SURFACE WAVE TOMOGRAPHY AND SHEAR WAVE VELOCITY STRUCTURE OF THE SOUTHWESTERN BLOCK OF THE CONGO CRATON

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DECLARATION

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

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Abstract

Rayleigh wave dispersion curves are used to invert for the group velocity maps of the southwestern block of the Congo craton. The group velocity maps were then inverted to obtain the three dimensional shear-wave velocity of the lithosphere beneath the region. In the process, the adjacent Kalahari craton and Damara mobile belt were also mapped to help constrain the southernmost edge of the Congo craton. To obtain the surface wave group velocity tomography, event-station dispersion curves of Rayleigh waves were measured using the multiple filter analysis method. Then the dispersion curves were inverted using the conjugate gradient least-square (CGLSQR) inversion method. To check the reliability of the result, a checkerboard test was performed.

The 2-dimensional group velocities and 3-dimensonal shear-wave velocities were found to be faster beneath the southwestern block of the Congo craton and the Kalahari craton and slower in the Damara mobile belt. The group velocity map at 20s period shows that basins are 0 to 3% slower than PREM model. For longer period (50s to 120s), the Central and East African Rift system are ~ 5 % faster, cratons are 5 to 8% faster, and the adjacent mobile belts are 0 to 4% faster than the PREM model. The Afar depression is the slowest, up to 6% slower than the continental PREM model at all periods. The shear-wave velocity maps reveal that (1) the Afar area is the slowest (up to 8% slower than the IASP91 model), (2) the cratons are faster (up to 6% faster than IASP91) than the surrounding mobile belts (up to 2% faster than IASP91). The East African Rifts system is also slow (up to 5%).

The Damara mobile belt constitutes a clear separation terrain between the Congo craton and the Kalahari craton. This result is consistent with previous studies by Pasyanos and Nyblade (2007), and Priestly et al. (2006, 2008), who also found faster shear-wave velocities beneath the Kalahari, Congo and Tanzania cratons.

The relatively slow seismic velocities (-1 to 2% compared to IASP91) in the Proterozoic Damara mobile belt between the southwestern block of the Congo craton and the Kalahari

craton are explained by the view that the Proterozoic lithosphere has hotter rock materials than the SW block of the Congo craton and the Kalahari craton. Our model of faster lithosphere beneath the SW block of the Congo and the Kalahari craton is also consistent with the model of strongly depleted (in basaltic components) lithosphere beneath these craton; compared to less depleted lithosphere beneath the DMB.

DEDICACE

This thesis is dedicated to my wife, Michelle Bilonda Mangongolo, my two daughters, Charis Mangongolo and Chanan Mangongolo, and my son Davel Mangongolo. They always encouraged me and gave me the moral support and love I needed to finish my studies.

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Chapter 1 INTRODUCTION

1.1. Research Objectives and Hypothesis

In this study, Rayleigh wave group velocity measurements are used to tomographically image the shear wave velocity structure of the southwestern (SW) block of the Congo craton, known as the Kasai-Angola block, and surrounding areas. The purpose of this study is to use seismic methods to determine the location of the southern boundary of the Congo craton.

The Congo craton, composed of the Gabon-Cameroon, Bomu-Kibalian and Kasai-Angola blocks, is a Precambrian craton that formed between about 3.6 and 2.0 Ga (Begg et al., 2009; De Waele at al., 2008).

The Congo craton underlies central southern Africa (Congo Republic, Democratic Republic of Congo, Gabon, Central Africa Republic, Angola, northern Namibia, southern Cameroon, northwestern Botswana and western Zambia) (Fig. 1.1). The southern part of the Congo craton is covered by the Quaternary Kalahari sands and therefore its boundaries are not well known (Fig. 1.1).

Tectonic maps of southern Africa (Kampunzu and Popoff, 1991) show the Damara belt (DMB) and the Lufilian-Zambezi belt separating the Congo craton from the Kalahari craton, but the exact location of the boundaries of the two cratons is unknown (Fig. 1.1).

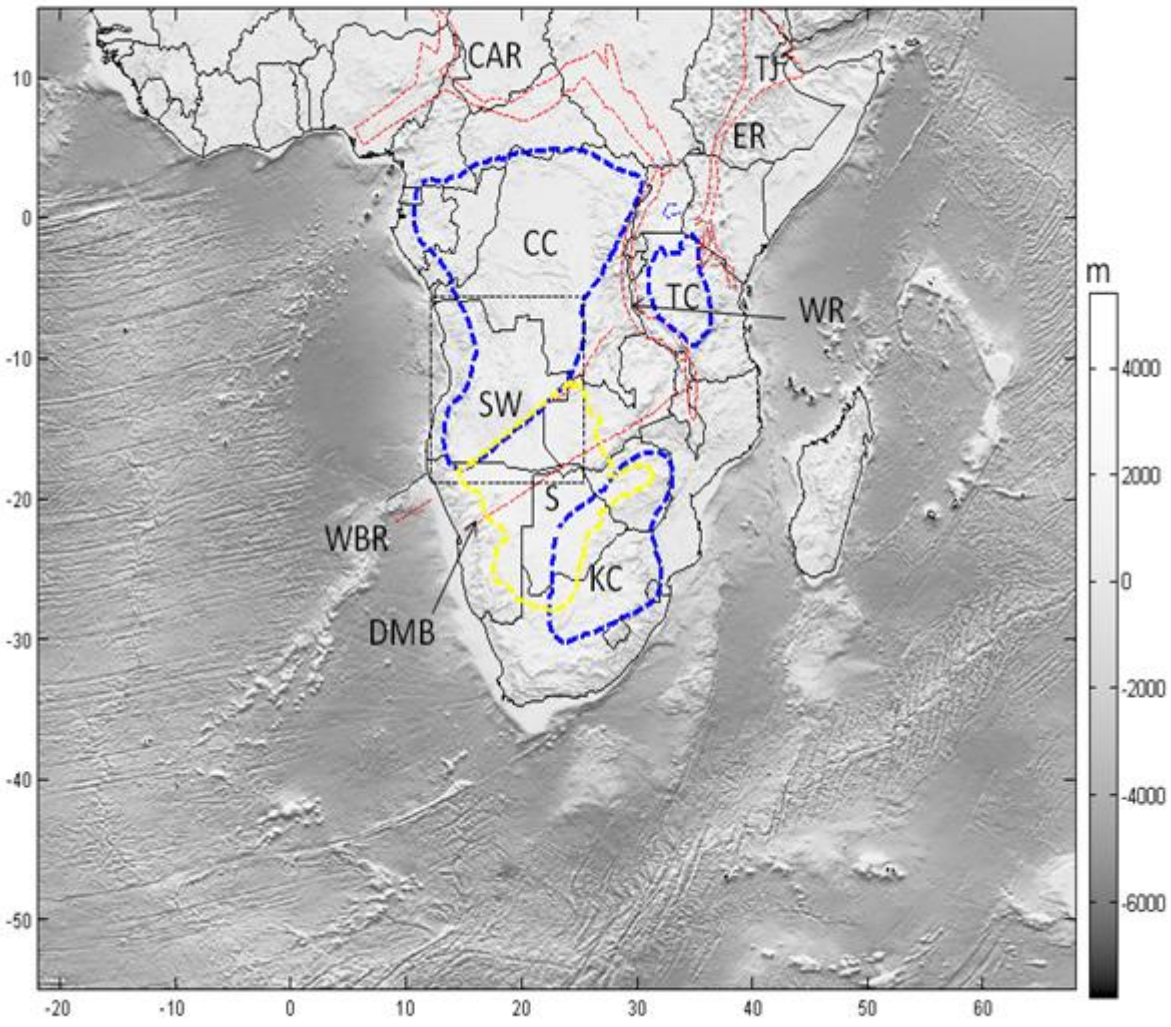

Figure 1.1: Simplified geological map superimposed on a topographic map of the southern Africa subcontinent. TJ refers to Afar triple junction, ER to Eastern branch of the East African Rift System (EARS), WR to the western branch of EARS, CAR to central Africa rift system, TC to the Tanzania craton, CC to the Congo craton, SW is the southwestern block of the Congo craton, WBR to the Walvis Bay ridge, DMB to Damara mobile belt and KC to the Kalahari craton. The Quaternary Kalahari sand covers (S) an area between the Congo and the Kalahari craton (Yellow polygon). The square in black surrounds the Southwestern block of the Congo craton. Craton outcrops are taken from after Kampunzu and Popoff (1991).

The question to be addressed here is the position of the southeastern boundary of the Congo craton and the northwestern boundary of the Kalahari craton. This study maps the boundaries using group velocity and shear-wave velocity tomography. Integration of the seismic tomography with petrological and geochemical information from mantle xenoliths and other geophysical data, help explicate the geodynamics at the cratonic boundary, and the interaction between two cratons.

This study is also motivated by the interest of diamond exploration companies to use geophysical mapping of the lithosphere beneath the southwestern block of the Congo craton to constrain the diamondiferous kimberlitic areas. In fact, Jones et al. (2009) used the magnetotellurics data in southern Africa and showed that electrically resistive regions are correlated with the Kaapvaal, Zimbabwe and the Angola craton (southwestern block of the Congo craton), and more conductive regions associated with the surrounding mobile belts and the Rehoboth terrain. They have also shown that the spatial distribution of diamondiferous kimberlites is associated with areas of change in resistivity or resistivity anisotropy. These areas were located at the edges of these cratons. They concluded that the cratonic edges are prospective areas for diamondiferous kimberlite exploration.

The shear wave velocity structure of the cratonic lithosphere is generally faster than the mobile belt lithosphere, particularly at depths ~80 to 100 km or deeper (Priestly et al; 2006, 2008). Thus craton boundaries can be revealed by a change in velocities at these depths or even deeper.

In this depth range, velocities beneath Proterozoic lithosphere decrease compared to the Archean lithosphere, because the Proterozoic lithosphere tends to be thinner than Archean lithosphere.

To map the craton boundaries, I used surface wave tomography to image the structure of the lithosphere beneath the SW block of the Congo craton and most of the Kalahari craton.

The procedure followed has two steps:

1. First, I made group velocity measurements for the fundamental mode of Rayleigh wave and used them in a 2D inversion to create maps showing group velocity variations at selected periods. Fundamental mode Rayleigh waves are used because these waves are sensitive to shear wave velocity at crustal and upper mantle depths. To obtain sufficient data coverage, I used stations and events in a broad region which includes the southern Africa, East Africa, parts of West Africa and the ocean basins surrounding Southern Africa.
2. Dispersion curves were obtained from the group velocity maps between 10s and 125s at regular spatial intervals across Southern Africa and then inverted for 1D shear wave velocity models. The 1D models were then combined to create a quasi 3D velocity structure model for the study area, and from this quasi 3D model, the craton boundaries were located.

Chapter 1 concludes with a brief summary of previous relevant studies on the shear-wave velocity structure southern Africa. I also briefly introduce the main geological settings of southern Africa.

Chapter 2 provides an explanation of the data acquisition techniques and the group velocity measurements. Chapter 3 focuses on the inversion methods and presents the results for the surface wave tomography (2D group velocities) and shear wave tomography (3D shear wave velocities). The interpretation of the two dimensional group velocity variations and the three dimensional shear wave velocities in terms of the craton boundaries is presented in chapter 4.

1.2. Geological Settings

Major tectonic features of Africa in general, and southern Africa and East Africa in particular, are discussed in detail by Goodwin (1996), De Wit et al. (1992), De Carvalho et al. (2000); Begg et al. (2009); De Waele et al. (2008) and Pankhurst (2008) among others. I present here features that are relevant to the discussion of the group velocity and shear wave velocity models, with a focus on Archean and Proterozoic regions, and Phanerozoic rifts and basins (Fig. 1.1).

1.2.1. Archean

The main Archean terrains in Southern Africa and East Africa are the Congo, the Kalahari and the Tanzania cratons. Each of these cratons are flanked by Proterozoic orogenic belts.

1.2.1.1. Congo craton

The Congo craton is covered in the middle by the Paleozoic -to-recent Congo basin (Cuvette Centrale). Cratonic rocks are exposed in four shields located around the Congo basin: the Gabon-Cameroon (northwestern block), the Bomu-Kibalian (northeastern block), the Kasai and the Angola shield (De Waele et al., 2008; and Begg et al., 2009). The Kasai and the Angola shield is referred as the southwestern (SW) block.

In the Gabon-Cameroon shield, 3.2-2.99 Ga migmatites, gneiss and remnants of greenstone belts and 2.97-2.54 Ga granites are exposed. The Bomu-Kibalian shield contains 3.42 Ga tonalitic gneisses and 3.0–2.6 Ga greenstone belts, as well as metamorphosed 2.51–2.46 Ga granites. In the SW block, the Kasai shield contains a 3.01 Ga granulite complex that was metamorphosed between 2.9–2.6 Ga. The Angolan shield consists of gneisses,

metasediments, and a 2.82 Ga gabbro-charnockite complex (De Carvalho et al., 2000; De Waele et al., 2008; Begg et al., 2009).

1.2.1.2. Kalahari craton

The Kalahari craton, which stabilized at about 2.3 Ga, is composed of the Kaapvaal craton and the Zimbabwe craton, and the intervening Archean and Paleoproterozoic Limpopo belt (De Wit et al, 1992). Cratonic rocks in the Zimbabwe craton are gneisses (3.5-2.8 Ga) and granitoids (~2.6 Ga), while the Kaapvaal craton consists of granitoids, gneisses and greenstone belt formed between 3.7-2.7 Ga (De Wit et al., 1992).

The Kaapvaal craton can be subdivided into four terrains: Kimberley (3.0–2.8 Ga), Pietersburg (3.0–2.8 Ga), Witwatersrand (3.6-3.1 Ga) and Swaziland terrains (3.6–3.1 Ga).

The Kalahari craton was affected by the intrusion of the Bushveld complex, a 2.05 Ga large layered igneous intrusion, and series of intracratonic basins (3.1-1.8 Ga) in which Proterozoic sediments and volcanics were deposited.

1.2.1.3. Tanzania craton

The Tanzania craton (Begg et al., 2009; Goodwin, 1996) consists of a northern block (2.8-2.66 Ga) intruded by granitoids (2.6 Ga) and a southern block containing gneiss and granitoids (2.93-2.85 Ga).

The northern boundary of the Tanzania craton is not known. The Paleoproterozoic Bangwelu terrain lies to the south.

1.2.2. Proterozoic Mobile Belts

The Congo craton, the Kalahari craton and the Tanzania craton are all surrounded by mobile belts formed by Pan-African (~600 Ma) or earlier orogenic activity.

In southern and East Africa, the Pan-African orogeny led to the closure of major Neoproterozoic oceans and the formation of the following mobile belts (Fig.1.1): the Damara-Kaoko-Gariep-Ghanzi-Chobe belt also known as the Damara mobile belt (DMB), the Lufilian-Zambezi composite mobile belt (LZ), the west Congo belt of Angola and Democratic Republic of Congo, the central African belt (called Ubanguides belt), and the Mozambique belt. The DMB in the northern Namibia and northern Botswana involves convergence and collision between the SW block of the Congo craton and the Kalahari craton, and separates these two cratons.

Other Proterozoic mobile belts include the Ubendien belt (southwest of Tanzania craton), the Usangara belt (east of Tanzania craton), Ruwenzori belt (north of Tanzania craton), Kheis-Okwa-Magondi belt (western boundary of the Kalahari craton), Kibaran belt (between the Congo and the Tanzania craton), the Irumide belt (between the Tanzania craton and the Bangwelu terrain), and the Namaqua belt (southern margin of the Kalahari craton).

1.2.3. Phanerozoic

After the Pan-African orogenic activity, the African plate was subject to episodic intraplate magmatic activity and rifting.

During the Karoo era, this activity included deposition of the Karoo Supergroup mostly in southern Africa; the widespread development of rift basin through southern and east Africa; and flood basalt volcanism.

In central Africa and east Africa, the late Jurassic to early Cretaceous was characterized by the opening of the South Atlantic, the opening of the Indian Ocean, and intraplate extension leading to the development of the basins along the edge and within the interior of the African plate. The formation of the Central and East African Rift system began by the early Cretaceous (~130 Ma). For the East African Rift system in particular, the rifting continues to the present day.

In the Congo craton, the Phanerozoic era is characterized by the formation of the Congo basin, which is mainly filled with fluvial and lacustrine sediments of late Jurassic to late Cenozoic age (Bumby and Guiraud, 2005).

In the Quaternary, the Kalahari sands were deposited which cover part of the Kalahari craton and Congo craton.

1.3. Previous studies of the seismic velocity beneath southern Africa

Early studies on the shear wave velocity structure of the lithosphere in Southern Africa concentrated on the Kalahari craton. Among the first studies, Hales and Sacks (1959) found a Moho depth at 37 km in the eastern Kaapvaal craton, with P and S velocities of 7.0 and 4.0 km/s, respectively, for the lower crust. In the northern part of the Kaapvaal craton, Bloch et al. (1969) inverted group and phase velocities and found crustal thickness between 40 and 45 km. In the Damara belt, Green (1983) found the Moho at 47 km depth. Durrheim and Green (1992) used tremors induced by deep-level gold mining and estimated the crustal thickness to be 36 km beneath the Kaapvaal craton. In another study using mine tremors, blasts from open pit mines and gravity data, Durrheim et al. (1992) estimated the crustal thickness of 30 km in the center of the Limpopo belt to 40 km within the Zimbabwe craton. For the Namaqua belt, Green and Durrheim (1990) used explosion seismic refraction data and obtained a velocity of 6.6-6.9 km/s for the lower crustal and a Moho at 42 km depth.

Using the seismograms of the SASE experiment (Southern Africa Seismic Experiment, Carlson et al., 1996), receiver functions were modeled to obtain estimates of crustal thickness of 35 to 40 km beneath the Kaapvaal and Zimbabwe cratons, and 45 to 55 km beneath the Bushveld Complex, the Limpopo belt and the Namaqua-Natal belts (Nguuri et al., 2001; James et al., 2003; Nair et al., 2006). In a more recent study by Kgaswane et al. (2009), estimates of crustal and upper mantle structure were obtained using a joint inversion of receiver functions and surface wave group velocities. Their results are consistent with the previous studies showing average crustal thickness for most terrains between 35 and 45 km.

The lithosphere beneath Africa has been imaged using continental-scale tomographic studies (e.g., Ritsema et al., 1999; Ritsema and van Heijst, 2000; Pasyanos and Nyblade, 2007; Priestly et al., 2008). These images show thick and fast lithosphere beneath cratonic regions in Africa. On average, in these studies, the Congo craton and the Kaapvaal cratons at depths between 100 and 150km are about +5% faster than PREM model, and the velocity perturbation is about 2% faster between 150 and 300 km depth (Ritsema et al., 1999; Ritsema and van Heijst, 2000).

Lithospheric structure has also been imaged beneath Africa with global tomographic models (Ritsema et al., 1999; Grand, 2002). These models show faster velocities beneath the Congo craton and the Kalahari craton to a depth of 250 km, and slower velocity anomalies beneath the Cenozoic flood basalt volcanism of the Afar region, the East African rift system and the mid-oceanic ridges. In the Afar, they explain the slower structure by the presence of mantle plume that originate at the Core-Mantle boundary, and rises up to the upper mantle. This African superplume is characterized by a low velocity region at the core-mantle boundary beneath southern Africa and rises beneath the upper mantle in the eastern Africa. The high topography in southern Africa (~500m positive residual topography) is an indication of the uplift from this rising superplume or hot upwelling of the African mantle (Nyblade and Robinson, 1994; Nyblade and Langston, 1998).

There are a number of regional-scale seismic models of the upper mantle for part of Africa, but these studies focus primarily on the Kalahari craton and surrounding mobile belts (Priestly et al., 2006; Larson et al, 2006; Li and Burke, 2006; Chevrot and Zhao, 2007; Hansen et al., 2009) or East Africa (Nyblade et al., 2000; Weeraratne et al., 2003). There are no regional-scale models that focus on the SW block of the Congo craton.

Chapter 2 GROUP VELOCITY MEASUREMENT

2.1. Theoretical background

In our study, we use Rayleigh waves produced by earthquakes. In fact, when an earthquake occurs, body waves are produced at the hypocenter. They are elastic waves that propagate through the earth's interior. They are subdivided into two types: P-waves and S-waves. Body waves propagate through the earth with continuously varying seismic velocities, but in the presence of discontinuities, they are reflected, transmitted or converted to other wave types.

At a free surface (a traction-free or stress-free surface), constructive interference of incident P and S-waves generate surface waves which propagate along the surface where they are trapped. Their amplitudes at seismic stations can be very large since their energy decays as 1/r, where r is the distance from the source, compared to the body waves which energy decays as $1/r^2$. Surface waves propagate at speed lower than body waves and are recorded after S-waves. There are two types of surface waves: Rayleigh waves (named after Lord Rayleigh, 1885) are denoted by LR or R (L for long and R for Rayleigh) and Love waves (named after A.H.E. Love, British mathematician, 1911) are denoted by LQ or Q (L for long and Q for Querwellen, German, for 'transverse waves').

Love waves are generated from the SH-waves, and move the ground from side to side. For a lateral homogeneous structure, Love waves have the same particle motion as horizontally polarized S-waves that would stick to the surface and have no vertical motion.

Rayleigh waves are generated by the interference of P and SV waves trapped near the surface and travel like the ocean waves over the surface of the earth. These waves have horizontal and vertical components of ground motion which are out of phase. So, their particle motions are retrograde elliptical.

On a three-component seismogram, Rayleigh waves are found on the vertical and the horizontal components. Considering a laterally homogeneous structure, Rayleigh waves can be isolated on the vertical component. To isolate Love waves, the N-S component and the E-W component should be rotated along the great-circle path. The N-S component will then be the radial and the E-W, is the transverse component. Love waves can then be isolated on the transverse component.

Working with the vertical component is easier since only Rayleigh wave can be present, and the noise level is generally less on the vertical component than in the horizontal.

Surface waves are dispersive i.e. their velocities depend on frequency. There are two velocities that are associated with surface waves, phase velocities and group velocities. The phase velocity is the speed at which any one frequency component of the wave travels, while the group velocity is the speed at which the envelope of the wave packet moves.

To derive these velocities, let us consider a harmonic wave with a single angular frequency *w*. Following Yomogida (1994), the equation of plane wave traveling in the *x*-direction is written as

$$f(x,t) = Ae^{i(kx-wt)} \tag{2.1}$$

where *A* is the amplitude and *k* is the wavenumber at angular frequency *w*.

