	2.6
2008	11	23	1	52	42.6	-26.933	26.689	6.6	4.4
2008	11	26	14	0	45.0	-29.338	28.370	5.0	1.5
2008	12	1	13	58	9.2	-29.127	28.693	5.0	1.9
2008	12	3	10	50	22.5	-31.275	28.240	5.0	2.6
2008	12	6	16	41	35.5	-19.746	23.629	5.0	4.8
2008	12	14	18	8	56.2	-29.898	28.157	5.0	1.8
2008	12	15	1	34	38.4	-26.909	26.724	2.0	4.0
2008	12	16	0	36	36.9	-29.648	18.512	5.0	2.0
2008	12	16	2	47	7.0	-30.254	21.270	5.0	1.9
2008	12	18	13	57	57.3	-26.333	27.215	10.0	4.4
2008	12	20	6	3	56.6	-28.738	32.820	5.0	3.6
2008	12	23	5	20	16.7	-29.743	18.776	5.0	2.1
2008	12	28	5	21	51.4	-32.525	25.208	5.0	2.8
2009	1	3	15	35	35.6	-29.496	27.975	5.0	2.3
2009	1	4	3	33	33.0	-32.873	22.056	5.0	2.0
2009	1	7	14	34	26.8	-32.962	18.839	0.0	1.3
2009	1	8	5	4	42.0	-28.721	32.662	5.0	4.1
2009	1	9	0	17	30.4	-23.541	15.171	10.0	4.4
2009	1	10	7	22	54.1	-30.828	26.140	5.0	2.5
2009	1	24	10	50	10.7	-32.073	18.868	5.0	2.1
2009	1	24	16	39	44.4	-32.677	17.741	5.0	1.6
2009	1	25	0	43	48.6	-30.159	21.284	5.0	1.8
2009	1	27	10	42	59.5	-30.220	29.283	5.0	3.7
2009	1	28	3	39	50.8	-28.624	18.536	5.0	3.4
2009	1	28	4	27	15.4	-28.582	18.591	10.0	4.2
2009	2	1	8	49	9.0	-33.241	19.037	5.0	1.3
2009	2	9	10	8	45.4	-28.619	28.935	5.0	1.9

2009	2	9	19	6	37.8	-28.412	28.833	5.0	1.9
2009	2	14	11	49	9.0	-32.513	19.732	5.0	0.9
2009	2	14	21	40	4.9	-33.225	19.100	5.0	2.8
2009	2	18	9	41	32.1	-29.792	18.992	5.0	2.1
2009	2	18	11	9	52.2	-32.963	18.682	0.0	1.9
2009	2	18	12	25	17.3	-23.970	28.909	0.0	1.7
2009	2	18	19	59	42.2	-26.554	31.707	10.0	4.0
2009	2	19	12	29	35.4	-25.739	26.109	0.0	1.8
2009	2	20	11	44	8.7	-32.931	18.808	0.0	1.1
2009	2	25	9	2	12.3	-24.086	17.696	10.0	3.0
2009	2	25	9	2	12.7	-24.083	17.694	10.0	3.9
2009	2	25	15	15	56.4	-33.577	19.471	0.0	1.4
2009	3	4	22	28	48.5	-17.908	24.709	10.0	4.8
2009	3	8	3	23	46.6	-33.163	21.846	5.0	2.1
2009	3	8	21	10	17.6	-32.728	20.252	5.0	3.5
2009	3	13	7	51	29.7	-26.935	26.842	2.0	4.0
2009	3	13	21	55	5.5	-29.154	27.387	5.0	2.5
2009	3	15	1	17	51.0	-27.485	29.196	5.0	2.2
2009	3	15	4	23	23.2	-27.616	29.237	5.0	1.6
2009	3	16	14	5	42.3	-26.949	26.753	2.0	4.6
2009	3	17	12	15	41.5	-33.667	20.879	5.0	2.7
2009	3	20	0	37	33.5	-33.403	19.356	5.0	2.6
2009	3	23	14	1	0.6	-32.848	18.860	0.0	1.3
2009	4	7	2	53	1.7	-29.961	27.490	5.0	1.8
2009	4	10	10	17	51.1	-33.560	18.275	5.0	1.7
2009	4	15	14	15	47.3	-29.501	27.983	5.0	1.9
2009	4	18	2	38	17.6	-26.973	26.784	2.0	4.4
2009	4	21	10	22	46.6	-29.831	18.882	5.0	2.3
2009	5	1	18	23	6.7	-18.820	23.749	10.0	5.4
2009	5	7	0	43	45.4	-30.310	18.136	5.0	2.3
2009	5	13	0	55	1.9	-30.096	19.069	5.0	1.6
2009	5	15	8	41	48.4	-23.369	25.669	10.0	3.5

2009	5	15	9	31	9.8	-23.688	25.696	10.0	2.9
2009	5	20	16	30	7.1	-30.266	20.459	5.0	1.7
2009	5	20	22	44	6.4	-29.651	27.685	5.0	3.6
2009	5	21	4	3	34.5	-28.631	28.986	5.0	3.7
2009	5	21	4	3	57.2	-28.635	28.975	5.0	3.5
2009	5	22	7	40	36.0	-28.597	29.004	5.0	2.5
2009	5	25	20	57	15.1	-29.655	17.843	5.0	2.0
2009	5	30	7	26	21.2	-29.026	29.209	5.0	1.5
2009	6	7	1	49	14.4	-25.720	15.871	10.0	4.8
2009	6	8	0	8	34.6	-32.836	22.068	5.0	3.1
2009	6	11	22	23	4.6	-29.429	24.924	5.0	1.6
2009	6	13	3	52	44.2	-30.172	18.087	5.0	1.9
2009	6	25	6	13	21.6	-29.716	27.844	5.0	2.2
2009	6	27	2	23	1.7	-29.057	27.510	5.0	1.7
2009	6	29	16	12	6.0	-32.160	23.118	5.0	2.2
2009	6	30	21	35	19.7	-30.102	19.443	5.0	1.7
2009	7	1	14	6	14.8	-30.846	18.683	5.0	1.4
2009	7	5	0	3	58.8	-30.930	29.288	5.0	3.1
2009	7	7	6	28	47.5	-25.323	16.773	10.0	4.7
2009	7	9	2	38	2.4	-28.857	20.198	5.0	3.6
2009	7	9	10	9	34.2	-28.776	20.142	5.0	2.2
2009	7	9	10	20	37.6	-28.883	20.280	5.0	2.2
2009	7	10	21	7	42.1	-28.818	20.184	5.0	2.4
2009	7	13	12	53	1.0	-29.496	19.806	5.0	4.3
2009	7	13	18	0	9.9	-34.570	18.252	5.0	3.2
2009	7	21	13	58	31.1	-27.128	28.817	5.0	1.7
2009	7	21	20	51	58.6	-30.107	25.863	5.0	2.0
2009	7	21	23	43	31.3	-28.868	20.278	5.0	3.3
2009	7	24	12	49	0.6	-28.581	17.461	5.0	2.3
2009	7	24	14	31	50.4	-26.101	25.400	5.0	1.6
2009	7	26	14	38	55.6	-29.036	28.829	5.0	2.5
2009	7	28	17	50	55.4	-28.613	28.923	5.0	1.8

2009	7	28	20	30	25.6	-28.679	28.865	5.0	1.7
2009	7	28	21	35	22.2	-28.633	28.946	5.0	2.0
2009	7	29	10	57	40.0	-30.909	18.812	5.0	1.5
2009	7	29	18	59	3.4	-30.590	19.212	5.0	1.3
2009	7	30	1	52	16.3	-28.875	19.639	10.0	3.2
2009	7	31	8	14	38.8	-20.947	14.928	10.0	6.4
2009	7	31	11	28	40.7	-28.747	28.791	5.0	1.9
2009	8	1	19	27	9.5	-30.204	29.393	5.0	2.3
2009	8	3	5	59	9.0	-29.866	28.089	5.0	2.6
2009	8	4	6	7	18.3	-29.929	19.365	5.0	1.8
2009	8	10	2	39	17.1	-30.093	27.401	5.0	1.7
2009	8	10	19	31	32.4	-30.043	28.157	5.0	1.9
2009	8	11	4	30	17.5	-32.794	22.049	5.0	3.7
2009	8	14	11	36	24.9	-29.510	19.768	5.0	2.2
2009	8	19	17	10	20.8	-32.831	22.117	5.0	2.5
2009	8	22	10	10	25.1	-33.298	19.471	5.0	1.5
2009	8	22	12	0	7.7	-29.140	28.784	5.0	1.8
2009	8	24	23	12	20.0	-31.816	18.244	5.0	2.3
2009	8	31	13	14	28.3	-28.932	20.384	5.0	2.8
2009	8	31	15	25	37.2	-26.083	23.349	0.0	1.6
2009	9	1	0	16	40.1	-23.262	25.930	10.0	2.9
2009	9	1	1	54	59.6	-23.851	25.714	5.0	1.9
2009	9	3	6	33	1.5	-32.849	22.046	5.0	3.6
2009	9	5	13	58	54.2	-28.862	29.433	5.0	2.1
2009	9	6	17	27	49.6	-30.355	27.622	5.0	1.6
2009	9	7	13	56	36.1	-28.943	29.179	5.0	1.7
2009	9	9	15	43	48.6	-33.788	18.680	0.0	1.3
2009	9	10	21	42	34.3	-25.288	26.179	2.0	2.2
2009	9	21	13	58	41.1	-29.049	28.999	5.0	2.1
2009	9	22	1	23	35.8	-32.734	31.336	5.0	3.5
2009	9	23	8	13	18.2	-30.301	29.585	5.0	2.7
2009	9	26	8	42	12.4	-29.577	25.088	5.0	1.9

2009	9	27	14	9	19.8	-28.779	20.149	5.0	2.4
2009	10	7	16	36	54.0	-30.270	29.378	5.0	3.3
2009	10	9	19	27	57.1	-26.438	27.440	2.0	4.3
2009	10	11	4	47	0.7	-29.976	28.455	5.0	2.1
2009	10	13	7	38	27.4	-30.201	18.514	5.0	1.9
2009	10	14	14	7	17.2	-29.005	29.049	5.0	1.7
2009	10	15	22	36	4.1	-29.131	29.474	5.0	2.5
2009	10	16	18	32	28.0	-31.278	20.705	5.0	3.8
2009	10	16	18	35	48.8	-31.297	20.670	5.0	4.0
2009	10	17	2	14	26.1	-31.279	20.762	5.0	3.3
2009	10	17	18	26	58.0	-30.760	19.059	5.0	1.9
2009	10	18	19	49	19.0	-32.970	22.191	5.0	1.7
2009	10	24	2	21	13.3	-29.491	24.658	5.0	1.8
2009	10	24	12	21	48.5	-32.284	25.905	5.0	1.8
2009	10	28	17	29	17.5	-29.914	27.558	5.0	2.1
2009	10	29	9	20	46.8	-24.988	26.279	0.0	2.0
2009	10	30	7	2	3.5	-28.904	20.237	5.0	2.1
2009	10	30	13	54	5.6	-29.092	28.736	5.0	2.1
2009	11	1	3	23	21.5	-31.587	21.409	5.0	1.7
2009	11	4	1	28	34.1	-30.198	19.005	5.0	1.5
2009	11	4	22	14	11.5	-31.572	24.943	5.0	3.4
2009	11	5	12	39	54.7	-32.843	22.152	5.0	4.3
2009	11	5	16	8	22.8	-29.709	29.056	5.0	2.9
2009	11	7	9	57	21.2	-32.856	22.057	5.0	2.9
2009	11	7	23	9	8.4	-32.854	21.986	5.0	2.1
2009	11	8	13	36	36.7	-28.945	28.932	5.0	2.0
2009	11	13	5	36	59.8	-30.220	18.849	5.0	3.0
2009	11	16	5	43	45.5	-30.892	18.768	5.0	2.4
2009	11	16	14	47	56.2	-26.134	25.195	0.0	1.9
2009	11	18	17	57	57.0	-29.164	28.869	5.0	2.6
2009	11	20	11	43	40.8	-25.135	26.202	0.0	1.8
2009	11	22	14	16	52.5	-29.096	28.702	5.0	1.9

2009	11	22	21	57	43.4	-29.710	26.699	5.0	1.6
2009	11	29	1	4	46.9	-26.944	26.781	2.0	4.2
2009	11	29	1	4	46.9	-26.944	26.781	2.0	4.2
2009	12	1	13	44	42.5	-32.693	31.421	10.0	4.2
2009	12	2	13	55	46.4	-29.165	28.633	5.0	2.1
2009	12	2	17	9	24.0	-33.085	18.266	5.0	3.7
2009	12	3	13	57	33.8	-29.853	28.859	5.0	1.7
2009	12	8	1	9	50.3	-30.103	27.650	5.0	2.4
2009	12	8	17	30	15.8	-26.383	27.462	2.0	4.6
2009	12	8	23	21	39.5	-32.791	22.146	5.0	4.5
2009	12	9	14	32	58.2	-28.900	28.959	5.0	2.3
2009	12	9	17	6	59.7	-32.626	22.113	5.0	2.3
2009	12	9	22	4	19.9	-30.801	24.407	5.0	1.7
2009	12	11	12	8	6.0	-31.616	18.429	5.0	2.0
2009	12	16	0	43	24.2	-32.655	31.213	10.0	3.8
2009	12	18	15	12	34.6	-26.232	28.208	2.0	4.6
2010	1	12	14	39	16.0	-27.509	28.785	0.0	2.4
2010	1	12	20	39	16.3	-30.025	28.903	5.0	1.9
2010	1	13	22	40	7.9	-24.224	26.369	5.0	2.0
2010	1	17	12	26	23.5	-28.849	29.297	5.0	2.2
2010	1	18	8	57	22.6	-25.233	26.177	5.0	1.8
2010	1	19	7	56	32.6	-29.180	28.736	5.0	2.0
2010	1	21	12	9	20.5	-28.378	26.089	0.0	1.7
2010	1	21	22	53	24.6	-27.874	26.678	2.0	4.7
2010	1	23	20	49	35.6	-29.851	27.759	5.0	1.2
2010	1	27	14	47	33.5	-25.779	24.331	5.0	1.8
2010	1	29	13	50	57.3	-30.123	29.555	5.0	2.3
2010	1	30	12	25	24.6	-28.831	29.186	5.0	2.0
2010	2	3	11	50	35.8	-22.795	26.456	5.0	2.5
2010	2	12	4	34	9.0	-30.155	27.382	5.0	2.7
2010	2	12	5	51	55.4	-29.997	27.491	5.0	2.0
2010	2	14	1	2	16.1	-26.495	27.577	2.0	4.6

2010	2	15	21	9	16.8	-26.980	26.764	2.0	4.2
2010	2	16	12	20	17.6	-28.861	26.837	5.0	3.1
2010	2	18	17	18	23.4	-26.153	23.967	0.0	1.5
2010	2	19	7	23	14.8	-28.497	20.045	5.0	2.6
2010	2	22	15	2	27.7	-24.973	21.027	5.0	2.8
2010	2	24	1	7	25.1	-30.179	28.485	5.0	3.2
2010	3	1	14	1	11.1	-28.941	28.907	5.0	1.6
2010	3	2	0	27	14.3	-20.511	27.315	5.0	3.0
2010	3	2	13	40	58.5	-26.531	23.287	0.0	1.9
2010	3	3	13	1	52.1	-30.493	30.999	5.0	3.4
2010	3	3	13	40	43.8	-24.500	28.186	5.0	3.2
2010	3	5	14	2	10.4	-25.206	23.470	5.0	2.3
2010	3	8	17	30	24.9	-26.235	23.077	5.0	1.7
2010	3	10	13	2	32.3	-26.777	23.940	0.0	1.6
2010	3	10	13	59	0.2	-24.669	28.472	5.0	2.5
2010	3	10	18	21	34.5	-26.689	24.141	5.0	1.4
2010	3	10	23	28	3.7	-34.660	19.126	5.0	2.5
2010	3	11	15	6	37.4	-30.364	25.995	5.0	3.6
2010	3	12	12	56	11.9	-24.839	24.884	0.0	2.0
2010	3	20	12	16	25.8	-29.548	28.077	5.0	1.8
2010	3	23	14	1	41.5	-29.671	27.572	5.0	2.1
2010	3	28	0	0	22.0	-30.257	29.446	5.0	2.2
2010	3	28	14	38	33.8	-29.393	27.675	5.0	2.5
2010	3	29	8	54	39.1	-34.161	18.329	5.0	2.4
2010	4	4	10	27	26.3	-29.573	27.076	5.0	1.4
2010	4	4	19	15	16.5	-22.685	29.028	5.0	2.4
2010	4	8	6	39	40.3	-29.460	19.787	5.0	3.3
2010	4	9	23	42	57.4	-29.307	24.803	0.0	1.8
2010	4	10	8	51	23.0	-29.019	20.929	5.0	1.8
2010	4	11	12	28	48.0	-24.403	15.824	0.0	4.1
2010	4	11	14	47	44.3	-18.402	16.033	10.0	4.0
2010	4	11	16	23	13.0	-24.800	19.070	0.0	2.9

2010	4	15	12	28	48.8	-24.798	19.074	5.0	2.9
2010	4	15	13	41	24.1	-30.071	27.891	5.0	2.5
2010	4	18	9	59	41.0	-30.153	27.820	5.0	2.4
2010	4	21	11	28	47.6	-29.567	18.325	5.0	2.7
2010	4	22	12	36	8.5	-29.453	19.890	5.0	2.7
2010	4	28	0	19	51.4	-32.990	17.807	5.0	1.9
2010	5	5	16	33	44.7	-28.795	20.221	5.0	1.8
2010	5	5	18	3	58.7	-29.033	27.136	5.0	2.5
2010	5	9	1	50	0.4	-30.030	29.447	5.0	2.4
2010	5	9	17	21	28.8	-30.487	28.351	5.0	1.9
2010	5	12	8	11	2.1	-28.804	26.440	5.0	1.5
2010	5	12	15	26	11.7	-28.735	26.878	5.0	1.7
2010	5	12	23	21	12.6	-29.617	28.077	5.0	1.5
2010	5	13	12	59	47.8	-24.953	24.574	0.0	2.0
2010	5	13	20	22	1.8	-33.305	19.443	5.0	2.0
2010	5	14	12	16	32.9	-25.359	26.053	2.0	1.8
2010	5	15	5	5	58.1	-29.771	28.023	5.0	2.5
2010	5	15	23	48	42.4	-23.881	26.108	5.0	3.0
2010	5	18	13	32	54.8	-32.454	17.783	5.0	2.2
2010	5	20	2	33	31.0	-29.252	27.755	5.0	2.7
2010	5	20	13	25	13.9	-33.195	26.717	5.0	2.0
2010	5	22	16	44	21.6	-33.073	22.518	5.0	1.5
2010	5	24	11	0	48.3	-24.403	15.824	10.0	4.1
2010	5	24	13	0	48.0	-24.800	19.000	0.0	3.1
2010	5	25	1	14	25.0	-29.787	25.591	5.0	2.6
2010	5	25	4	43	18.3	-24.511	29.515	5.0	2.1
2010	5	27	10	12	17.2	-28.821	26.363	5.0	2.0
2010	6	4	18	27	60.0	-22.343	31.988	5.0	2.8
2010	6	4	18	28	0.0	-22.343	31.988	5.0	2.8
2010	6	5	8	31	45.4	-27.617	29.469	0.0	1.9
2010	6	5	17	47	1.9	-32.018	14.592	5.0	4.4
2010	6	6	18	23	55.3	-28.883	28.395	5.0	1.8

2010	6	7	1	53	35.4	-30.031	30.133	5.0	2.4
2010	6	7	2	56	25.7	-23.856	25.971	5.0	3.6
2010	6	7	13	21	40.5	-26.992	26.820	2.0	4.1
2010	6	9	15	41	26.6	-25.144	24.757	0.0	2.4
2010	6	13	6	37	30.1	-29.001	27.029	5.0	2.0
2010	6	14	11	51	56.4	-26.467	27.504	2.0	4.2
2010	6	15	2	18	10.3	-29.767	26.377	5.0	1.7
2010	6	15	3	43	0.4	-30.321	29.682	5.0	2.5
2010	6	17	8	20	19.4	-22.978	25.842	0.0	2.4
2010	6	19	10	12	22.3	-24.039	26.653	5.0	2.2
2010	6	19	18	59	48.7	-29.995	27.064	5.0	3.0
2010	6	20	3	45	30.5	-26.032	21.320	5.0	3.6
2010	6	20	21	15	2.1	-28.648	20.466	5.0	1.8
2010	6	21	1	17	59.8	-28.682	20.435	5.0	2.6
2010	6	22	1	26	38.8	-24.797	18.562	5.0	3.0
2010	6	22	1	26	38.0	-22.600	17.150	0.0	2.5
2010	6	22	22	53	7.4	-28.717	22.118	5.0	2.8
2010	6	24	10	6	26.7	-28.721	20.804	5.0	4.0
2010	6	24	10	6	26.7	-28.721	20.804	5.0	4.0
2010	6	24	10	20	36.8	-28.507	19.004	5.0	3.1
2010	6	24	10	20	36.0	-17.430	16.130	0.0	4.0
2010	6	24	11	2	43.1	-30.154	21.533	5.0	2.1
2010	6	24	16	39	37.3	-28.217	20.046	5.0	3.2
2010	6	26	12	46	6.7	-27.414	27.385	2.0	1.9
2010	6	29	2	7	0.4	-28.380	20.014	5.0	3.7
2010	7	1	14	8	20.2	-26.466	20.793	5.0	2.7
2010	7	2	14	32	45.0	-29.108	28.444	5.0	1.9
2010	7	2	21	9	45.8	-28.550	20.437	5.0	2.5
2010	7	4	1	14	33.6	-28.618	20.346	5.0	1.8
2010	7	12	6	0	13.2	-25.645	31.138	5.0	2.8
2010	7	13	12	21	6.9	-28.715	20.430	5.0	2.7
2010	7	15	10	32	11.8	-29.823	18.720	5.0	2.2

2010	7	19	15	3	28.3	-28.877	25.819	5.0	2.1
2010	7	24	12	4	35.3	-33.342	22.022	5.0	2.6
2010	7	26	14	24	19.2	-28.790	20.406	5.0	3.5
2010	7	26	14	27	5.4	-28.632	20.328	5.0	3.8
2010	7	26	19	43	53.9	-28.745	20.452	5.0	2.4
2010	7	30	13	16	28.7	-25.071	24.865	5.0	2.1
2010	7	31	12	15	58.1	-27.571	27.563	5.0	1.8
2010	8	4	5	12	48.6	-28.694	20.504	10.0	2.4
2010	8	5	9	3	57.4	-28.708	20.458	10.0	3.0
2010	8	8	19	59	26.4	-28.409	20.315	5.0	2.8
2010	8	10	3	14	59.5	-33.382	19.290	5.0	1.8
2010	8	20	11	1	28.4	-29.737	17.321	5.0	1.7
2010	8	20	16	31	2.3	-29.541	21.339	5.0	2.1
2010	8	20	16	40	33.7	-28.354	20.261	5.0	1.9
2010	8	23	23	38	50.6	-29.981	18.783	5.0	2.2
2010	8	25	5	11	45.3	-28.771	20.170	5.0	2.5
2010	8	25	12	14	53.3	-29.616	23.036	5.0	2.8
2010	8	25	14	11	8.4	-31.699	18.518	10.0	1.4
2010	8	25	14	15	7.2	-30.327	20.671	10.0	1.9
2010	8	25	14	26	5.0	-31.308	29.030	5.0	2.4
2010	8	25	14	26	10.0	-30.739	30.137	10.0	2.9
2010	8	26	22	25	14.9	-28.379	20.355	5.0	2.2
2010	8	30	1	37	4.2	-33.245	18.967	5.0	1.4
2010	8	30	1	37	4.9	-33.173	19.516	5.0	1.7
2010	9	2	20	15	31.2	-28.378	20.309	5.0	1.9
2010	9	6	8	2	22.0	-25.939	24.638	5.0	2.3
2010	9	7	14	9	51.3	-19.249	24.308	10.0	4.6
2010	9	8	16	14	7.0	-24.800	18.560	0.0	3.0
2010	9	9	20	21	7.6	-28.787	20.445	5.0	2.1
2010	9	10	4	49	54.6	-32.233	20.256	5.0	2.1
2010	9	15	23	37	49.8	-21.351	26.467	10.0	3.1
2010	9	17	15	55	7.7	-29.142	18.412	5.0	2.5