The wavefront at a certain phase propagates with a velocity of

$$(kx - wt) = constant \tag{2.2}$$

The phase velocity is

$$C(w) = \frac{\Delta x}{\Delta t} = \frac{w}{k} \tag{2.3}$$

We have defined phase velocity at a single frequency or one harmonic wave, but surface waves are a superposition of harmonic waves with various frequencies. The harmonic waves of each frequency propagate independently at various phase velocities, and the wave packet at a given frequency propagates at a given velocity called group velocity. The group velocity at a central frequency will be defined by the waves of two adjacent frequencies w_1 and w_2.

Let us consider two harmonic waves $f_1(x,t)$ and $f_2(x,t)$ with the same amplitude A

$$f_1(x,t) = Ae^{i(k_1x - w_1t)}$$

and

$$f_2(x,t) = Ae^{i(k_2x - w_2t)}$$

The wave packet composed of the two waves $f_1(x,t)$ and $f_2(x,t)$ is

$$f_1(x,t) + f_2(x,t) = Ae^{i(k_1x - w_1t)} + Ae^{i(k_2x - w_2t)}$$

If w_1 and w_2 are close to each other and defined by:

$$w_1 = w + \Delta w,\ k_1 = k + \Delta k,\ w_2 = w - \Delta w, \text{ and } k_2 = k - \Delta k \tag{2.4}$$

Using the expressions in (2.4),

$$f_1(x,t) + f_2(x,t) = 2Ae^{i(kx - wt)} \cos(\Delta k x - \Delta w t) \tag{2.5}$$

with $e^{(ix)} = \cos x + i \sin x$ and $e^{(-ix)} = \cos x - i \sin x$

As $\Delta k \longrightarrow 0$, the exponential term, which expresses the phase of the wavepacket oscillates faster than the cosine term. The latter describes the position of the wavepacket, which propagates with a velocity called group velocity $U(w)$

$$U(w) = \lim_{\Delta k \to 0} \frac{\Delta w}{\Delta k} = \frac{dw}{dk} \tag{2.6}$$

The wave's energy propagates with this velocity (Yomigida, 1994).

The two velocities associated with surface waves are defined by eq.(2.3) and eq.(2.6) and are related. In fact, since the phase velocity $C(w) = \frac{w}{k}$, $w = ck$, and

$$U = \frac{dw}{dk} = \frac{dck}{dk} = c + k\frac{dc}{dk} \tag{2.7}$$

Using the wavelength $\lambda = \frac{1}{k}$,

$$U = \frac{dw}{dk} = \frac{dck}{dk} = c + k\frac{dc}{dk} \tag{2.8}$$

In general, for a given frequency w there are several wavenumbers k_n that satisfy relation (2.5) for surface waves.

The k_n are eigenvalues of the surface wave equation. k_n, (n=0, 1, 2, 3 …) that correspond to modes of vibrations before the amplitude decays to zero. The highest eigenvalue k_0 (lowest frequency) correspond to the fundamental mode of Rayleigh or Love waves. And the other eigenvalues k_1, k_2, k_3 ... correspond to higher modes, first, second, third higher mode respectively and so on. For the fundamental mode (or vibration without nodes, by analogy with the vibration of the string fixed at both ends with a force applied at one point) the amplitude (energy) decays almost continuously with depth. The first higher mode has one

node at a certain depth with a faster phase velocity for same frequency, the second higher mode has two nodes, on so on. In this study, we have used only the fundamental mode, since it is dominant in seismograms.

A plot of the phase or group velocity as a function of period is called a dispersion curve. In this study, group velocity dispersion curves of Rayleigh waves will be used to derive the shear-wave velocities. In other words, frequency-dependent Rayleigh waves velocities will be turned to depth-dependent shear-wave velocities. The whole idea can be explained by the so-called "Depth sensitivity kernels", the partial derivative of group or phase velocity as a function of shear-wave velocity versus depth. This kernel expresses also the depth penetration of surface-wave modes for a given frequency. Also, this kernel describes how structure in a certain depth interval influences a wave of a particular frequency and represents the sensitivity of the surface-wave mode at a certain depth as function of a particular frequency. The depth sensitivity kernels are computed from a reference earth model.

To connect the group velocity dispersion of fundamental Rayleigh waves to depth, the depth sensitivity kernels for several periods (Fig.2.1) are calculated from the IASP91 velocity model using the joint inversion code by Julià et al. (2000)

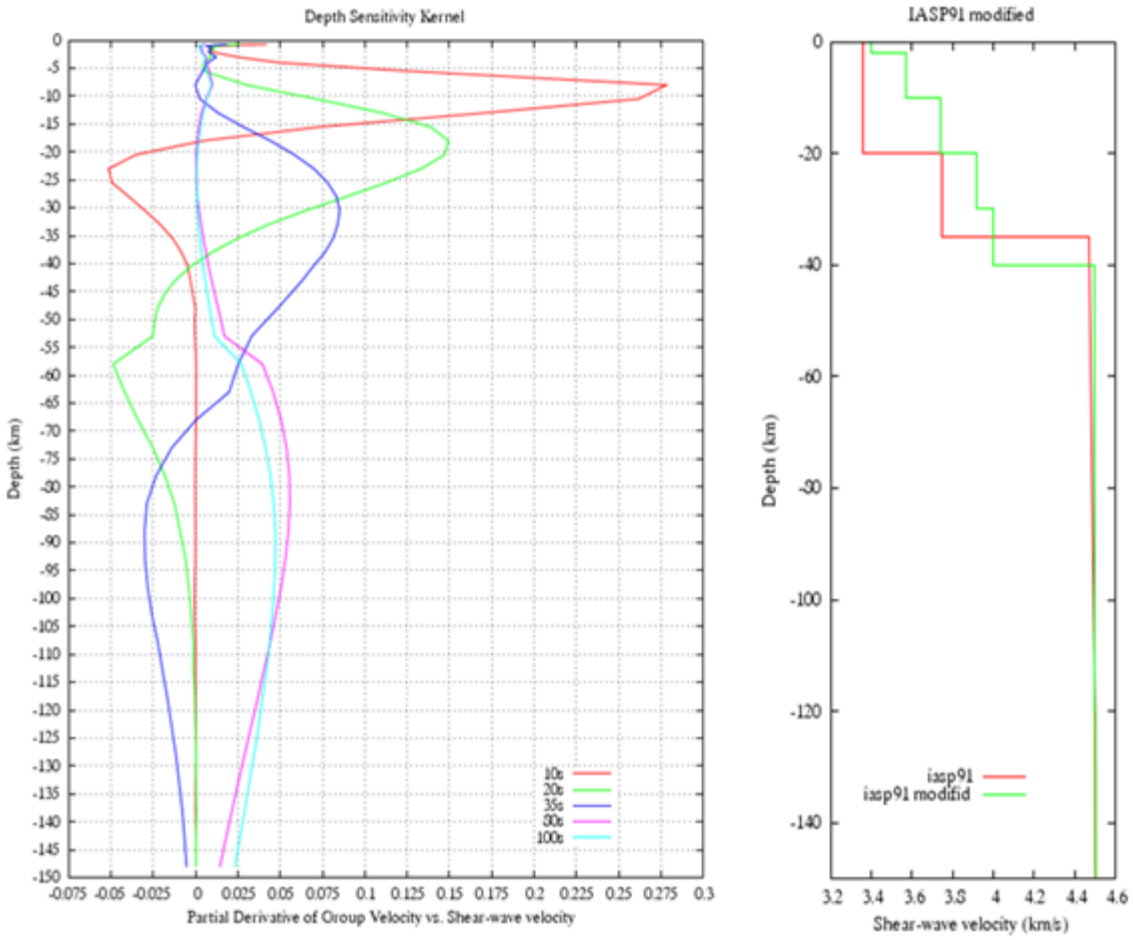

Figure 2.1: Sensitivity kernel computed using the IASP91 model modified. This kernel shows the variation of group velocity (horizontal axis) for each period as function of depth in km (vertical axis): for 10s (red line), 20s (green line), 35s (blue line), 80s (magenta line), and 100s (light blue line).

The depth of maximum amplitude of the sensitivity kernel for group-velocity can be approximately related to its period:

- for 10s, the maximum amplitude is located at about 10 km,
- for 20s, the maximum amplitude is located at about 20 km,
- for 35s, the maximum amplitude is located at about 35 km,
- for 80s, the maximum amplitude is located at about 80 km and
- for 100s, the maximum amplitude is located at about 100 km.

Fundamental mode Rayleigh wave dispersion curve measurements provide constraints on averages of the absolute shear wave velocity at different depths. The sensitivity kernel roughly equates depths in kilometers to periods in seconds (Fig.2.1).

Longer wavelength (longer-period, lower-frequency) surface waves sample deeper Earth structure and shorter wavelength (shorter-period, higher-frequency) surface waves sample shallow Earth structure. In term of velocity, the first surface wave energy to arrive at any seismological station is those of longer periods, since they sample deeper structure and have higher velocities.

2.2. Method

The following explains the method used in this study to measure group velocity dispersions.

For a given seismogram recorded at a station, if we know the origin time t_o, the group velocity defined by the arrival of the wave packet energy (group arrival time) can be measured by finding the arrival of the maximum amplitude in a given finite and narrow frequency range. To do this, a time-frequency analysis method named the Multiple Filter Technique (Dziewonski et al., 1969; Herrmann, 1973) is used. A narrow-band Gaussian

filter with peak amplitude centered at a given period T is applied to the seismogram. The time at the corresponding peak envelope is the group delay time τ_m , and the instantaneous period T_m at the peak is considered as the period T . The frequency-dependant (period-dependant) group velocities are then calculated, using the relation between the epicentral distance and time, and considering that the wave travels along the great-circle path between the source and the receiver. The arrival time τ_m can be measured for certain narrow-band Gaussian filters and the group velocity *U(T)* can be obtained using the relation:

$$U(T) = \frac{\Delta}{\tau_m - \tau_o} \tag{2.9}$$

where Δ is the epicentral distance and τ_o, the origin time.

The longest period to consider using this method depends on the energy of the seismogram considered or the magnitude of the earthquake that produced the surface wave in the seismogram, since the maximum amplitude of the filtered signal is considered as the main energy group arriving at the station/receiver.

Ammon (1998) used this multiple filter technique and wrote the computer program that I used in this study. The details of the processing can be found in Charles Ammon (1998, http://eqseis.geosc.psu.edu/~cammon/).

After application of the multiple filter technique, another process recommended is to clean up the dispersion curves. Ammon (1998) uses a phase-match filter. This phase-match filtering technique isolates the fundamental mode and makes sure that it is not contaminated by higher modes, and multipathing arrivals. To do that, a mode isolation filter (Herrin and Goforth, 1977) is constructed from the group velocities obtained and applied to the seismogram. The results obtained after application of the mode isolation

filter are smooth and stable spectral amplitudes, less contaminated by higher modes and multipathing arrivals.

2.3. Data Acquisition

Rayleigh waves from earthquakes ($\text{magnitude} \geq 4.5$ and $\text{depth} \leq 100\text{km}$) recorded on broad band seismic stations in Africa were used in this study. All stations and earthquakes from January 1990 to December 2009, in the region between $22^{\circ}\text{W} \leq \text{longitude} \leq 68^{\circ}\text{E}$ and $55^{\circ}\text{S} \leq \text{latitude} \leq 15^{\circ}\text{N}$ were used (Fig. 2.1). Earthquakes (events) and seismic stations in a broader region than just the Congo craton were needed to increase the event-station ray paths crossing the southwestern block of the Congo craton.

The stations used are from permanent networks operated by the Incorporated Research Institution for Seismology (IRIS) and the US Geological Survey (IU, G, II, GT), AfricaArray network, Angola network, PASSCAL temporary deployments (XA, XB, XD, XI, YB, ZF and ZP), the GEOFON temporary experiment in Namibia (TE), and the Congo craton deployment (CC) (Fig.2.2).

Using all available stations in this broader area and the Congo craton deployment, allows us to increase the number of ray paths crossing the SW block of the Congo craton. In fact, most studies in southern Africa have poor resolution across the Congo craton.

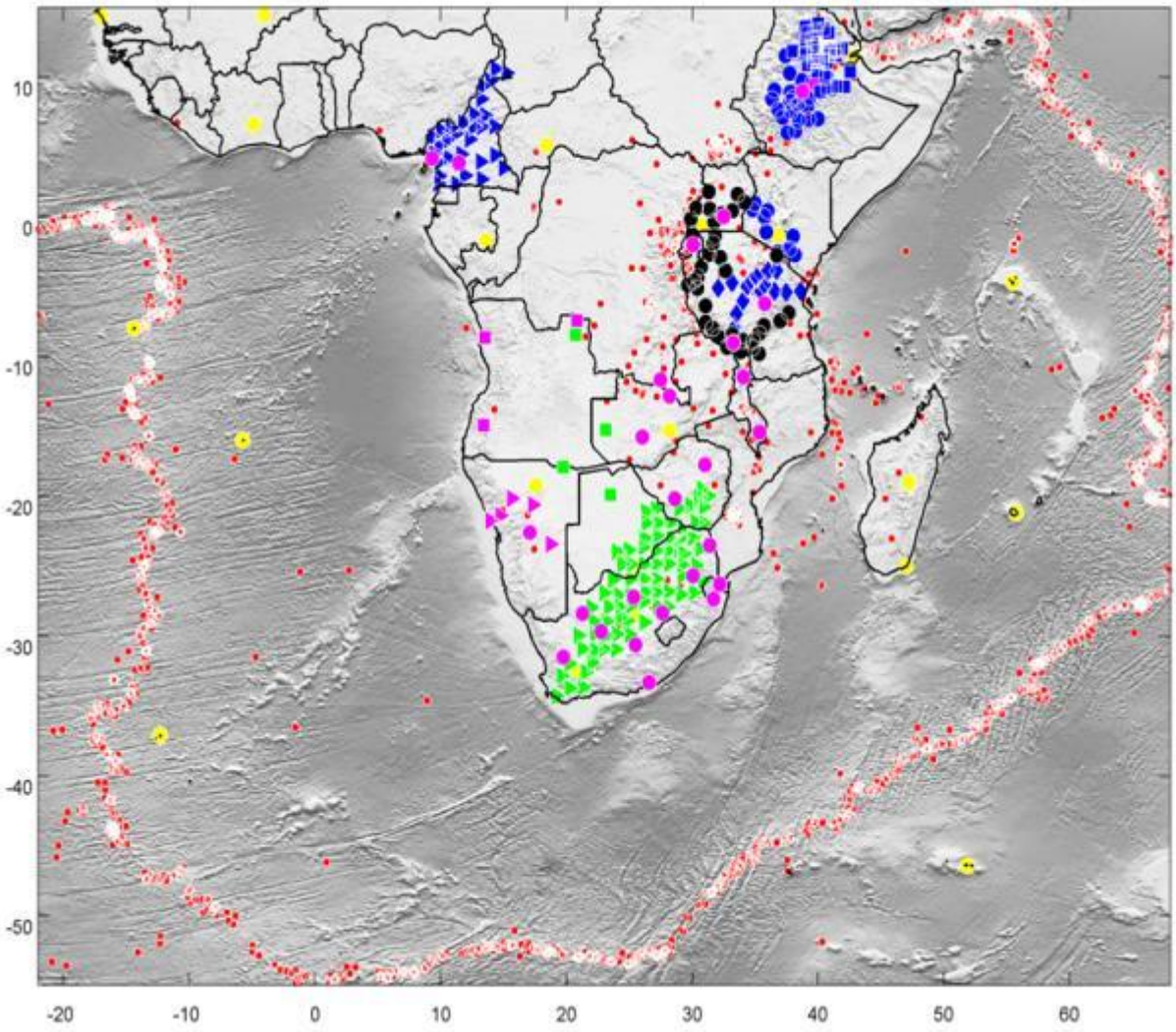

Figure 2. 2: Events (red circles) and stations used. We used the following networks: IU, II, G and GT (yellow circles), XD (blue diamonds), XI (blue circles), AF (purple circles), ZP (green diamonds), XB (blue triangles), XA and YB (green triangles), TE (purple triangles), AN (purple squares), ZF (blue squares) and CC (green squares).

The complete listing of the earthquakes (events) is given in Appendix B, and the complete listing of stations in Appendix C.

Long-period high-gain vertical component seismograms (LHZ) were used to measure Rayleigh wave group velocities. Where LHZ waveforms were not available, broadband high-gain vertical component (BHZ) records were used after decimation to 1 Hz.

Seismograms from 1954 events (Appendix B) between January 1990 and December 2009 were used for measuring group velocities.

2.4. Results

In this study, group velocities for period of 10 to 125 s were measured. This period range was chosen since many events did not have enough energy to generate Rayleigh waves of period longer than 125s. The data processing procedure, which includes the removal of the instrument response, Multiple Filter Analysis and phase-match filtering is discussed in detail by Ammon (1998).

The preparation of the seismograms followed two main steps prior to measuring group velocity. In the first step, the quality of the seismogram was examined to assess the effect of background noise, such as microseism or body waves, arriving at the same time as the surface waves. A visual check was performed and signals with low signal-to-noise ratios were discarded. Seismograms were then filtered in different frequency bands and inspected. An example of a filtered unfiltered waveform (a), waveform after instrument correction (b), and filtered waveform (c) to (f), are shown in Figure 2.3.

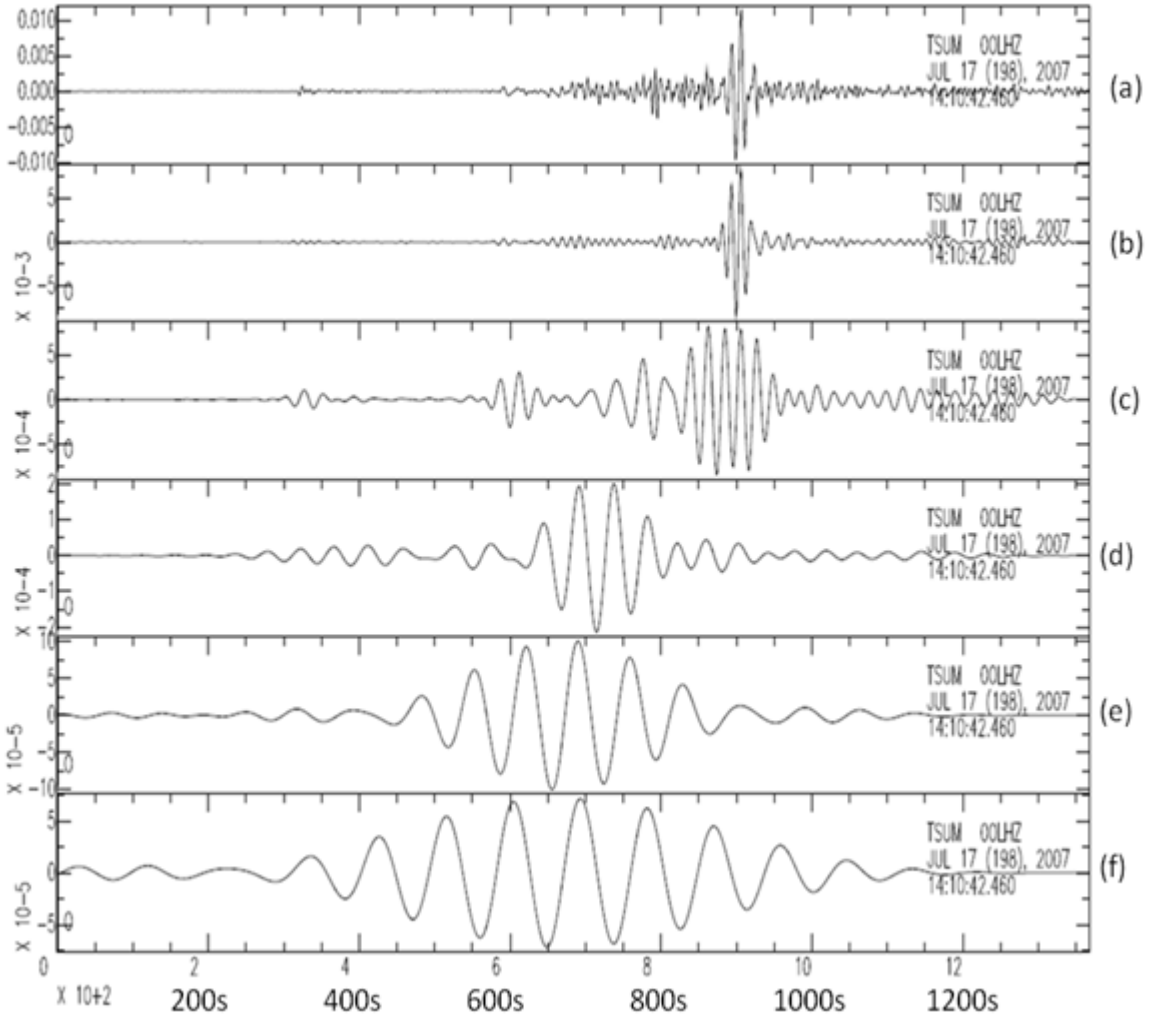

Figure 2.3: 17 July 2007, Mb 5.9 Tanzania earthquake recorded at Tsumeb (TSUM), Namibia. From top to bottom, (a) the original trace, (b) trace after instrument correction, (c) trace filtered between 40s to 10s, (d) trace filtered between 80s to 40s, (e) trace filtered between 100s to 80sHz, and (f) trace filtered between 125s to 100s. Rayleigh wave packet of trace filtered between 80s to 40s (d) arrives early compares to the packet of the trace filtered between 40s to 10s (c).

For the high-quality waveforms, the instrument response was then removed and the waveform was integrated to obtain a displacement seismogram.

In the second step, group velocity measurements on the displacement seismograms were made using the program PGSWMFA (Ammon, 1998).

The parameters used in this code are shown in Table 2.1, and examples of the dispersion curves obtained for station TSUM are shown in Fig.2.4 and Fig.2.5. After phase-match filtering, the dispersion curve is saved in a file (Appendix A).

The instantaneous period and the splined group velocity is used as input data for generating the 2D group velocity maps, as discussed in Section 3.

Line		Comments
1	57	Gaussian filter
2	2.25,4.75	Minimum and maximum group velocities
3	10,140	Minimum and maximum periods
4	100	Number of periods to sample

Table 2. 1: Parameter used for the PGSWMFA program.

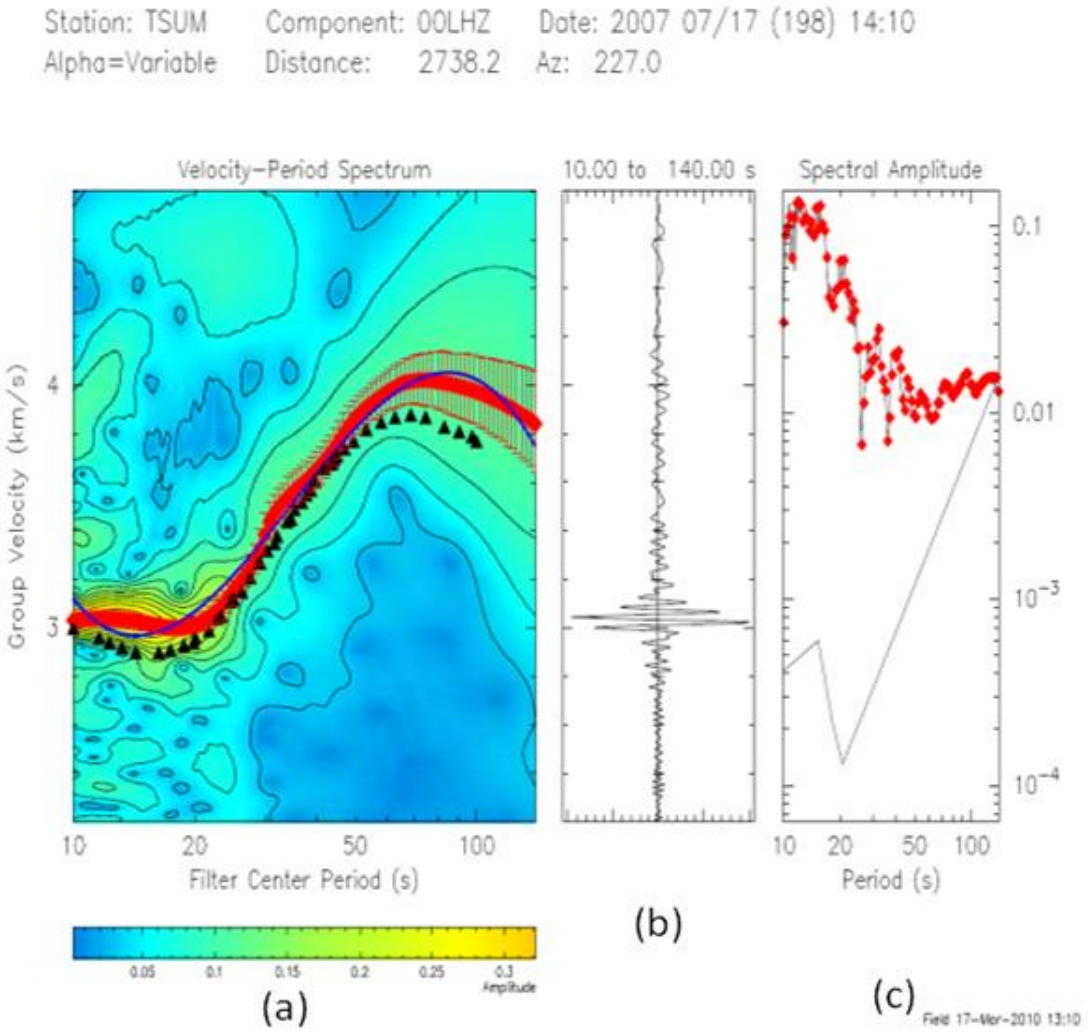

Figure 2. 4: (a) Dispersion analysis (a). The group velocity points obtained are plotted in red. The blue line is the splined group velocities and the black triangles represent the PREM reference curve. The contour diagram shows also some region of high amplitude off the dispersion curve, related to either higher mode arrivals or multipathing effects. (b) Seismogram in the center, and (c) the amplitude spectrum with the sampled points (red diamonds) along with the USGS high-noise curve.

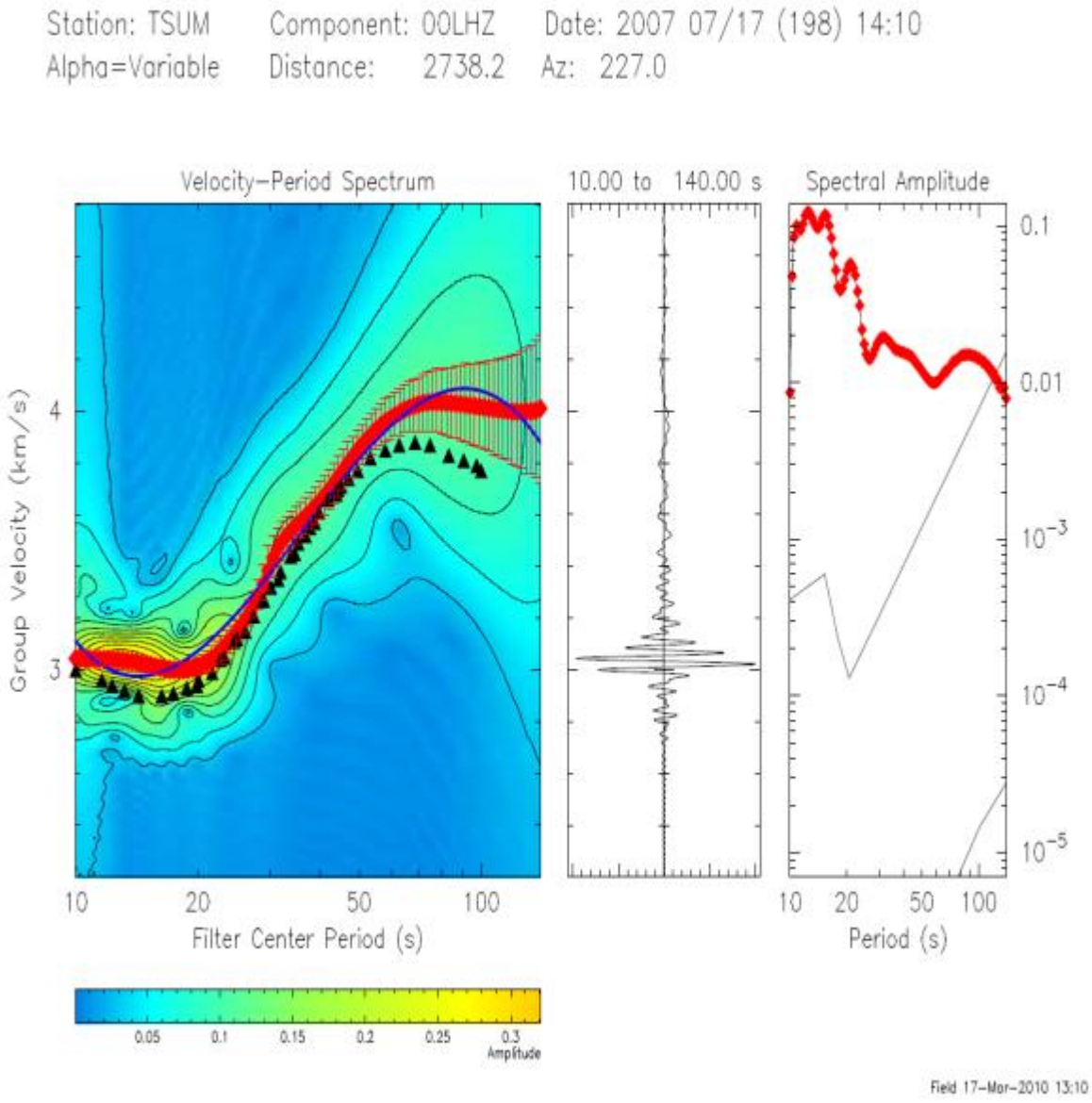

Figure 2. 5: Phase match filter applied to the seismogram in Figure 2.4. The results are smooth and the spectral amplitudes are stable, less contaminated by higher modes and multipathing arrivals.

Comparing the PREM dispersion curve model and the dispersion curve computed using the multiple filter technique (Fig.2.4 and Fig.2.5), one can see that for TSUM station and for this particular event, PREM is slower on average than the computed dispersion curve.

However, it is difficult to infer the shear-wave velocity using only one event. The best is to consider many events coming from different azimuths. In this study, we combine all the dispersion curves obtained for all event-station pairs and invert to obtain 2-dimensional maps of group velocities. At each location, dispersion curve will be extracted from the maps and inverted for shear-wave velocity.

Chapter 3 INVERSION METHODS AND RESULTS

In this Chapter, I discuss the inversion of the event-to-station group velocity to produce 2D maps showing velocity variations at specified periods, and then describe how the group velocities are used to create a quasi 3D model of the shear wave velocities at lithospheric mantle depths.

The result of the inversion of event-station group velocity dispersions that produce 2D maps of group velocities is called group velocity tomography. For group velocity tomography, the inversion is done for each period (10 to 125s at 5-s intervals). The combined 2D maps for all periods will help to produce a dispersion curve at a given location. Dispersion inferred at each location will be inverted for depth-dependant shear-wave velocity.

3.1. Group Velocity Tomography

3.1.1. Methodology

Group velocity measurements at selected periods are inverted for 2-dimensional group velocity distribution. For the inversion, the Conjugate Gradient (CG) method is used.

To perform the inversion, the study area was discretized into a 1^{o} x 1^{o} grid of constant slowness. The goal of the inversion is to find a slowness model that best fits the observed travel time data (i.e., group delay).

Seismic tomography using travel times is discussed in detail in Aki and Richards (1980), Nolet (1987), Iyer and Hirahara (1993) amongst others.

In a 2D medium characterized by parameters *m(x,y)* (or perturbation from the slowness model), the travel time from source to receiver is

$$dt = \int m(x,y)\, dl \tag{3.1}$$

where $dt = T_{obs} - T_{cal}$ and the integration is done along *L*, the total length of the great circle path between the source and the receiver. T_{obs} and T_{cal} are the observed and the calculated travel time, respectively.

If we discretize the medium into blocks, where the model consists of discrete and constant model parameter blocks, the equation (3.1) can be expresses by:

$$dt_i = \sum_j l_{ij}\, m_j \tag{3.2}$$

where l_{ij} is the length of the ray *i* in the block *j* and m_j is the inverse of the velocity (the slowness) in the block *j*.

In a medium described by *M* constant slowness blocks, the discrete form of equation (3.2) for *N* rays can be written,

$$d = Gm \tag{3.3}$$

where *d* is the *N* vector of the travel time residuals for each ray, *G* is a *NxM* matrix of ray lengths l_{ij} ,and *m* is the *M* vector of the slowness in each block. The assumption made in this approach is that Rayleigh waves travel along a great circle path.

The classic least squares solution of the inverse problem equation (3.3) is obtained by minimizing the data misfit :

$$\varepsilon = \|Gm - d\|^2 \tag{3.4}$$

In tomography is the matrix *G* usually underdetermined and/or one or more rows or columns of *G* are linearly dependent. This leads to the non-uniqueness of the solution. To

address this non-uniqueness of the solution, the smoothing and damping constraints are included to the equation (3.4), which becomes:

$$\varepsilon = \|Gm - d\|^2 + \eta\|Lm\|^2 + \mu\|m\|^2 \quad (3.5)$$

In (3.5), the matrix L can be defined as the gradient or the first-difference operator, and μ and η are the damping and the smoothing factors, respectively.

After minimizing (3.5), the estimates solution is

$$\hat{m}(G^T G + \eta L + \mu I) = G^T d \quad (3.6)$$

In seismic tomography where the model unknowns m are velocity or slowness, Eq. (3.3) is a non-linear system because the ray paths and hence travel times depend on the velocity structure. For small to moderate size G matrix, the least square solution $\hat{m}$ can be found by computing the matrix $(G^T G + \eta L + \mu I)^{-1}$ using the Single Value Decomposition (SVD) technique or the Cholesky factorization of the matrix $(G^T G + \eta L + \mu I)$. But in general, G is sparse and the iterative method such as the conjugate gradient least square are preferred.

To check how well the model parameters *m* is resolved via the inversion (e.g. how closed the estimate solution is to the model *m*), the resolution test is performed using the relation:

$$R = (G^T G + \eta L + \mu I)^{-1} G^T G$$

However, in tomography, *G* is a large matrix and the computation of *R* is difficult. That is why another resolution test like the checkerboard resolution test is preferred. In this test, a synthetic Earth model m_{syn} is created, wherein seismic velocities alternate between slow and fast in a checkerboard pattern, to generate a synthetic data set d_{syn} using

$$G^T d_{syn} = (G^T G + \eta L + \mu I) m_{syn} .$$

d_{syn} is then inverted to recreate the inversion model $\hat{m}_{syn}$.

Usually, regions in which the checkerboard pattern is clearly recovered are considered to be well resolved and tomographic results are taken as reliable. The scale length of the blocks in the input synthetic model usually equals the smallest wavelength structure in the real model that is of interest to the interpreter. Ray path coverage can also provide insight into the resolution of the model. Areas well covered by ray paths are generally better resolved and any areas without crossing ray paths area poorly imaged. In other words, velocity anomalies are smeared out along ray paths.

A conjugate gradient (CG) least squares LSQR method (Paige and Saunders; 1982, Berrryman, 1991) is used to solve the inverse problem (3.6).

Given a starting velocity (slowness) model, the inversion finds the perturbation and updates this starting model. The correction at a given block is determined by taking the average of the perturbations calculated for the four surrounding blocks. Blocks located on the edges and the corners of the model are updated by the average three and two cells, respectively . When all blocks are updated, forward modeling of travel-times are obtained for the next iteration.

The iteration is done until convergence to the minimum-norm least-squares solution or when the perturbation $\leq \varepsilon$, where ε is a threshold value below which the iteration stops.

In this study, this conjugate gradient least square method is used to invert group velocities (group arrival times) and obtain the group velocity maps. The trade-off curves of Rayleigh wave group travel-time misfit vs. the model roughness allowed us to determine the optimum smoothness we used during the inversion.

For the checkerboard resolution test, identical events and stations for each period are used to predict group travel times (synthetic group travel times) for a synthetic model using a constant group velocity of 3.0 km/s. For the whole region, the model is typically constructed of alternative high and low velocity anomaly blocks of +/-5% relative to the constant group velocity.

The predicted synthetic group travel times are then inverted to see if the input structure of blocks can be recovered (i.e. resolved).

The inversion for the 2-dimensional group velocity distributions also uses a homogeneous starting group velocity at each period. This starting group velocity at each period was the corresponding group velocity from PREM model. The PREM model was preferred because this model is routinely used for the inversion of surface waves (e.g. Romanowicz, 2002; Stein and Wysession, 2003; Larson and Ekström, 2001) and it is obtained from body wave travel times, surface wave dispersion curves, and free-oscillation eigenperiods (Dziewonski and Anderson, 1981). The inversion was performed for group velocities with periods between 10 and 125 s at 5-s intervals. At each period, the starting group velocity model was the corresponding group velocity of the PREM model.

For the inversion, a damping factor of 1.0 was used and a smoothing value of 2000. The value of 2000 was used because it resulted in a good trade-off between fitting the group travel times (data) and the model roughness. The trade-off curves for all periods are similar. A representative curve is shown in Appendix D.

In this study, I perform the resolution test for 2x2 degree blocks, 3x3 degree blocks and 4x4 degree blocks. I started with 2x2 degree blocks. In the case where the checkerboard was not well recovered, I used 3x3 degree or 4x4 degree blocks.

3.1.2. Results

In this sub-section, results of the inversion for group velocity tomography will be presented and correlated with features in Fig.1.1. I will identify regions with anomalously faster or slower velocities compared to the average velocity. I will conclude this section by comparing our results with the continental PREM model (Fig.2.4 and Fig.2.5). This comparison will help to quantify how fast or slow my model is.

Figures 3.1 to 3.5 show ray paths, checkerboard tests and group velocity models for period of 20s, 50s, 80s, 100s, and 120s. Results for all periods are in Appendix E.

At 20s or approximately 20km depth (Fig. 3.1), the group velocity maps shows fast regions that correspond to oceanic paths and slower regions that correspond to continental paths. At this period, the group velocity map clearly delineates the ocean-continent boundary. This boundary can be seen clearly at periods of 20s to around 50s (Fig. 3. 1., Fig. 3. 2., and Appendix E).

On the 20s period map, rifts and basins on the continent correspond to areas of slower velocities; slow velocities, for example in the Phanerozoic-to-recent Congo basin (Cuvette centrale), the Karoo basins of Southern Africa, the East African rift basins and in basins along the Eastern African coast from Mozambique to Somalia. For these basins, the 3x3 degree checkerboard structure can be well resolved. The basins along the coast from Angola to West Africa also have slower velocities, but these basins are not well resolved.

From these maps we can also see that higher velocity areas are correlated with the oceanic paths (i.e the Atlantic and Indian oceans). In fact, the oceanic paths are the fastest features.

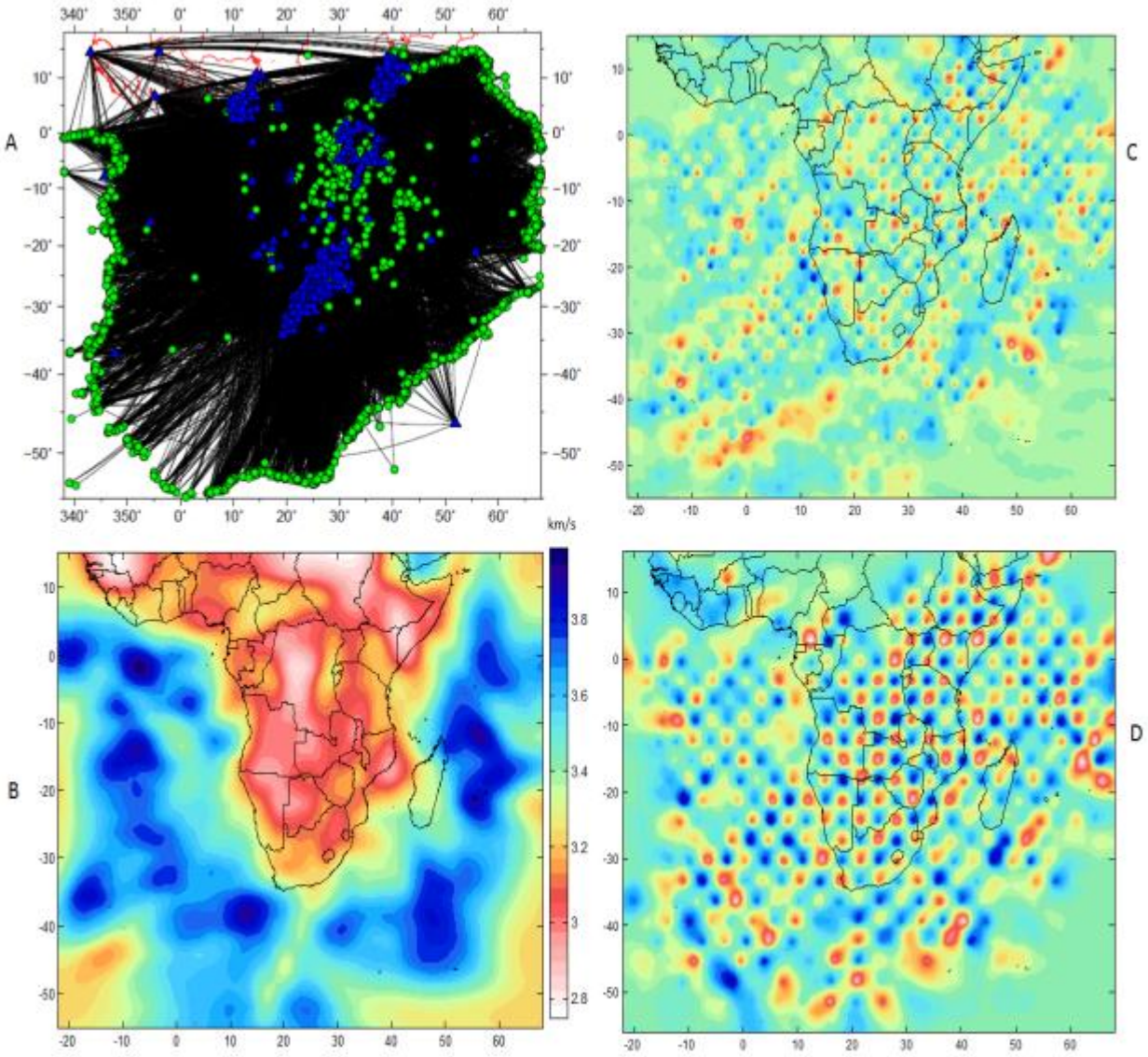

Figure 3. 1: Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 20s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.