2010	9	18	11	2	11.9	-30.403	25.274	5.0	2.7
2010	9	18	14	3	34.6	-28.159	29.317	5.0	1.9
2010	9	25	5	44	45.5	-28.334	20.381	5.0	1.7
2010	9	25	12	18	21.5	-25.736	25.946	5.0	2.2
2010	9	27	3	28	52.3	-33.342	22.197	5.0	2.5
2010	9	29	1	18	40.7	-33.312	19.406	5.0	1.3
2010	10	2	17	12	1.1	-33.066	18.002	5.0	2.0
2010	10	3	7	28	24.2	-26.946	30.859	5.0	3.0
2010	10	4	19	34	3.7	-28.634	20.317	5.0	1.9
2010	10	5	18	54	0.5	-28.991	20.462	5.0	1.9
2010	10	7	0	52	9.6	-28.656	20.366	5.0	3.1
2010	10	7	1	52	5.3	-28.781	20.438	5.0	2.1
2010	10	8	13	16	5.3	-28.780	20.577	5.0	2.5
2010	10	9	6	18	36.9	-27.138	29.169	0.0	2.4
2010	10	15	16	32	56.0	-30.499	21.070	5.0	3.0
2010	10	31	2	26	52.7	-30.876	23.617	5.0	2.2
2010	11	1	15	19	57.3	-30.485	21.049	5.0	3.3
2010	11	1	15	25	10.5	-28.961	27.430	5.0	1.9
2010	11	3	17	45	7.4	-30.349	27.669	5.0	2.6
2010	11	12	17	46	34.5	-29.211	25.079	5.0	2.2
2010	11	12	22	53	46.4	-26.386	27.425	5.0	4.1
2010	11	13	11	17	40.5	-28.259	29.270	5.0	2.7
2010	11	13	11	17	40.6	-28.272	29.267	5.0	2.7
2010	11	14	12	58	49.4	-28.810	20.497	5.0	2.0
2010	11	14	12	58	49.6	-28.802	20.500	5.0	2.0
2010	11	14	16	55	53.6	-28.376	20.402	5.0	2.0
2010	11	14	16	55	53.8	-28.368	20.401	5.0	2.2
2010	11	14	18	49	32.8	-29.178	29.397	5.0	2.2
2010	11	14	18	49	32.9	-29.178	29.422	5.0	2.5
2010	11	14	21	26	8.9	-30.289	27.726	5.0	2.3
2010	11	15	7	22	50.6	-29.176	19.149	5.0	3.0
2010	11	15	14	12	12.3	-28.821	20.430	5.0	1.6

2010	11	15	22	48	47.4	-32.469	17.914	5.0	1.6
2010	11	17	11	53	36.7	-30.110	28.152	5.0	3.0
2010	11	17	14	9	13.2	-28.797	20.448	5.0	2.8
2010	11	17	15	20	23.9	-28.585	20.327	5.0	2.5
2010	11	18	2	50	40.6	-28.840	20.491	5.0	3.1
2010	11	18	10	0	16.7	-23.372	30.517	5.0	3.2
2010	11	21	2	28	52.4	-28.567	20.367	5.0	3.8
2010	11	23	1	37	28.9	-28.547	20.316	5.0	1.7
2010	12	4	16	25	0.8	-28.990	29.110	5.0	2.5
2010	12	5	5	2	36.0	-30.774	25.959	5.0	2.1
2010	12	5	20	49	43.2	-28.379	20.287	5.0	3.0
2010	12	8	5	31	23.3	-27.580	31.730	10.0	5.5
2010	12	9	8	51	55.2	-28.619	20.332	5.0	3.3
2010	12	16	3	41	29.9	-28.730	27.628	0.0	4.0
2010	12	16	4	0	50.0	-28.728	20.425	5.0	4.4
2010	12	17	12	24	54.7	-24.399	26.446	5.0	2.8
2010	12	19	3	44	1.1	-31.168	19.114	5.0	1.5
2010	12	23	23	52	10.9	-29.753	18.727	5.0	1.6
2010	12	25	9	57	6.9	-28.690	20.454	5.0	1.9
2010	12	25	16	29	0.1	-28.693	20.452	5.0	1.6
2010	12	25	16	58	52.8	-28.691	20.408	5.0	2.5
2010	12	25	17	59	0.5	-28.728	20.416	5.0	2.1
2010	12	25	18	29	10.4	-28.733	20.476	5.0	3.8
2010	12	25	19	43	20.8	-28.771	20.459	5.0	2.0
2010	12	25	21	6	2.7	-28.680	20.340	5.0	2.7
2010	12	25	23	28	22.2	-28.732	20.442	5.0	4.3
2010	12	26	12	19	45.1	-28.741	20.418	5.0	2.3
2010	12	26	19	10	26.1	-28.715	20.417	5.0	1.9
2010	12	27	17	17	48.7	-28.747	20.388	5.0	2.3
2010	12	27	22	50	5.0	-28.782	20.443	5.0	2.0
2010	12	28	0	38	41.2	-28.743	20.452	5.0	4.2
2010	12	28	19	9	42.4	-28.652	20.457	5.0	2.8

2010	12	28	19	9	52.1	-29.218	21.001	5.0	2.5
2010	12	29	7	50	43.7	-28.660	20.443	5.0	1.4
2010	12	29	9	33	17.8	-28.762	20.460	5.0	2.4
2010	12	30	11	20	31.2	-28.651	20.376	5.0	2.2
2010	12	30	11	45	32.3	-28.827	20.468	5.0	2.2
2010	12	31	15	43	27.0	-28.766	20.459	5.0	1.9
2010	12	31	16	0	11.6	-26.433	27.500	2.0	4.2
2011	1	1	9	15	35.1	-28.801	20.529	5.0	2.8
2011	1	1	9	58	47.9	-28.675	20.355	5.0	1.5
2011	1	2	12	52	54.8	-28.699	20.477	5.0	3.5
2011	1	4	2	10	53.4	-30.115	21.624	5.0	2.0
2011	1	4	11	41	26.5	-28.789	20.498	5.0	3.5
2011	1	4	13	6	2.6	-28.709	20.457	5.0	2.8
2011	1	6	6	22	40.1	-28.787	20.540	5.0	2.8
2011	1	6	15	5	52.8	-28.649	20.368	5.0	2.3
2011	1	6	15	38	53.2	-28.788	20.487	5.0	2.8
2011	1	7	12	56	41.3	-28.634	20.362	5.0	4.0
2011	1	7	15	58	18.1	-30.608	20.470	5.0	2.3
2011	1	7	19	53	10.1	-28.671	20.398	5.0	1.6
2011	1	7	21	0	19.3	-28.739	20.404	5.0	2.9
2011	1	8	0	8	58.4	-28.487	20.321	5.0	1.8
2011	1	8	2	59	40.9	-28.690	20.359	5.0	1.9
2011	1	8	19	57	19.0	-28.703	20.496	5.0	3.0
2011	1	8	20	33	8.5	-28.633	20.369	5.0	2.5
2011	1	9	3	40	33.0	-28.666	20.418	5.0	2.4
2011	1	9	12	35	31.1	-28.636	20.457	5.0	2.3
2011	1	10	1	13	11.7	-29.957	28.486	5.0	1.2
2011	1	10	2	32	27.5	-28.741	20.421	5.0	1.6
2011	1	10	4	55	2.4	-28.726	20.457	5.0	2.2
2011	1	10	6	48	33.8	-28.533	20.355	5.0	2.7
2011	1	10	7	15	24.0	-28.711	20.420	5.0	2.4
2011	1	11	4	29	35.8	-28.418	20.323	5.0	1.9

2011	1	11	5	14	21.8	-28.608	20.379	5.0	2.1
2011	1	11	5	31	53.6	-28.779	20.424	5.0	2.8
2011	1	11	9	47	48.3	-28.754	20.522	5.0	2.1
2011	1	11	19	8	14.8	-28.566	20.328	5.0	2.1
2011	1	11	20	43	11.4	-28.659	20.391	5.0	2.2
2011	1	12	0	9	50.2	-28.654	20.429	5.0	3.8
2011	1	12	6	14	21.0	-28.690	20.348	5.0	4.2
2011	1	13	0	32	27.4	-28.827	20.564	5.0	1.7
2011	1	13	0	34	18.3	-28.786	20.520	5.0	1.8
2011	1	13	0	38	38.4	-28.758	20.491	5.0	2.0
2011	1	13	2	32	52.6	-28.688	20.497	5.0	1.3
2011	1	13	4	42	14.2	-29.056	20.739	5.0	1.6
2011	1	13	4	51	23.3	-28.813	20.566	5.0	1.2
2011	1	13	4	58	16.2	-28.757	20.533	5.0	1.4
2011	1	13	5	41	36.0	-28.824	20.565	5.0	1.7
2011	1	13	5	51	44.4	-29.032	20.711	5.0	1.3
2011	1	13	9	21	22.6	-28.899	20.593	5.0	1.6
2011	1	13	14	19	46.6	-28.729	20.479	5.0	2.3
2011	1	13	14	26	44.1	-28.783	20.497	5.0	2.1
2011	1	13	17	36	56.3	-28.749	20.445	5.0	4.1
2011	1	13	18	34	58.9	-28.898	20.624	5.0	1.2
2011	1	13	20	45	27.6	-28.842	20.577	5.0	1.8
2011	1	13	21	8	28.9	-28.857	20.615	5.0	1.7
2011	1	13	22	51	11.7	-28.953	20.666	5.0	1.3
2011	1	14	11	34	31.2	-29.137	21.085	5.0	1.7
2011	1	14	19	43	37.3	-28.836	20.549	5.0	1.5
2011	1	14	19	54	39.4	-28.815	20.518	5.0	2.0
2011	1	14	20	56	51.2	-28.841	20.497	5.0	2.7
2011	1	15	2	6	31.0	-28.795	20.539	5.0	1.8
2011	1	15	3	10	44.8	-27.670	20.441	5.0	2.1
2011	1	15	3	11	10.8	-28.740	20.569	5.0	1.3
2011	1	15	6	47	41.6	-28.832	20.440	5.0	2.3

2011	1	15	8	55	12.7	-28.500	20.316	5.0	2.6
2011	1	15	8	55	13.9	-28.794	20.492	5.0	2.2
2011	1	15	9	12	45.6	-28.754	20.463	5.0	2.6
2011	1	15	11	16	18.3	-28.693	20.372	5.0	1.6
2011	1	15	13	14	44.6	-28.758	20.514	5.0	2.1
2011	1	15	19	27	44.1	-28.802	20.509	5.0	2.0
2011	1	15	21	47	39.5	-28.754	20.455	5.0	1.3
2011	1	16	0	44	47.4	-28.729	20.481	5.0	1.9
2011	1	16	0	45	18.7	-28.456	20.364	5.0	1.8
2011	1	16	1	41	14.7	-28.791	20.497	5.0	1.9
2011	1	16	2	7	36.9	-28.753	20.493	5.0	3.3
2011	1	16	2	7	37.8	-28.773	20.520	5.0	2.7
2011	1	16	7	50	53.8	-28.801	20.495	5.0	2.5
2011	1	16	16	58	50.6	-28.701	20.448	5.0	2.2
2011	1	16	20	2	21.7	-28.885	20.187	5.0	3.1
2011	1	16	20	2	22.2	-29.017	20.340	5.0	2.6
2011	1	17	0	3	26.6	-28.860	20.596	5.0	2.8
2011	1	17	6	36	35.1	-28.805	20.533	5.0	2.7
2011	1	17	8	51	9.3	-28.753	20.476	5.0	2.2
2011	1	17	15	12	48.7	-28.825	20.501	5.0	2.5
2011	1	17	16	39	53.0	-18.850	17.380	10.0	3.8
2011	1	17	19	54	26.6	-28.816	20.388	5.0	2.9
2011	1	18	0	6	19.6	-28.798	20.485	5.0	1.2
2011	1	18	0	21	28.6	-28.643	20.481	5.0	1.2
2011	1	18	2	28	33.8	-28.787	20.443	5.0	1.5
2011	1	18	2	58	31.8	-28.794	20.500	5.0	2.3
2011	1	18	3	2	53.6	-28.719	20.458	5.0	2.5
2011	1	18	3	42	37.7	-28.745	20.450	5.0	1.3
2011	1	18	4	53	3.0	-28.682	20.471	5.0	1.7
2011	1	18	10	53	2.7	-28.855	20.532	5.0	1.7
2011	1	18	16	26	52.4	-28.598	20.417	5.0	2.2
2011	1	18	17	33	32.2	-28.753	20.483	5.0	3.1

2011	1	19	0	17	43.0	-28.751	20.501	5.0	1.0
2011	1	19	2	18	13.6	-28.626	20.355	5.0	1.4
2011	1	19	3	40	55.0	-28.668	20.452	5.0	2.5
2011	1	19	3	49	8.8	-28.932	20.594	5.0	3.8
2011	1	19	5	9	3.4	-28.748	20.485	5.0	1.5
2011	1	19	12	4	10.2	-28.781	20.474	5.0	2.2
2011	1	19	14	25	55.3	-28.686	20.430	5.0	1.9
2011	1	19	21	38	20.3	-28.754	20.465	5.0	2.5
2011	1	20	7	4	31.9	-28.670	20.433	5.0	1.7
2011	1	20	18	3	56.1	-28.795	20.538	5.0	2.9
2011	1	20	19	16	36.7	-28.797	20.475	5.0	1.4
2011	1	20	19	17	21.2	-28.775	20.503	5.0	1.9
2011	1	20	23	3	49.0	-28.683	20.443	5.0	1.6
2011	1	20	23	5	36.2	-28.652	20.449	5.0	2.2
2011	1	20	23	9	25.4	-28.683	20.366	5.0	2.9
2011	1	21	9	2	24.8	-28.645	30.547	5.0	3.4
2011	1	21	19	26	19.0	-28.768	20.430	5.0	2.0
2011	1	21	20	0	56.9	-28.579	20.467	5.0	2.0
2011	1	22	0	43	19.9	-28.730	20.430	5.0	2.2
2011	1	22	2	18	1.5	-28.600	20.353	5.0	1.9
2011	1	22	2	34	39.7	-28.763	20.448	5.0	3.1
2011	1	22	2	35	53.0	-28.550	20.306	5.0	3.1
2011	1	22	3	26	25.6	-28.707	20.459	5.0	1.7
2011	1	22	4	15	23.8	-28.358	20.267	5.0	1.9
2011	1	22	4	39	2.2	-28.562	20.304	5.0	1.9
2011	1	22	6	56	33.3	-28.584	20.336	5.0	2.4
2011	1	22	11	16	21.8	-28.645	20.366	5.0	2.2
2011	1	22	13	5	27.1	-28.892	20.613	5.0	1.4
2011	1	22	14	54	53.9	-28.774	20.474	5.0	2.0
2011	1	22	15	56	37.6	-28.551	20.438	5.0	2.0
2011	1	22	16	18	27.7	-28.646	20.417	5.0	2.4
2011	1	22	16	56	57.5	-28.728	20.452	5.0	1.8

2011	1	22	19	39	3.4	-28.755	20.546	5.0	1.3
2011	1	22	19	46	24.1	-28.779	20.494	5.0	1.4
2011	1	22	20	26	34.6	-28.755	20.546	5.0	1.3
2011	1	22	20	55	41.7	-28.769	20.480	5.0	1.6
2011	1	22	23	15	56.2	-28.663	20.464	5.0	1.8
2011	1	22	23	17	26.7	-28.835	20.776	5.0	1.4
2011	1	22	23	26	53.5	-28.587	20.440	5.0	1.2
2011	1	22	23	44	58.5	-28.781	20.469	5.0	1.8
2011	1	22	23	45	0.0	-28.609	20.408	5.0	1.6
2011	1	23	1	39	12.8	-29.091	20.716	5.0	1.2
2011	1	23	2	24	32.2	-28.660	20.459	5.0	1.0
2011	1	23	3	28	44.9	-28.875	20.624	5.0	1.0
2011	1	23	3	33	44.7	-28.554	20.441	5.0	1.6
2011	1	23	4	48	6.4	-28.571	20.395	5.0	1.7
2011	1	23	4	57	35.3	-29.200	20.564	5.0	1.1
2011	1	23	4	58	50.1	-28.939	20.612	5.0	1.3
2011	1	23	5	19	28.8	-28.774	20.494	5.0	1.9
2011	1	23	6	57	48.5	-28.823	20.548	5.0	1.4
2011	1	23	7	41	6.8	-28.688	20.416	5.0	2.1
2011	1	23	8	45	48.1	-28.644	20.386	5.0	2.3
2011	1	23	9	14	38.0	-29.996	19.679	5.0	2.1
2011	1	23	9	58	19.2	-28.373	20.334	5.0	1.8
2011	1	23	15	42	23.9	-28.771	20.540	5.0	1.8
2011	1	23	20	44	2.3	-28.647	20.389	5.0	3.3
2011	1	23	21	13	33.6	-28.707	20.512	5.0	2.0
2011	1	23	21	15	8.2	-28.711	20.495	5.0	2.1
2011	1	23	21	35	16.7	-28.826	20.524	5.0	1.4
2011	1	23	21	57	34.2	-28.801	20.578	5.0	1.3
2011	1	23	21	58	4.9	-28.698	20.423	5.0	1.1
2011	1	23	22	4	26.5	-28.980	20.569	5.0	1.0
2011	1	23	22	5	34.5	-28.605	20.437	5.0	1.0
2011	1	23	22	21	1.6	-28.771	20.528	5.0	1.4

2011	1	23	22	57	30.7	-28.729	20.472	5.0	1.1
2011	1	23	23	46	52.6	-28.796	20.551	5.0	1.1
2011	1	24	3	27	30.6	-28.684	20.459	5.0	1.2
2011	1	24	3	37	10.4	-28.590	20.412	5.0	1.0
2011	1	24	4	10	44.7	-28.668	20.472	5.0	1.3
2011	1	24	7	31	36.7	-28.772	20.539	5.0	1.5
2011	1	24	10	33	14.8	-28.685	20.414	5.0	2.8
2011	1	24	12	20	56.1	-28.783	20.423	5.0	1.1
2011	1	24	12	28	48.3	-28.869	20.523	5.0	1.4
2011	1	24	14	58	7.0	-28.645	20.467	5.0	1.6
2011	1	24	16	0	15.7	-28.713	20.484	5.0	1.5
2011	1	24	21	27	18.0	-28.860	20.516	5.0	1.5
2011	1	24	21	29	36.1	-28.641	20.489	5.0	1.7
2011	1	24	21	33	32.4	-28.709	20.455	5.0	1.4
2011	1	24	21	37	26.7	-28.695	20.498	5.0	1.3
2011	1	24	21	47	30.3	-28.582	20.415	5.0	1.8
2011	1	25	0	38	8.8	-28.649	20.433	5.0	1.0
2011	1	25	0	42	40.5	-28.694	20.480	5.0	1.2
2011	1	25	0	44	45.7	-28.781	20.588	5.0	0.8
2011	1	25	0	59	13.4	-28.586	20.409	5.0	1.0
2011	1	25	2	31	10.0	-28.651	20.481	5.0	1.1
2011	1	25	2	39	52.4	-28.759	20.426	5.0	4.4
2011	1	25	6	47	14.8	-28.783	20.498	5.0	1.8
2011	1	25	7	36	11.3	-28.771	20.469	5.0	2.3
2011	1	25	9	49	47.6	-28.608	20.402	5.0	1.3
2011	1	25	10	7	29.8	-26.802	21.569	5.0	1.7
2011	1	25	12	32	59.2	-28.632	20.406	5.0	1.3
2011	1	25	22	13	22.2	-32.792	17.493	5.0	1.6
2011	1	25	23	27	38.6	-28.988	20.300	5.0	1.0
2011	1	26	5	13	51.8	-28.450	20.333	5.0	1.9
2011	1	26	7	6	17.7	-28.688	20.507	5.0	1.8
2011	1	26	14	44	50.6	-27.532	29.658	5.0	2.4

2011	1	26	17	46	6.0	-28.958	20.579	5.0	2.1
2011	1	26	21	11	10.3	-28.658	20.470	5.0	1.7
2011	1	26	22	24	2.5	-28.807	20.450	5.0	1.1
2011	1	27	0	57	5.2	-28.601	20.377	5.0	2.0
2011	1	27	1	20	31.5	-28.104	20.105	5.0	2.0
2011	1	27	1	20	44.0	-28.691	20.435	5.0	1.5
2011	1	27	3	40	40.0	-28.732	20.504	5.0	1.4
2011	1	27	14	48	55.7	-28.706	20.418	5.0	1.4
2011	1	27	19	7	12.1	-28.748	20.412	5.0	1.1
2011	1	27	20	24	40.2	-28.686	20.499	5.0	1.8
2011	1	28	1	29	8.6	-28.655	20.436	5.0	3.3
2011	1	28	3	27	43.8	-28.789	20.463	5.0	1.1
2011	1	28	3	53	29.8	-28.795	20.572	5.0	1.5
2011	1	28	14	20	31.3	-28.891	20.248	5.0	1.3
2011	1	28	16	42	49.8	-28.645	20.441	5.0	1.9
2011	1	28	18	27	58.0	-28.768	20.490	5.0	1.6
2011	1	28	19	58	59.1	-28.921	20.583	5.0	1.5
2011	1	28	22	43	13.3	-28.827	20.621	5.0	1.0
2011	1	28	23	35	37.6	-28.815	20.533	5.0	1.2
2011	1	29	0	47	11.2	-28.825	20.534	5.0	1.0
2011	1	29	0	59	57.4	-28.830	20.612	5.0	1.3
2011	1	29	1	30	27.0	-28.744	20.458	5.0	2.2
2011	1	29	2	46	39.9	-28.811	20.535	5.0	1.4
2011	1	29	2	52	45.2	-28.722	20.440	5.0	1.2
2011	1	29	3	49	6.1	-28.663	20.482	5.0	1.1
2011	1	29	3	57	3.6	-28.679	20.486	5.0	1.4
2011	1	29	6	15	21.3	-28.941	20.262	5.0	1.5
2011	1	29	10	20	5.6	-28.687	20.400	5.0	1.9
2011	1	29	11	0	35.4	-28.691	20.490	5.0	1.6
2011	1	29	13	54	18.8	-28.747	20.440	5.0	1.2
2011	1	29	15	39	31.8	-28.896	20.565	5.0	1.5
2011	1	29	15	59	58.7	-28.635	20.447	5.0	1.1

2011	1	29	16	6	45.5	-28.724	20.450	5.0	2.6
2011	1	29	18	38	5.8	-28.763	20.504	5.0	2.3
2011	1	29	20	45	55.3	-28.436	20.304	5.0	1.9
2011	1	29	21	40	40.2	-28.676	20.475	5.0	1.1
2011	1	30	3	2	36.3	-28.802	20.480	5.0	1.7
2011	1	30	4	26	28.4	-28.624	20.398	5.0	2.5
2011	1	30	5	18	37.2	-28.808	20.533	5.0	3.1
2011	1	30	7	55	42.5	-28.618	20.341	5.0	2.7
2011	1	30	9	2	44.6	-28.773	20.474	5.0	2.0
2011	1	30	16	8	18.5	-28.754	20.507	5.0	2.1
2011	1	30	17	9	31.8	-28.685	20.463	5.0	2.2
2011	1	30	19	48	18.6	-28.161	20.156	5.0	1.6
2011	1	30	20	0	43.2	-28.732	20.446	5.0	1.6
2011	1	31	3	20	25.3	-28.704	20.460	5.0	2.1
2011	1	31	7	12	46.9	-28.739	20.530	5.0	2.5
2011	1	31	10	6	10.5	-30.314	18.730	5.0	2.0
2011	1	31	15	48	4.8	-28.774	20.552	5.0	2.2
2011	1	31	23	38	19.9	-28.745	20.443	5.0	1.9
2011	2	1	0	30	36.2	-28.818	20.444	5.0	1.4
2011	2	1	6	58	10.1	-28.752	20.428	5.0	2.7
2011	2	1	7	27	55.4	-28.678	20.454	5.0	2.2
2011	2	1	7	30	49.7	-28.820	20.573	5.0	2.2
2011	2	1	10	15	55.3	-28.822	20.439	5.0	1.8
2011	2	1	10	57	48.3	-28.658	20.367	5.0	2.3
2011	2	1	14	58	43.6	-28.879	20.625	5.0	2.8
2011	2	1	17	19	57.1	-28.853	20.570	5.0	2.7
2011	2	1	20	2	52.1	-28.937	20.629	5.0	1.6
2011	2	1	20	47	13.9	-28.770	20.514	5.0	2.3
2011	2	2	5	45	33.2	-30.413	26.162	5.0	2.2
2011	2	3	6	32	1.1	-28.563	20.420	5.0	3.4
2011	2	3	17	57	13.5	-28.583	20.445	5.0	3.0
2011	2	3	20	21	47.1	-25.306	25.782	5.0	2.1