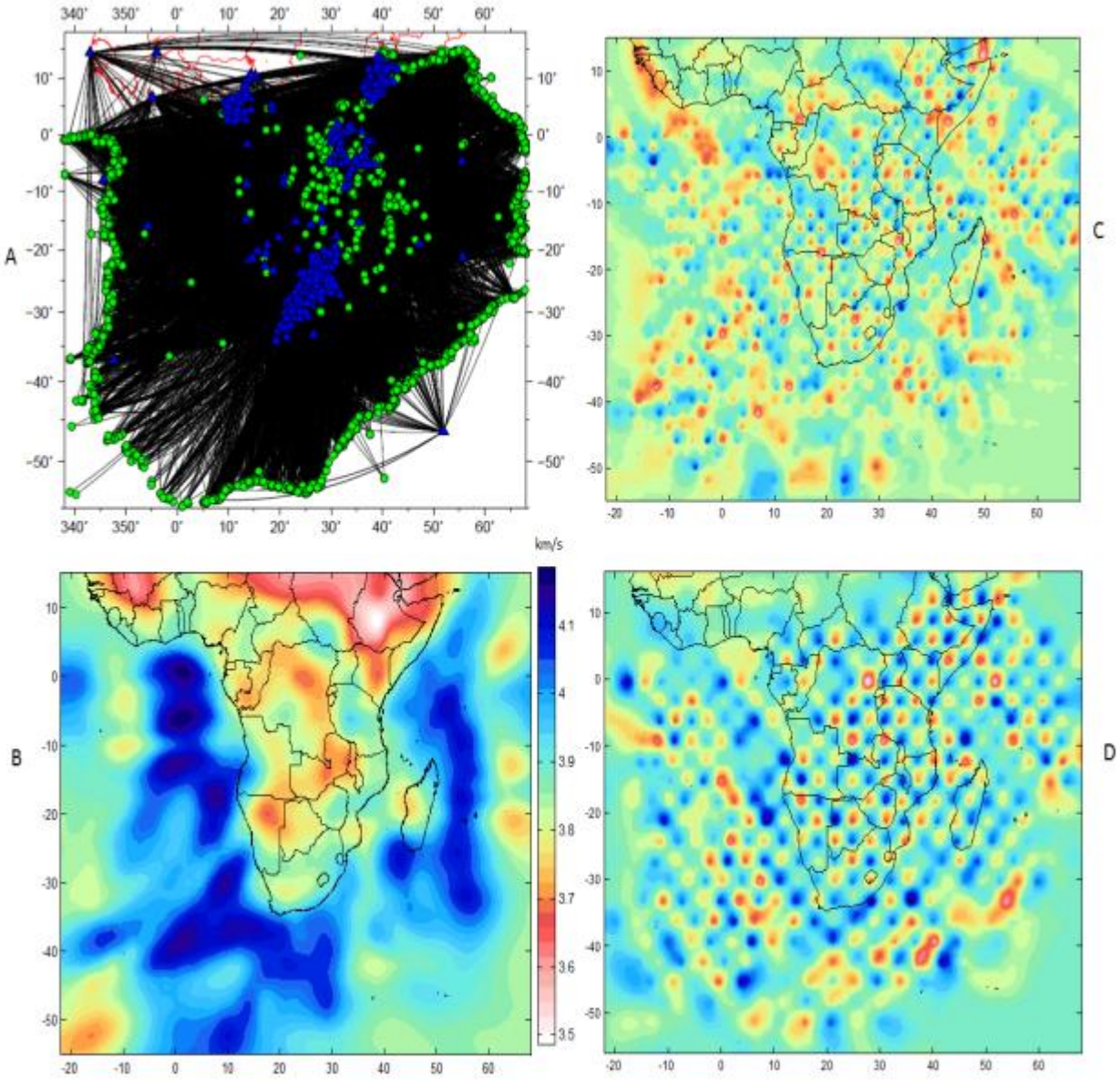

Figure 3. 2: Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 50s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.

At 50s (Fig. 3.2) or approximately 50km depth, the Rayleigh waves start to sample the lower crust and upper mantle and begin to delineate the cratons, with cratonic blocks showing up as faster regions on the group velocity map.

The Tanzania craton shows up as a faster area encircled by slower areas of the Western branch and the Eastern branch of the East Africa rift system. For the Congo craton, velocities are faster the Kasai shield and the Angola shield. The Zimbabwe craton and the Kaapvaal craton also show up as regions of faster velocities. At this period, the 3x3 degree checkerboard is well resolved in East Africa, in the Kalahari craton and the SW block of the Congo craton.

At 80s (Fig. 3.3) and 100s (Fig. 3.4), or depth of approximately 80km and 100km, respectively, Rayleigh waves are most sensitive to the shear wave velocities of the upper mantle (Fig. 2.1). The cratons (Congo, Tanzania and Kalahari) show up as regions with faster group velocities. Slower velocities are seen between the Congo craton and the Kalahari craton along the DMB and the Lufilian-Zambezi belt. The Western branch and the Eastern branch of the East Africa Rift System are slower than the Tanzania craton.

South of the Tanzania craton, an area with slower velocity coincides with the Irumide belt. The 3x3 degree checkerboard tests for 80s and 100s show that the East African Rifts, the Tanzania craton, the SW block of the Congo craton and the Kalahari craton are well resolved.

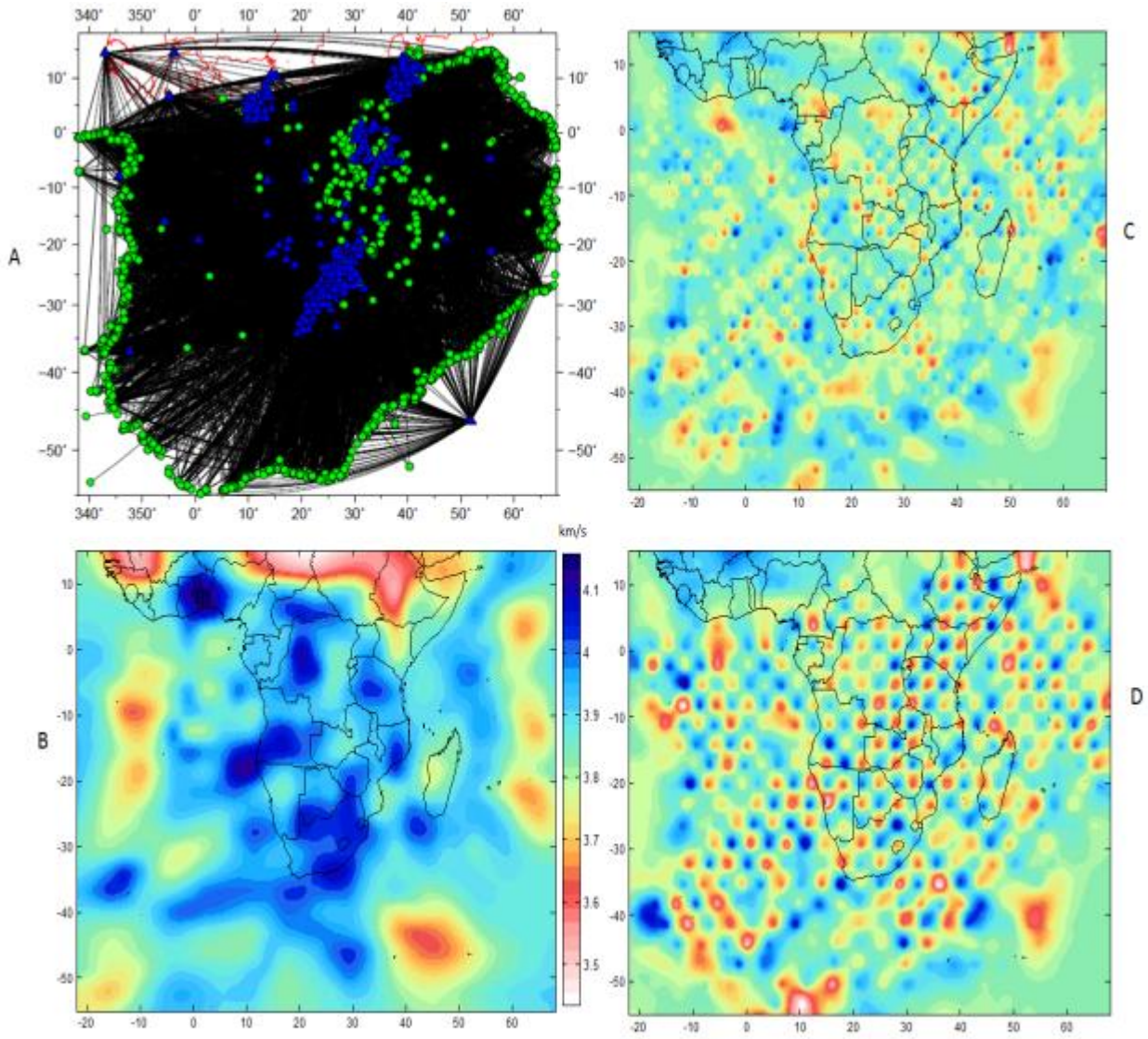

Figure 3. 3: Ray path coverage (A), group velocity model (C) and checkerboard (B and D) test for 80s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (B) and (D), respectively.

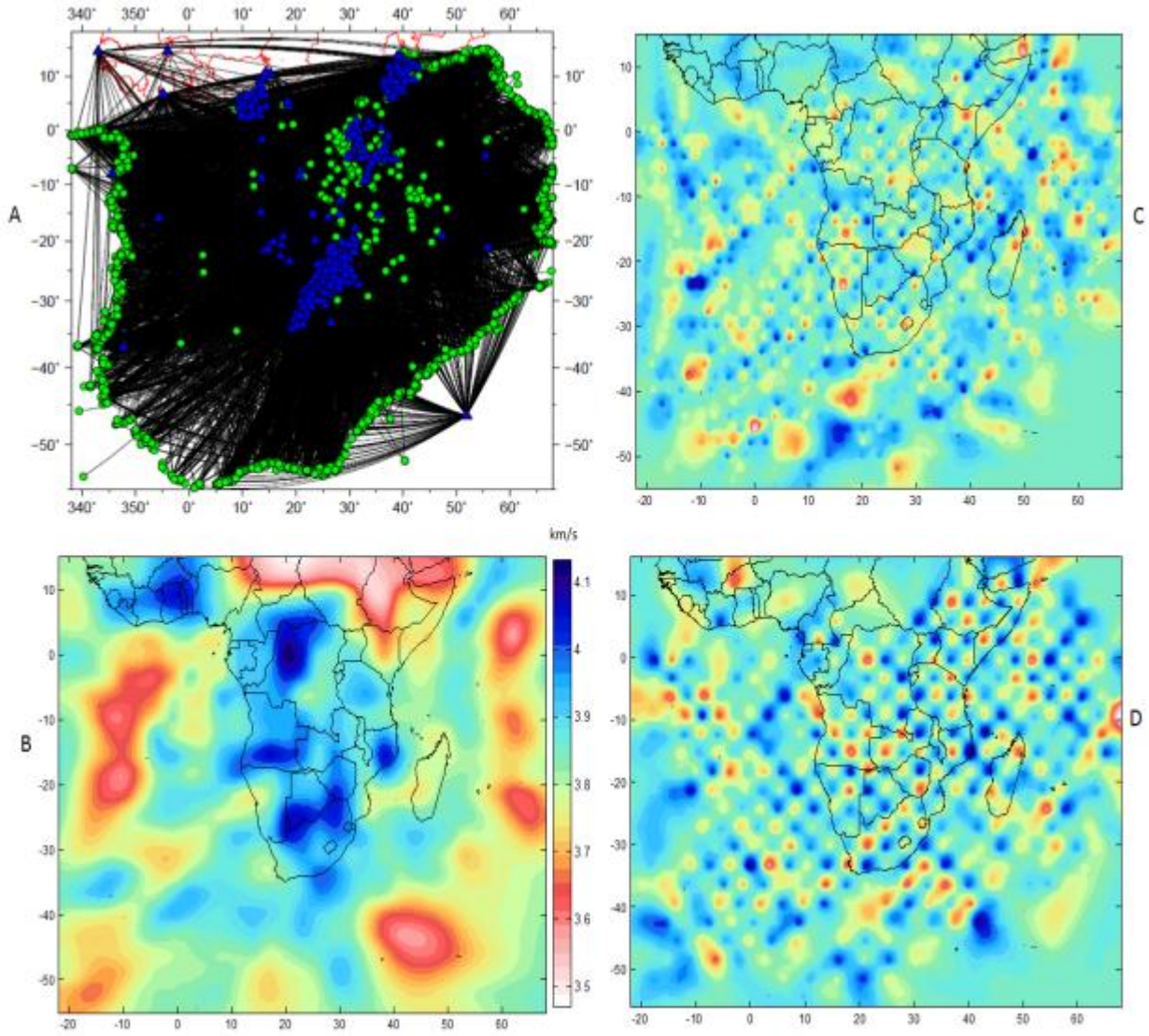

Figure 3. 4: Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 100s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.

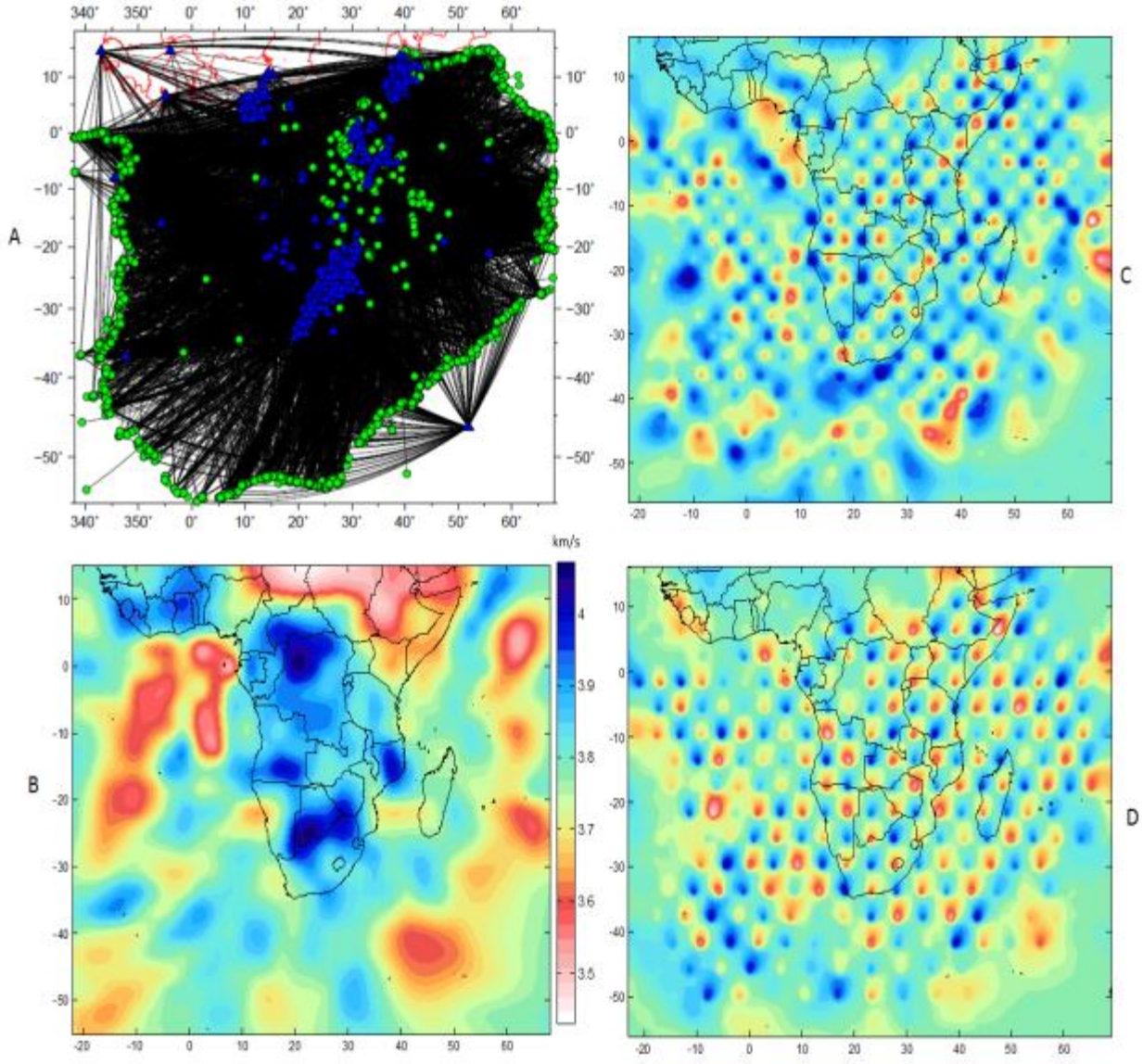

Figure 3. 5: Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 120s. The grid block sizes are 3x3 degrees and 4x4 degrees in the checkerboard tests (C) and (D), respectively.

The map at 120s (Fig.3.5) shows almost the same result as the maps at 80s and 100s. The only difference here is in terms of resolution. At this period, the checkerboard resolution for 3x3 degree blocks shows smearing across the Congo craton and the Kalahari craton. However, 4x4 degrees checkers can be resolved in the Congo and the Kalahari craton.

3.1.3. Comparison with the PREM model

I computed the group velocity perturbations which are changed (percentage-wise) (Fig.3.6) with respect to the continental PREM group velocity model. The group velocity perturbation at a given location and period is calculated using the relation:

$$\delta U\% = \left(\frac{U - U_o}{U_o}\right) * 100 \tag{3.7}$$

where δU, U and U_o are the group velocity perturbation, the 2D group velocity at a given location and period and the PREM group velocity model at the period considered, respectively.

The 2D group velocity maps show that at 20s, group velocities are slowest in basins and rifts. For 50s to 120s, our group velocity maps show slowest velocities beneath the East African rift system and the central African rifts, fastest velocity distributions in cratons, and intermediate velocities in adjacent mobile belts, except for the Limpopo belt.

How fast or slow these features are compared to the continental PREM model can be seen in Fig.3.6. The group velocity perturbations (Fig. 3.6) are between -5% and 7% for 20s on the continent, -4.5 and 8% for 50s, -6 and 8% for 80s, -6 and 8% for 100s, and -6 and 8% for 120s. At 20s, basins are about 0 to 4% slower and the Central and East African Rift systems are ~10 % faster. From 80 to 120s, cratons are 5 to 8% faster, the adjacent mobile

belts are 0 to 4% faster, and rifts are 0 to 6% slower than PREM model. The Afar depression is the slowest, up to 6% slower than the continental PREM model.

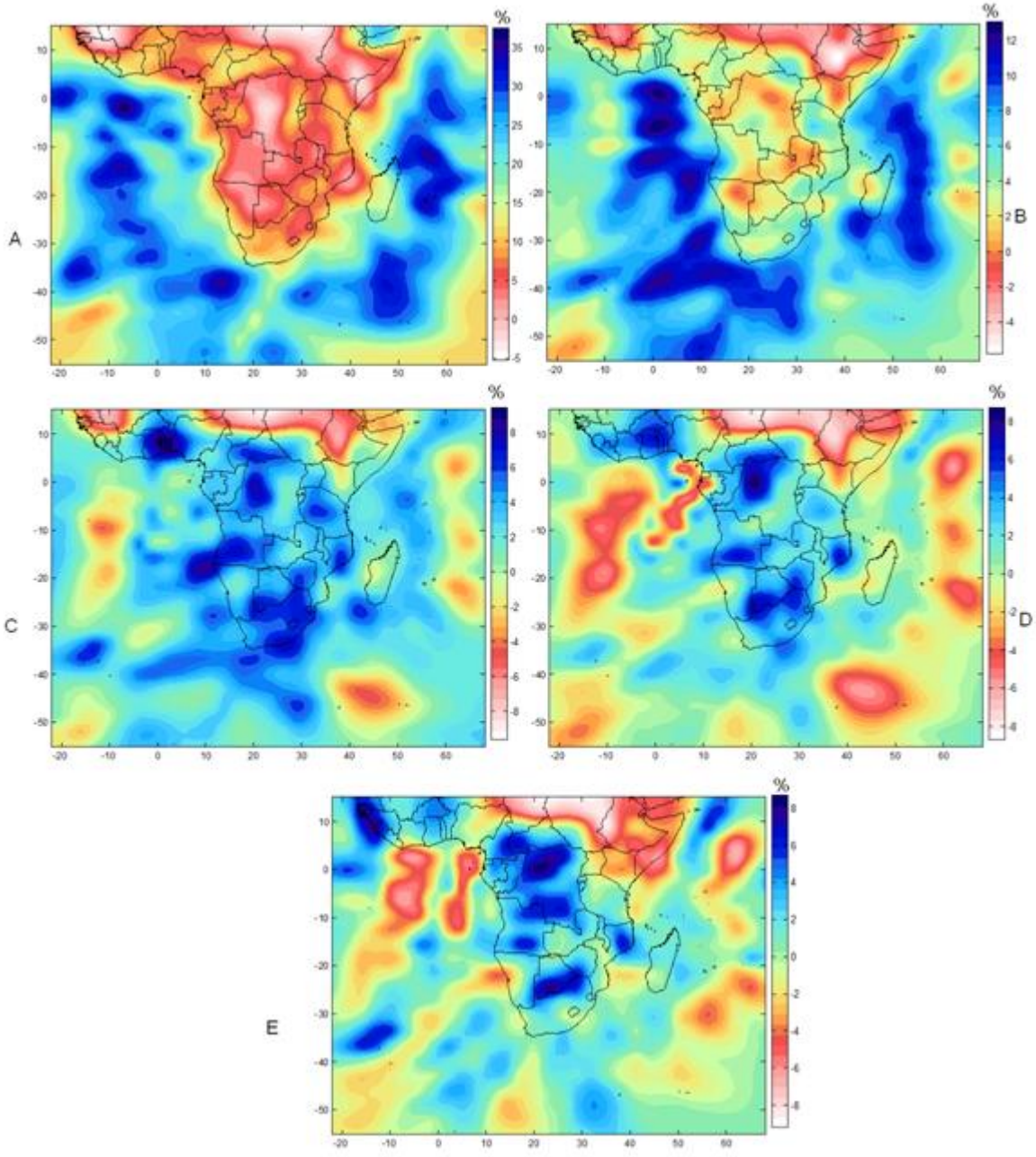

Figure 3. 6: Change of group velocity in respect to PREM model for 20s (A), 50s (B), 80s (C), 100s (D) and 120s (E), respectively.

3.2. 3D Shear Wave Velocity Structure

This Chapter reviews the inversion methodology for 3D shear-wave velocity. Velocity distributions will be correlated with the geology map (Fig.1.1). To conclude this section, shear-wave velocity perturbations in relation with the IASP91 model will be computed and correlated with the geology map (Fig.1.1).

3.2.1. Methodology

To obtain a quasi 3-dimensional shear wave velocity model of the upper mantle, the study region was divided into a 1x1 degree grid and a dispersion curve at each grid node was extracted from the group velocity maps (from 10 to 120s, with 5s increment) and inverted for a depth dependant one-dimensional shear wave velocity model. The one-dimensional models for all grids were then combined to create a 3-dimensional structure model of the upper mantle using GMT tools (Wessel and Smith, 1998).

The inversion technique is based on the sensitivity of surface wave dispersion observations to the shear wave velocity structure of the Earth.

To invert the dispersion curve at each grid node for the shear wave velocity, an iterative damped linearized inversion procedure is used to translate the group velocity curve into a model of shear wave velocity (Julia et al., 2000).

In this procedure, the goodness-of-fit functional

$$S(x) = \frac{p}{N_y}\sum_{i=1}^{N_y}\left(\frac{y_i - \sum_{j=1}^{M} Y_{ij}x_j}{\sigma_{y_i}}\right)^2 + \frac{1-p}{N_z}\sum_{i=1}^{N_z}\left(\frac{z_i - \sum_{j=1}^{M} Z_{ij}x_j}{\sigma_{z_i}}\right)^2 \tag{3.8}$$

is minimized iteratively (Julia et al., 2000).

In equation (3.7), y_i describes the N_y dispersion data and z_i describes the N_z receiver functions, x_j are the M shear velocities for a given set of plane layers with fixed thickness. Y_{ij} are partial derivatives of the dispersion data with respect to shear wave velocity and Z_{ij} are partial derivatives of the receiver functions with respect to shear wave velocity. σ_{y_i} and σ_{z_i} are the variances on the dispersion data and receiver functions, respectively. Details of the inversion procedures can be found in Julia et al. (2000). His method performs an iterative damped generalized inversion by minimizing a weighted least-squares norm of dispersion curves (group and/or phase velocities) and receiver function data. In our case, we only use group velocities, and so the influence of the receiver function data in the inversion is set to zero using the parameter $p=1$ in equation 3.7.

The starting model for our inversion consisted of 44 layers of uniform velocity and increasing thickness with depth using IASP91 (Kennett and Engdahl, 1991). To invert for shear-wave velocity, IASP91 model was preferred to PREM model because it is a radially stratified model and from this model, the travel time tables are derived so that a consistent basis exists for all phases. The model extends to a depth of 578 km and velocities below 250 km were fixed to IASP91. This IASP91 model was modified at crustal depths up to 40 km (Fig.2.1) to account for the variation of group velocity with depth (see Table 3.1).

Depth (km)	Shear-wave velocity (km/s)
0-2	3.4
2-10	3.57
10-20	3.74
20-30	3.92
30-39	4.0
39-40	4.0
40-120	4.51
120-250	4.52

Table 3. 1: Starting crustal model for shear-wave velocity. This crustal model was use on top of the sub-crustal IASP91 model.

We also fixed the Moho depth at 40 km because this is an average Moho depth for Southern Africa (see section 1.3). To constrain the Moho depth while simultaneously allowing for large velocity change across the boundary, a 1 km thick layer was included above and below the Moho. The shear-wave velocity in the 1 km above the Moho was set to 4.0 km/s. Above the Moho, the crust consisted of six layers of variable thicknesses (Table 3.1). The sixth layer was fixed and not smoothed, the other layers were slightly smoothed and not fixed.

The uppermost mantle 1 km below Moho was also fixed. The other layers from 51 km to 250 km depth were not fixed and were smoothed. The thicknesses of layers between 51 km and 250 km depth was 10 km.

The influence of the crustal thickness on the propagation of surface waves was not taken into account since we did not have a priori 3-D crustal thickness model for Southern Africa. Also, the strong influence of crustal depths on surface waves propagation goes beyond the scope of ray approximation (Bozdağ and Trampert, 2008). We preferred to use a simple crustal model and fix the Moho. We also were influenced by the fact that surface wave dispersion curves do not resolve sharp discontinuities like the Moho depth.

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3.2.2. Results of the inversion for 3D shear-wave velocity

Our 3D shear wave velocity model is illustrated in Figures 3.7 and 3.8 with slices at depths of 51 km, 61 km, 71 km, 81 km, 91 km, 101 km, 111 km and 121 km.

For the upper mantle, our results show the area with the slowest velocity is beneath the Afar triple junction. Slower velocity areas are also found under the Western branch and the Eastern branch of the East African rift system, the Central African rift system, the West Congo belt, and the Damara and the Lufilian-Zambezi belt.

The cratons (Congo, Tanzania, Kaapvaal and Zimbabwe) are associated with relatively fast velocities. Between the SW block of the Congo craton and the Kaapvaal craton, slower velocities can be seen in the Damara mobile belt. The upper mantle in the Limpopo belt between the Zimbabwe craton and the Kaapvaal craton is as fast as the upper mantle beneath the two cratons.

Our model shows clearly a separation between the Congo craton and the Kaapvaal craton, with upper mantle in that depth range in the DBM being slower than the cratons.

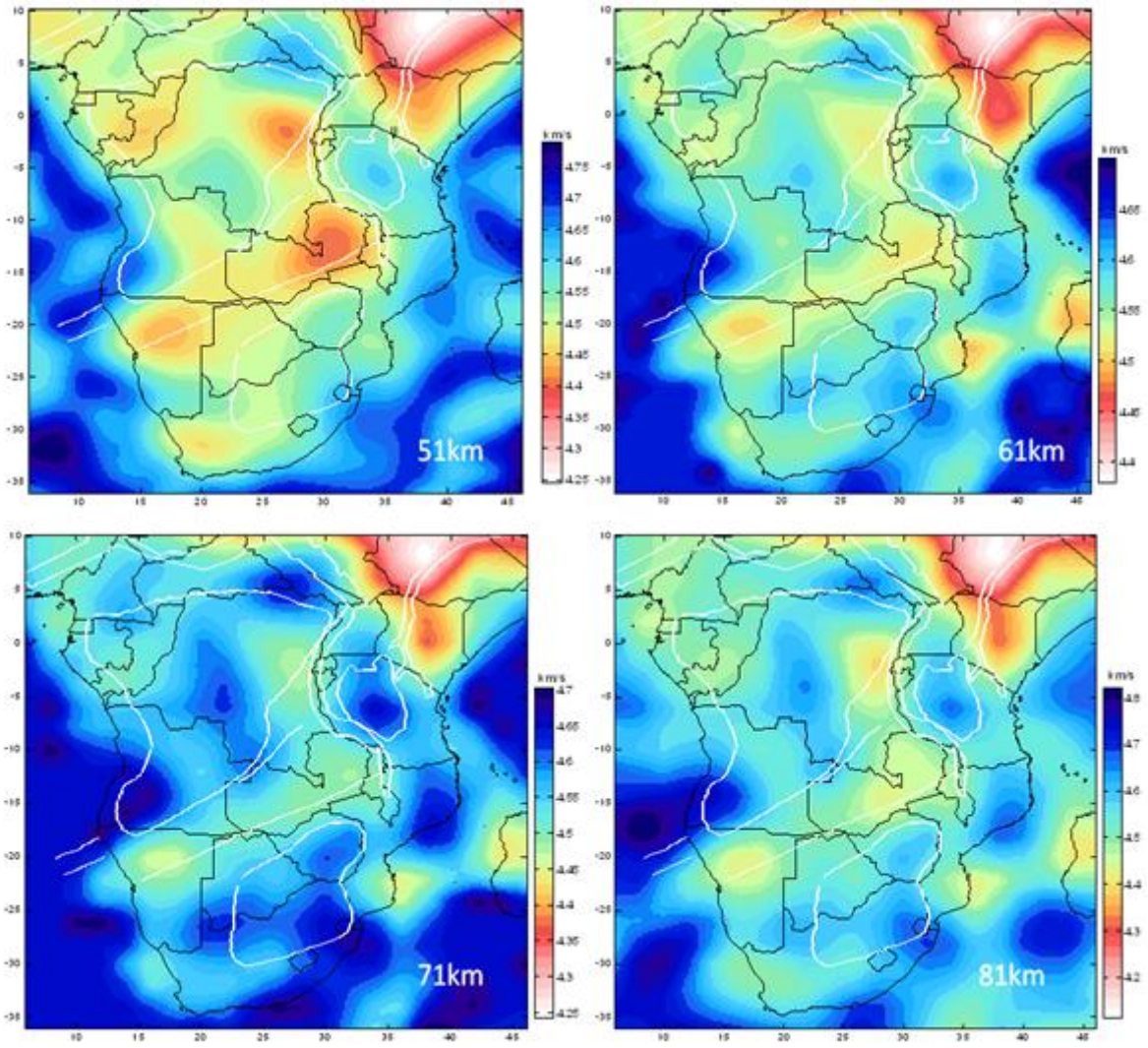

Figure 3. 7: Shear wave velocity model at 51 km (A), 61 km (B), 71 km (C) and 81 km (D) depth, respectively. Superimposed on the shear wave velocities are the geological terrains shown in Figure 1.1. delineating cratons, Proterozoic belt and the East African rift system.

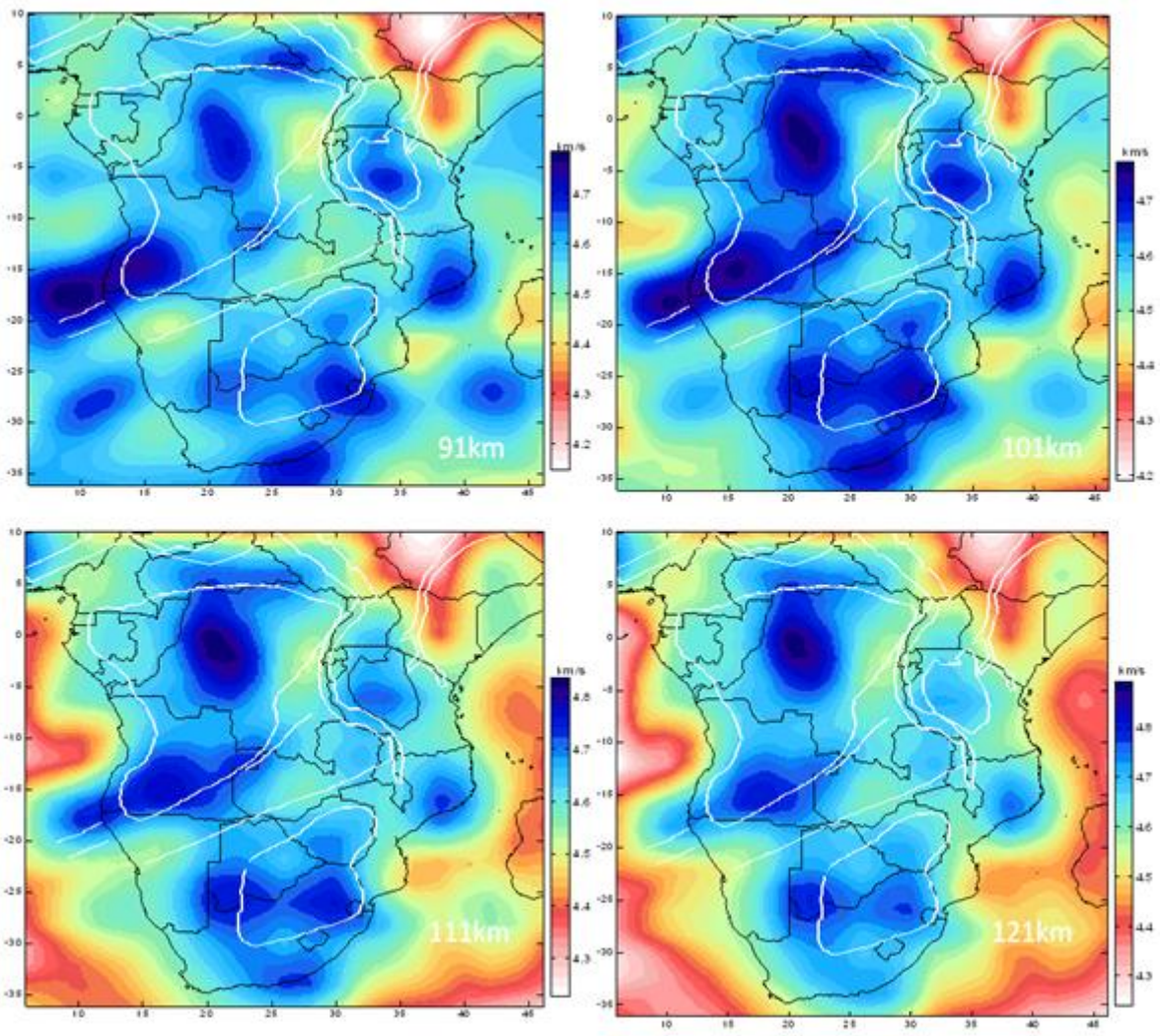

Figure 3. 8: Shear wave velocity model at 91 km (A), 101 km (B), 111 km (C) and 121 km (D), respectively. Superimposed on the shear wave velocities are the geological terrains shown in Figure 1.1. delineating cratons, Proterozoic belt and the East African rift system.

3.2.3. Comparison with the IASP91 model

The 3D shear-wave velocity models obtained after the inversion shows that the East Africa Rift system is an area of slower velocities, with the Afar area being the slowest, the cratons (West Africa, Congo, Tanzania and Kalahari) are all regions of faster velocities, and the DMB and the Lufilian-Zambezi belts are areas of intermediate velocities.

To determine how fast or slow these features are, I computed the shear-wave velocity perturbations (percentage-wise) of the shear-wave velocity models obtained in relation with the IASP91 model. At each depth, the shear-wave velocity perturbations are calculated using the relation:

$$\delta V\% = \left(\frac{V - V_o}{V_o}\right) * 100 \qquad (3.2)$$

where δV, v and v_o are the shear-wave velocity perturbation, our shear-wave velocity model and the IASP91 shear-wave velocity model at a given depth, respectively.

Compared to IASP91 model, the following results have been obtained (Fig. 3.9):

The Afar area is 3 to 5% and 5 to 6% slower than IASP91 model at 51 km and 61 km, respectively. The changes in this area increases from 5 to 8% between 71 to 91 km, and from 5 to 7% between 101 to 121 km. The largest deviation from IASP91 is between 71 to 91 km.

The cratons are all ~1 to 2% faster than IASP91 and the surrounding mobile belts are -2 to 0% faster than IASP91, between 51 to 81 km. Deeper than 91 km, cratons are 2 to 6% faster and the surrounding mobile belts are -1 to 2% faster. The rifts are 1 to 5% and 2 to 6% slower between 51 to 61 km and 71 to 121 km, respectively.

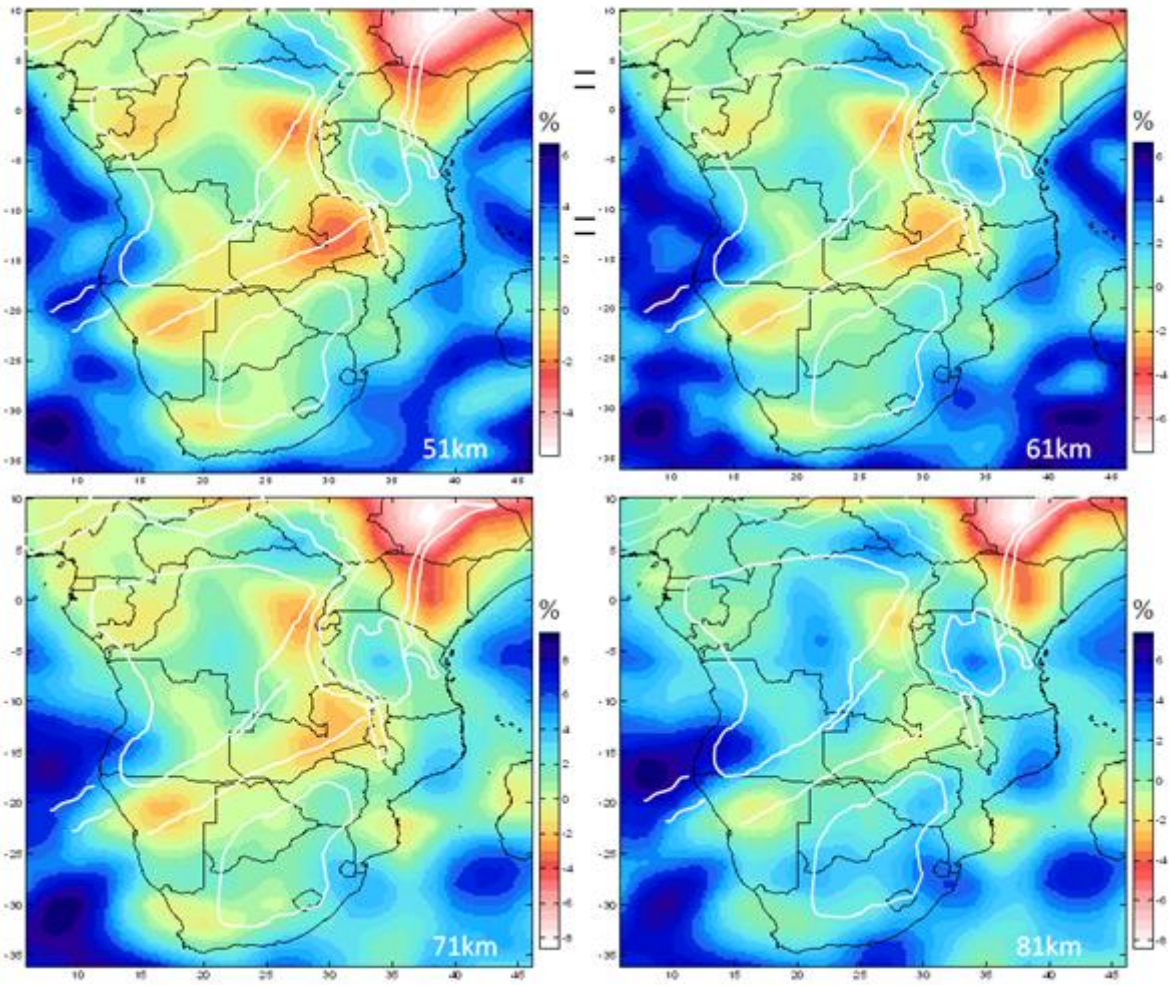

Figure 3. 9: Depth slices of 3D shear-wave velocity changes in respect to IASP91 model for 51 km, 61 km, 71 km and 81 km, respectively.

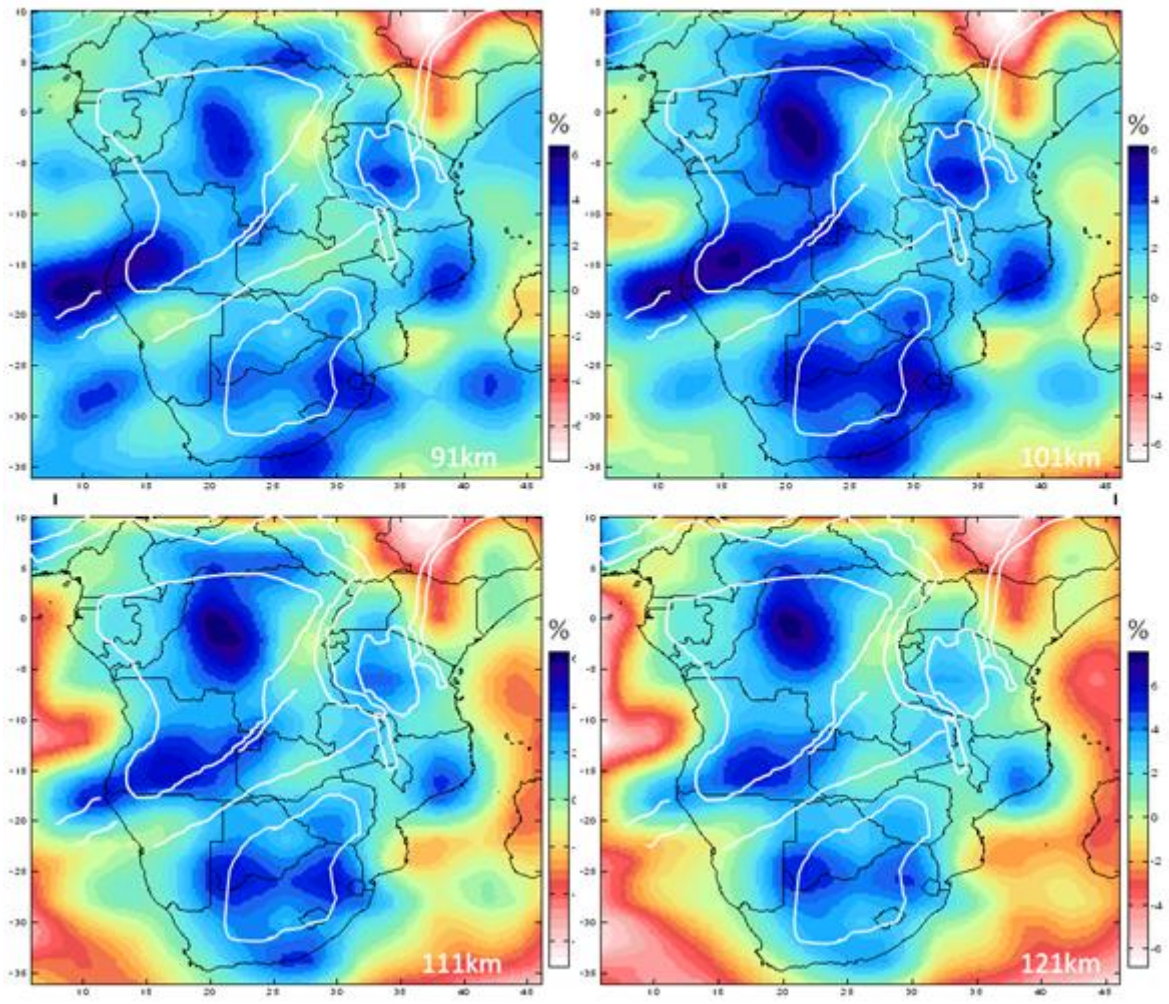

Figure 3. 10: Depth slices of 3D shear-wave velocity changes in respect to IASP91 model for 91 km, 101 km, 111 km and 121 km, respectively.

Simple 1D model of shear wave velocities beneath cratons, mobile belts and rifts of southern Africa are also obtained. The model of the Afar depression is also presented. These simple models are obtained by averaging shear wave velocities of few points taken in the middle of each geological area. To construct these 1D model, we used: (1) the Congo, Tanzania, the Kaapvaal and the Zimbabwe craton for the model beneath craton, (2) the West Congo and the Damara and the Lufilian-Zambezi belt for the model beneath mobile belt, (3) the Central and the East African rift system for model beneath the rift and (4) the Afar triple junction for the model beneath the area. The result of the average 1D shear wave velocity structure beneath these areas shows that in the uppermost mantle (51 to 121 km) cratons are the fastest feature, followed by mobile belts, then rifts and the Afar (Fig.3.11).