2011	2	4	15	18	20.3	-28.618	20.417	5.0	2.9
2011	2	4	18	18	42.0	-28.623	20.378	5.0	1.3
2011	2	4	18	33	53.4	-28.666	20.491	5.0	1.5
2011	2	4	22	27	20.8	-28.713	20.380	5.0	1.7
2011	2	4	23	38	38.0	-28.703	20.389	5.0	2.9
2011	2	5	2	43	58.3	-28.688	20.391	5.0	1.3
2011	2	5	5	47	39.5	-28.878	20.577	5.0	3.5
2011	2	5	7	21	24.8	-28.726	20.422	5.0	1.3
2011	2	5	8	14	52.4	-28.690	20.378	5.0	2.4
2011	2	5	8	22	37.7	-28.697	20.414	5.0	4.3
2011	2	5	12	43	15.2	-29.105	24.912	5.0	2.7
2011	2	5	17	12	32.7	-28.688	20.347	5.0	1.8
2011	2	5	20	17	6.4	-28.709	20.399	5.0	1.2
2011	2	5	23	52	25.9	-28.721	20.465	5.0	1.2
2011	2	6	1	21	33.4	-28.751	20.451	5.0	1.4
2011	2	6	2	16	42.3	-28.820	20.395	5.0	2.2
2011	2	6	3	28	51.6	-28.689	20.368	5.0	1.1
2011	2	6	5	9	57.3	-28.638	20.356	5.0	2.7
2011	2	6	23	47	31.3	-28.782	20.438	5.0	1.7
2011	2	7	0	52	18.0	-28.571	20.044	5.0	1.9
2011	2	7	3	35	18.9	-28.679	20.373	5.0	2.0
2011	2	7	6	38	46.6	-28.716	20.399	5.0	2.2
2011	2	7	6	40	40.4	-28.503	20.411	5.0	2.2
2011	2	7	15	27	2.5	-28.685	20.396	5.0	2.3
2011	2	8	0	57	10.1	-28.593	20.458	5.0	1.1
2011	2	8	1	29	21.1	-28.804	20.630	5.0	0.7
2011	2	8	10	24	18.8	-28.627	20.442	5.0	1.6
2011	2	8	12	55	36.9	-28.692	20.460	5.0	2.4
2011	2	8	15	14	19.0	-28.675	20.435	5.0	1.4
2011	2	8	20	17	45.9	-28.669	20.393	5.0	2.2
2011	2	9	2	44	26.0	-33.149	17.373	5.0	2.3
2011	2	9	2	44	27.7	-33.128	17.697	5.0	2.7

2011	2	9	6	17	36.8	-28.574	20.394	5.0	1.3
2011	2	9	6	24	16.8	-28.652	20.425	5.0	2.1
2011	2	9	13	4	48.8	-28.713	20.496	5.0	1.9
2011	2	9	13	22	25.6	-28.603	20.437	5.0	3.5
2011	2	9	23	22	1.1	-28.482	20.038	5.0	1.6
2011	2	10	0	24	11.9	-28.750	20.491	5.0	1.9
2011	2	10	0	32	28.8	-28.842	20.558	5.0	0.7
2011	2	10	0	36	7.3	-28.836	20.549	5.0	1.2
2011	2	10	19	1	5.5	-28.781	20.545	5.0	2.4
2011	2	11	7	52	35.7	-28.786	20.535	5.0	3.4
2011	2	11	7	58	52.8	-28.848	20.546	5.0	3.3
2011	2	11	11	28	29.6	-28.708	20.456	5.0	1.3
2011	2	11	11	28	58.4	-29.194	20.877	5.0	1.4
2011	2	11	11	57	16.4	-28.649	20.462	5.0	1.8
2011	2	11	11	58	19.2	-29.068	20.781	5.0	1.4
2011	2	11	18	41	45.5	-28.625	20.365	5.0	1.6
2011	2	12	4	52	23.5	-28.741	20.408	5.0	1.4
2011	2	12	4	53	49.9	-28.666	20.455	5.0	1.3
2011	2	12	5	54	39.7	-28.703	20.315	5.0	1.3
2011	2	12	10	44	1.1	-28.761	20.383	5.0	1.2
2011	2	12	11	15	22.8	-28.685	20.379	5.0	1.6
2011	2	12	23	3	27.0	-23.953	16.649	5.0	3.9
2011	2	13	1	46	23.1	-28.859	20.394	5.0	1.8
2011	2	13	4	19	16.5	-28.816	20.547	5.0	1.1
2011	2	13	5	20	30.8	-32.030	19.905	5.0	2.3
2011	2	13	5	20	36.0	-31.801	19.850	5.0	1.8
2011	2	13	7	32	57.2	-28.656	20.368	5.0	1.6
2011	2	13	7	33	0.2	-28.776	20.621	5.0	1.6
2011	2	13	13	26	55.3	-28.756	20.476	5.0	2.4
2011	2	13	13	32	53.3	-28.823	20.510	5.0	2.6
2011	2	13	14	20	54.7	-28.933	20.547	5.0	1.1
2011	2	13	14	26	13.3	-28.799	20.507	5.0	1.8

2011	2	13	22	39	12.0	-28.715	20.382	5.0	1.2
2011	2	13	23	45	3.2	-30.787	21.103	5.0	2.3
2011	2	13	23	45	6.2	-30.804	20.855	5.0	1.9
2011	2	14	0	25	17.3	-28.685	20.424	5.0	1.4
2011	2	14	2	34	49.1	-28.824	20.544	5.0	1.1
2011	2	14	5	21	18.4	-29.218	20.953	5.0	2.2
2011	2	14	5	21	21.1	-28.695	20.471	5.0	2.2
2011	2	14	10	13	59.7	-28.847	20.452	5.0	2.3
2011	2	14	10	14	1.3	-28.720	20.453	5.0	2.0
2011	2	14	10	40	7.3	-28.549	20.332	5.0	1.2
2011	2	14	14	12	48.9	-28.839	20.489	5.0	2.0
2011	2	14	14	16	31.9	-28.788	20.482	5.0	1.8
2011	2	14	17	19	40.7	-28.783	20.465	5.0	2.5
2011	2	14	17	19	41.8	-28.788	20.545	5.0	2.2
2011	2	14	17	46	46.8	-28.766	20.513	5.0	1.3
2011	2	14	17	53	35.0	-28.574	20.408	5.0	2.2
2011	2	15	5	17	42.0	-28.676	20.434	5.0	2.3
2011	2	15	7	27	13.2	-28.747	20.447	5.0	2.5
2011	2	15	14	30	59.0	-28.996	20.735	5.0	1.1
2011	2	15	16	57	53.6	-28.860	20.620	5.0	1.3
2011	2	16	9	7	42.6	-28.558	20.348	5.0	2.3
2011	2	17	12	26	50.6	-28.717	20.402	5.0	2.5
2011	2	17	23	19	0.5	-28.687	20.376	5.0	2.4
2011	2	18	23	48	51.3	-28.855	20.568	5.0	1.7
2011	2	20	0	5	41.5	-28.802	20.431	5.0	1.9
2011	2	20	0	23	2.1	-28.771	20.429	5.0	1.7
2011	2	20	2	56	46.7	-28.742	20.415	5.0	2.1
2011	2	20	17	48	46.2	-28.688	20.366	5.0	2.8
2011	2	21	7	7	9.8	-34.710	32.460	10.0	5.4
2011	2	21	10	47	31.2	-28.815	20.426	5.0	2.2
2011	2	21	11	22	46.6	-16.900	18.780	10.0	5.4
2011	2	21	21	19	11.8	-28.799	20.495	5.0	4.0

2011	2	23	3	11	2.6	-28.710	20.376	5.0	1.6
2011	2	23	17	8	46.9	-28.719	20.382	5.0	2.6
2011	2	24	7	21	36.7	-29.736	27.065	5.0	2.9
2011	2	24	9	39	45.9	-28.709	20.387	5.0	1.7
2011	2	24	9	41	5.3	-29.169	20.818	5.0	1.5
2011	2	24	9	43	8.6	-28.690	20.385	5.0	1.5
2011	2	24	20	21	59.4	-28.727	20.256	5.0	1.3
2011	2	24	20	23	6.1	-28.774	20.389	5.0	2.1
2011	2	25	0	36	46.1	-28.644	20.462	5.0	1.3
2011	2	25	6	30	11.4	-29.157	20.775	5.0	1.8
2011	2	25	9	46	6.3	-28.693	20.333	5.0	1.6
2011	2	25	11	32	42.9	-28.738	20.363	5.0	1.5
2011	2	25	12	40	13.1	-32.863	22.135	5.0	3.2
2011	2	25	18	15	35.9	-29.606	19.870	5.0	1.6
2011	2	25	20	22	7.1	-28.713	20.396	5.0	1.2
2011	2	26	15	2	14.9	-28.742	20.397	5.0	1.4
2011	2	26	17	35	14.7	-29.245	20.763	5.0	1.3
2011	2	27	0	32	42.4	-28.808	20.333	5.0	1.2
2011	2	27	1	26	4.5	-28.776	20.417	5.0	1.0
2011	2	27	20	16	31.6	-28.685	20.402	5.0	1.4
2011	2	27	21	3	11.9	-28.646	20.365	5.0	1.1
2011	3	1	3	23	28.2	-28.910	20.542	5.0	3.5
2011	3	1	6	17	56.7	-28.637	20.372	5.0	1.3
2011	3	1	6	36	42.2	-28.659	20.254	5.0	1.4
2011	3	1	8	38	8.7	-28.716	20.408	5.0	1.4
2011	3	1	12	3	27.0	-28.688	20.382	5.0	1.4
2011	3	1	12	11	43.7	-28.733	20.419	5.0	1.3
2011	3	1	13	59	20.6	-29.638	20.070	5.0	1.8
2011	3	1	16	9	37.1	-28.590	20.376	5.0	2.2
2011	3	1	18	58	57.3	-28.773	20.464	5.0	1.0
2011	3	1	21	51	37.4	-28.741	20.430	5.0	1.2
2011	3	1	22	34	41.0	-29.122	20.678	5.0	1.6

2011	3	2	4	39	12.1	-28.566	20.402	5.0	2.2
2011	3	2	4	40	9.2	-28.577	20.524	5.0	2.1
2011	3	2	5	45	40.4	-28.467	20.278	5.0	2.0
2011	3	2	8	26	55.5	-28.801	20.528	5.0	2.3
2011	3	3	7	30	32.8	-28.770	20.440	5.0	2.2
2011	3	4	0	20	54.1	-28.652	20.378	5.0	1.2
2011	3	4	0	48	47.7	-28.681	20.388	5.0	1.3
2011	3	5	2	15	35.2	-28.662	20.373	5.0	1.6
2011	3	5	2	29	56.3	-28.810	20.451	5.0	1.3
2011	3	5	3	12	28.2	-28.563	20.317	5.0	1.6
2011	3	5	7	40	35.4	-28.464	20.348	5.0	2.1
2011	3	5	12	47	42.4	-28.656	20.423	5.0	1.6
2011	3	5	21	51	40.3	-28.668	20.399	5.0	1.8
2011	3	6	8	44	14.9	-28.676	20.436	5.0	1.6
2011	3	6	8	57	57.3	-28.649	20.591	5.0	1.4
2011	3	6	10	51	35.9	-28.699	20.508	5.0	3.0
2011	3	6	11	27	0.4	-30.086	28.818	5.0	2.1
2011	3	6	12	15	26.7	-29.351	20.896	5.0	1.7
2011	3	6	12	40	30.8	-22.530	21.890	10.0	6.0
2011	3	6	15	12	24.5	-28.667	20.542	5.0	1.4
2011	3	6	15	46	10.2	-28.601	20.419	5.0	1.8
2011	3	6	20	55	39.2	-28.653	20.389	5.0	1.1
2011	3	6	21	2	29.8	-28.705	20.466	5.0	1.0
2011	3	6	23	53	41.4	-28.771	20.512	5.0	2.3
2011	3	7	0	56	11.9	-28.607	20.415	5.0	1.5
2011	3	7	1	58	1.6	-28.569	20.400	5.0	1.4
2011	3	7	2	9	31.6	-29.758	21.915	5.0	1.9
2011	3	8	0	26	25.9	-28.588	20.352	5.0	1.7
2011	3	8	0	36	8.8	-28.593	20.359	5.0	1.4
2011	3	8	1	51	41.5	-28.687	20.430	5.0	1.2
2011	3	8	7	43	53.5	-28.631	20.479	5.0	2.7
2011	3	8	15	10	20.9	-28.630	20.401	5.0	2.3

2011	3	8	16	51	45.2	-28.541	20.244	5.0	2.3
2011	3	9	2	36	7.9	-28.910	20.654	5.0	0.9
2011	3	9	2	46	4.9	-29.029	20.699	5.0	1.2
2011	3	9	8	52	44.6	-28.635	20.432	5.0	3.9
2011	3	9	9	3	35.0	-28.565	20.413	5.0	2.0
2011	3	9	12	42	25.9	-28.764	20.464	5.0	1.5
2011	3	9	20	9	22.1	-30.955	30.241	5.0	2.6
2011	3	9	21	35	45.1	-26.822	26.585	5.0	4.3
2011	3	10	22	52	13.0	-28.582	20.475	5.0	1.4
2011	3	10	22	59	15.0	-28.691	20.381	5.0	1.3
2011	3	11	2	46	22.0	-28.645	20.468	5.0	1.5
2011	3	11	17	57	41.8	-30.479	24.555	5.0	2.2
2011	3	11	23	33	29.8	-28.748	20.407	5.0	1.4
2011	3	11	23	58	51.3	-28.758	20.509	5.0	4.3
2011	3	11	23	58	54.3	-27.838	20.851	0.0	3.3
2011	3	13	4	56	35.4	-29.644	19.741	5.0	1.5
2011	3	14	8	18	31.8	-28.789	20.450	5.0	1.4
2011	3	14	10	51	4.4	-28.651	20.461	5.0	1.5
2011	3	15	13	24	16.6	-29.237	20.867	5.0	1.9
2011	3	15	16	35	55.3	-28.726	20.523	5.0	1.9
2011	3	15	17	31	35.1	-28.656	20.406	5.0	1.5
2011	3	15	17	48	38.6	-28.545	20.448	5.0	1.7
2011	3	15	20	37	12.7	-29.233	20.908	5.0	1.3
2011	3	16	15	3	55.8	-29.161	28.745	5.0	1.8
2011	3	16	18	3	17.5	-28.525	20.368	5.0	2.6
2011	3	16	18	12	23.0	-28.558	20.413	5.0	2.0
2011	3	16	18	34	59.7	-28.448	20.329	5.0	2.1
2011	3	16	18	42	43.0	-28.528	20.293	5.0	2.0
2011	3	16	23	54	35.8	-28.524	20.297	5.0	1.8
2011	3	17	4	43	6.9	-28.550	20.352	5.0	1.8
2011	3	17	6	46	16.5	-28.648	20.418	5.0	1.4
2011	3	17	16	3	19.8	-29.111	20.736	5.0	1.4

2011	3	17	21	44	55.3	-28.783	20.462	5.0	2.2
2011	3	17	21	57	14.5	-28.880	20.568	5.0	1.1
2011	3	17	22	4	7.1	-28.559	20.405	5.0	2.0
2011	3	17	22	46	6.2	-28.491	20.309	5.0	1.6
2011	3	18	0	29	46.2	-28.691	20.406	5.0	2.3
2011	3	18	4	21	23.8	-28.678	20.465	5.0	1.6
2011	3	18	4	32	39.0	-29.266	21.067	5.0	1.5
2011	3	18	7	17	22.7	-29.679	24.542	5.0	2.5
2011	3	18	13	40	33.9	-28.619	20.472	5.0	1.3
2011	3	18	20	42	58.4	-32.061	24.745	5.0	2.7
2011	3	18	21	12	41.7	-28.626	20.320	5.0	1.8
2011	3	19	2	58	58.5	-28.589	20.267	5.0	2.2
2011	3	19	16	2	38.0	-28.548	20.423	5.0	1.8
2011	3	19	20	17	32.7	-28.478	20.333	5.0	2.9
2011	3	19	23	25	16.6	-28.601	20.378	5.0	1.5
2011	3	19	23	26	53.6	-28.658	20.538	5.0	1.5
2011	3	20	2	9	57.8	-28.628	20.398	5.0	1.2
2011	3	20	6	43	58.4	-28.524	20.518	5.0	1.7
2011	3	20	6	55	47.0	-28.548	20.377	5.0	1.6
2011	3	20	15	25	8.3	-28.699	20.424	5.0	1.2
2011	3	20	21	25	1.5	-30.619	19.029	5.0	1.7
2011	3	21	13	4	47.7	-28.660	20.393	5.0	2.0
2011	3	21	20	53	25.0	-29.901	27.352	5.0	2.9
2011	3	22	2	57	59.8	-28.661	20.443	5.0	2.1
2011	3	22	2	59	30.9	-28.688	20.456	5.0	3.2
2011	3	22	2	59	53.7	-28.987	20.889	5.0	2.9
2011	3	22	3	26	2.8	-28.557	20.430	5.0	1.5
2011	3	22	19	4	24.3	-28.730	20.449	5.0	1.1
2011	3	23	4	10	57.5	-28.642	20.484	5.0	1.3
2011	3	23	20	33	2.6	-31.587	28.704	5.0	2.6
2011	3	24	2	45	36.8	-28.789	20.205	5.0	1.6
2011	3	25	2	17	24.4	-28.456	20.385	5.0	1.7

2011	3	25	21	6	8.2	-28.476	20.318	5.0	2.1
2011	3	25	23	21	44.4	-29.262	21.182	5.0	1.3
2011	3	26	1	51	23.1	-28.712	20.455	5.0	1.3
2011	3	26	18	23	25.3	-29.307	20.749	5.0	1.3
2011	3	26	22	28	38.5	-27.981	20.488	5.0	2.0
2011	3	27	5	55	16.7	-27.738	26.619	0.0	1.8
2011	3	27	6	55	34.8	-28.653	20.459	5.0	1.3
2011	3	27	22	30	33.0	-28.703	20.500	5.0	2.0
2011	3	28	6	44	8.7	-28.920	20.658	5.0	1.2
2011	3	29	0	6	58.8	-28.579	20.418	5.0	1.5
2011	3	29	6	40	28.6	-28.472	20.291	5.0	1.7
2011	3	29	10	47	16.5	-28.543	20.402	5.0	1.6
2011	3	29	11	54	21.9	-28.550	20.476	5.0	1.5
2011	3	29	12	52	47.4	-28.674	20.517	5.0	1.7
2011	3	29	17	46	1.5	-28.561	20.455	5.0	1.5
2011	3	29	18	36	43.4	-28.573	20.458	5.0	1.6
2011	3	29	19	37	4.7	-26.027	17.095	5.0	2.5
2011	3	29	21	43	4.2	-28.643	20.411	5.0	1.5
2011	3	31	2	23	10.3	-28.564	20.436	5.0	1.3
2011	3	31	5	24	6.4	-28.716	20.444	5.0	2.0
2011	3	31	5	32	24.9	-28.706	20.386	5.0	1.2
2011	3	31	20	16	21.4	-28.531	20.432	5.0	1.8
2011	3	31	20	36	47.5	-28.728	20.424	5.0	1.9
2011	4	1	21	24	4.9	-34.420	28.020	10.0	3.3
2011	4	2	3	5	46.4	-28.795	20.475	5.0	1.9
2011	4	3	2	28	57.0	-28.632	20.354	5.0	1.2
2011	4	3	3	33	16.0	-29.823	19.722	5.0	1.7
2011	4	3	19	45	29.6	-28.762	20.374	5.0	2.7
2011	4	3	20	4	47.7	-28.634	20.427	5.0	1.4
2011	4	5	2	36	22.9	-28.698	20.374	5.0	1.9
2011	4	5	22	12	41.3	-28.411	20.288	5.0	2.3
2011	4	6	10	1	54.7	-29.063	28.953	5.0	1.8

2011	4	6	18	22	15.2	-28.828	20.495	5.0	2.1
2011	4	6	23	34	54.0	-28.722	20.329	10.0	4.8
2011	4	6	23	56	9.4	-28.745	20.403	5.0	2.0
2011	4	7	0	17	44.2	-28.647	20.444	5.0	2.3
2011	4	7	8	42	16.3	-28.715	20.405	5.0	2.7
2011	4	7	9	34	34.0	-28.749	20.394	5.0	1.8
2011	4	7	18	43	34.1	-28.558	20.423	5.0	1.5
2011	4	9	11	38	3.8	-28.724	20.416	5.0	1.8
2011	4	9	18	40	4.7	-28.664	20.439	5.0	1.1
2011	4	10	10	36	54.2	-28.749	20.410	5.0	1.3
2011	4	12	11	35	2.3	-30.230	24.036	5.0	2.5
2011	4	12	12	16	6.9	-28.711	20.425	5.0	1.6
2011	4	12	16	58	39.2	-28.883	20.441	5.0	1.1
2011	4	12	18	45	26.9	-28.724	20.435	5.0	2.0
2011	4	13	2	53	26.0	-29.042	20.600	5.0	1.9
2011	4	14	2	52	23.1	-28.789	20.410	5.0	1.3
2011	4	14	5	1	34.1	-28.625	20.441	5.0	2.8
2011	4	14	5	18	53.4	-28.655	20.441	5.0	2.0
2011	4	14	6	33	16.4	-28.729	20.354	5.0	1.4
2011	4	15	2	6	40.8	-28.498	20.335	5.0	2.1
2011	4	15	2	19	31.5	-28.646	20.435	5.0	1.6
2011	4	15	4	16	52.2	-28.679	20.465	5.0	1.4
2011	4	16	3	27	14.2	-29.157	20.814	5.0	1.4
2011	4	16	17	19	30.7	-28.652	20.443	5.0	2.9
2011	4	18	0	31	2.0	-27.810	31.392	5.0	2.7
2011	4	18	5	26	11.2	-28.662	20.336	5.0	1.9
2011	4	18	15	47	2.4	-27.983	20.299	5.0	1.4
2011	4	19	0	13	55.3	-28.717	20.389	5.0	1.2
2011	4	19	6	36	31.6	-28.713	20.368	5.0	1.5
2011	4	19	16	35	1.2	-28.777	20.159	5.0	1.4
2011	4	19	17	6	54.3	-28.715	20.394	5.0	1.5
2011	4	19	19	31	9.3	-29.952	28.044	5.0	2.7

2011	4	19	21	5	29.0	-29.947	28.071	5.0	2.3
2011	4	20	1	5	57.9	-29.209	20.887	5.0	1.2
2011	4	20	3	17	15.4	-28.733	20.474	5.0	1.4
2011	4	20	8	39	4.4	-28.635	20.461	5.0	2.9
2011	4	20	9	35	58.5	-28.660	20.447	5.0	1.7
2011	4	20	19	50	51.4	-28.688	20.417	5.0	1.6
2011	4	21	13	20	21.1	-28.633	20.484	5.0	3.0
2011	4	21	14	3	54.2	-28.154	28.899	5.0	2.2
2011	4	22	0	57	6.7	-30.505	26.304	5.0	2.2
2011	4	22	2	48	40.6	-28.634	20.446	5.0	1.5
2011	4	22	14	38	11.8	-23.816	28.674	5.0	2.9
2011	4	23	7	37	17.3	-29.937	19.018	5.0	1.8
2011	4	23	11	32	15.5	-28.840	20.333	5.0	1.4
2011	4	23	20	35	29.3	-28.631	20.455	5.0	2.7
2011	4	23	23	23	14.4	-28.609	20.437	5.0	1.2
2011	4	24	3	16	9.6	-28.734	20.398	5.0	1.3
2011	4	24	7	52	58.3	-28.649	20.425	5.0	1.7
2011	4	24	13	27	11.7	-28.733	20.415	5.0	1.1
2011	4	24	15	13	7.6	-28.756	20.410	5.0	1.9
2011	4	24	16	46	54.3	-28.662	20.486	5.0	1.5
2011	4	24	17	8	2.5	-28.689	20.386	5.0	1.2
2011	4	24	22	36	32.2	-29.887	28.065	5.0	2.3
2011	4	26	8	31	39.1	-28.690	20.430	5.0	1.4
2011	4	26	12	6	28.9	-28.623	20.428	5.0	2.0
2011	4	26	12	48	38.1	-26.370	31.869	5.0	1.2
2011	4	27	8	30	29.5	-28.662	20.515	5.0	1.3
2011	4	28	6	41	37.8	-30.274	30.806	5.0	3.0
2011	4	28	22	32	43.8	-28.749	20.418	5.0	2.1
2011	4	28	23	24	38.8	-28.690	20.364	5.0	1.5
2011	4	29	17	46	41.9	-28.679	20.448	5.0	1.3
2011	4	30	17	6	14.7	-28.697	20.416	5.0	1.5
2011	5	2	10	12	41.1	-27.352	20.329	5.0	1.8