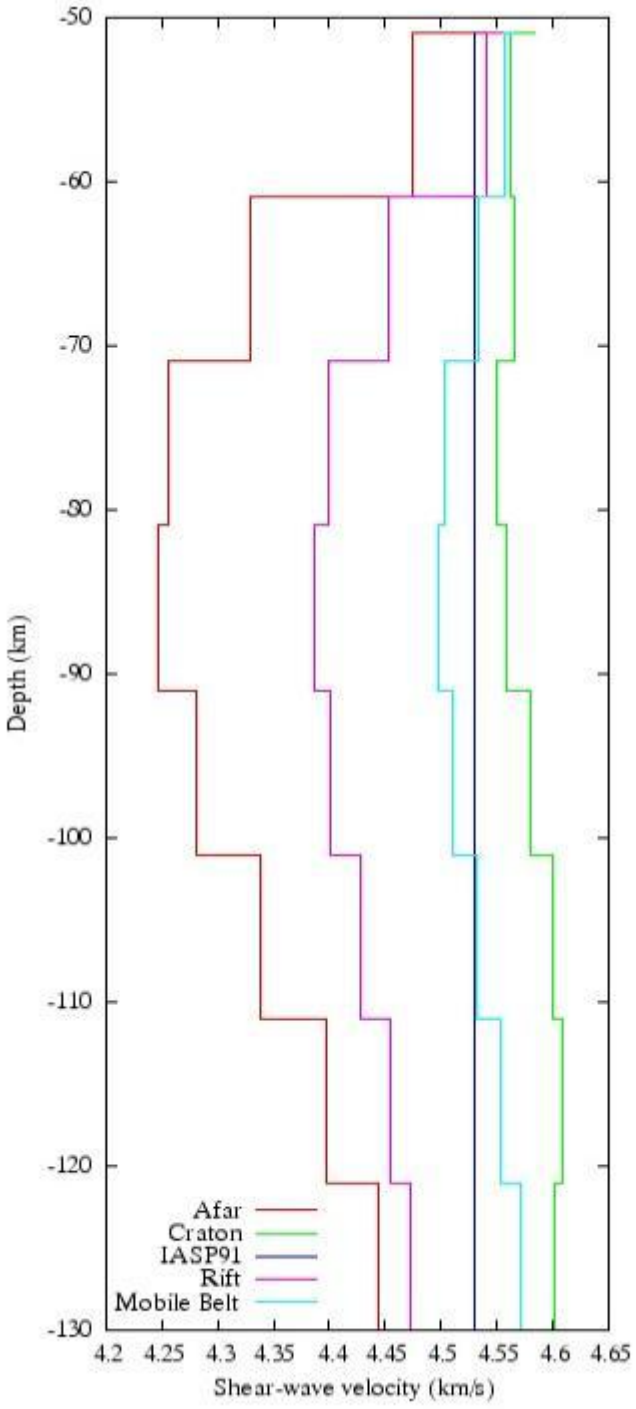

Figure 3. 11: Average shear--wave velocity in the uppermost mantle (51-121 km) for craton, mobile belt, rift and the Afar depression, respectively.

Chapter 4 DISCUSSION AND CONCLUSION

4.1. Velocity structure of southern Africa

Group velocity maps (Fig 3.1 to 3.9) show that:

(1) Group velocities at 20s period are slower in basins and rifts than PREM model.

(2) Group velocities for periods between 50s to 120s shows faster velocity distributions in cratons and slower velocities in adjacent mobile belts, except for the Limpopo belt.

(3) The Damara mobile belt clearly separates the SW block of the Congo craton and the Kalahari craton.

(4) When compared to the continental group velocity PREM model, the basins are the only features slower (0 to -3%). The rifts are faster (~5%) than PREM for 20s period, while for longer periods (50 to 120s), the rifts are up to 6% slower. The Precambrian terrains (Archean and Proterozoic) are faster at these longer periods (50 to 120s), with cratons faster (up to 8%) than the mobile belts (up to 4%).

The 3D shear wave velocity models from 51 to 121 km (fig.3.9, fig. 4.1 and fig. 4.2) show that:

(1) The East Africa rift system is an area of relatively slow velocities, with the Afar area being the slowest. In the Afar area, the velocities are up to 8% slower than IASP91 model. Beneath the East African rift, the velocities are up to 2% slower.

(2) The cratonic terrains (SW block of the Congo craton, Tanzania and Kalahari) are all faster than IASP91. The Precambrian terrains are up to 6% faster and up to 2% faster for cratons and mobile belts, respectively. The velocity changes are between 2 to 6% and from -2 to 2% faster, in cratons and belts respectively. The value of 2 to 3% can thus be used to delineate the cratonic edges.

(3) The Damara mobile belt and the Lufilian-Zambezi belts are areas of slower velocities.

(4) The Damara mobile belt separates the SW block of the Congo craton and the northwestern part of the Kalahari craton.

In summary, velocities are fastest in cratons, slowest in Mesozoic and Cenozoic rifts, and intermediate in the Proterozoic Pan-African mobile belts.

I compare the results of group velocity tomography with the study by Pasyanos and Nyblade (2007) and the 3D shear wave velocity models with the study by Priestly et al. (2006), Pasyanos and Nyblade (2007), and Priestly et al. (2008). Pasyanos and Nyblade (2007) also used group velocity dispersion curves to invert for 2D group velocity maps and then used the maps to calculate 3D shear wave velocities. Priestley et al. (2006) and Priestly et al. (2008) inverted fundamental and higher mode of surface wave dispersion for 3D shear wave velocity structure. These studies focused on whole southern African continent, not only on the Kaapvaal and Zimbabwe cratons.

For the 3D structure, shear wave velocity models below depth of 51 to 121 km (fig. 4.1 and fig. 4.2) are first compared to previous studies and then used to determine the location of the southern boundary of the Congo craton. The northwestern boundary of the Kalahari craton is also examined. Only areas where the 3x3 degree blocks were recovered in the checkerboard test were used.

The group velocity tomography result is similar to Pasyanos and Nyblade (2007). They found that at shorter periods the slower velocity areas coincide with sedimentary basins. At longer periods, the faster velocities are associated with cratonic terrains, and the slower velocities associated with the East Africa rift system. However, they could not resolve the Damara mobile belt, since they did not have sufficient ray coverage in the area. In this study, ray coverage was improved by the broadband seismic stations of the AfricaArray network, the Congo craton experiment, and the Angola network.

Pasyanos and Nyblade (2007) found that 3D shear wave velocities are also fast in upper mantle beneath cratons (e.g. Congo, Kalahari and Tanzania) and slower under rifts (e.g. East Africa). Priestly et al. (2006, 2008) found high velocities (4 to 7%) to depth of about 225-250 km beneath the Congo and the Tanzania cratons, with the exception of the Kalahari craton where the high velocity root only extends to 170 km. They also found that the Damara belt separates the Congo craton and the Kalahari craton. The difference between their model and our model is that Priestly et al. (2006, 2008) found the shear wave velocity beneath the Damara belt to be as high as the Kalahari craton and the Damara mobile belt could not be delineated. However, this study found that shear wave velocities of the lithosphere in the Damara mobile belt is slower than the Kalahari craton. But compared to other Pan-African mobile belts and the East African rift system, the Damara mobile belt is relatively fast.

The relatively slow seismic velocity in the Proterozoic Damara belt (compared to the SW block of the Congo craton and the Kalahari craton) can be explained by temperature variations or differences in rock type, or chemistry. Evidence for the thermal mechanism of the continental lithosphere is provided on (1) surface heat flow, which assume a contribution from the upper mantle, and (2) the paleogeotherm from the thermobarometric calculations, based on mineral chemistry of mantle xenoliths and/or xenocrysts. These rocks provide samples of the lithospheric mantle at the time they erupted. Based on heat flow measurements and paleogeotherms, Artemieva and Mooney (2001) and Artemieva, (2006) showed that cratons are colder than Proterozoic mobile belts. Ballard et al. (1987) and Nyblade and Pollack (1993) studied surface heat flow in southern Africa and showed that upper mantle heat flow in this area increases from craton to mobile belt.

In fact, cratons are characterized by low heat flow of about 40mW/m^2 (Nyblade, 1999) compared to non-cratonic continental lithosphere, which have heat flow of about 57mW/m^2. In southern Africa, average values of heat flow of 47mW/m^2 and 66mW/m^2 were measured in the Kaapvaal-Zimbabwe craton area and Proterozoic mobile belt, respectively (Ballard et al., 1987). In fact, in Southern Africa, they found that heat flow

increases at the edges of cratons, as a result of heat being diverted toward surrounding mobile belts. In the Swakopmund area, along the Damara mobile belt, Whitehead et al., (2002) studied mantle xenoliths discovered in the Swakopmund area, within the Damara mobile belt, and reported a local geotherm of 90mW/m^2, much hotter compared to the local geotherm beneath the Gibeon kimberlites (c. 45mW/m^2). These observations indicate that the Damara mobile belt lithosphere is hotter than the surrounding cratons. This belt is also hotter than Gideon-Rehoboth terrain, which is off the Kalahari craton.

Another factor that could explain slower Damara belt compared to cratons is the chemical depletion measured by the Mg-number (Mg#) in the mantle peridotite xenoliths. In fact, Jordan (1978; 1988) proposed the isopycnic theory to characterize cratonic lithosphere. This isopycnic hypothesis suggested that cratons were characterized by high chemical depletion of basaltic elements and low density upper mantle. In fact, the negative thermal buoyancy of cold cratonic lithosphere is compensated by positive chemical buoyancy due to the high melt-depletion.

Xenoliths studies have shown that Proterozoic lithosphere has intermediate depletion degrees between Phanerozoic (less depleted) and Archean (strongly depleted) lithospheres (Griffin et al., 1999; O'Reilly and Griffin, 2006).

Olivine is the main constituent of peridotite mantle xenoliths and a major host of magnesium, iron and nickel. Mg-number (Mg#), defined by the relation Mg/(Mg+Fe)x100 in olivine, characterizes the whole peridotite xenolith, and is related to the degree of melt-depletion or enrichment in iron. Mg# of olivine is 88-92 and, and 91-94 for off- and on-craton mantle xenoliths. This reflects that the on-craton mantle xenoliths are more iron-depleted (Boyd and Mertzman, 1987) than the off-craton mantle xenoliths. For the Kaapvaal craton, Boyd (1989) studied mantle xenoliths and obtained the value of Mg# between 91.5 and 93.5. He proposed that these peridotite xenoliths are high-pressure residues of komatiite formation. These ultramafic volcanic rocks of high magnesium left a depleted mantle. The effect of the depletion in dense material, is the increase in velocity.

In the Rehoboth terrain, an off-craton terrain just south of the Damara mobile belt, xenoliths have Mg# of 91.6 on average, and reveal that the mantle lithosphere is less depleted than the Kaapvaal craton (Boyd et al., 2004). Mantle xenoliths discovered in the Swakopmund area in the Damara mobile belt, Namibia reveal that Mg# of olivine are between around 90.0 to 92.0 (Whitehead et al., 2002).

Our model of relatively slower Proterozoic Damara mobile belt as boundary between faster areas beneath the SW block of the Congo and the Kalahari craton, can then be explained by the evidence from studies of the mantle xenoliths collected in the Damara mobile belt, the Rehoboth terrain of the Kaapvaal craton. Depletion-wise, the lithosphere is less depleted beneath the Damara mobile belt than the two surrounding cratons.

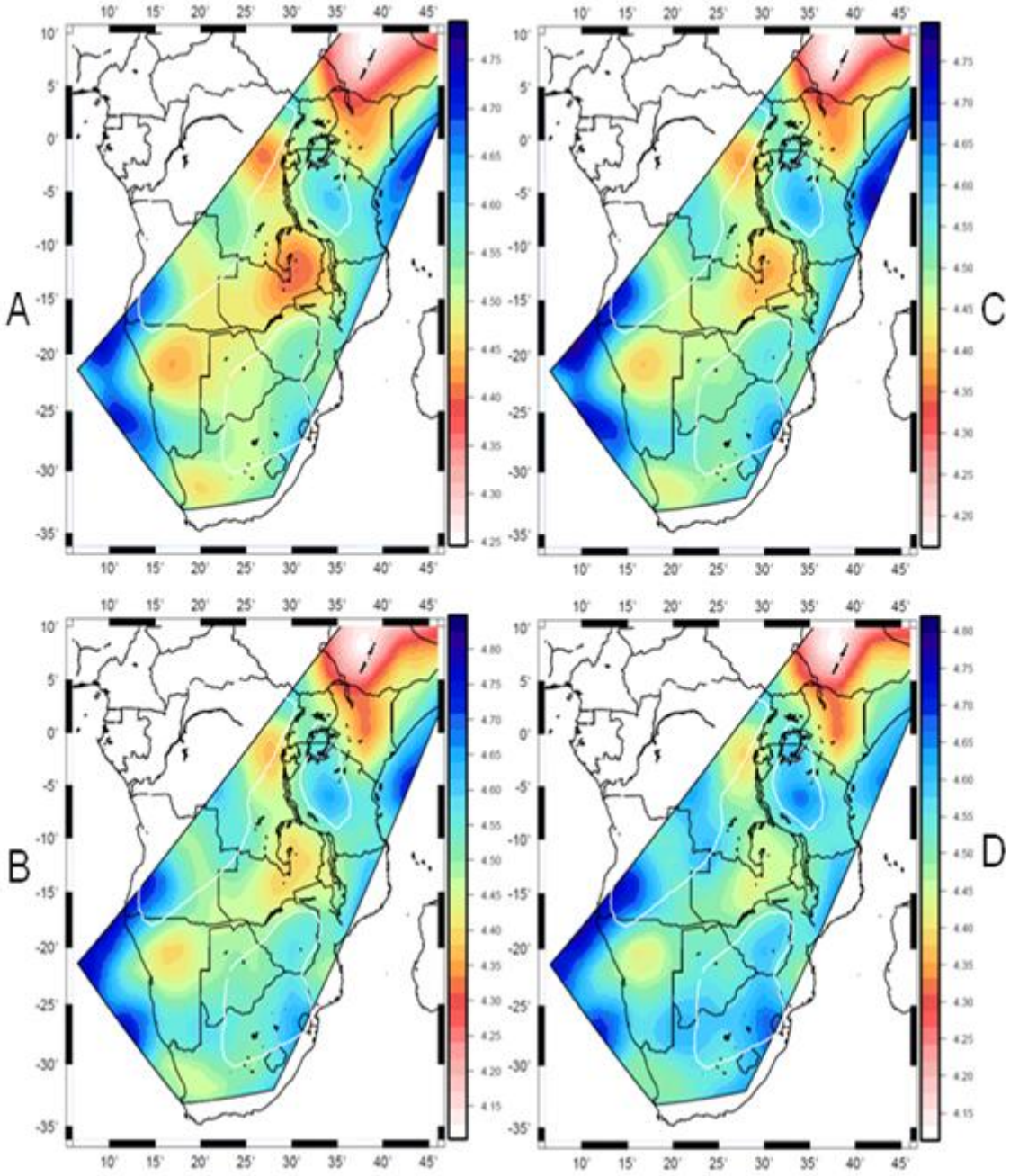

Figure 4. 1: Depth slices of the 3D shear wave velocity model at 51km (A), 61km (B), 71km (C) and 81km (D). We have masked area where our resolution is poor.

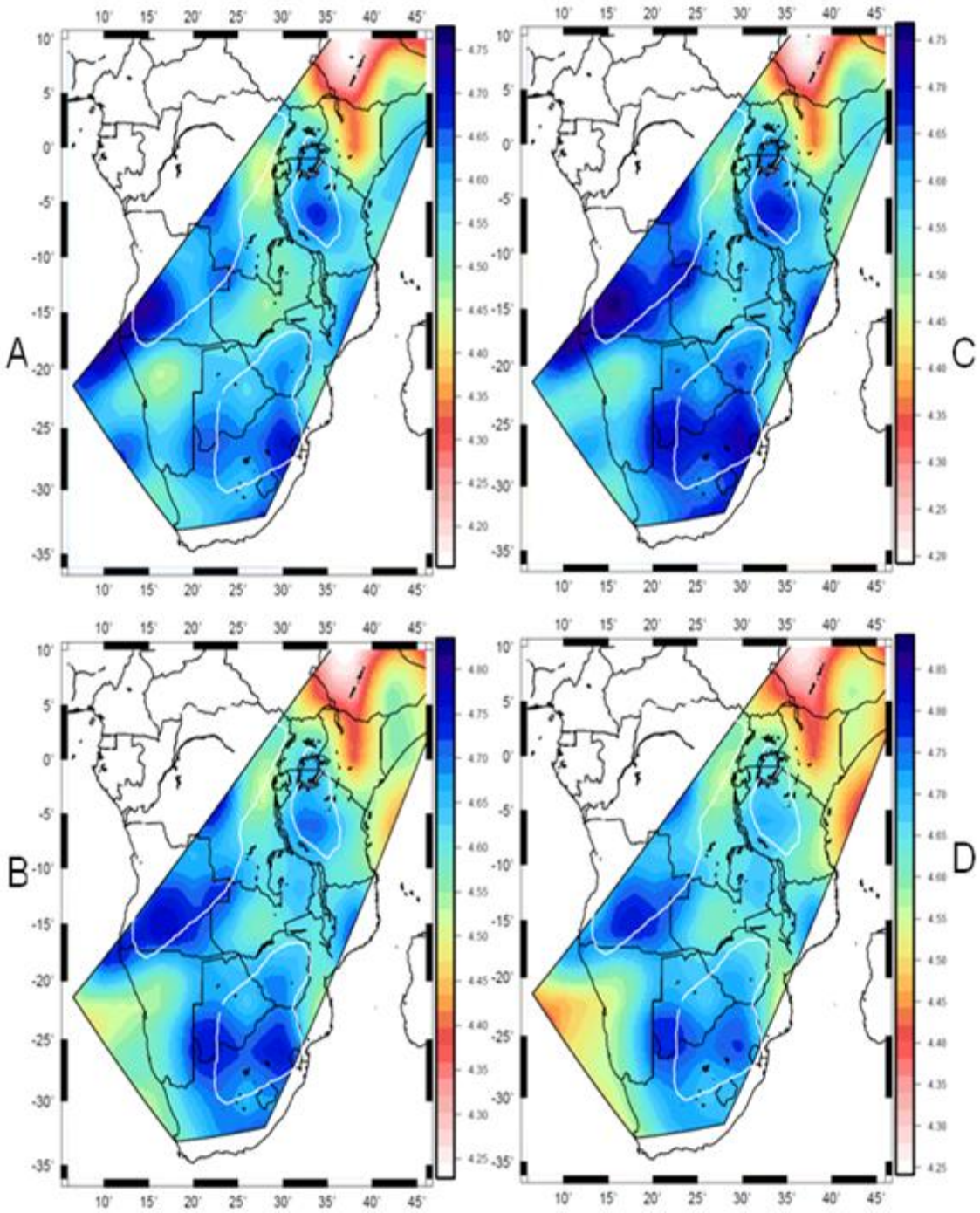

Figure 4. 2: Depth slices of 3D shear wave velocity model at 91km (A), 101km (B), 111km (C) and 121km (D). We have masked area where our resolution is poor.

4.2. Cratonic Edges.

The purpose of this study was to map the SW block of the Congo craton using seismic tomography (shear-wave velocity tomography obtained using group velocity tomography) and to determine the southern boundary of the Congo craton. To increase ray coverage, seismic tomography for the whole southern Africa was used. In this section, I focus on the area between the SW block of the Congo craton and the adjacent Damara mobile belt, and Kalahari craton.

Since the velocity changes at depth between 51 to 121km relative to IASP91 are 2 to 6% and -2 to 2% , beneath cratons and mobile belts, respectively, I postulate that the boundary between craton and mobile belt be drawn where the velocity relative to IASP91 changes from -2 to 2% to 2 to 6%. Using this criteria, I drew the lines that I think represent the southern edge of SW block of the Congo craton.

Likewise, I estimate also the northwestern edge of the Kalahari craton. Figure 4.3 shows the result for the southern edge of the SW block of the Congo craton and the northwestern edge of the Kalahari craton, at depth between 91 to 121km. At these depths, the edges correspond to velocity changes of 2 to 3% faster (e.g. 4.59 to 4.635 km/s) than IASP91 (e.g. 4.51km/s).

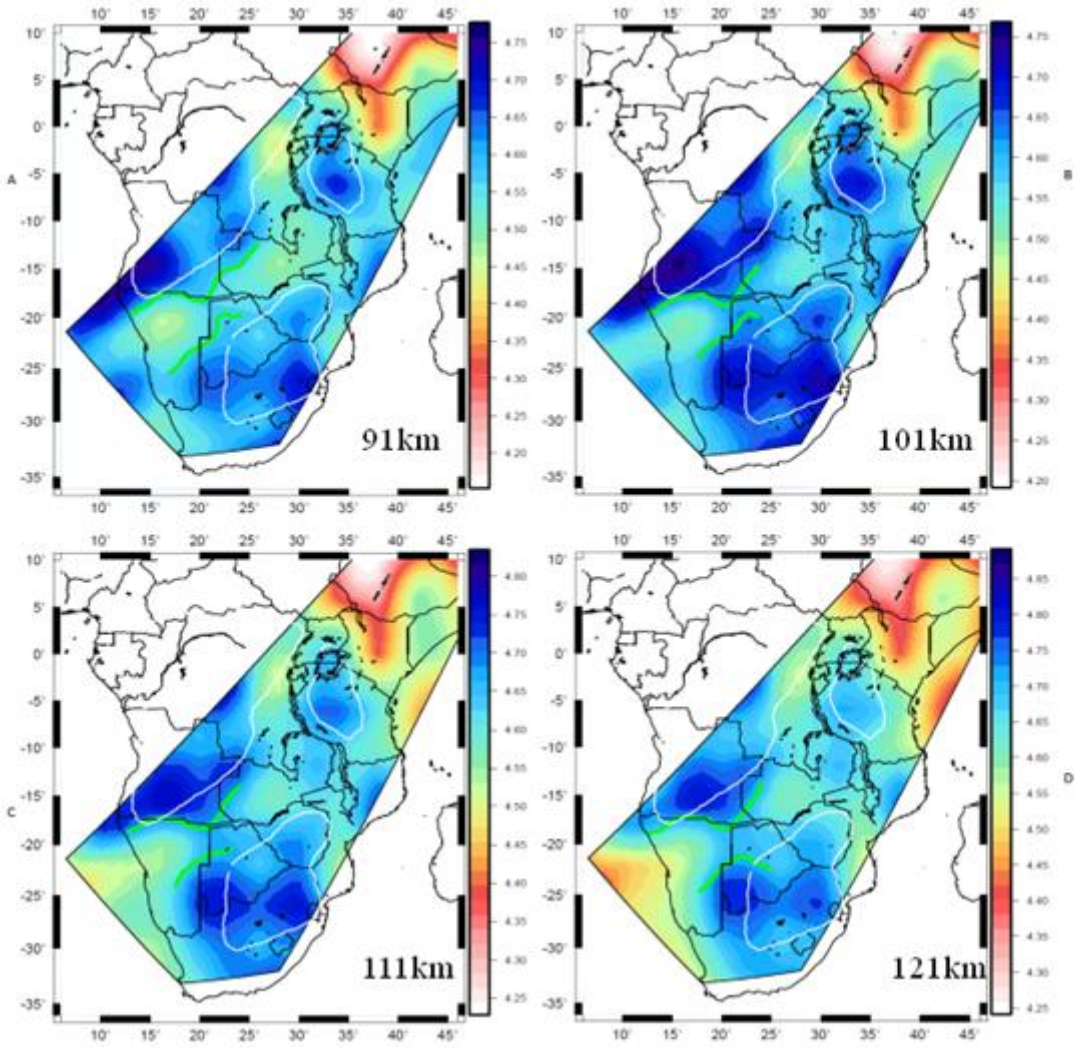

Figure 4. 3: Shear wave velocity model at 91km, 101km, 111km and 121km, respectively. We have masked regions where our resolution is poor and have approximate the southern edge of the SW block of the Congo craton and the Northwestern edge of the Kalahari craton. Interpreted cratonic edges are delineated in green.