2011	5	2	18	0	57.4	-28.768	20.456	5.0	1.4
2011	5	2	18	55	8.3	-29.272	21.098	5.0	1.5
2011	5	2	19	17	54.6	-28.531	20.490	5.0	1.5
2011	5	2	21	48	52.1	-28.648	20.430	5.0	1.4
2011	5	3	2	45	49.7	-28.553	20.386	5.0	1.4
2011	5	3	3	8	8.8	-29.334	21.021	5.0	1.4
2011	5	3	4	15	51.0	-28.725	20.583	5.0	1.4
2011	5	3	4	30	39.4	-29.230	20.885	5.0	1.1
2011	5	3	4	33	25.1	-28.892	20.637	5.0	1.2
2011	5	3	7	26	16.8	-29.297	21.159	5.0	1.4
2011	5	3	8	4	59.8	-28.759	20.386	5.0	1.7
2011	5	3	19	45	57.5	-28.447	16.077	5.0	2.5
2011	5	3	20	2	32.7	-28.248	16.251	5.0	2.8
2011	5	4	9	59	1.2	-28.461	20.386	5.0	3.6
2011	5	4	12	42	34.2	-28.790	20.365	5.0	2.5
2011	5	4	12	44	8.5	-28.243	16.474	5.0	3.6
2011	5	4	14	29	55.7	-28.736	20.407	5.0	1.9
2011	5	4	17	16	53.9	-28.283	30.803	5.0	1.7
2011	5	5	10	6	27.2	-28.452	20.354	5.0	3.0
2011	5	5	10	11	42.4	-28.809	20.359	5.0	4.2
2011	5	5	10	38	20.9	-28.543	19.982	5.0	3.2
2011	5	5	10	59	33.8	-28.748	20.469	5.0	2.4
2011	5	5	11	37	23.4	-28.478	20.301	5.0	2.0
2011	5	5	11	45	27.8	-28.737	20.405	5.0	3.0
2011	5	6	4	14	42.0	-17.342	13.063	10.0	3.9
2011	5	6	5	57	39.3	-28.807	20.358	5.0	1.6
2011	5	6	23	12	19.7	-29.173	20.879	5.0	1.3
2011	5	7	9	53	19.8	-28.608	20.470	5.0	3.5
2011	5	7	9	54	6.7	-28.755	31.534	5.0	2.4
2011	5	7	15	14	42.8	-28.682	20.437	5.0	1.7
2011	5	7	15	18	16.6	-28.569	20.452	5.0	1.3
2011	5	8	0	0	36.1	-29.198	20.822	5.0	1.6

2011	5	8	17	20	25.0	-28.732	20.401	5.0	1.8
2011	5	8	22	53	12.4	-28.674	20.445	5.0	1.7
2011	5	9	1	48	40.6	-28.706	20.467	5.0	1.3
2011	5	9	10	40	21.6	-28.693	20.440	5.0	1.5
2011	5	9	22	36	33.9	-28.959	20.655	5.0	1.4
2011	5	9	23	45	32.4	-28.801	20.704	5.0	1.0
2011	5	10	23	5	29.2	-29.702	19.721	5.0	1.6
2011	5	11	0	20	5.3	-28.734	20.407	5.0	2.0
2011	5	11	0	43	55.3	-28.534	20.437	5.0	1.8
2011	5	11	0	48	40.2	-28.694	20.435	5.0	2.0
2011	5	11	20	1	30.1	-28.588	20.435	5.0	1.9
2011	5	11	20	6	45.7	-28.756	20.398	5.0	1.8
2011	5	12	0	1	39.1	-28.693	20.428	5.0	1.4
2011	5	12	1	1	49.3	-28.610	20.414	5.0	1.5
2011	5	12	14	49	13.5	-29.136	20.762	5.0	1.4
2011	5	12	15	3	28.5	-27.875	16.445	5.0	2.9
2011	5	12	15	31	53.5	-28.400	20.316	5.0	1.6
2011	5	12	20	13	53.7	-28.693	20.547	5.0	1.1
2011	5	13	9	31	2.1	-29.569	21.254	5.0	1.3
2011	5	13	15	31	59.1	-28.651	20.490	5.0	1.2
2011	5	13	15	40	39.8	-28.636	20.435	5.0	2.3
2011	5	14	2	7	33.2	-28.603	20.369	5.0	1.1
2011	5	14	7	13	59.0	-28.866	20.504	5.0	2.2
2011	5	14	7	28	33.0	-28.480	20.543	5.0	1.1
2011	5	14	14	10	41.0	-32.780	22.139	5.0	4.2
2011	5	14	16	26	12.0	-28.790	20.406	5.0	3.2
2011	5	14	18	36	41.0	-28.558	20.425	5.0	1.4
2011	5	14	19	9	8.2	-28.463	20.347	5.0	1.6
2011	5	14	19	45	54.5	-28.559	20.359	5.0	1.7
2011	5	14	21	48	3.1	-28.575	20.475	5.0	1.5
2011	5	14	22	40	13.4	-28.349	20.482	5.0	1.6
2011	5	14	23	14	39.8	-28.574	20.430	5.0	1.8

2011	5	14	23	51	4.1	-28.662	20.575	5.0	1.3
2011	5	14	23	57	22.5	-28.603	20.451	5.0	1.3
2011	5	15	0	13	37.7	-28.638	20.549	5.0	1.0
2011	5	15	1	59	27.4	-28.574	20.470	5.0	1.5
2011	5	15	3	5	14.3	-28.554	20.458	5.0	1.6
2011	5	15	3	9	7.3	-29.285	20.998	5.0	1.3
2011	5	15	3	28	17.7	-28.598	20.406	5.0	1.4
2011	5	15	3	40	21.5	-28.537	20.488	5.0	1.4
2011	5	15	4	56	31.7	-28.586	20.447	5.0	2.0
2011	5	15	11	50	17.1	-28.618	20.361	5.0	1.3
2011	5	15	16	5	1.6	-28.467	20.335	5.0	1.5
2011	5	15	17	4	50.9	-28.661	20.478	5.0	1.1
2011	5	15	22	40	42.5	-28.491	20.358	5.0	1.5
2011	5	16	0	29	0.5	-28.605	20.444	5.0	1.6
2011	5	16	2	17	29.7	-28.581	20.928	5.0	1.0
2011	5	16	8	32	3.8	-29.671	19.747	5.0	2.5
2011	5	16	16	27	38.8	-28.897	20.264	5.0	1.7
2011	5	16	17	6	3.9	-28.820	20.241	5.0	1.3
2011	5	17	19	34	52.5	-28.584	20.366	5.0	1.5
2011	5	18	12	57	44.4	-29.854	20.321	5.0	1.9
2011	5	19	0	44	36.3	-28.705	20.512	5.0	1.4
2011	5	19	12	22	13.5	-28.675	20.426	5.0	1.9
2011	5	19	16	10	35.4	-28.636	20.466	5.0	1.2
2011	5	19	16	55	4.0	-28.707	20.437	5.0	1.3
2011	5	19	18	27	31.1	-28.665	20.555	5.0	1.2
2011	5	20	0	14	10.0	-28.732	20.441	5.0	1.2
2011	5	20	2	48	48.0	-28.695	20.548	5.0	1.5
2011	5	20	9	0	49.0	-29.271	20.978	5.0	1.4
2011	5	20	12	57	7.1	-24.024	29.043	5.0	2.5
2011	5	20	17	45	12.1	-28.893	20.214	5.0	1.8
2011	5	21	12	28	6.0	-29.111	28.397	5.0	1.7
2011	5	22	0	44	56.2	-28.701	20.418	5.0	1.8

2011	5	22	9	26	36.5	-28.739	20.405	5.0	2.0
2011	5	22	10	35	46.0	-28.651	20.531	5.0	1.6
2011	5	22	15	22	22.7	-28.562	20.432	5.0	1.5
2011	5	23	1	35	27.7	-28.627	20.406	5.0	2.1
2011	5	23	2	33	14.9	-32.722	22.201	5.0	3.2
2011	5	23	18	35	45.0	-28.675	20.432	5.0	2.0
2011	5	23	18	37	47.1	-28.445	20.410	5.0	1.5
2011	5	23	18	44	30.4	-28.438	20.424	5.0	1.9
2011	5	23	18	45	51.9	-29.423	21.353	5.0	1.7
2011	5	23	19	27	46.0	-28.722	20.429	5.0	1.1
2011	5	23	21	57	13.3	-28.532	20.415	5.0	1.6
2011	5	24	7	5	11.9	-29.629	26.775	5.0	2.4
2011	5	24	19	9	25.6	-28.596	20.433	5.0	1.6
2011	5	25	15	53	43.3	-28.671	20.447	5.0	1.3
2011	5	25	19	21	59.2	-28.518	20.346	5.0	1.6
2011	5	25	19	22	54.5	-28.670	20.549	5.0	1.7
2011	5	25	19	32	9.1	-28.675	20.432	5.0	1.6
2011	5	25	23	1	18.1	-28.628	20.541	5.0	1.3
2011	5	26	2	3	13.9	-29.234	20.974	5.0	1.3
2011	5	26	2	16	5.1	-28.650	20.400	5.0	1.7
2011	5	27	3	50	51.2	-28.414	20.365	5.0	1.8
2011	5	27	4	2	27.7	-28.812	20.341	5.0	2.7
2011	5	27	4	25	35.8	-28.718	20.395	5.0	3.3
2011	5	27	5	5	21.9	-28.575	20.445	5.0	2.0
2011	5	27	16	29	11.0	-28.627	20.485	5.0	1.6
2011	5	27	18	31	49.0	-28.581	20.447	5.0	1.6
2011	5	27	20	19	20.0	-28.695	20.405	5.0	2.0
2011	5	28	3	4	8.3	-28.599	20.423	5.0	1.6
2011	5	28	9	20	3.9	-28.806	20.463	5.0	1.5
2011	5	29	4	24	46.2	-28.637	20.436	5.0	1.2
2011	5	29	4	29	4.1	-28.763	20.343	5.0	2.0
2011	5	29	8	3	16.6	-28.497	20.426	5.0	1.6

2011	5	29	8	5	21.8	-28.748	20.409	5.0	2.6
2011	5	29	8	20	32.3	-29.085	20.780	5.0	1.3
2011	5	29	9	46	19.5	-28.893	20.840	5.0	1.1
2011	6	1	10	32	35.8	-28.722	20.427	5.0	2.1
2011	6	1	10	47	7.6	-28.756	20.405	5.0	1.9
2011	6	1	12	44	2.9	-28.716	20.419	5.0	1.8
2011	6	1	14	53	17.2	-28.551	20.435	5.0	2.0
2011	6	1	16	8	2.5	-28.491	20.421	5.0	1.6
2011	6	4	3	35	13.8	-28.725	20.489	5.0	1.3
2011	6	4	8	18	5.8	-28.623	20.435	5.0	2.0
2011	6	5	23	33	52.8	-32.969	22.063	5.0	2.8
2011	6	6	6	57	32.1	-28.899	20.269	5.0	1.4
2011	6	7	4	33	35.0	-30.309	28.205	5.0	2.5
2011	6	7	7	25	8.0	-28.625	20.433	5.0	2.7
2011	6	7	19	38	13.0	-28.949	20.250	5.0	2.0
2011	6	8	21	44	17.0	-28.786	20.149	5.0	1.5
2011	6	10	13	46	31.6	-28.600	20.476	5.0	2.3
2011	6	10	14	11	9.3	-28.676	20.445	5.0	1.6
2011	6	10	23	12	46.5	-28.626	20.452	5.0	2.5
2011	6	11	0	7	22.3	-28.716	20.442	5.0	2.0
2011	6	12	2	6	29.2	-28.726	20.462	5.0	3.4
2011	6	12	4	24	5.4	-28.777	20.381	5.0	1.7
2011	6	12	8	28	49.1	-28.696	20.471	5.0	3.0
2011	6	12	8	50	11.6	-28.682	20.496	5.0	2.5
2011	6	13	10	9	57.8	-28.665	20.455	5.0	3.2
2011	6	13	14	37	43.5	-25.513	23.362	5.0	2.6
2011	6	14	0	48	5.4	-28.715	20.379	5.0	1.8
2011	6	14	7	54	36.2	-28.742	20.413	5.0	1.9
2011	6	14	12	6	50.0	-27.881	18.562	5.0	3.0
2011	6	14	15	17	22.2	-25.827	26.055	5.0	2.0
2011	6	14	17	52	50.5	-28.698	20.493	5.0	1.6
2011	6	14	21	24	19.2	-28.771	20.395	5.0	1.8

2011	6	15	1	2	39.3	-27.942	18.576	5.0	2.7
2011	6	15	1	41	54.9	-28.664	20.378	5.0	1.9
2011	6	16	9	43	53.5	-29.154	20.796	5.0	1.6
2011	6	17	17	29	41.7	-20.981	26.461	5.0	4.0
2011	6	18	1	45	57.9	-27.965	18.483	5.0	2.4
2011	6	18	6	29	8.6	-28.732	20.437	5.0	1.8
2011	6	19	6	35	37.0	-28.653	20.411	5.0	1.6
2011	6	19	8	32	33.4	-29.081	28.688	5.0	2.0
2011	6	20	5	30	7.2	-32.770	22.274	5.0	2.8
2011	6	20	10	12	36.4	-28.501	20.348	5.0	1.7
2011	6	20	16	44	53.3	-22.370	28.940	10.0	5.9
2011	6	20	20	49	55.1	-28.619	20.295	5.0	1.7
2011	6	21	12	7	56.9	-27.459	21.933	5.0	1.9
2011	6	22	1	42	49.4	-28.758	20.392	5.0	2.2
2011	6	22	16	19	2.5	-28.687	20.418	5.0	2.5
2011	6	22	16	42	41.2	-28.693	20.419	5.0	1.7
2011	6	22	19	12	52.2	-28.751	20.407	5.0	1.8
2011	6	22	19	33	39.7	-28.715	20.244	5.0	1.5
2011	6	22	19	55	59.6	-28.742	20.411	5.0	1.2
2011	6	22	21	2	50.6	-28.570	20.437	5.0	3.5
2011	6	22	21	10	4.4	-28.618	20.456	5.0	3.8
2011	6	22	21	30	0.7	-28.548	20.426	5.0	1.5
2011	6	22	21	38	50.9	-28.693	20.409	5.0	2.3
2011	6	22	21	45	24.5	-28.725	20.400	5.0	2.1
2011	6	23	4	35	15.5	-28.702	20.394	5.0	1.7
2011	6	23	4	40	28.1	-28.748	20.390	5.0	2.3
2011	6	23	7	30	1.8	-28.531	20.362	5.0	1.5
2011	6	23	8	16	39.2	-28.717	20.425	5.0	2.0
2011	6	23	14	57	19.4	-29.221	28.579	5.0	1.5
2011	6	24	0	28	53.2	-28.583	20.357	5.0	1.7
2011	6	24	2	50	10.8	-28.755	20.375	5.0	1.9
2011	6	24	3	28	33.0	-20.540	14.695	10.0	2.6

2011	6	25	13	38	22.0	-30.167	17.900	5.0	3.6
2011	6	25	21	45	32.5	-28.426	20.494	5.0	1.5
2011	6	25	22	18	28.5	-28.563	20.365	5.0	1.6
2011	6	25	23	1	5.4	-28.696	20.381	5.0	1.7
2011	6	25	23	36	48.3	-28.423	20.307	5.0	1.8
2011	6	25	23	46	50.6	-28.604	20.374	5.0	1.6
2011	6	26	1	42	27.0	-28.841	20.311	5.0	1.7
2011	6	26	6	57	6.3	-28.750	20.408	5.0	1.8
2011	6	28	5	15	51.1	-26.427	27.569	0.0	3.3
2011	6	29	12	32	30.0	-27.775	18.811	5.0	2.0
2011	6	29	15	53	41.1	-29.096	28.807	5.0	2.1
2011	6	30	22	0	32.5	-31.067	18.119	5.0	2.6
2011	7	1	7	8	12.1	-31.374	20.128	5.0	2.1
2011	7	1	7	51	11.0	-28.556	20.456	5.0	1.7
2011	7	1	9	6	15.1	-28.786	20.532	5.0	1.2
2011	7	2	0	24	7.1	-28.665	20.453	5.0	1.6
2011	7	2	5	13	52.2	-28.287	20.226	5.0	2.0
2011	7	2	6	14	48.2	-28.721	20.383	5.0	1.9
2011	7	2	6	16	53.0	-28.591	20.482	5.0	1.5
2011	7	2	6	58	52.8	-28.609	20.622	5.0	1.4
2011	7	2	7	47	27.0	-28.566	20.463	5.0	1.8
2011	7	2	11	35	26.5	-28.670	20.444	5.0	2.7
2011	7	2	11	42	55.2	-28.597	20.447	5.0	1.8
2011	7	3	20	3	11.0	-29.220	20.996	5.0	1.7
2011	7	4	14	36	48.5	-28.700	20.464	5.0	1.3
2011	7	5	1	7	41.4	-29.243	20.900	5.0	1.2
2011	7	5	5	1	22.0	-19.724	16.798	10.0	2.6
2011	7	5	11	53	48.3	-27.255	22.205	0.0	2.3
2011	7	6	0	30	16.5	-30.132	29.442	5.0	2.4
2011	7	6	4	48	15.1	-28.483	20.284	5.0	1.9
2011	7	6	9	39	53.0	-30.285	29.365	5.0	2.6
2011	7	10	19	30	36.8	-28.593	20.410	5.0	2.7

2011	7	10	19	38	40.3	-28.416	20.352	5.0	1.9
2011	7	13	10	0	30.3	-32.363	27.338	5.0	2.4
2011	7	15	18	13	28.9	-28.828	19.413	5.0	1.6
2011	7	16	8	27	16.7	-28.893	20.197	5.0	3.1
2011	7	16	8	47	45.3	-28.916	20.290	5.0	2.0
2011	7	16	9	31	22.4	-28.956	20.250	5.0	1.2
2011	7	17	23	40	8.1	-28.518	20.425	5.0	1.4
2011	7	18	5	31	21.1	-28.821	20.221	5.0	1.9
2011	7	18	15	23	25.9	-28.643	22.409	5.0	2.2
2011	7	19	0	53	4.2	-28.801	20.260	5.0	1.6
2011	7	19	19	51	32.4	-28.520	20.453	5.0	1.5
2011	7	20	0	40	22.5	-28.727	20.524	5.0	1.3
2011	7	20	1	5	8.2	-28.748	20.379	5.0	1.7
2011	7	20	1	9	29.2	-28.636	20.460	5.0	1.9
2011	7	20	1	29	14.3	-28.587	20.561	5.0	1.3
2011	7	20	18	38	30.4	-28.449	17.028	5.0	1.8
2011	7	21	1	3	5.3	-29.237	19.179	5.0	1.4
2011	7	21	6	30	1.9	-28.742	20.440	5.0	1.3
2011	7	21	6	38	35.7	-28.762	20.408	5.0	1.2
2011	7	21	16	20	19.4	-33.533	17.340	5.0	3.3
2011	7	24	15	37	36.3	-28.700	20.456	5.0	1.7
2011	7	25	22	1	30.3	-30.692	18.151	5.0	1.8
2011	7	26	21	30	57.9	-28.707	20.471	5.0	1.3
2011	7	27	1	58	5.7	-28.723	20.533	5.0	1.5
2011	7	28	19	50	49.0	-29.195	20.862	5.0	1.2
2011	7	28	19	58	53.8	-28.601	20.310	5.0	1.8
2011	7	30	14	52	30.9	-28.999	28.908	5.0	1.7
2011	7	31	19	8	4.4	-29.807	20.572	5.0	2.3
2011	7	31	20	48	47.8	-31.246	24.678	5.0	2.6
2011	8	1	12	58	34.0	-25.113	26.667	5.0	1.9
2011	8	1	20	12	35.4	-28.833	21.330	5.0	1.6
2011	8	1	23	39	59.7	-28.858	20.120	5.0	1.7

2011	8	2	10	18	3.6	-28.880	29.039	5.0	1.9
2011	8	3	19	33	59.9	-28.838	20.188	5.0	1.8
2011	8	4	9	58	50.0	-29.485	28.045	5.0	1.9
2011	8	5	2	27	50.3	-28.664	20.343	5.0	1.6
2011	8	7	20	22	49.6	-30.078	21.051	5.0	2.4
2011	8	8	3	57	29.3	-28.290	20.489	5.0	1.8
2011	8	8	13	6	53.5	-29.386	25.458	2.0	3.0
2011	8	8	13	7	19.5	-24.643	28.145	5.0	2.7
2011	8	9	9	58	58.6	-28.957	28.964	5.0	2.1
2011	8	9	10	10	50.8	-28.228	25.142	5.0	2.4
2011	8	9	10	57	4.6	-31.100	22.973	5.0	3.0
2011	8	9	12	18	32.9	-26.725	21.342	5.0	2.5
2011	8	10	12	19	15.8	-30.012	21.378	5.0	2.4
2011	8	10	12	20	26.9	-28.297	29.085	5.0	2.3
2011	8	10	17	11	49.1	-28.736	20.389	5.0	1.9
2011	8	10	17	14	12.5	-28.739	20.356	5.0	2.0
2011	8	10	18	36	4.7	-28.643	20.409	5.0	1.6
2011	8	10	18	38	29.4	-28.755	20.373	5.0	1.6
2011	8	12	1	0	28.1	-30.180	18.918	5.0	1.8
2011	8	12	13	45	7.2	-28.197	28.371	5.0	3.2
2011	8	13	13	58	47.7	-29.028	28.871	5.0	1.8
2011	8	13	14	38	38.8	-29.916	21.273	5.0	1.9
2011	8	13	18	5	32.0	-29.032	21.151	5.0	1.7
2011	8	13	18	23	36.5	-29.084	20.684	5.0	1.4
2011	8	13	18	26	31.2	-28.648	20.346	5.0	1.3
2011	8	13	18	51	21.8	-30.913	18.268	5.0	3.3
2011	8	13	18	52	45.1	-28.619	20.469	5.0	2.2
2011	8	13	18	53	6.5	-29.802	19.219	5.0	2.3
2011	8	13	19	33	28.7	-28.446	20.360	5.0	3.3
2011	8	13	19	42	1.8	-28.585	20.354	5.0	2.0
2011	8	13	19	46	47.3	-28.671	20.603	5.0	1.4
2011	8	13	19	47	17.4	-28.637	20.485	5.0	1.5

2011	8	13	19	47	49.3	-28.707	20.940	5.0	1.1
2011	8	13	19	48	7.6	-29.909	18.717	5.0	2.5
2011	8	13	19	53	53.9	-28.614	20.575	5.0	1.4
2011	8	13	20	17	21.3	-28.566	20.609	5.0	1.3
2011	8	13	20	20	50.3	-28.699	20.549	5.0	1.6
2011	8	13	21	13	48.9	-28.701	20.436	5.0	2.1
2011	8	13	23	3	54.8	-28.682	20.388	5.0	2.3
2011	8	14	12	23	45.7	-28.741	20.416	5.0	1.9
2011	8	14	12	47	8.6	-28.724	20.409	5.0	1.9
2011	8	17	4	31	7.6	-28.805	20.427	5.0	1.9
2011	8	17	22	53	49.9	-30.184	27.633	5.0	2.2
2011	8	20	19	3	20.6	-28.796	20.536	5.0	1.5
2011	8	20	22	53	51.0	-27.377	29.188	5.0	1.4
2011	8	22	13	30	36.0	-27.116	21.762	5.0	2.3
2011	8	22	16	39	6.3	-28.759	20.558	5.0	1.7
2011	8	22	18	40	53.3	-28.713	20.420	5.0	2.3
2011	8	22	21	29	38.0	-30.237	28.268	5.0	1.7
2011	8	24	3	17	30.7	-28.681	20.545	5.0	1.6
2011	8	24	13	45	55.5	-26.369	25.383	5.0	2.4
2011	8	24	20	24	36.6	-25.334	23.875	5.0	1.7
2011	8	25	12	51	11.0	-27.698	27.531	5.0	1.5
2011	8	25	15	2	38.8	-29.673	29.310	5.0	2.1
2011	8	25	15	23	46.9	-30.971	20.472	5.0	2.3
2011	8	26	1	4	4.8	-28.697	20.411	5.0	2.0
2011	8	26	2	26	27.8	-28.620	20.430	5.0	2.1
2011	8	26	9	47	45.0	-25.443	25.827	5.0	2.7
2011	8	26	18	56	36.7	-28.606	20.271	5.0	1.6
2011	8	27	1	0	11.3	-28.751	20.565	5.0	3.4
2011	8	27	4	17	36.6	-28.691	20.410	5.0	2.2
2011	8	27	4	20	21.7	-28.617	20.454	5.0	2.0
2011	8	27	17	8	29.1	-28.595	20.431	5.0	2.0
2011	8	27	17	42	39.2	-28.654	20.426	5.0	2.0