To test if the structure in this area (SW Block of Congo craton /DMB/ adjacent Kalahari craton) is resolved, I made another checkerboard test using only 4 blocks (2 blocks on each side of the DMB). The model in the four blocks is constructed of alternative high and low velocity anomaly blocks of +/-5% relative to a group velocity of 3km/s and zero velocity anomaly blocks elsewhere. In other words, the velocities are distributed as follows:

- 3.15km/s for the first block (blue),
- 2.85km/s for the second block (red),
- 3.15km/s for the third block (blue) and
- 2.85km/s for the forth block.

In addition, I put a distance of 100km, 200km, 300km and 400km between blocks. The size of the blocks is 400x400km. In doing this resolution test, I would like to check whether I can resolve the structure I see in the result of the inversion for group velocities. This test allows us to focus exclusively on southern edge of the Congo craton and northwestern edge of the Kalahari craton.

Fig 4.4 shows the results of this checkerboard tests for 120s. With this test, the checkerboards are recovered event for a distance of 100km between blocks. There is no smearing in this particular area for the four blocks. Since the synthetic model is well recovered, we can confirm that the SW block of the Congo craton is separated from the Kalahari craton. We conclude that the features we see between the SW block of the Congo craton and the Kalahari Craton are not artifacts but actual structures, and the two cratons are separated by the lower velocity Damara mobile belt.

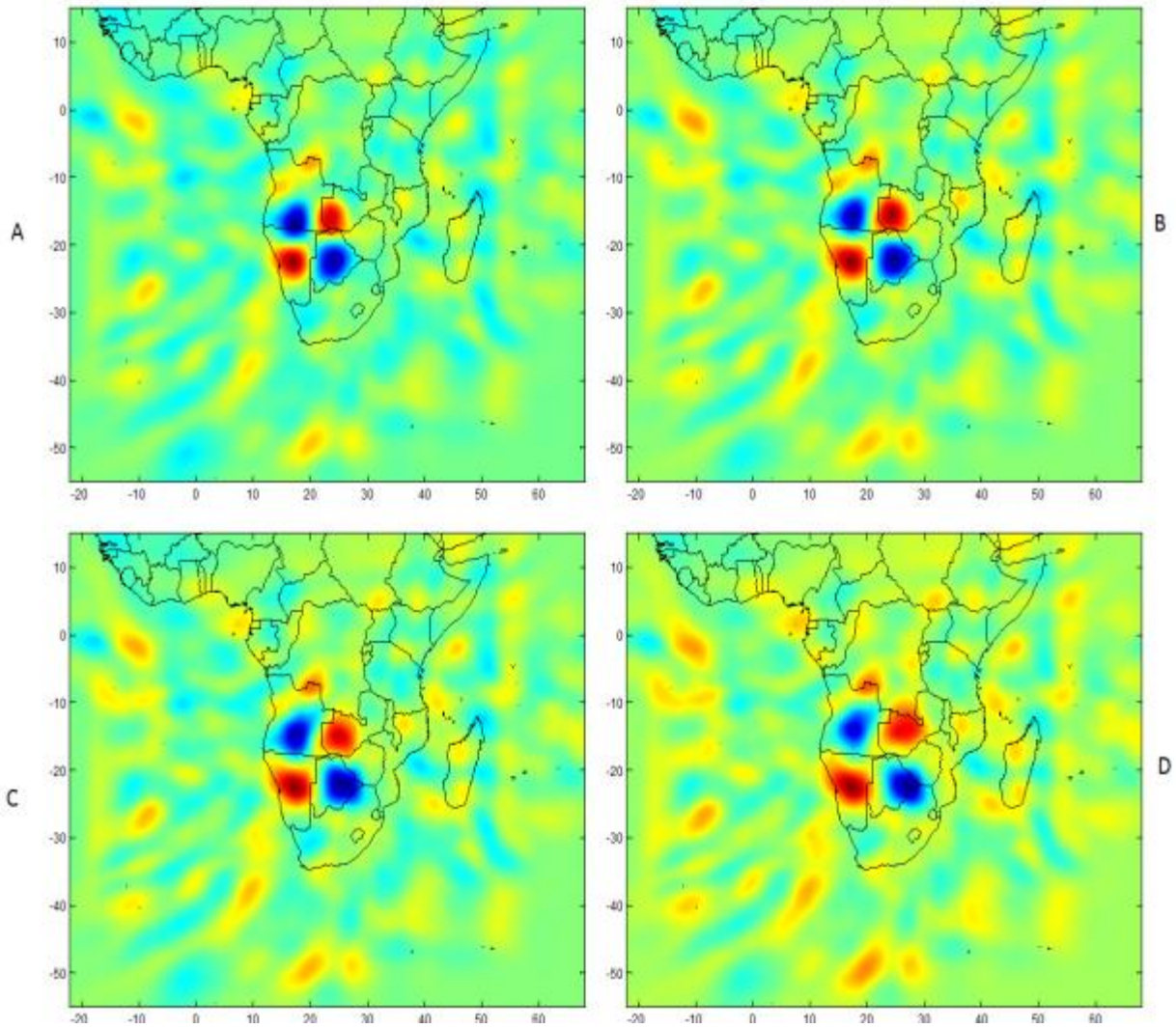

Figure 4. 4: Spike test for 120s using the separation distance of 100km (A), 200km (B), 300km (C), and 400(km) between blocks.

4.3. Conclusion

The objective of this study was to map seismically the structure of the SW block of the Congo craton and to delineate its southwestern margin. In the process the adjacent areas, Kalahari craton and the DMB belt were also mapped.

I used the event-station method to measure group velocity dispersion curves of Rayleigh waves. The events were earthquakes of magnitude ≥ 4.5 and depth ≤ 100km magnitude ≥ 4.5 and depth ≤ 100km, from January 1990 to December 2009, in the area of longitude 22˚W to 68˚E and latitude 55˚S to 15˚N. The stations were seismological broadband stations in the same area.

Measured group velocity dispersions were inverted to obtain the 2D group velocity maps. The maps were later inverted for 3D shear wave velocity structure.

The result shows that faster and highly depleted rocks constitute the upper mantle beneath the Tanzania craton, the Congo craton and the Kalahari craton, and slower, hotter and less depleted rocks constitute the upper mantle beneath the rifts.

In the area of interest (the SW block of the Congo craton, the Damara mobile belt and Kalahari craton) faster velocities are associated with the Kalahari craton and the Congo craton and slower associated with the DMB. The DMB belt is relatively faster than other Pan-African Proterozoic terrains and slower than the Limpopo belt.

The southern edge of the SW block of the Congo craton and the northwestern edge of the Kalahari craton were delineated. Shear wave velocities changes of 2 to 3% faster starting at the inferred geological boundary of the SW block of the Congo craton and northwestern part of the Kalahari craton, respectively. I could not find the keel of the cratonic lithosphere since the period ranges of our dispersion curves (10 to 125s) could not sample deeper than about 130 km.

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Appendixes

Appendix A. Example of the output of the PGSWMFA program

In this output, the instantaneous period InstT and the peak velocity pkV are used in the inversion for group velocity tomography.

```
# SWMFA Version 3.9.0
# Station Info: TSUM -19.2022 17.5838 00LHZ
# Event Info: -2.7340 36.3620 .80E+04
# User and Time Processed: Field Wed Mar 17 13:10
# File name: 2007_198_14_10_42_IU_TSUM.LHZ.sac_dsp.z
# Directory
# /home/Field/davel/dsp
# Filter Width Parameter: V -99.00 Mode Isolation: 1 Peak Error Fraction:
0.95
# Period Range Processed: 10.00 140.00
# Group Velocity Range Processed: 2.20 4.80
#
# T0    InstT   spV   pkV   ldV   hdV      Real(A)        Imag(A)
 10.00  11.35 3.112 3.044 0.027 0.031  0.121500E+01 -0.590947E+00
 10.27  11.44 3.091 3.044 0.027 0.027  0.441483E+01 -0.228054E+01
 10.55  11.53 3.072 3.044 0.027 0.027  0.114109E+00 -0.796847E+01
 10.83  11.65 3.055 3.043 0.027 0.027 -0.821421E+01 -0.337165E+01
 11.13  11.79 3.040 3.043 0.027 0.024 -0.533698E+01  0.657137E+01
 11.43  11.94 3.026 3.042 0.027 0.024  0.449784E+01  0.708421E+01
 11.73  12.11 3.014 3.041 0.023 0.024  0.917778E+01 -0.152748E+01
 12.05  12.31 3.004 3.040 0.023 0.024  0.230527E+01 -0.102398E+02
 12.38  12.53 2.995 3.039 0.023 0.024  0.107185E+02  0.192551E+01
 12.71  12.77 2.988 3.038 0.020 0.024 -0.116893E+01  0.105696E+02
 13.05  13.03 2.983 3.036 0.023 0.024  0.903661E+01  0.383669E+01
 13.41  13.31 2.979 3.035 0.020 0.024 -0.293061E+01  0.861675E+01
 13.77  13.61 2.976 3.032 0.023 0.024 -0.821725E+01 -0.248820E+01
 14.14  13.94 2.975 3.029 0.023 0.024  0.256355E+01 -0.825525E+01
 14.52  14.26 2.976 3.026 0.027 0.024 -0.912352E+01  0.943874E+00
 14.92  14.60 2.977 3.022 0.026 0.024 -0.201106E+01 -0.987952E+01
 15.32  14.95 2.980 3.017 0.026 0.027  0.961226E+01 -0.397757E+01
 15.73  15.30 2.984 3.012 0.026 0.027 -0.815989E+01 -0.564322E+01
 16.16  15.67 2.990 3.008 0.026 0.030  0.288390E+01 -0.787506E+01
 16.59  16.04 2.997 3.004 0.026 0.030 -0.671533E+01  0.148293E+01
 17.04  16.42 3.005 3.001 0.029 0.027  0.371225E+01  0.393990E+01
```

17.50	16.83	3.013	3.000	0.023	0.030	0.127937E+01	-0.407595E+01
17.98	17.28	3.023	3.000	0.026	0.030	0.346054E+01	0.403413E+00
18.46	17.77	3.035	3.001	0.029	0.027	-0.163697E+01	-0.303188E+01
18.96	18.31	3.047	3.003	0.029	0.027	0.458527E+00	-0.362351E+01
19.47	18.85	3.060	3.007	0.029	0.030	-0.371026E+01	0.194962E+01
20.00	19.41	3.073	3.012	0.033	0.034	0.405172E+01	0.248411E+01
20.54	19.94	3.088	3.020	0.036	0.037	0.451512E+00	-0.502283E+01
21.09	20.42	3.104	3.031	0.040	0.041	0.380813E+01	-0.322587E+01
21.66	20.86	3.120	3.044	0.047	0.048	-0.393848E+01	-0.221749E+01
22.25	21.29	3.137	3.061	0.050	0.052	-0.875748E+00	-0.389708E+01
22.85	21.67	3.155	3.078	0.054	0.053	-0.266566E+01	0.148984E+01
23.47	22.09	3.174	3.097	0.058	0.053	-0.229053E+01	-0.844980E+00
24.10	22.55	3.193	3.119	0.056	0.051	-0.137546E+00	0.171543E+01
24.75	23.08	3.213	3.142	0.053	0.051	-0.117721E+01	0.809767E+00
25.42	23.74	3.233	3.166	0.054	0.048	-0.120292E+01	-0.443178E+00
26.11	24.50	3.254	3.193	0.051	0.049	-0.195919E+00	-0.123092E+01
26.81	25.38	3.275	3.220	0.048	0.050	0.108908E+01	-0.691508E+00
27.54	26.47	3.297	3.252	0.053	0.051	0.108646E+01	0.862004E+00
28.28	27.57	3.319	3.288	0.054	0.060	-0.561321E+00	0.139921E+01
29.05	28.78	3.342	3.333	0.064	0.075	-0.160723E+01	-0.201119E+00
29.83	30.12	3.365	3.384	0.078	0.095	-0.170566E+00	-0.168741E+01
30.64	31.11	3.388	3.433	0.076	0.088	0.165031E+01	-0.489274E+00
31.46	31.86	3.411	3.468	0.073	0.081	-0.156510E+01	-0.699353E+00
32.31	32.65	3.435	3.497	0.074	0.078	0.500026E+00	-0.159039E+01
33.19	33.34	3.459	3.521	0.071	0.074	0.154486E+01	0.385695E+00
34.08	34.07	3.483	3.542	0.072	0.070	-0.809716E+00	-0.132371E+01
35.00	34.73	3.506	3.560	0.073	0.071	0.127928E+01	-0.740239E+00
35.95	35.32	3.530	3.577	0.069	0.072	0.626251E+00	0.128047E+01
36.92	36.04	3.554	3.595	0.069	0.072	0.519682E+00	-0.130854E+01
37.92	36.81	3.578	3.614	0.070	0.073	-0.130889E+01	0.483007E+00
38.94	37.60	3.602	3.633	0.071	0.074	-0.316116E+00	-0.133961E+01
40.00	38.43	3.626	3.654	0.072	0.075	-0.794871E+00	0.111142E+01
41.08	39.42	3.650	3.675	0.077	0.075	-0.959951E+00	-0.929645E+00
42.19	40.33	3.673	3.698	0.078	0.076	-0.880072E-01	0.131082E+01
43.32	41.42	3.696	3.724	0.079	0.078	0.104032E+01	-0.754957E+00
44.50	42.62	3.719	3.748	0.080	0.079	-0.121000E+01	-0.318173E+00
45.70	43.96	3.742	3.774	0.076	0.080	0.548298E+00	-0.103046E+01
46.93	45.38	3.764	3.801	0.078	0.081	-0.110542E+01	0.178907E+00
48.20	46.96	3.786	3.825	0.079	0.076	0.763607E+00	0.750672E+00
49.50	48.48	3.807	3.850	0.074	0.077	0.164129E+00	-0.100904E+01
50.84	50.11	3.828	3.870	0.075	0.078	-0.885885E+00	0.411354E+00
52.21	51.82	3.848	3.893	0.076	0.079	0.793195E+00	0.498401E+00
53.62	53.63	3.868	3.912	0.077	0.080	0.635254E-02	-0.905272E+00

55.07	55.32	3.887	3.928	0.077	0.081	-0.764843E+00	0.445202E+00
56.56	57.10	3.906	3.946	0.078	0.081	0.759225E+00	0.441032E+00
58.09	58.84	3.924	3.960	0.079	0.088	0.186895E-01	-0.885470E+00
59.66	60.60	3.941	3.972	0.079	0.088	-0.806553E+00	0.416727E+00
61.27	62.33	3.958	3.984	0.080	0.089	0.779219E+00	0.531441E+00
62.92	64.07	3.973	3.994	0.086	0.095	0.101465E+00	-0.983992E+00
64.62	65.91	3.988	4.005	0.086	0.096	-0.962377E+00	0.401255E+00
66.37	67.64	4.002	4.013	0.092	0.103	0.858273E+00	0.688007E+00
68.16	69.39	4.015	4.021	0.098	0.103	0.858273E+00	0.688007E+00
70.00	71.13	4.028	4.026	0.104	0.103	0.199803E+00	-0.114010E+01
71.90	72.95	4.039	4.032	0.110	0.110	-0.114616E+01	0.392513E+00
73.84	74.64	4.049	4.034	0.110	0.116	0.932109E+00	0.845886E+00
75.83	76.35	4.058	4.035	0.116	0.123	0.932109E+00	0.845886E+00
77.88	78.05	4.066	4.035	0.116	0.129	0.298604E+00	-0.126114E+01
79.99	79.77	4.073	4.035	0.121	0.129	-0.127216E+01	0.354842E+00
82.15	81.46	4.078	4.033	0.127	0.135	0.932747E+00	0.948994E+00
84.37	83.15	4.083	4.032	0.132	0.135	0.932747E+00	0.948994E+00
86.64	84.85	4.086	4.030	0.132	0.148	0.375556E+00	-0.126973E+01
88.99	86.56	4.087	4.028	0.143	0.147	0.375556E+00	-0.126973E+01
91.39	88.28	4.088	4.025	0.143	0.160	-0.126827E+01	0.285910E+00
93.86	90.01	4.087	4.023	0.148	0.160	0.843674E+00	0.933493E+00
96.39	91.77	4.085	4.020	0.153	0.160	0.843674E+00	0.933493E+00
99.00	93.41	4.081	4.018	0.153	0.172	0.372400E+00	-0.113961E+01
101.67	95.20	4.075	4.015	0.164	0.172	0.372400E+00	-0.113961E+01
104.42	97.01	4.069	4.012	0.164	0.184	-0.109754E+01	0.238497E+00
107.24	98.85	4.060	4.009	0.174	0.184	-0.109754E+01	0.238497E+00
110.14	100.71	4.050	4.007	0.179	0.197	0.709404E+00	0.750492E+00
113.11	102.35	4.038	4.005	0.184	0.197	0.709404E+00	0.750492E+00
116.17	104.22	4.025	4.001	0.189	0.209	0.231919E+00	-0.900569E+00
119.31	106.10	4.010	3.999	0.205	0.215	0.231919E+00	-0.900569E+00
122.53	107.70	3.993	3.999	0.210	0.222	-0.772677E+00	0.267831E+00
125.84	109.55	3.974	3.998	0.221	0.235	-0.772677E+00	0.267831E+00
129.24	111.45	3.953	3.998	0.236	0.248	0.569529E+00	0.406138E+00
132.73	112.92	3.931	4.000	0.242	0.255	0.569529E+00	0.406138E+00
136.32	114.73	3.906	4.002	0.257	0.275	0.569529E+00	0.406138E+00
140.00	116.63	3.880	4.011	0.289	0.283	-0.242644E-01	-0.578220E+00

Appendix B. List of events used in this study

The first, the second is the agency reporting the event following by, the origin time, the location (latitude, longitude and depth) and the magnitude of the event, respectively.

ISCCD/NEIC	1990/01/07	20:53:29.2000	-32.159	57.447	10.	5.3
ISCCD/NEIC	1990/01/10	10:06:01.5000	-52.192	13.514	10.	5.5
ISCCD/NEIC	1990/02/22	16:51:51.0000	-11.458	66.380	12.	5.7
ISCCD/NEIC	1990/02/28	20:05:31.7000	-13.969	34.107	33.	5.1
ISCCD/NEIC	1990/02/28	22:18:21.6000	-13.852	34.063	33.	4.9
ISCCD/NEIC	1990/03/01	22:56:42.4000	-14.004	34.209	10.	4.9
ISCCD/NEIC	1990/03/04	21:02:32.6000	12.987	50.555	10.	4.8
ISCCD/NEIC	1990/03/05	08:26:27.3000	13.126	50.423	10.	4.8
ISCCD/NEIC	1990/03/07	18:22:03.1000	-17.295	66.675	10.	5.2
ISCCD/NEIC	1990/03/13	23:05:29.4000	-3.994	39.925	10.	5.3
ISCCD/NEIC	1990/03/17	12:48:02.2000	-47.295	-13.344	10.	5.2
ISCCD/NEIC	1990/03/18	23:19:29.7000	-20.286	66.740	20.	5.8
ISCCD/NEIC	1990/03/31	20:19:35.3000	-39.970	45.783	10.	5.3
ISCCD/NEIC	1990/04/05	19:20:44.1000	-2.927	35.891	10.	4.9
ISCCD/NEIC	1990/04/17	17:58:19.6000	12.583	48.272	23.	4.9
ISCCD/NEIC	1990/04/27	17:53:23.3000	-18.041	35.289	10.	4.8
ISCCD/NEIC	1990/04/30	05:54:41.4000	-54.279	1.271	10.	5.9
ISCCD/NEIC	1990/05/04	10:12:06.8000	11.754	40.964	10.	5.0
ISCCD/NEIC	1990/05/09	03:47:47.2000	-11.786	66.129	10.	4.8
ISCCD/NEIC	1990/05/14	06:52:11.8000	-37.283	47.736	10.	5.4
ISCCD/NEIC	1990/05/15	15:21:26.2000	-3.225	35.744	5.	5.3
ISCCD/NEIC	1990/05/15	16:24:19.5000	-3.075	35.891	5.	5.5
ISCCD/NEIC	1990/05/16	05:36:06.3000	9.885	57.559	10.	4.9
ISCCD/NEIC	1990/05/20	02:22:01.6000	5.121	32.145	15.	6.7
ISCCD/NEIC	1990/05/23	12:26:49.7000	5.494	31.681	10.	4.9
ISCCD/NEIC	1990/05/24	19:34:44.2000	5.277	31.829	16.	5.9
ISCCD/NEIC	1990/05/24	20:00:08.1000	5.358	31.848	16.	6.5
ISCCD/NEIC	1990/05/24	22:16:03.3000	5.436	31.876	10.	5.5
ISCCD/NEIC	1990/05/25	00:42:31.9000	5.425	31.848	10.	5.3
ISCCD/NEIC	1990/05/25	02:49:02.3000	5.358	31.328	10.	4.8
ISCCD/NEIC	1990/05/25	06:12:44.8000	4.490	31.490	10.	4.8
ISCCD/NEIC	1990/05/26	05:53:50.6000	5.321	32.044	10.	4.8
ISCCD/NEIC	1990/05/26	14:22:40.8000	5.134	31.769	10.	5.0
WHDF/NEIC	1990/05/27	07:29:30.2000	4.203	30.035	10.	4.9
ISCCD/NEIC	1990/05/27	07:29:32.6000	4.804	31.743	10.	5.0
ISCCD/NEIC	1990/05/27	18:56:56.8000	13.129	39.927	52.	5.0
ISCCD/NEIC	1990/05/28	01:11:57.2000	5.462	31.847	10.	4.8