2011	8	27	18	25	52.4	-28.683	20.440	5.0	2.3
2011	8	27	22	6	9.1	-28.608	20.447	5.0	1.9
2011	8	28	5	36	58.9	-27.736	28.798	5.0	2.4
2011	8	29	12	6	9.5	-30.129	23.567	5.0	2.6
2011	8	29	17	14	46.4	-28.612	20.460	5.0	1.7
2011	8	29	21	27	32.4	-28.660	20.468	5.0	1.8
2011	8	30	10	9	50.4	-26.163	24.195	5.0	1.8
2011	8	30	13	13	51.9	-23.844	24.106	5.0	2.3
2011	8	31	5	49	7.3	-27.899	24.814	0.0	1.5
2011	8	31	15	8	28.2	-27.092	24.045	5.0	2.7
2011	8	31	16	49	15.6	-26.207	25.855	5.0	2.3
2011	9	1	3	47	34.8	-28.957	26.786	5.0	2.1
2011	9	2	11	14	15.0	-24.020	17.064	10.0	3.3
2011	9	2	23	43	5.3	-30.113	17.262	5.0	2.6
2011	9	3	8	19	36.9	-29.798	26.570	5.0	2.0
2011	9	3	20	1	16.1	-28.896	30.591	5.0	1.9
2011	9	4	3	1	50.9	-32.079	20.819	5.0	2.6
2011	9	4	12	13	49.7	-30.250	27.998	5.0	2.6
2011	9	5	18	44	55.0	-29.232	20.900	5.0	1.6
2011	9	5	21	37	18.8	-28.667	20.471	5.0	1.5
2011	9	5	21	48	18.4	-28.616	20.429	5.0	1.5
2011	9	5	22	1	3.2	-31.912	20.980	5.0	2.5
2011	9	5	22	5	33.3	-28.601	20.166	5.0	1.8
2011	9	5	22	37	27.9	-28.502	20.375	5.0	1.9
2011	9	5	22	55	17.7	-28.617	20.471	5.0	2.9
2011	9	5	23	3	55.6	-28.586	20.217	5.0	1.9
2011	9	5	23	21	28.1	-28.614	20.492	5.0	1.9
2011	9	5	23	23	13.6	-28.698	20.422	5.0	2.5
2011	9	5	23	30	46.0	-28.636	20.442	5.0	1.7
2011	9	5	23	41	7.1	-28.602	20.434	5.0	1.8
2011	9	6	1	34	45.5	-28.658	20.452	5.0	1.7
2011	9	6	1	46	32.3	-28.697	20.437	5.0	2.5

2011	9	6	14	40	28.0	-28.444	20.376	5.0	1.8
2011	9	6	22	11	30.6	-28.710	20.433	5.0	2.1
2011	9	7	0	2	23.9	-28.793	20.149	5.0	1.8
2011	9	9	4	28	7.8	-28.663	20.454	5.0	1.6
2011	9	9	4	37	30.3	-28.645	20.478	5.0	1.6
2011	9	10	9	59	41.8	-28.905	28.690	5.0	1.6
2011	9	11	22	35	22.0	-24.987	20.575	5.0	2.8
2011	9	11	22	43	12.4	-28.729	20.358	5.0	1.9
2011	9	11	23	25	22.2	-28.562	20.465	5.0	2.1
2011	9	12	2	0	14.7	-28.503	20.409	5.0	1.7
2011	9	12	2	3	3.0	-28.652	20.462	5.0	2.1
2011	9	12	6	30	47.8	-28.752	20.424	5.0	1.5
2011	9	12	6	38	26.6	-28.568	20.448	5.0	2.1
2011	9	14	8	34	32.5	-24.972	29.205	5.0	2.2
2011	9	14	21	19	30.5	-28.779	20.533	5.0	1.2
2011	9	16	0	18	59.4	-28.728	20.419	5.0	2.0
2011	9	16	14	30	60.0	-27.390	27.325	5.0	1.7
2011	9	16	15	10	0.9	-28.590	20.450	5.0	1.7
2011	9	16	17	4	55.1	-24.755	28.432	5.0	2.5
2011	9	16	18	36	19.2	-28.572	20.537	5.0	1.6
2011	9	17	1	23	49.1	-30.114	19.156	5.0	2.0
2011	9	18	10	56	49.8	-28.619	20.461	5.0	1.5
2011	9	19	23	6	8.0	-28.649	20.416	5.0	1.9
2011	9	20	6	37	46.2	-30.501	27.399	5.0	1.7
2011	9	21	12	20	12.0	-26.350	27.388	5.0	4.4
2011	9	22	19	26	56.0	-28.794	17.825	5.0	2.8
2011	9	23	4	38	16.3	-26.604	20.419	5.0	2.4
2011	9	23	16	10	36.4	-25.520	26.364	2.0	1.7
2011	9	24	1	39	13.2	-28.695	20.445	5.0	2.6
2011	9	24	8	52	49.9	-25.889	24.934	5.0	1.6
2011	9	25	17	44	26.6	-28.635	20.459	5.0	1.4
2011	9	26	9	46	48.0	-27.910	16.218	5.0	3.9

2011	9	26	16	38	21.1	-28.640	20.457	5.0	2.2
2011	9	26	19	32	41.8	-30.387	28.367	5.0	2.2
2011	9	26	23	56	33.3	-28.634	20.463	5.0	2.0
2011	9	29	12	18	26.7	-28.815	20.357	5.0	1.1
2011	9	29	15	31	34.5	-27.431	27.310	5.0	1.8
2011	9	29	18	12	0.2	-28.761	20.372	5.0	1.6
2011	9	29	21	22	37.9	-29.626	27.355	5.0	1.8
2011	9	30	6	58	54.8	-28.692	20.465	5.0	1.9
2011	10	1	10	11	54.4	-28.640	20.464	5.0	2.1
2011	10	1	11	40	58.0	-26.224	31.193	10.0	3.1
2011	10	1	12	40	49.9	-28.662	20.460	5.0	1.1
2011	10	1	20	5	18.2	-28.756	20.401	0.0	2.6
2011	10	1	20	7	10.6	-26.963	24.693	5.0	1.6
2011	10	1	20	16	9.6	-28.783	20.392	5.0	1.9
2011	10	1	23	52	10.8	-28.687	20.394	5.0	1.7
2011	10	2	1	48	11.6	-28.836	20.618	5.0	1.9
2011	10	2	3	27	39.8	-28.684	20.438	5.0	1.8
2011	10	2	8	26	49.5	-29.011	28.783	5.0	2.0
2011	10	2	18	28	53.1	-28.690	20.384	5.0	1.9
2011	10	4	10	6	0.8	-29.134	28.794	5.0	1.5
2011	10	4	20	9	32.9	-30.971	21.032	5.0	1.8
2011	10	5	20	48	57.4	-28.098	26.766	2.0	4.2
2011	10	5	20	48	59.6	-27.949	26.705	5.0	3.1
2011	10	5	20	49	21.7	-28.065	26.729	5.0	2.5
2011	10	6	2	15	23.1	-28.720	20.427	5.0	1.7
2011	10	6	9	44	24.1	-28.796	20.585	5.0	1.6
2011	10	6	9	55	45.8	-28.772	20.417	5.0	1.2
2011	10	6	11	8	35.0	-29.745	23.630	5.0	2.2
2011	10	6	14	3	36.8	-25.828	25.969	5.0	1.5
2011	10	6	21	23	39.6	-30.983	21.040	5.0	2.1
2011	10	7	7	23	37.3	-29.092	26.157	5.0	2.9
2011	10	8	6	42	23.0	-25.907	26.445	5.0	1.5

2011	10	8	22	0	1.3	-28.674	20.232	5.0	1.8
2011	10	8	22	7	48.9	-28.747	20.430	5.0	1.8
2011	10	8	22	47	36.2	-28.878	20.450	5.0	2.3
2011	10	9	4	9	46.9	-28.615	20.447	5.0	1.9
2011	10	9	5	55	19.8	-28.623	20.682	5.0	1.4
2011	10	9	6	41	37.3	-28.719	20.438	5.0	1.8
2011	10	9	6	42	33.2	-28.669	20.435	5.0	1.9
2011	10	9	7	14	8.3	-28.710	20.400	5.0	1.9
2011	10	9	7	52	56.9	-31.034	21.149	5.0	2.0
2011	10	9	9	40	30.4	-34.297	15.529	5.0	3.0
2011	10	9	10	9	19.8	-29.059	28.791	5.0	2.0
2011	10	10	12	18	34.9	-31.236	19.106	5.0	2.1
2011	10	10	14	11	40.2	-29.143	28.656	5.0	1.6
2011	10	11	0	13	7.7	-33.503	19.478	5.0	1.7
2011	10	11	13	23	44.8	-27.904	30.790	5.0	2.9
2011	10	13	13	30	45.4	-29.072	29.057	5.0	1.7
2011	10	13	15	32	28.2	-29.609	20.363	5.0	2.0
2011	10	14	12	53	43.3	-24.847	26.436	5.0	2.3
2011	10	14	13	1	50.8	-29.725	23.944	5.0	2.3
2011	10	15	15	3	50.9	-26.152	25.378	5.0	1.8
2011	10	16	2	42	39.7	-32.435	19.946	5.0	0.9
2011	10	17	0	19	54.6	-28.689	20.459	5.0	1.7
2011	10	17	1	11	18.3	-30.508	25.136	5.0	2.1
2011	10	17	1	55	20.4	-28.736	20.460	5.0	2.0
2011	10	17	9	18	53.9	-28.780	20.383	5.0	2.2
2011	10	17	12	14	40.0	-28.740	20.402	5.0	2.0
2011	10	17	15	43	37.3	-28.741	20.355	5.0	2.1
2011	10	17	16	6	19.6	-28.762	20.340	5.0	1.8
2011	10	17	16	16	57.8	-28.768	20.374	5.0	2.0
2011	10	17	16	29	11.0	-28.574	20.512	5.0	1.2
2011	10	17	16	30	10.2	-28.564	20.441	5.0	1.4
2011	10	17	16	32	35.3	-28.714	20.431	5.0	1.7

2011	10	17	17	3	57.3	-28.773	20.347	5.0	1.7
2011	10	17	17	41	47.0	-28.744	20.364	5.0	1.8
2011	10	17	18	8	1.3	-30.898	20.191	5.0	2.6
2011	10	17	18	19	15.9	-30.973	20.203	5.0	2.0
2011	10	17	19	21	42.2	-29.905	19.231	5.0	1.9
2011	10	17	20	10	12.1	-28.430	20.029	5.0	1.7
2011	10	17	21	55	21.7	-28.795	20.412	5.0	2.3
2011	10	17	23	41	59.4	-28.652	20.417	5.0	2.6
2011	10	18	7	13	53.6	-28.698	20.401	5.0	2.3
2011	10	18	18	33	24.3	-28.946	16.930	5.0	2.2
2011	10	18	21	54	10.4	-28.752	17.654	5.0	2.9
2011	10	19	14	15	10.8	-25.800	26.046	5.0	2.3
2011	10	20	15	18	1.4	-29.481	22.767	5.0	2.2
2011	10	21	0	14	47.6	-27.180	20.474	5.0	2.1
2011	10	21	0	41	45.0	-28.606	20.407	5.0	1.7
2011	10	21	12	32	39.8	-29.001	21.684	5.0	2.4
2011	10	22	2	5	53.9	-28.694	20.541	5.0	1.4
2011	10	22	4	16	45.8	-28.760	20.466	5.0	0.9
2011	10	22	9	25	35.7	-28.304	28.352	5.0	2.1
2011	10	22	23	37	24.5	-28.259	27.837	5.0	2.3
2011	10	23	2	30	53.1	-28.611	20.416	5.0	2.3
2011	10	23	2	38	30.1	-28.642	20.472	5.0	2.0
2011	10	23	2	39	35.9	-28.564	20.463	5.0	2.0
2011	10	23	16	31	14.3	-30.307	27.556	5.0	2.5
2011	10	24	0	49	56.4	-30.775	26.120	5.0	2.9
2011	10	25	12	25	43.3	-23.605	28.365	5.0	2.7
2011	10	26	12	24	12.3	-29.039	28.084	5.0	1.6
2011	10	27	8	10	30.8	-30.619	26.821	5.0	2.4
2011	10	27	16	44	1.2	-26.084	22.264	5.0	2.4
2011	10	27	20	32	23.3	-28.671	20.417	5.0	1.4
2011	10	28	5	34	32.8	-28.425	27.237	5.0	1.7
2011	10	28	13	7	11.7	-27.520	27.361	5.0	1.9

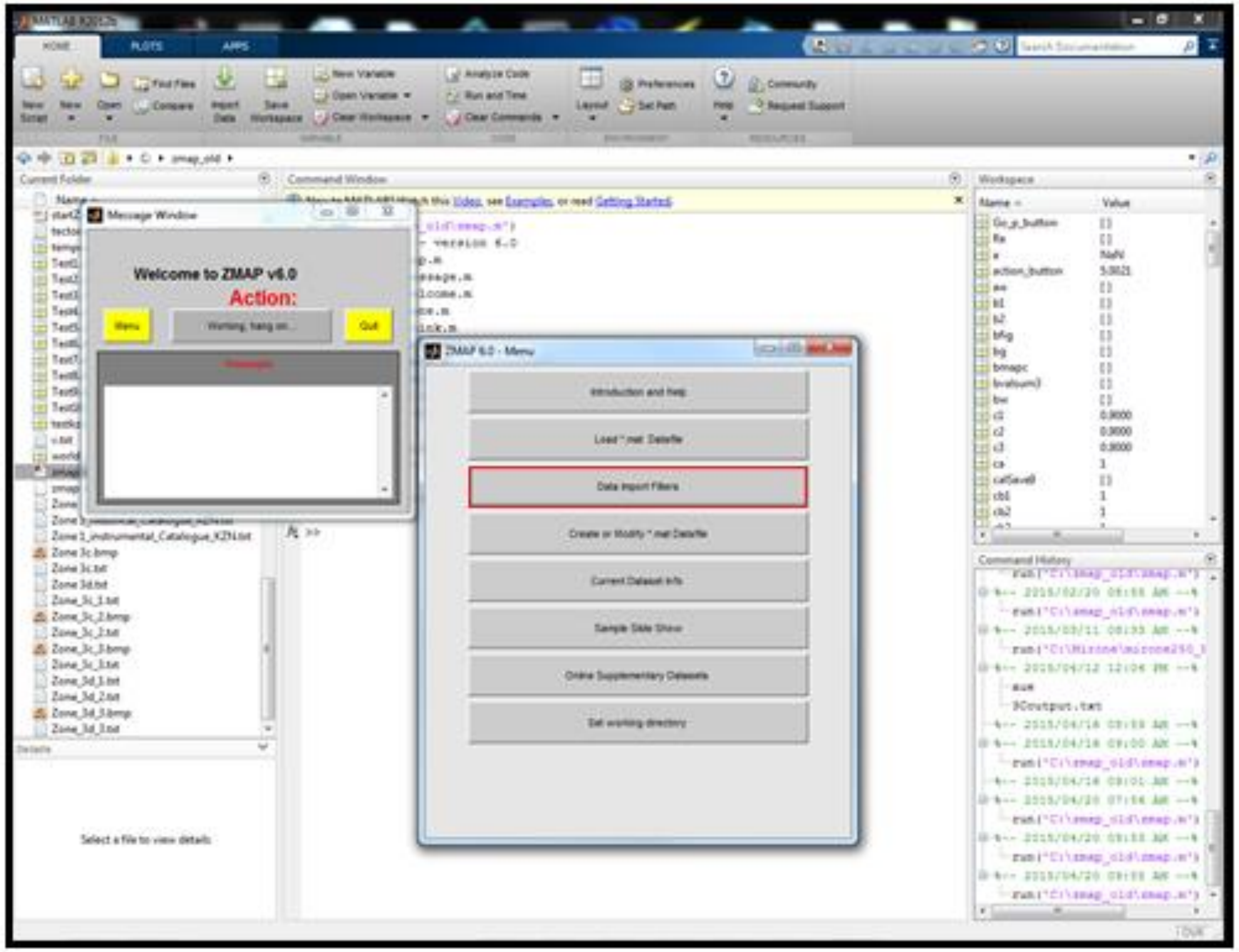
2011	10	29	13	58	39.2	-27.435	21.432	5.0	2.2
2011	10	30	23	29	15.3	-29.143	27.766	5.0	2.0
2011	11	3	5	29	48.0	-29.586	24.852	5.0	1.8
2011	11	4	7	32	37.9	-25.973	29.052	0.0	2.7
2011	11	4	14	10	40.2	-28.723	25.106	5.0	2.2
2011	11	5	13	44	24.6	-28.621	20.414	5.0	2.1
2011	11	6	2	36	5.6	-30.585	27.815	5.0	1.7
2011	11	6	10	24	53.7	-29.074	28.904	5.0	1.6
2011	11	6	15	53	12.9	-30.027	28.331	5.0	1.5
2011	11	6	21	52	26.3	-29.334	20.485	5.0	1.9
2011	11	7	21	12	31.1	-28.689	20.429	5.0	1.7
2011	11	7	21	26	50.7	-28.618	20.407	5.0	1.9
2011	11	8	4	44	50.7	-28.638	20.418	5.0	1.7
2011	11	8	16	13	14.3	-26.178	23.729	5.0	2.5
2011	11	9	3	56	51.4	-28.969	25.692	5.0	1.8
2011	11	9	8	46	48.4	-28.678	20.422	5.0	1.6
2011	11	9	11	53	32.1	-22.537	26.785	5.0	2.6
2011	11	9	12	27	23.0	-30.611	28.980	5.0	2.5
2011	11	9	18	31	33.0	-27.072	15.497	10.0	4.1
2011	11	10	15	39	57.3	-30.884	23.793	5.0	2.1
2011	11	12	1	43	45.3	-26.799	33.778	5.0	3.2
2011	11	12	8	3	58.8	-24.674	26.197	5.0	1.9
2011	11	12	21	39	38.8	-28.712	20.427	5.0	1.4
2011	11	12	23	8	13.6	-28.552	20.227	5.0	2.8
2011	11	13	1	33	4.5	-28.676	20.416	5.0	3.2
2011	11	13	16	29	23.0	-29.836	28.575	5.0	1.3
2011	11	14	12	38	25.5	-29.835	26.526	5.0	1.7
2011	11	14	17	32	23.2	-26.051	23.301	5.0	1.9
2011	11	14	18	46	45.5	-24.705	26.628	5.0	1.4
2011	11	16	11	34	59.6	-30.173	29.031	5.0	3.1
2011	11	16	16	5	15.0	-28.714	28.772	5.0	1.9
2011	11	17	2	15	12.8	-27.728	29.067	5.0	1.8

2011	11	17	6	0	11.4	-26.407	27.329	2.0	4.0
2011	11	17	11	39	38.6	-28.527	20.206	5.0	1.6
2011	11	17	20	3	28.7	-30.244	29.621	5.0	2.0
2011	11	17	22	4	16.1	-28.377	20.428	5.0	1.4
2011	11	20	0	15	6.9	-28.720	20.445	5.0	1.3
2011	11	21	23	11	30.7	-28.662	20.432	5.0	1.5
2011	11	21	23	17	19.8	-28.573	20.452	5.0	1.4
2011	11	21	23	35	19.1	-28.656	20.446	5.0	2.5
2011	11	22	0	52	28.5	-28.679	20.392	5.0	1.7
2011	11	22	13	23	40.2	-27.442	27.330	5.0	1.7
2011	11	23	14	17	7.3	-29.145	28.690	5.0	1.6
2011	11	23	20	55	12.9	-27.094	25.489	5.0	1.8
2011	11	29	1	42	49.7	-28.824	20.170	5.0	2.0
2011	11	29	5	41	42.5	-29.034	20.408	5.0	3.4
2011	12	1	9	11	15.1	-26.901	28.750	0.0	3.1
2011	12	2	13	5	31.9	-26.540	23.131	5.0	2.1
2011	12	2	15	20	41.8	-27.479	27.318	5.0	1.4
2011	12	2	16	54	53.7	-25.889	23.474	5.0	1.9
2011	12	2	17	5	20.7	-30.019	20.446	5.0	2.5
2011	12	3	16	2	21.8	-22.609	26.531	5.0	2.6
2011	12	4	13	32	42.9	-25.180	24.600	5.0	1.8
2011	12	4	23	2	41.2	-24.151	28.355	5.0	2.2
2011	12	6	18	31	46.3	-28.873	20.213	5.0	2.0
2011	12	7	18	52	3.8	-30.038	28.220	5.0	2.1
2011	12	7	21	24	13.7	-29.508	21.081	5.0	2.0
2011	12	8	19	28	46.2	-32.793	17.802	5.0	3.5
2011	12	9	2	50	44.1	-28.562	20.383	5.0	1.2
2011	12	9	11	30	41.1	-23.801	26.700	5.0	2.7
2011	12	9	11	59	13.9	-24.277	28.143	5.0	2.5
2011	12	11	13	18	26.8	-25.705	24.270	5.0	1.6
2011	12	13	13	43	47.5	-27.495	28.774	5.0	2.4
2011	12	15	3	25	4.6	-28.214	20.014	5.0	1.9

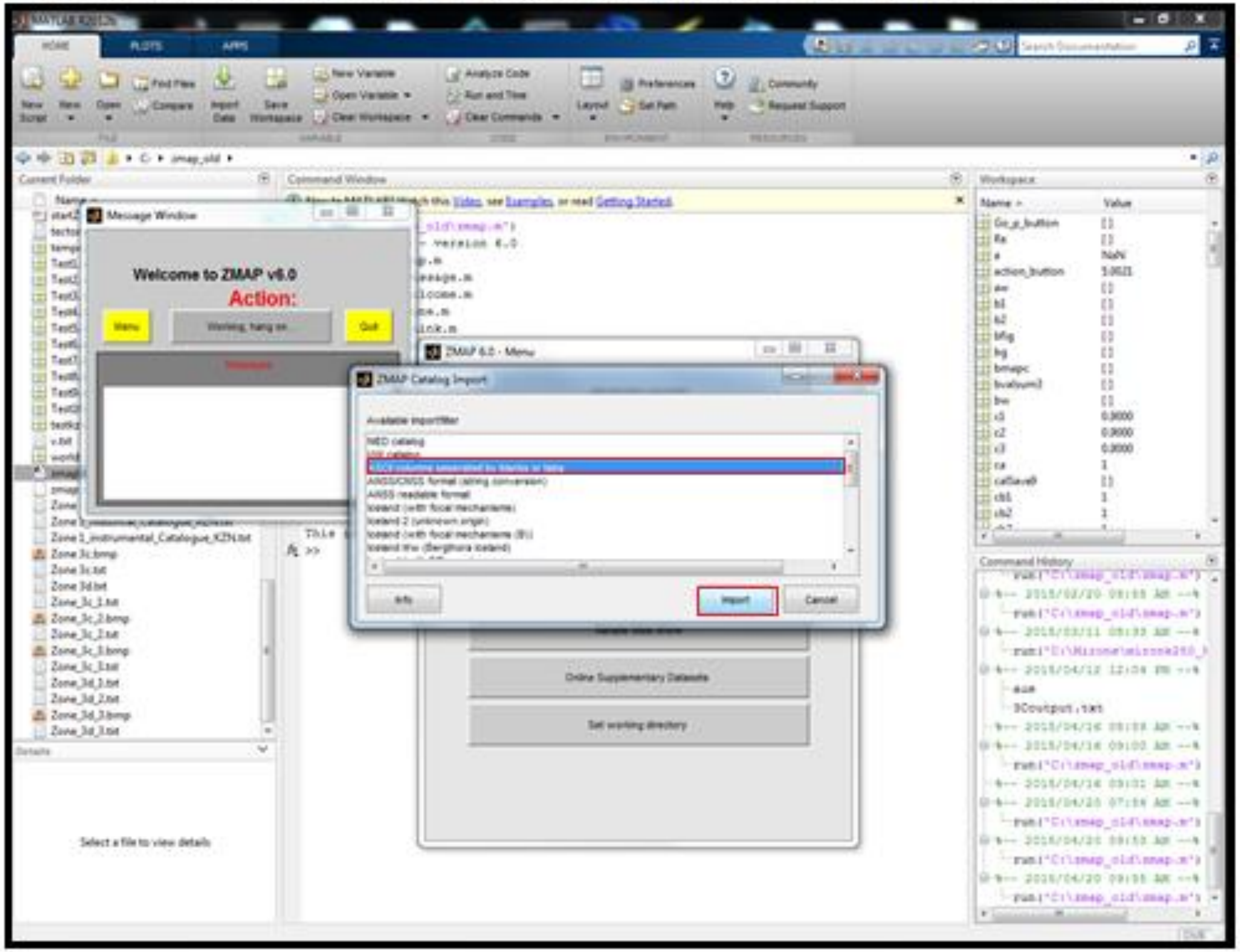
Appendix B

Figure B - 1: Summarised steps of calculating M_c using ZMAP

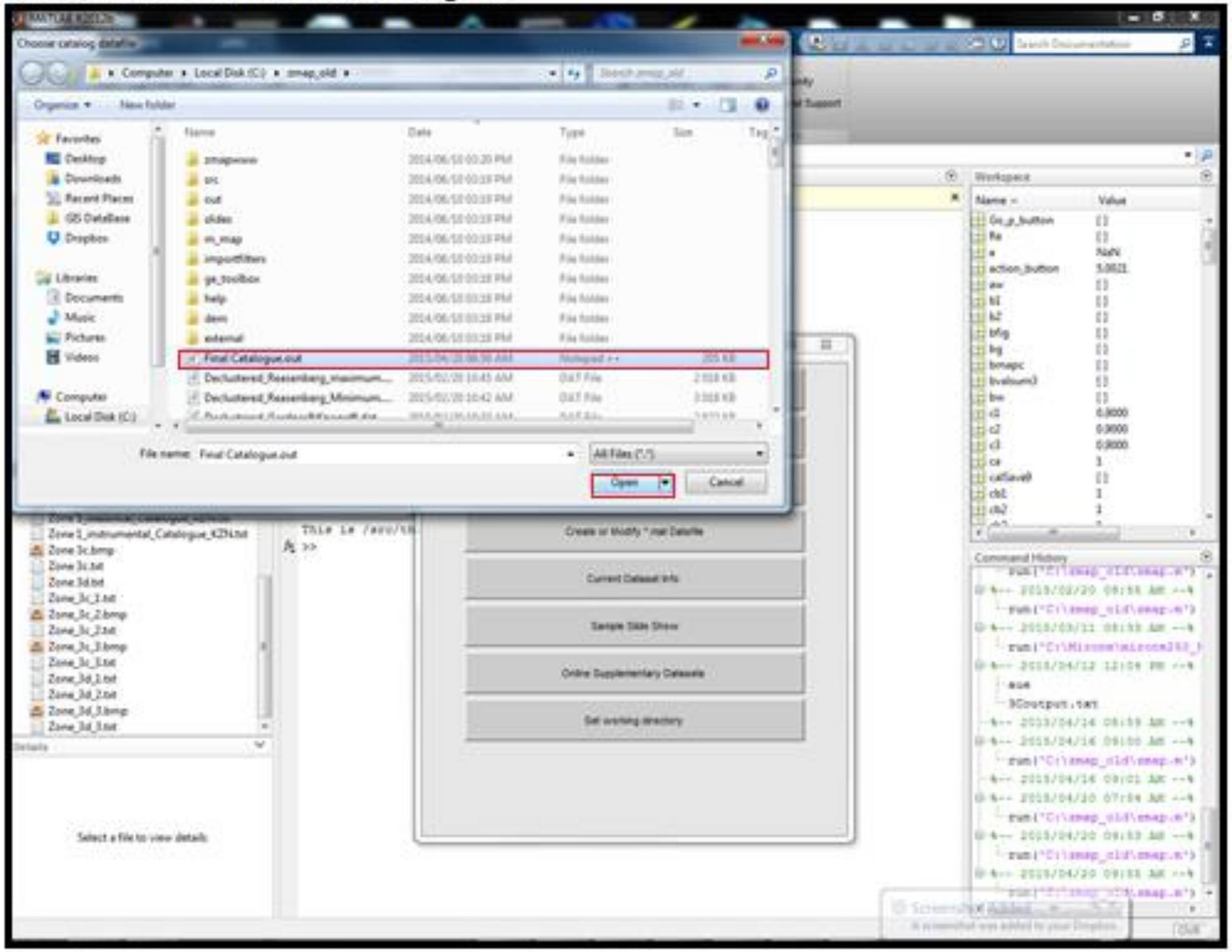
1. Import the catalogue



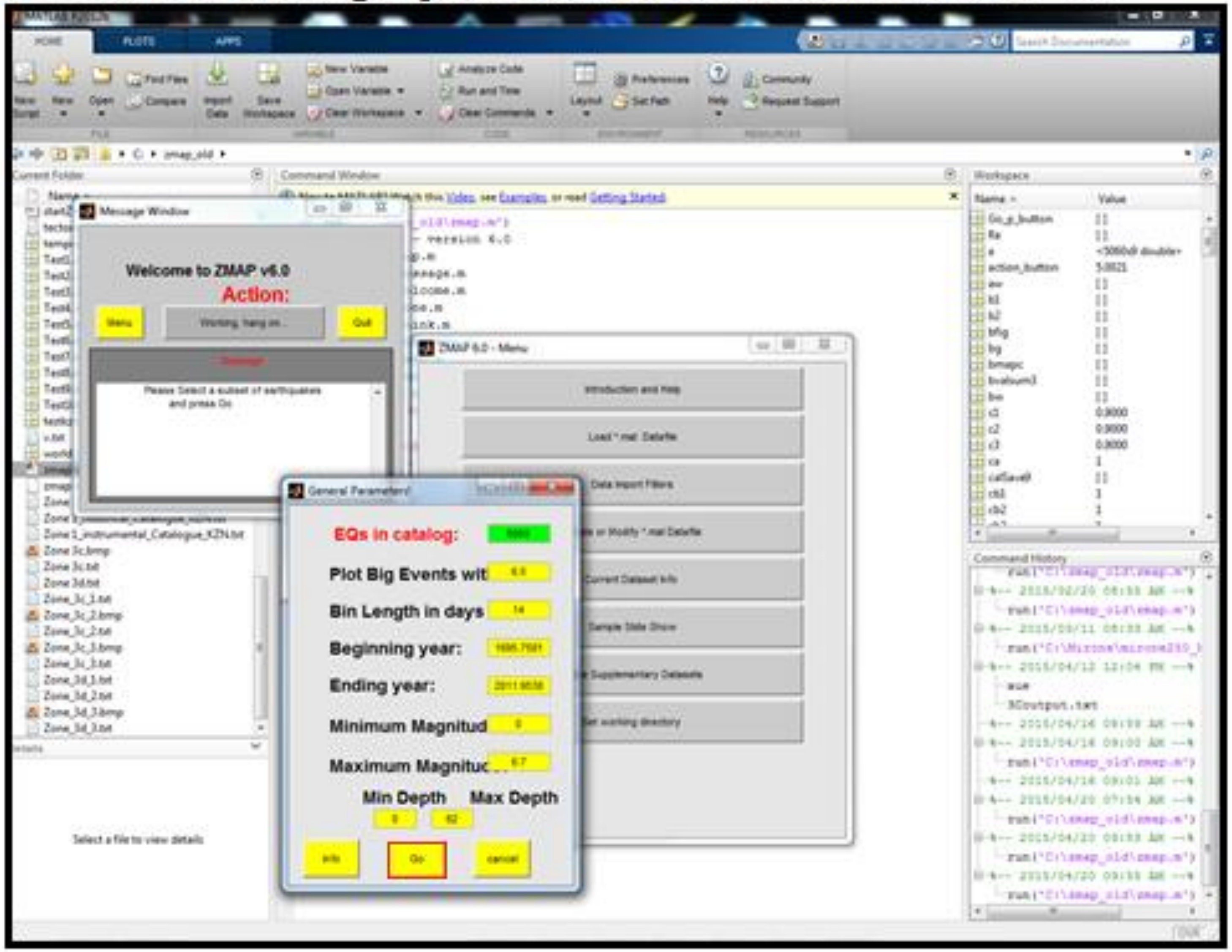
2. Select ASCII columns separated by blanks or tabs and then import



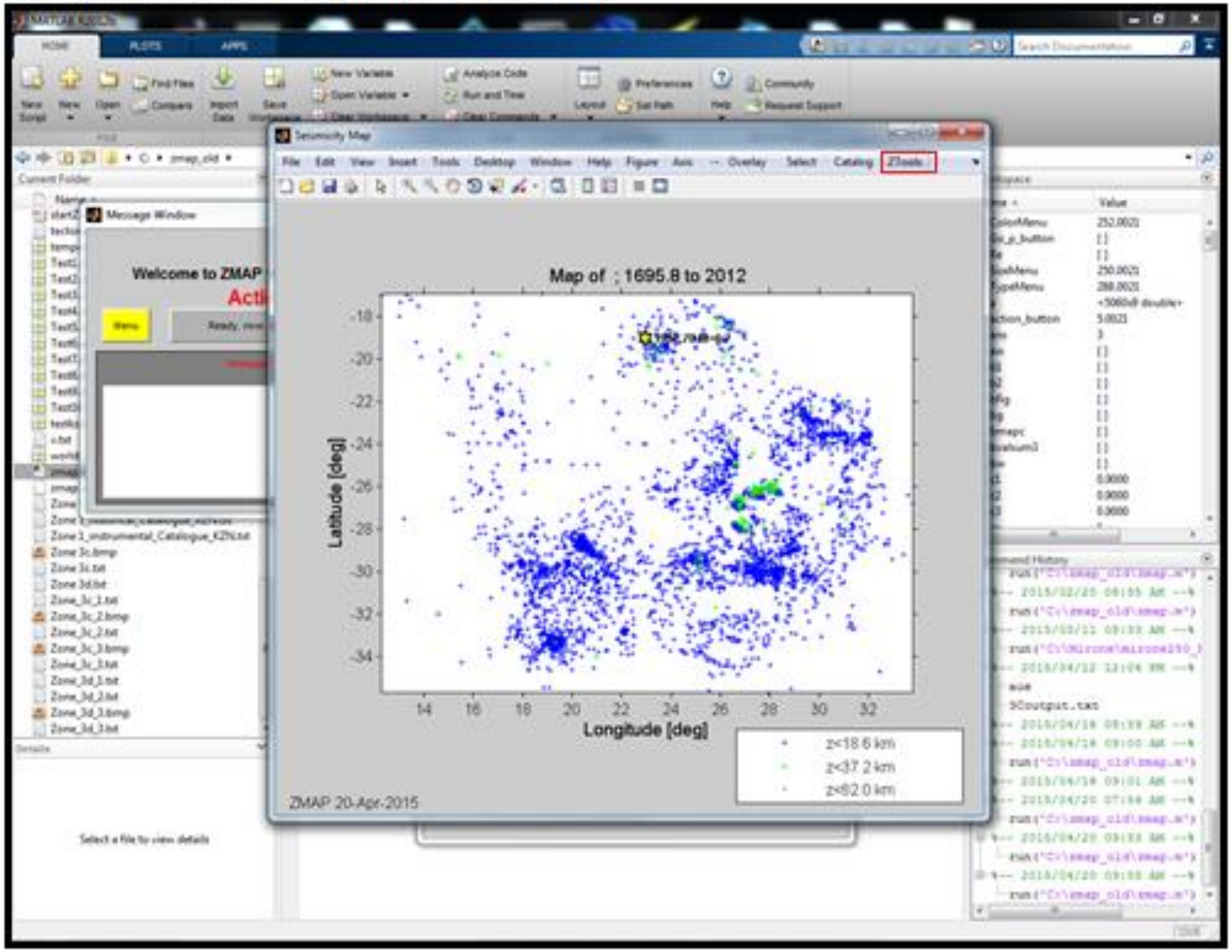
3. Select the data file and open



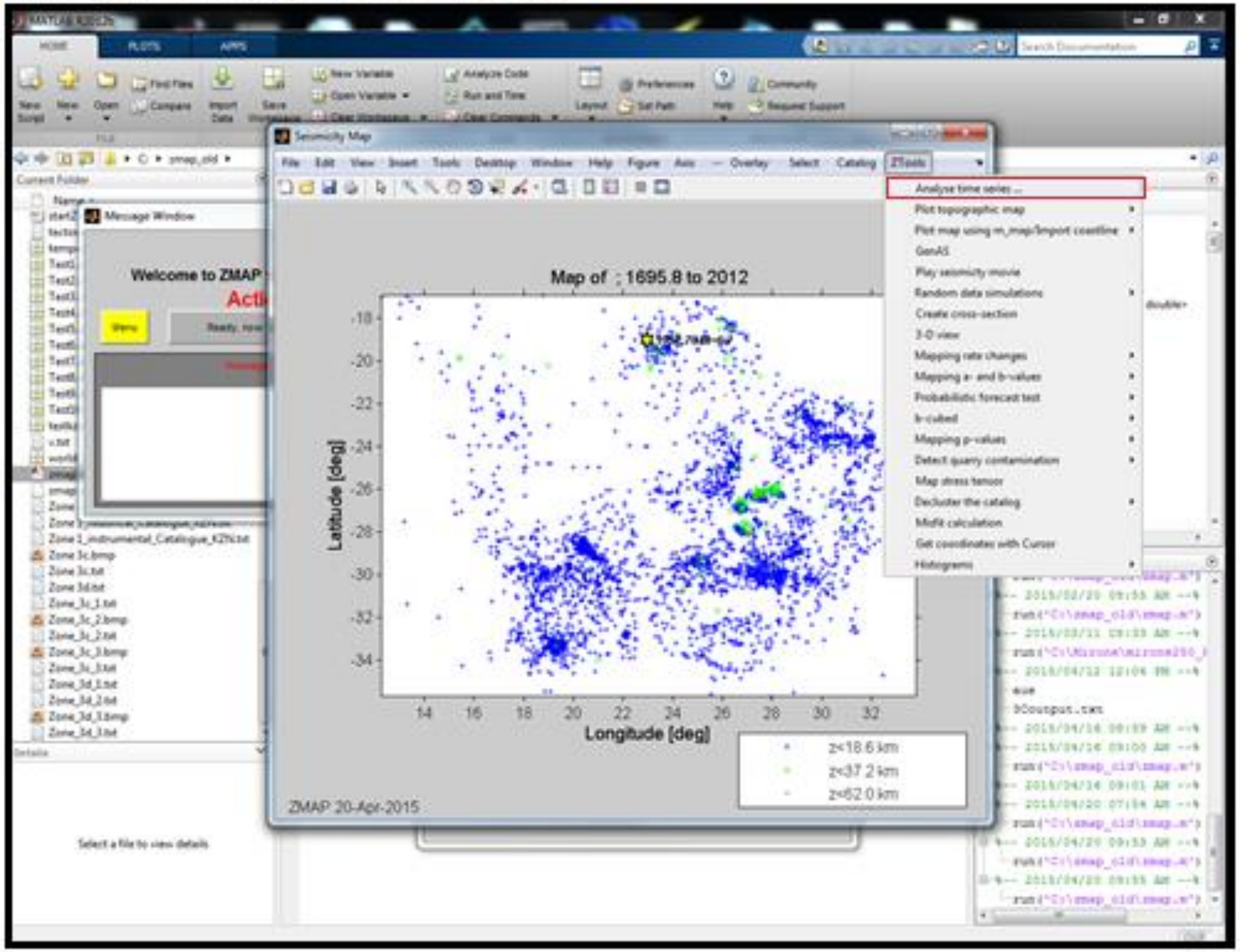
4. Check if the catalogue parameters are correct and then click 'Go'



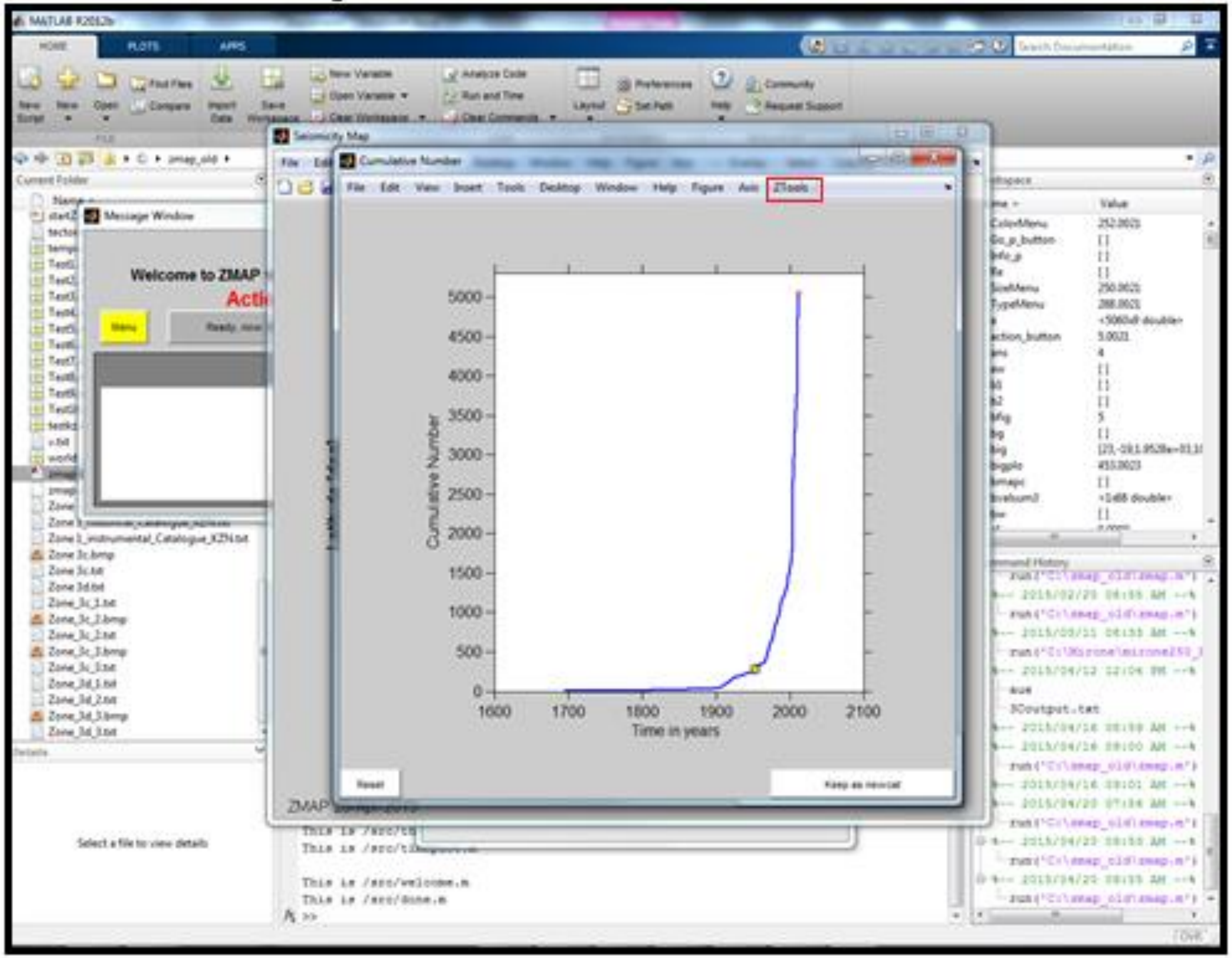
5. Hover the mouse pointer on ZTools



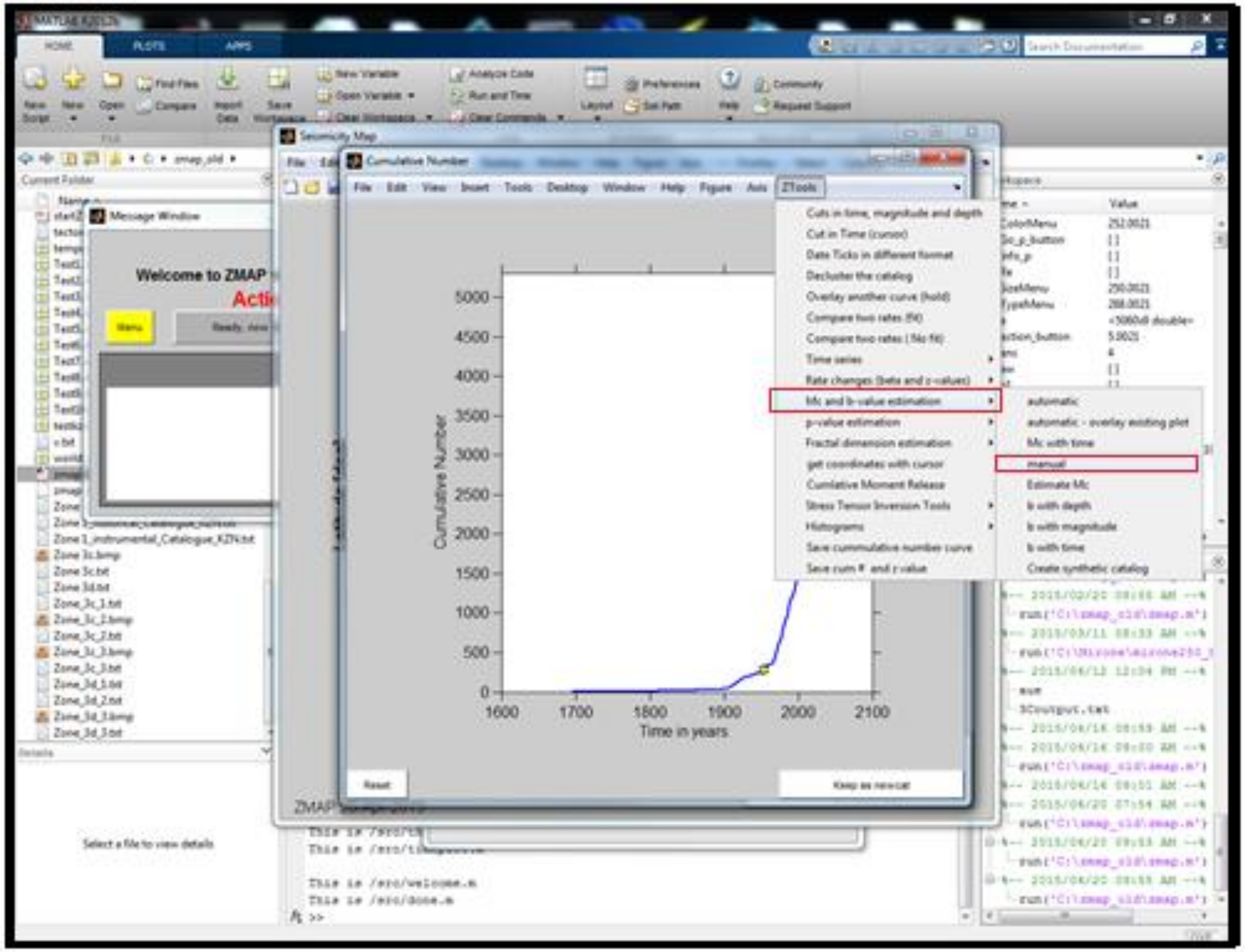
6. Click on 'Analyse time series ...'



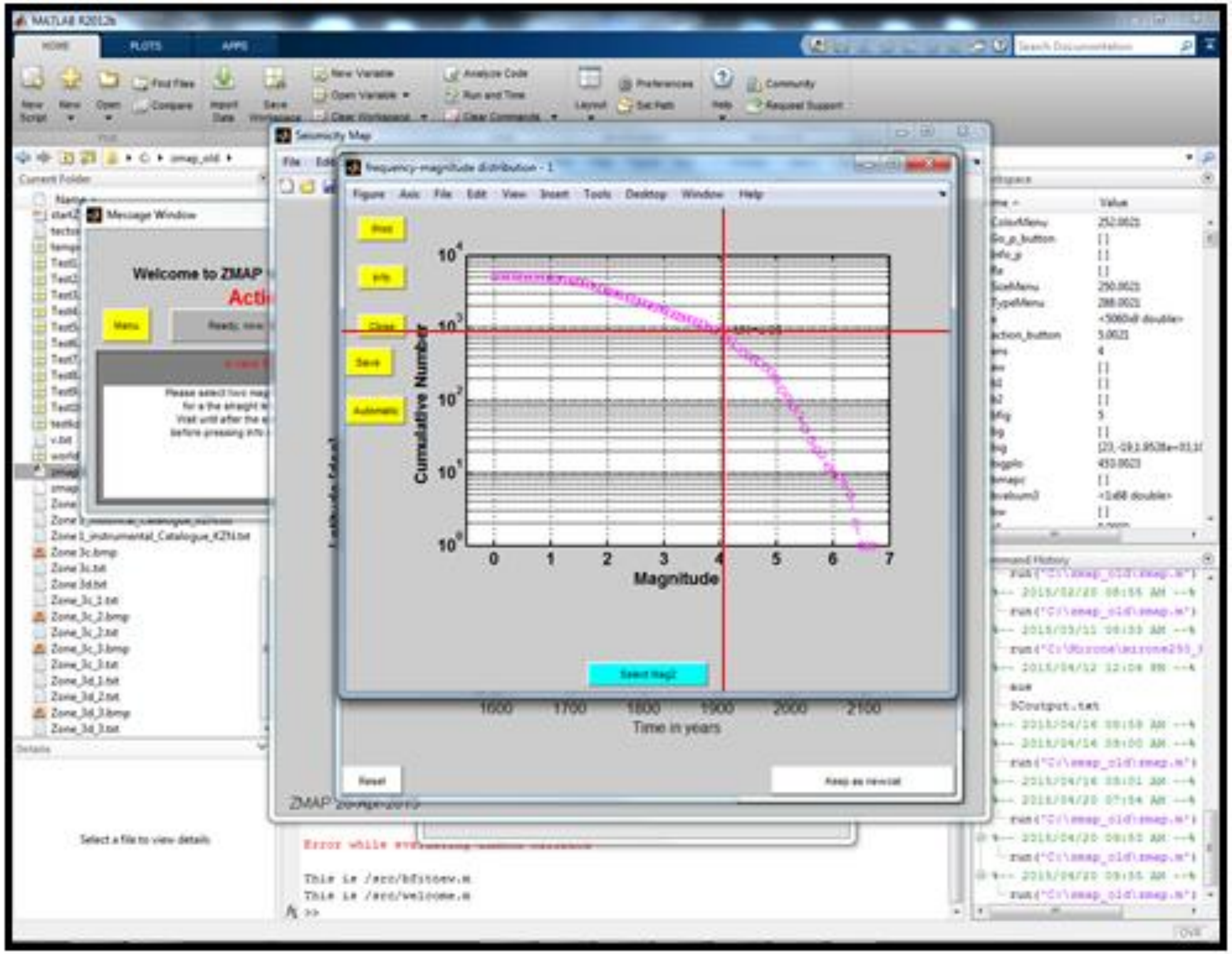
7. Hover the mouse pointer on ZTools



8. Hover the mouse pointer on Mc and b-value estimation and then click on manual



9. Select M1, the minimum magnitude where the there is the first maximum curvarture



10. Select M2, maximum magnitude where the curvature line ends

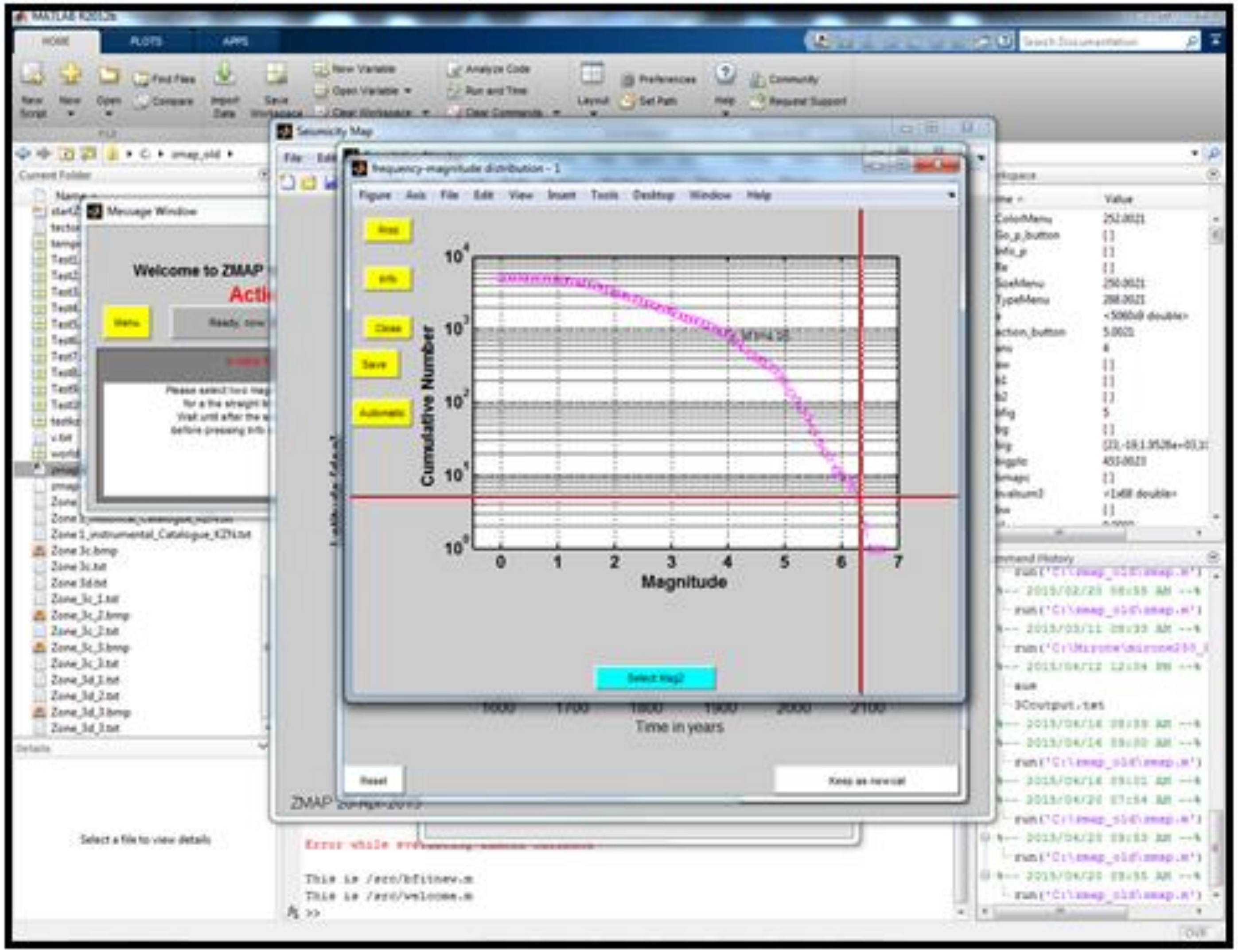
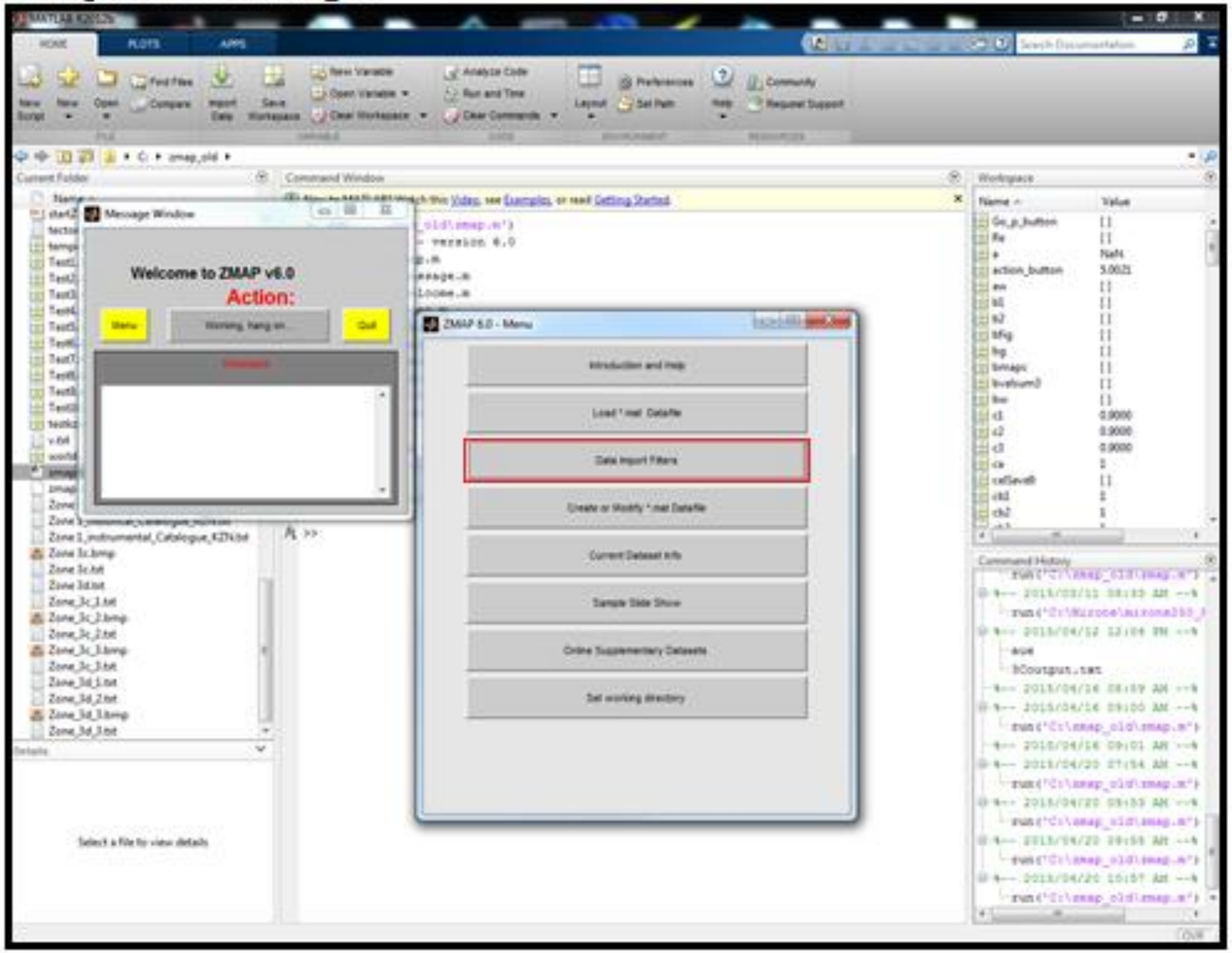
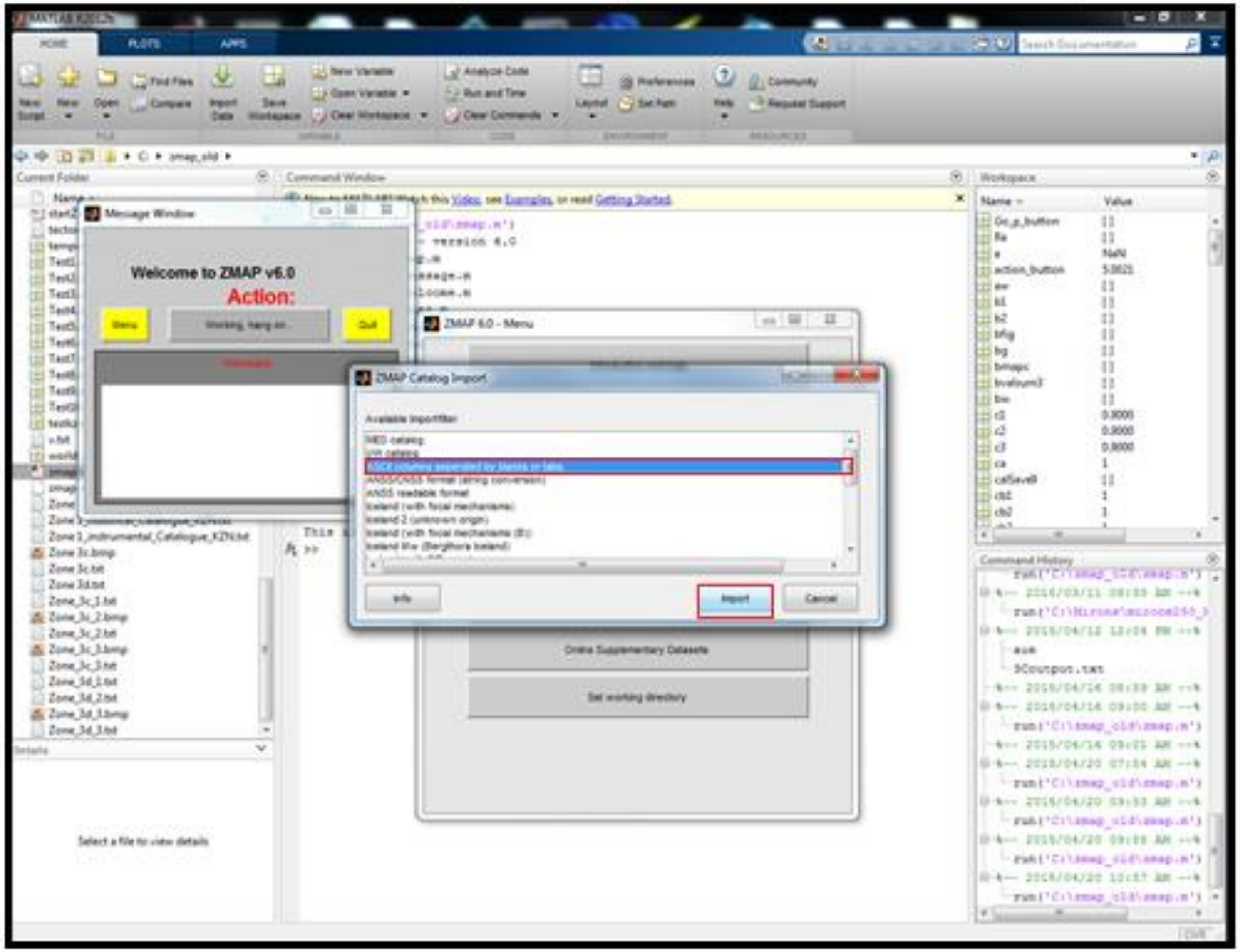


Figure B - 2: Summarised steps for drafting a map of spatial distribution of M_c calculated using maximum curvature.

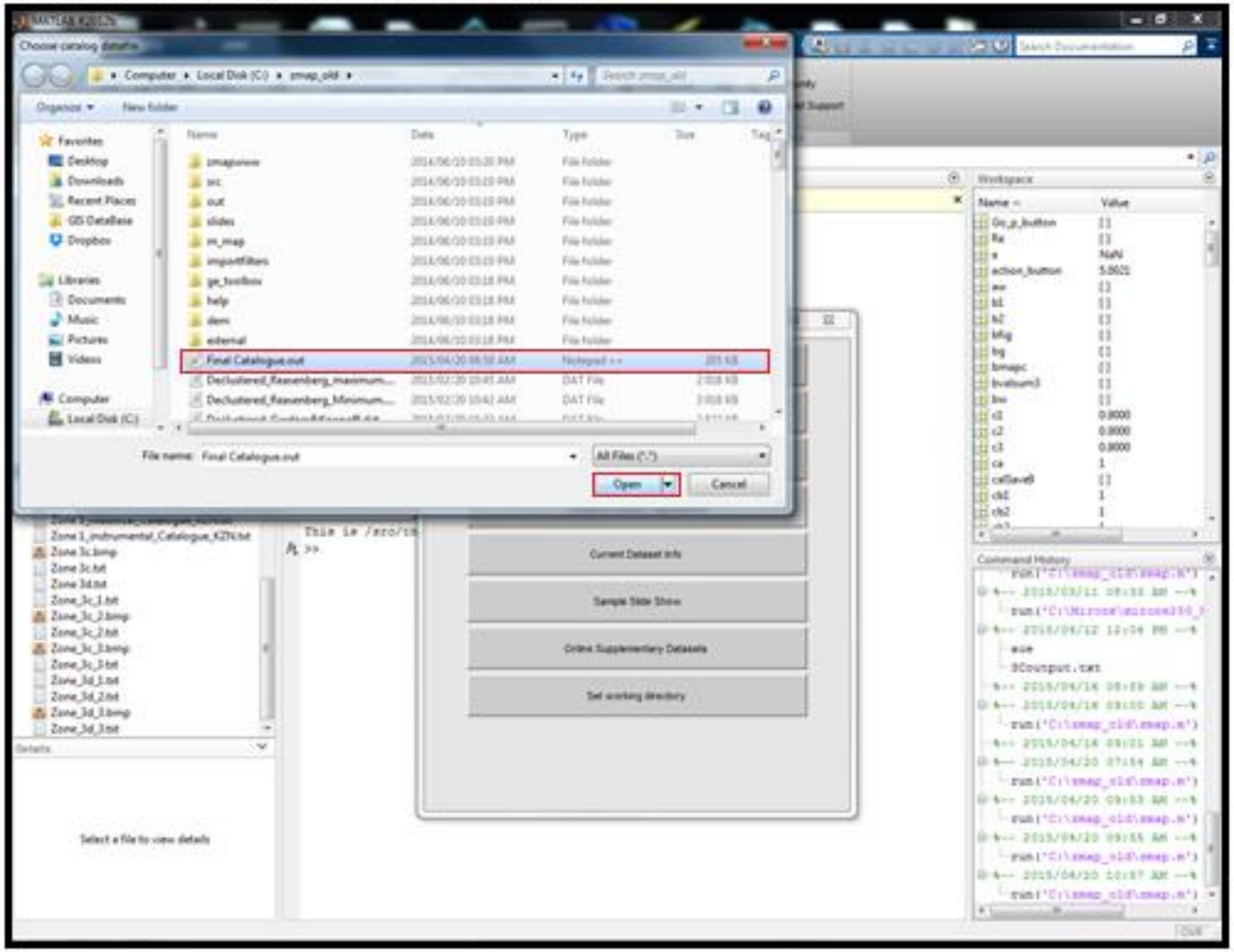
1. Import the catalogue



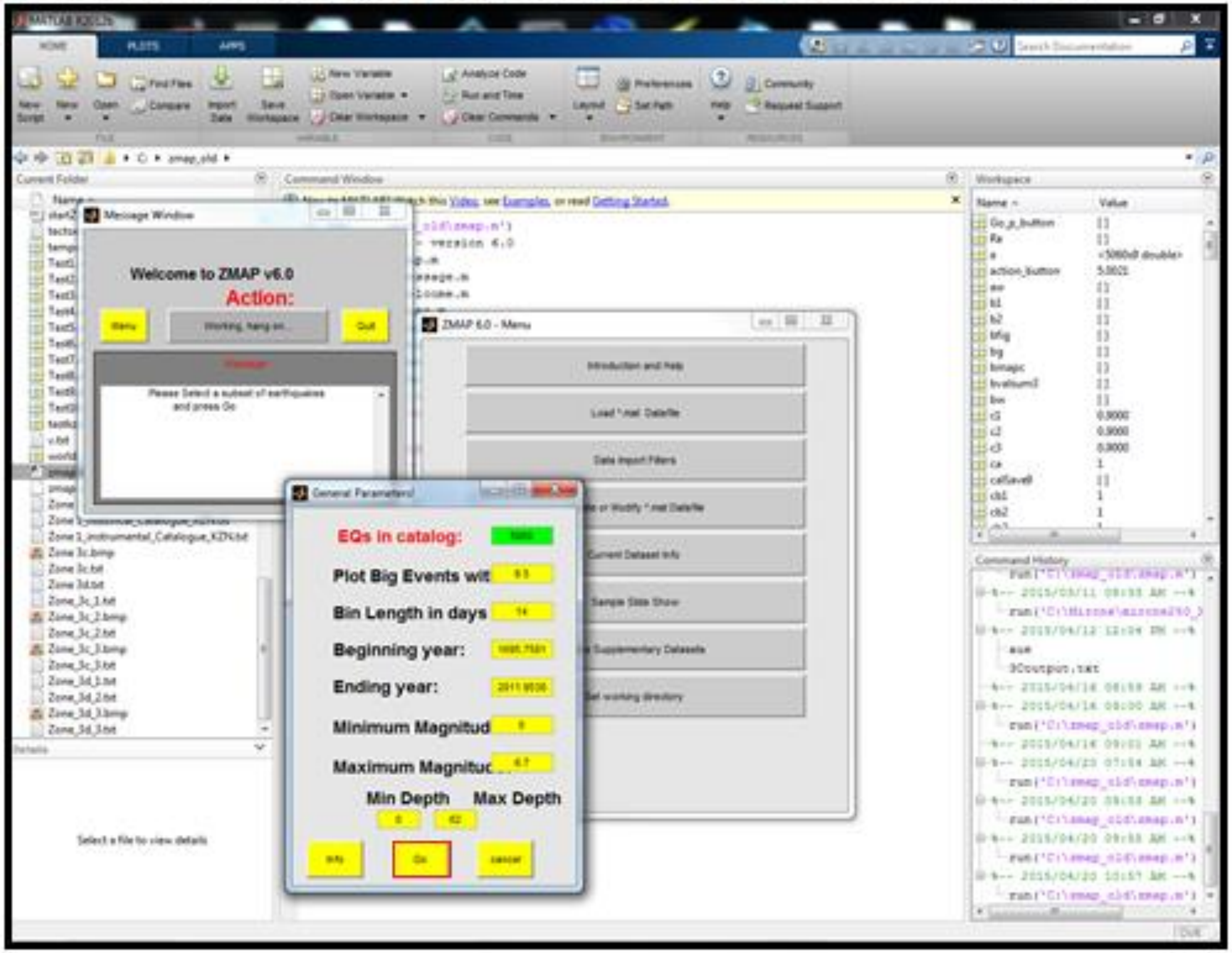
2. Select ASCII columns separated by blanks or tabs and then import



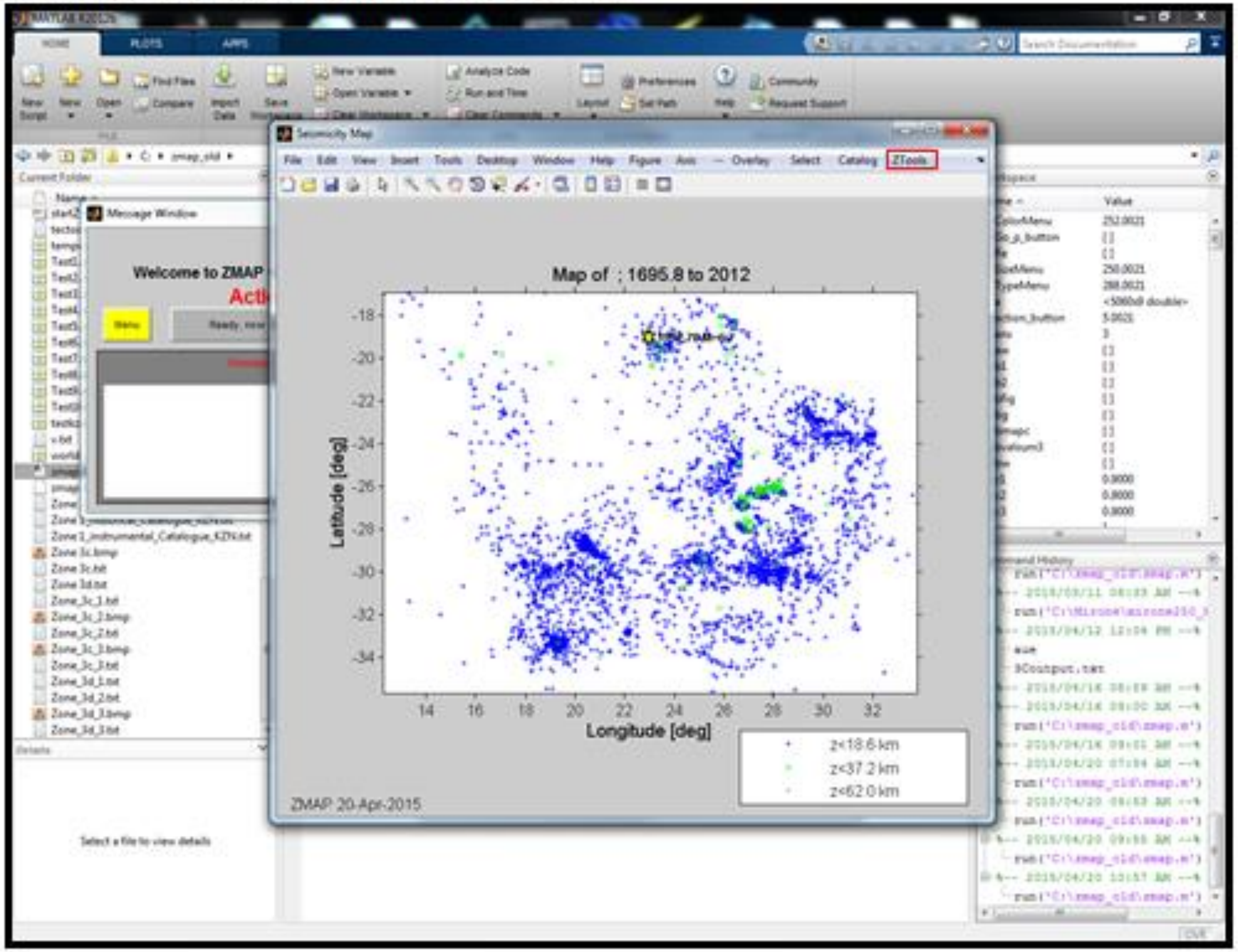
3. Select the data file and then open



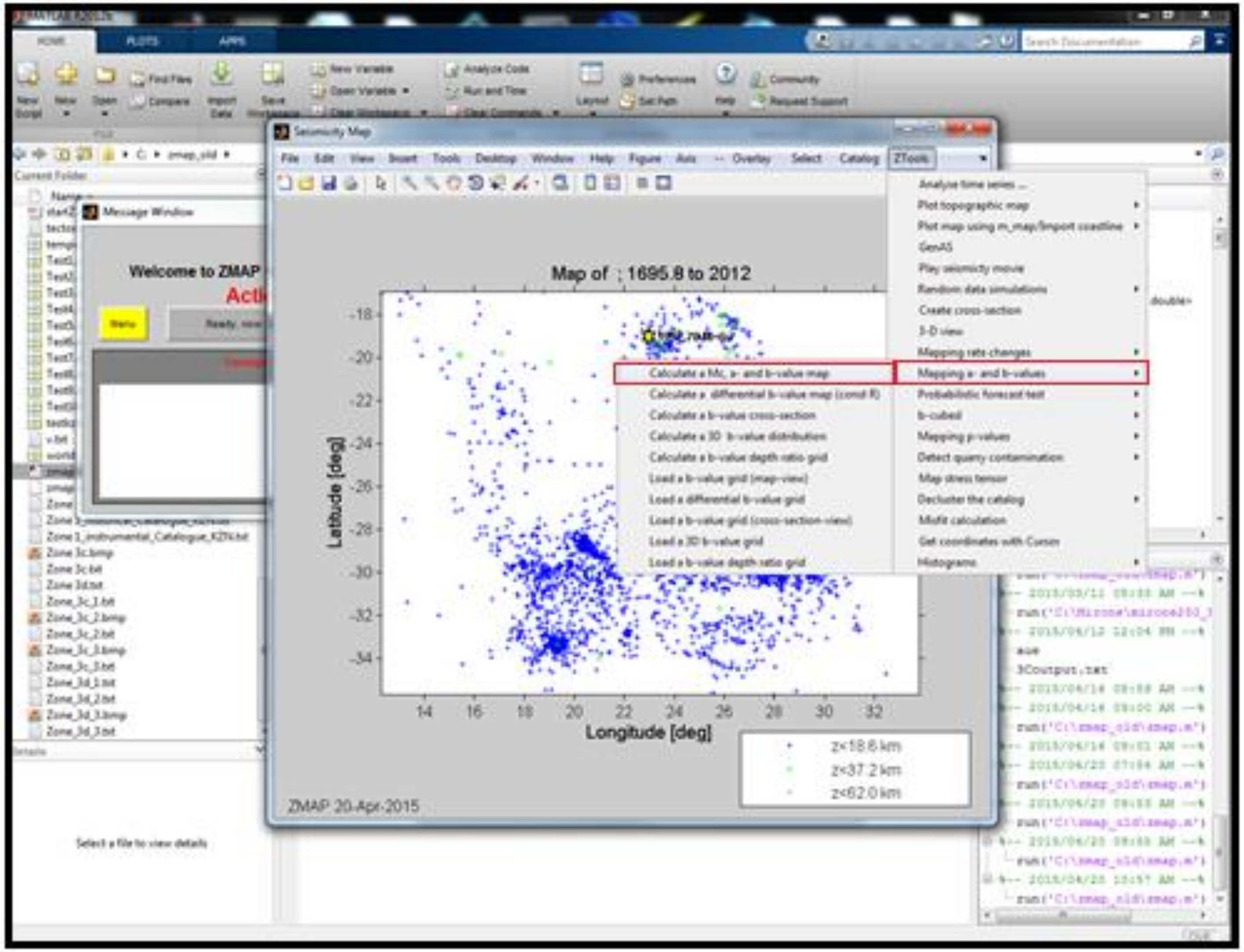
4. Check if the catalogue parameters are correct and then click 'Go'



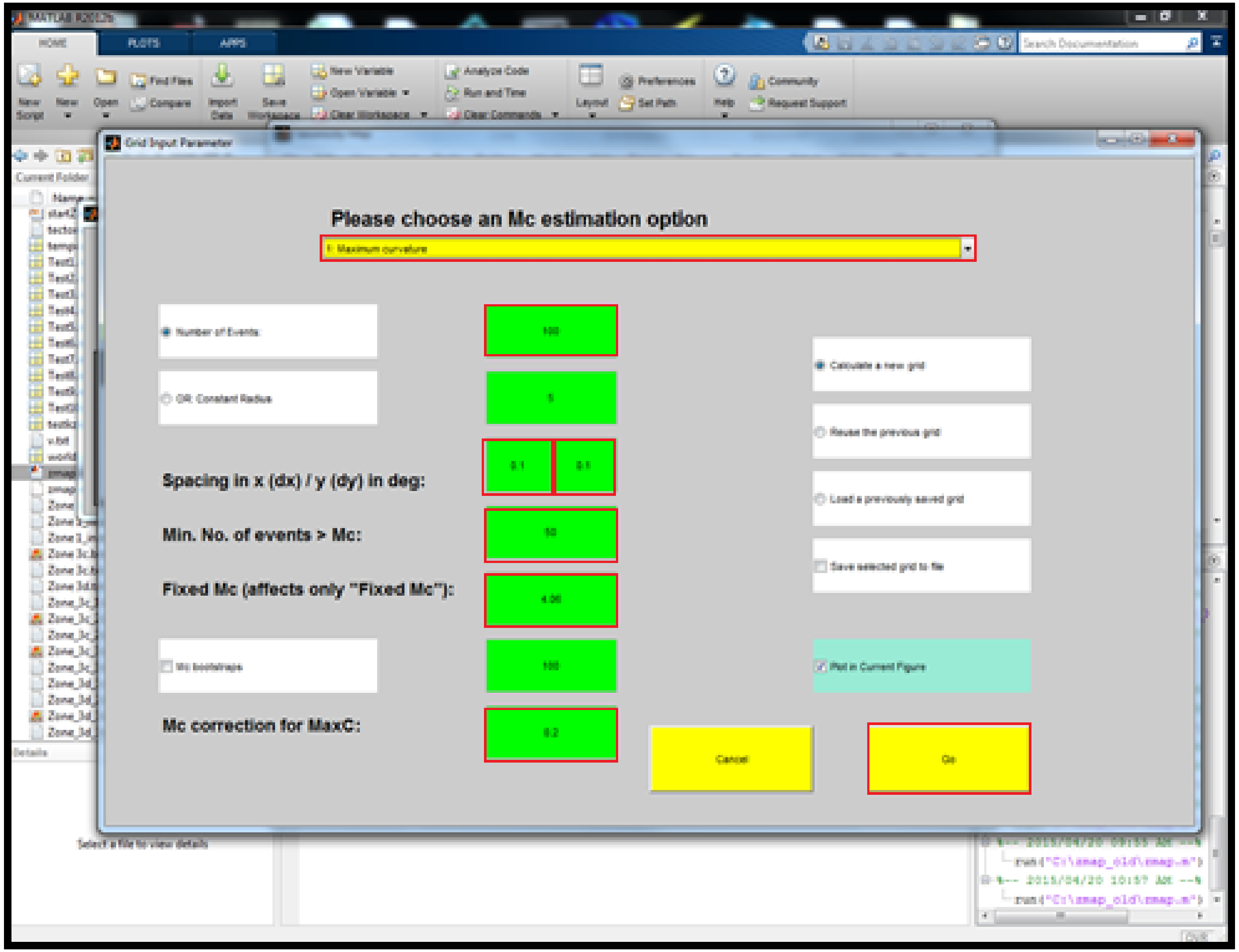
5. Hover the mouse pointer on ZTools



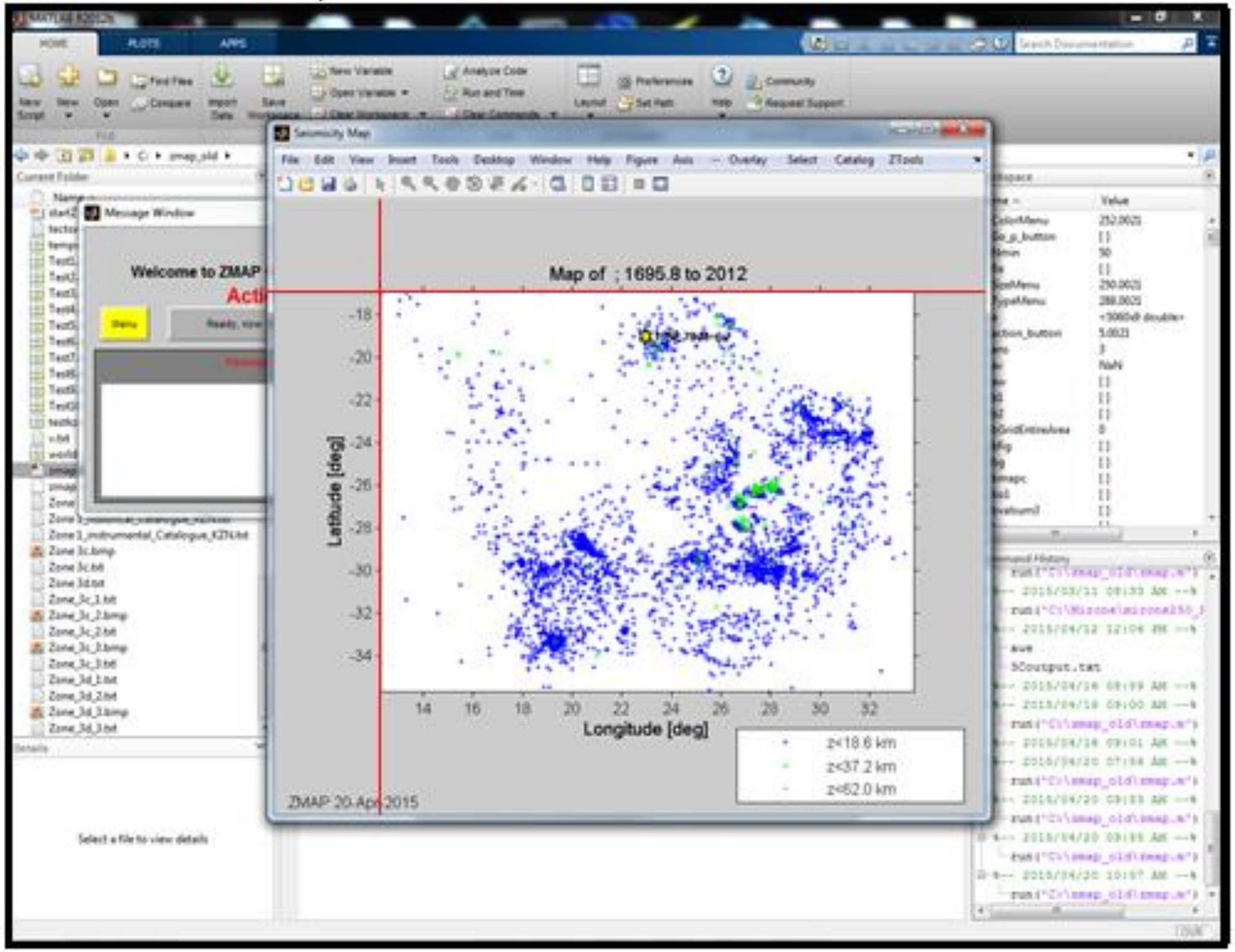
6. Hover the mouse pointer on Mapping a- and b-values and then click on Calculate a Mc, a- and b-value map



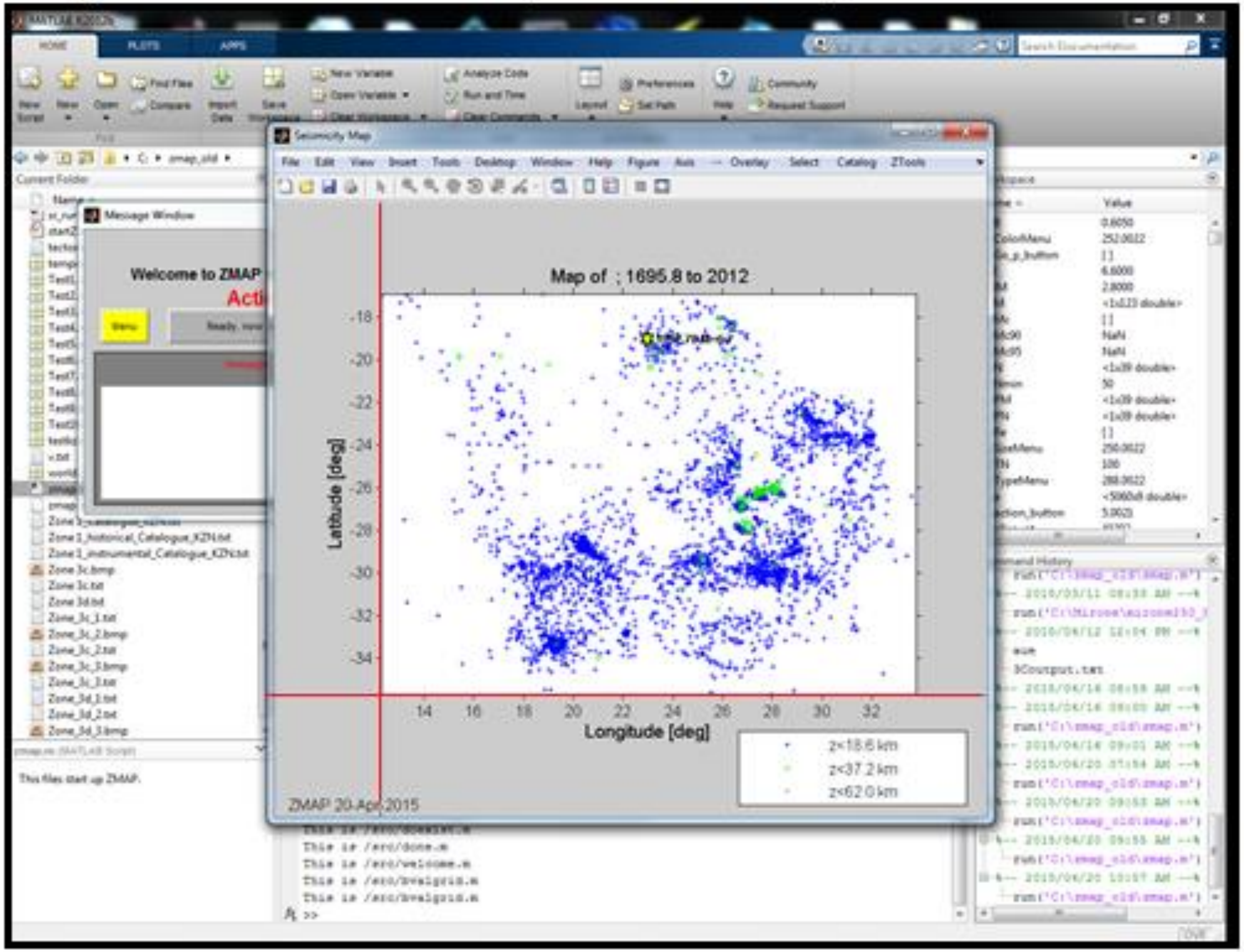
7. Select an Mc estimation option to be Maximum Curvature, insert the parameters as stated in Table 3 and then click 'Go'



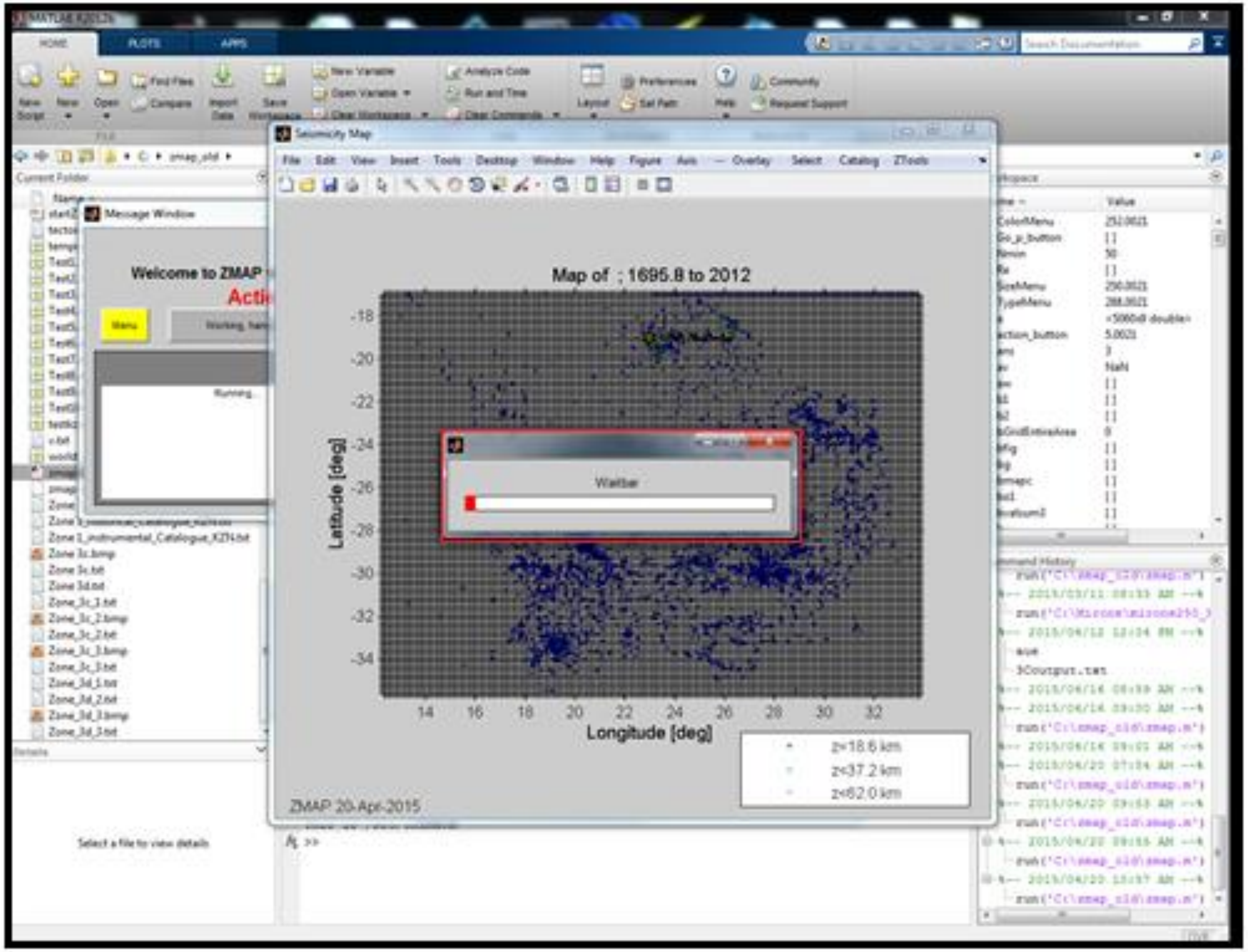
8. Starting from the top-left corner of the seismicity map, going in the clockwise direction, left click the first three corners



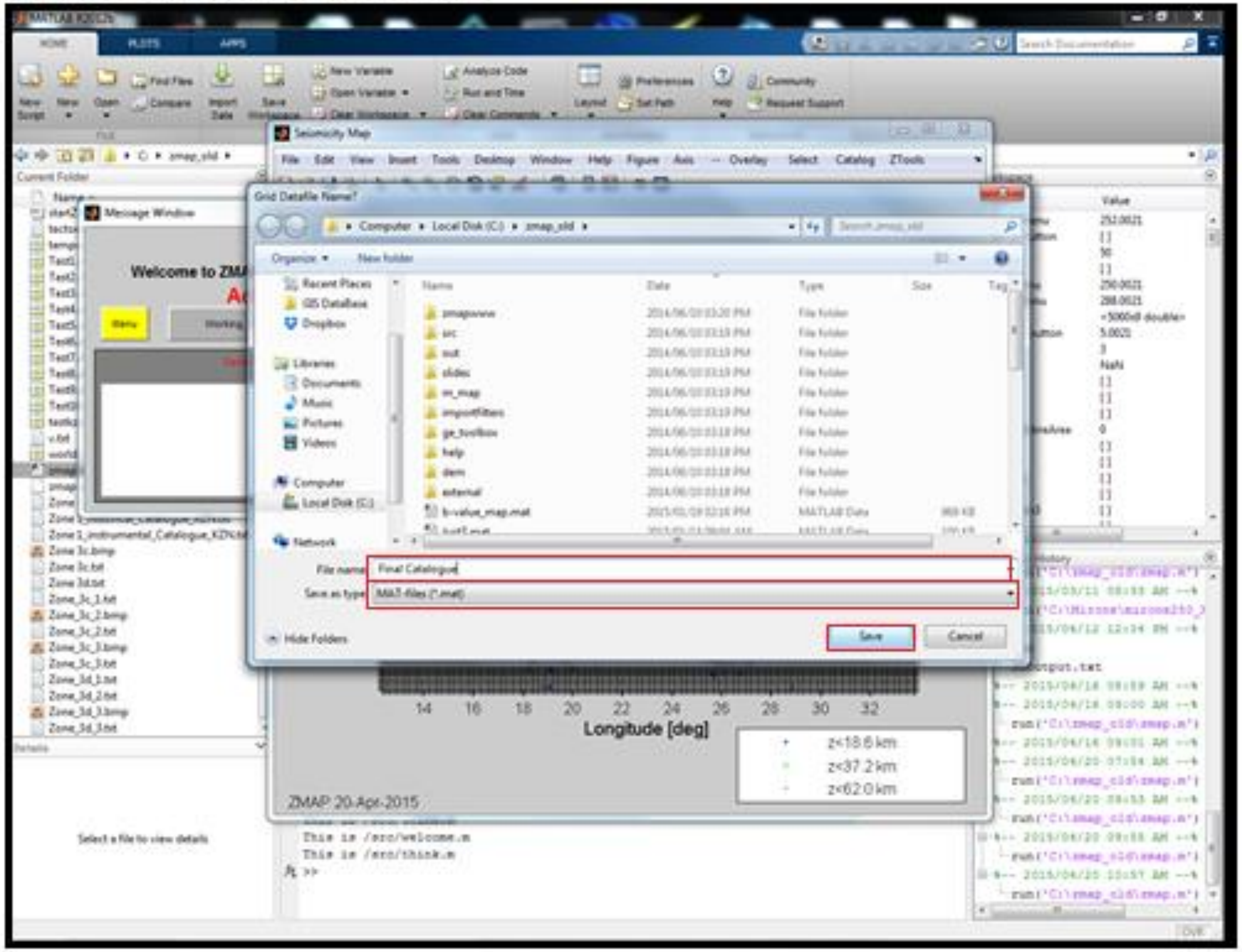
9. Right click on the last corner (bottom left corner)



10. Wait for the data to load



11. Save the data as a .mat file



12. Hover the mouse pointer on Maps and click on Magnitude of completeness map