ISCCD/NEIC	1990/06/03	16:23:39.1000	5.442	32.121	10.	5.1
ISCCD/NEIC	1990/06/07	07:14:42.4000	-20.117	66.555	10.	5.0
ISCCD/NEIC	1990/06/16	02:05:37.7000	-38.365	-16.587	10.	5.0
ISCCD/NEIC	1990/06/17	16:46:04.2000	-38.477	-16.454	10.	5.3
ISCCD/NEIC	1990/06/19	10:34:43.6000	-38.409	-16.450	10.	5.0
WHDF/NEIC	1990/06/20	16:24:28.8000	-38.554	-16.447	10.	5.0
ISCCD/NEIC	1990/06/20	16:24:30.9000	-37.967	-16.897	10.	5.0
ISCCD/NEIC	1990/06/20	18:47:58.9000	5.412	31.717	16.	5.0
ISCCD/NEIC	1990/06/21	06:49:34.5000	-38.456	-16.449	10.	5.1
ISCCD/NEIC	1990/06/23	03:22:00.7000	-14.849	66.030	10.	4.9
ISCCD/NEIC	1990/06/29	07:24:35.0000	10.133	57.424	10.	4.8
ISCCD/NEIC	1990/07/02	18:27:33.7000	-11.838	65.657	10.	5.3
ISCCD/NEIC	1990/07/04	02:01:48.9000	-44.751	-15.605	10.	4.8
ISCCD/NEIC	1990/07/08	17:29:08.5000	-4.521	-12.294	10.	4.9
ISCCD/NEIC	1990/07/09	15:11:20.3000	5.395	31.654	13.	5.9
ISCCD/NEIC	1990/07/14	05:54:25.4000	0.003	-17.376	11.	6.2
ISCCD/NEIC	1990/07/14	07:24:39.6000	-0.074	-17.523	12.	5.8
ISCCD/NEIC	1990/07/26	05:15:43.9000	-2.948	35.854	10.	4.9
ISCCD/NEIC	1990/07/27	20:41:31.0000	5.072	32.078	10.	4.8
ISCCD/NEIC	1990/07/28	16:46:02.7000	5.225	32.604	10.	5.3
ISCCD/NEIC	1990/07/30	10:04:52.5000	-4.369	-10.779	10.	4.8
ISCCD/NEIC	1990/07/30	10:06:15.0000	-4.349	-10.819	10.	5.1
ISCCD/NEIC	1990/07/31	04:12:47.5000	-0.544	-14.266	10.	4.8
ISCCD/NEIC	1990/08/05	17:42:32.1000	-1.080	-13.887	10.	5.6
ISCCD/NEIC	1990/08/07	07:14:01.2000	-19.080	65.595	10.	5.1
ISCCD/NEIC	1990/08/07	19:22:06.5000	-19.097	65.620	10.	5.1
ISCCD/NEIC	1990/08/10	21:11:49.0000	6.572	60.240	10.	5.5
ISCCD/NEIC	1990/08/13	14:57:41.1000	-18.719	65.398	10.	4.9
ISCCD/NEIC	1990/08/24	15:41:20.0000	-17.699	-13.253	10.	5.1
ISCCD/NEIC	1990/08/30	02:41:13.5000	-0.044	-17.317	10.	4.8
ISCCD/NEIC	1990/09/04	01:48:00.7000	-0.479	29.085	10.	5.0
ISCCD/NEIC	1990/09/06	21:32:23.9000	-26.638	67.937	10.	5.1
ISCCD/NEIC	1990/09/07	00:12:26.2000	5.443	31.686	10.	5.2
ISCCD/NEIC	1990/09/08	09:51:49.5000	-13.964	-14.402	10.	4.8
ISCCD/NEIC	1990/09/08	11:39:19.8000	-13.972	-14.506	10.	5.0
ISCCD/NEIC	1990/09/10	23:26:04.2000	4.528	62.370	10.	4.8
ISCCD/NEIC	1990/09/14	20:40:18.3000	13.382	51.456	10.	5.4
ISCCD/NEIC	1990/09/18	04:55:42.0000	-4.061	29.483	10.	5.0
ISCCD/NEIC	1990/09/23	06:43:36.5000	13.045	49.874	10.	4.9
ISCCD/NEIC	1990/09/26	23:08:23.9000	-28.014	26.727	5.	5.4
ISCCD/NEIC	1990/10/04	09:11:33.7000	-0.257	-20.894	10.	4.8
ISCCD/NEIC	1990/10/06	09:08:09.1000	-2.711	67.908	10.	5.6
ISCCD/NEIC	1990/10/06	14:21:14.1000	3.981	62.601	10.	5.1

ISCCD/NEIC	1990/10/07	15:40:02.7000	3.947	62.786	10.	5.0
ISCCD/NEIC	1990/10/08	00:51:32.4000	4.011	62.648	10.	5.0
ISCCD/NEIC	1990/10/14	19:48:12.6000	-46.121	33.554	10.	4.9
ISCCD/NEIC	1990/10/21	04:22:56.9000	2.563	64.788	10.	4.9
ISCCD/NEIC	1990/10/26	05:49:37.9000	-35.143	-16.426	10.	5.1
ISCCD/NEIC	1990/10/26	06:04:15.7000	-35.368	-16.108	10.	5.1
ISCCD/NEIC	1990/11/03	00:31:28.8000	-21.358	33.282	10.	4.9
ISCCD/NEIC	1990/11/03	11:20:19.3000	14.656	54.303	10.	5.1
ISCCD/NEIC	1990/11/05	15:34:13.2000	-43.651	-16.157	10.	5.3
ISCCD/NEIC	1990/11/08	14:56:00.4000	-13.809	66.221	10.	5.1
ISCCD/NEIC	1990/11/12	15:47:13.8000	8.400	58.319	10.	5.0
ISCCD/NEIC	1990/11/12	15:48:08.2000	9.006	58.548	10.	5.2
ISCCD/NEIC	1990/11/12	15:49:56.8000	9.830	58.514	10.	4.9
ISCCD/NEIC	1990/11/12	15:54:33.0000	8.074	58.857	10.	5.1
ISCCD/NEIC	1990/11/13	20:13:29.3000	-0.062	-16.671	10.	5.0
ISCCD/NEIC	1990/11/14	00:31:39.4000	-28.122	26.789	5.	4.8
ISCCD/NEIC	1990/11/16	21:38:50.8000	-35.211	-17.127	10.	4.9
ISCCD/NEIC	1990/11/22	13:18:13.3000	-52.700	10.417	10.	4.8
ISCCD/NEIC	1990/12/06	01:16:55.1000	-16.690	66.764	10.	5.0
ISCCD/NEIC	1990/12/09	11:07:34.1000	-48.300	31.392	10.	5.3
ISCCD/NEIC	1990/12/11	05:09:08.5000	5.350	32.639	10.	5.0
ISCCD/NEIC	1990/12/18	02:33:12.3000	-42.553	-16.140	10.	5.4
ISCCD/NEIC	1990/12/18	02:49:22.8000	-42.667	-15.948	12.	5.6
ISCCD/NEIC	1990/12/20	22:44:47.1000	-51.085	15.879	10.	4.8
ISCCD/NEIC	1990/12/23	16:39:16.5000	-49.231	30.493	10.	5.1
ISCCD/NEIC	1990/12/24	14:52:31.2000	-52.987	22.440	10.	4.8
ISCCD/NEIC	1990/12/24	15:59:40.9000	-53.068	22.235	10.	4.9
ISCCD/NEIC	1990/12/24	16:26:27.2000	-21.026	-11.485	10.	4.9
ISCCD/NEIC	1990/12/24	16:40:12.6000	-21.013	-11.595	10.	5.2
ISCCD/NEIC	1990/12/28	22:11:48.4000	-15.189	66.673	10.	4.9
ISCCD/NEIC	1990/12/28	22:32:17.2000	-14.875	66.777	17.	6.0
ISCCD/NEIC	1991/01/05	15:47:49.1000	5.140	32.080	33.	4.9
ISCCD/NEIC	1991/01/06	11:25:08.0000	-52.585	27.707	10.	4.8
ISCCD/NEIC	1991/01/08	16:09:30.6000	5.365	32.541	10.	4.8
ISCCD/NEIC	1991/01/10	07:06:26.2000	5.114	31.822	11.	5.2
ISCCD/NEIC	1991/01/19	02:08:52.4000	-3.410	-12.122	10.	5.0
ISCCD/NEIC	1991/01/20	00:09:54.1000	-3.158	-12.278	10.	5.3
ISCCD/NEIC	1991/01/24	12:55:51.2000	-13.138	23.227	10.	4.9
ISCCD/NEIC	1991/02/09	08:45:55.4000	5.196	32.466	10.	4.8
ISCCD/NEIC	1991/02/15	19:17:41.7000	2.567	66.336	10.	4.8
ISCCD/NEIC	1991/02/15	22:31:03.1000	-4.379	28.518	10.	4.7
ISCCD/NEIC	1991/02/16	01:12:43.7000	2.438	66.665	10.	4.9
ISCCD/NEIC	1991/02/16	09:14:30.2000	2.409	66.623	10.	4.8

ISCCD/NEIC	1991/02/18	16:19:56.4000	2.861	66.410	10.	5.1
ISCCD/NEIC	1991/02/18	22:51:45.4000	11.865	57.701	10.	4.8
ISCCD/NEIC	1991/02/22	22:06:11.1000	-3.972	35.811	10.	5.3
ISCCD/NEIC	1991/02/23	14:43:20.7000	-24.570	-14.469	10.	4.8
ISCCD/NEIC	1991/02/24	19:31:53.1000	-1.680	28.772	10.	4.6
ISCCD/NEIC	1991/03/08	02:26:46.3000	-33.564	-14.454	10.	4.9
ISCCD/NEIC	1991/03/11	21:15:56.4000	-51.154	29.255	10.	5.8
ISCCD/NEIC	1991/03/15	08:22:54.1000	5.715	32.301	10.	4.8
ISCCD/NEIC	1991/03/19	20:29:34.8000	-5.754	35.629	33.	4.7
ISCCD/NEIC	1991/03/29	09:06:06.4000	5.210	32.672	10.	5.5
ISCCD/NEIC	1991/03/29	16:54:31.2000	5.405	32.951	10.	4.8
ISCCD/NEIC	1991/04/21	23:12:22.5000	-18.287	46.416	19.	5.8
ISCCD/NEIC	1991/05/08	09:42:13.3000	-16.602	66.884	10.	5.1
ISCCD/NEIC	1991/05/09	17:00:40.2000	5.129	31.590	10.	4.8
ISCCD/NEIC	1991/05/10	01:12:38.4000	-17.352	25.016	10.	5.0
ISCCD/NEIC	1991/05/11	15:26:29.7000	12.413	47.516	17.	5.2
ISCCD/NEIC	1991/05/12	16:12:37.1000	12.279	47.487	10.	5.3
ISCCD/NEIC	1991/05/12	16:27:38.2000	-19.921	67.892	10.	4.9
ISCCD/NEIC	1991/05/30	09:34:43.2000	-11.205	32.624	10.	4.7
ISCCD/NEIC	1991/06/10	13:28:04.4000	-26.842	26.724	5.	4.8
ISCCD/NEIC	1991/06/11	20:24:44.3000	-0.070	-16.748	10.	4.9
ISCCD/NEIC	1991/06/21	19:33:47.1000	2.502	66.550	10.	4.9
ISCCD/NEIC	1991/06/30	03:08:14.2000	-14.371	-13.562	10.	5.3
ISCCD/NEIC	1991/07/04	04:29:37.2000	-34.132	-14.227	10.	4.8
ISCCD/NEIC	1991/07/12	08:13:43.3000	-36.278	-17.658	10.	4.9
ISCCD/NEIC	1991/07/12	13:26:44.4000	-35.930	-17.817	10.	4.8
ISCCD/NEIC	1991/07/16	22:35:36.9000	0.309	67.042	10.	4.8
ISCCD/NEIC	1991/07/17	17:27:32.6000	-7.234	67.978	10.	4.8
ISCCD/NEIC	1991/07/17	17:35:52.3000	3.815	63.315	10.	5.0
ISCCD/NEIC	1991/07/17	18:54:17.2000	3.786	63.280	10.	5.0
ISCCD/NEIC	1991/07/18	23:01:38.7000	-37.786	-17.532	10.	4.9
ISCCD/NEIC	1991/07/24	13:54:52.0000	-18.274	34.856	32.	5.2
ISCCD/NEIC	1991/08/04	20:23:48.4000	-8.682	67.270	10.	4.9
ISCCD/NEIC	1991/08/12	13:02:30.2000	-14.170	-14.255	10.	5.5
ISCCD/NEIC	1991/08/24	18:19:52.5000	-32.549	57.760	10.	4.8
ISCCD/NEIC	1991/08/29	16:59:49.0000	-6.988	-12.677	10.	5.0
ISCCD/NEIC	1991/09/01	22:34:33.2000	-10.821	41.252	29.	4.8
ISCCD/NEIC	1991/09/03	13:27:22.9000	-15.550	-13.204	10.	4.9
ISCCD/NEIC	1991/09/06	16:08:34.2000	5.341	32.155	10.	4.8
ISCCD/NEIC	1991/09/15	15:10:31.5000	-1.696	-12.833	10.	4.9
ISCCD/NEIC	1991/10/02	16:18:35.1000	-46.539	-10.443	10.	5.0
ISCCD/NEIC	1991/10/03	14:21:32.1000	-46.769	-10.543	10.	4.9
ISCCD/NEIC	1991/10/08	18:51:20.1000	-2.040	27.446	10.	4.8

ISCCD/NEIC	1991/10/09	17:22:05.4000	1.804	31.293	33.	5.7
ISCCD/NEIC	1991/10/10	07:04:02.5000	-31.656	57.778	10.	5.1
ISCCD/NEIC	1991/10/25	07:22:08.0000	-41.075	44.177	10.	4.8
ISCCD/NEIC	1991/10/27	23:06:04.6000	-0.008	-16.659	10.	4.8
ISCCD/NEIC	1991/11/03	18:28:55.4000	-26.895	26.700	5.	5.1
ISCCD/NEIC	1991/11/05	21:16:16.0000	-16.908	66.162	10.	5.6
ISCCD/NEIC	1991/11/22	18:38:49.9000	-47.141	-13.187	10.	4.9
ISCCD/NEIC	1991/11/26	06:59:21.1000	-22.345	-12.693	10.	4.9
ISCCD/NEIC	1991/12/01	20:03:10.5000	-26.878	26.664	10.	5.0
ISCCD/NEIC	1991/12/02	17:32:20.7000	-17.864	-13.836	10.	5.3
ISCCD/NEIC	1991/12/07	19:21:24.4000	-37.443	51.281	10.	5.1
ISCCD/NEIC	1991/12/18	07:54:21.7000	-5.068	-11.865	10.	4.9
ISCCD/NEIC	1992/01/10	11:15:13.5000	11.765	42.334	10.	4.9
ISCCD/NEIC	1992/01/18	23:51:50.5000	-26.846	26.816	5.	4.6
ISCCD/NEIC	1992/01/23	14:46:15.3000	-53.436	24.861	10.	5.0
ISCCD/NEIC	1992/01/30	04:46:08.3000	-1.742	-12.841	10.	5.0
ISCCD/NEIC	1992/02/24	06:39:53.4000	-53.674	2.524	10.	5.1
ISCCD/NEIC	1992/02/26	03:45:19.7000	11.803	57.764	10.	5.8
ISCCD/NEIC	1992/03/05	08:55:05.6000	11.513	42.812	7.	5.5
ISCCD/NEIC	1992/03/07	00:43:03.6000	-26.512	27.353	10.	4.9
ISCCD/NEIC	1992/03/12	16:34:46.9000	-7.840	-13.635	10.	5.1
ISCCD/NEIC	1992/03/13	07:44:03.2000	-8.002	-13.338	10.	4.8
ISCCD/NEIC	1992/03/15	17:38:06.7000	-7.622	-13.424	10.	4.9
ISCCD/NEIC	1992/03/15	19:21:54.5000	-39.599	-15.325	10.	5.3
ISCCD/NEIC	1992/03/18	17:26:42.4000	-54.512	1.603	10.	4.8
ISCCD/NEIC	1992/03/22	19:25:08.1000	-42.669	-18.507	10.	5.6
ISCCD/NEIC	1992/03/30	03:28:39.9000	-52.365	27.401	10.	4.9
ISCCD/NEIC	1992/04/02	03:17:55.6000	-37.562	-17.164	10.	5.4
ISCCD/NEIC	1992/04/02	06:42:42.0000	-37.298	-17.351	10.	5.4
ISCCD/NEIC	1992/04/06	23:50:54.3000	-46.525	33.868	10.	4.8
ISCCD/NEIC	1992/04/08	01:28:52.2000	11.997	45.972	10.	5.0
ISCCD/NEIC	1992/04/08	01:55:51.0000	11.826	45.950	10.	4.8
ISCCD/NEIC	1992/04/20	21:39:26.0000	-28.209	-12.604	10.	4.9
ISCCD/NEIC	1992/05/06	04:28:48.8000	-34.901	-17.224	10.	5.0
ISCCD/NEIC	1992/05/06	23:26:14.9000	-45.658	34.874	10.	5.0
ISCCD/NEIC	1992/05/13	11:16:06.4000	-26.527	67.780	10.	4.8
ISCCD/NEIC	1992/05/14	05:19:41.2000	-26.690	67.763	10.	4.9
ISCCD/NEIC	1992/05/14	05:37:54.0000	-26.657	67.802	10.	4.9
ISCCD/NEIC	1992/05/17	02:38:32.3000	-9.860	34.021	28.	4.9
ISCCD/NEIC	1992/05/17	03:10:14.8000	-9.953	34.240	32.	4.8
ISCCD/NEIC	1992/05/20	04:14:46.7000	-26.366	67.874	10.	4.8
ISCCD/NEIC	1992/05/21	04:13:17.6000	13.312	50.916	21.	5.0
ISCCD/NEIC	1992/05/23	10:53:49.8000	-43.654	-15.531	10.	5.1

ISCCD/NEIC	1992/05/27	00:54:34.8000	12.191	57.859	10.	4.8
ISCCD/NEIC	1992/06/03	16:12:22.2000	12.699	49.486	10.	4.8
ISCCD/NEIC	1992/06/06	18:34:00.7000	-28.020	26.753	10.	5.3
ISCCD/NEIC	1992/06/13	10:00:41.0000	-32.280	57.154	10.	4.9
ISCCD/NEIC	1992/06/13	16:42:08.4000	-1.831	67.972	10.	4.9
ISCCD/NEIC	1992/06/28	16:19:24.3000	-44.441	37.691	10.	4.8
ISCCD/NEIC	1992/06/29	13:49:21.0000	-28.336	62.907	10.	5.0
ISCCD/NEIC	1992/07/02	23:32:03.7000	-34.843	54.544	10.	5.3
ISCCD/NEIC	1992/07/07	22:47:13.3000	-44.978	-20.387	10.	5.4
ISCCD/NEIC	1992/07/11	08:40:05.1000	-12.183	-14.870	10.	5.1
ISCCD/NEIC	1992/07/11	08:41:15.1000	-12.842	-14.358	10.	5.2
ISCCD/NEIC	1992/07/11	10:46:37.0000	-12.571	-14.744	10.	4.9
ISCCD/NEIC	1992/07/11	16:07:56.7000	-12.994	-14.483	10.	5.2
ISCCD/NEIC	1992/07/23	13:30:37.2000	14.232	56.815	10.	4.8
ISCCD/NEIC	1992/07/23	23:31:50.6000	-14.038	-14.314	10.	5.2
ISCCD/NEIC	1992/08/03	15:06:44.3000	-35.908	-17.780	10.	4.9
ISCCD/NEIC	1992/08/12	15:20:50.1000	-27.927	63.591	10.	5.0
ISCCD/NEIC	1992/08/21	09:54:51.3000	-18.321	65.097	10.	5.1
ISCCD/NEIC	1992/08/28	18:18:46.4000	-0.965	-13.562	16.	6.3
ISCCD/NEIC	1992/09/11	03:57:26.5000	-6.087	26.651	11.	6.7
ISCCD/NEIC	1992/09/12	13:36:36.6000	-38.756	46.383	10.	5.2
ISCCD/NEIC	1992/09/15	04:07:26.4000	-12.295	-14.776	10.	5.0
ISCCD/NEIC	1992/09/16	18:34:46.6000	-6.337	26.622	10.	4.6
ISCCD/NEIC	1992/09/19	14:20:04.5000	-6.250	26.658	16.	4.8
ISCCD/NEIC	1992/09/21	10:18:49.3000	-7.816	-13.585	10.	5.8
ISCCD/NEIC	1992/09/23	14:52:27.6000	-6.163	26.718	11.	5.6
ISCCD/NEIC	1992/09/25	00:39:21.8000	-6.184	26.836	10.	4.9
ISCCD/NEIC	1992/09/28	23:49:27.3000	4.179	62.578	10.	5.3
ISCCD/NEIC	1992/09/28	23:55:54.1000	4.229	62.337	10.	5.1
ISCCD/NEIC	1992/09/28	23:58:16.2000	4.469	62.404	10.	5.3
ISCCD/NEIC	1992/09/29	00:16:36.3000	4.343	62.542	10.	5.1
ISCCD/NEIC	1992/10/09	09:34:51.0000	-0.936	-15.966	10.	5.3
ISCCD/NEIC	1992/10/13	16:22:11.7000	4.793	32.108	33.	4.7
ISCCD/NEIC	1992/10/15	20:28:19.8000	-53.851	6.900	10.	5.2
ISCCD/NEIC	1992/10/21	15:05:24.6000	-6.322	26.772	10.	4.8
ISCCD/NEIC	1992/11/01	07:51:25.3000	-48.852	-8.533	10.	5.3
ISCCD/NEIC	1992/11/04	05:28:38.2000	-0.131	-17.175	10.	4.8
ISCCD/NEIC	1992/11/04	14:49:08.8000	-54.147	2.792	10.	5.0
ISCCD/NEIC	1992/11/04	20:31:04.0000	-0.590	-17.466	10.	5.0
ISCCD/NEIC	1992/11/14	05:54:48.2000	-22.991	45.847	23.	5.1
ISCCD/NEIC	1992/11/20	03:46:14.9000	-31.082	-13.548	10.	5.1
ISCCD/NEIC	1992/11/21	09:21:41.1000	-6.973	-11.737	10.	4.9
ISCCD/NEIC	1992/11/22	02:21:20.6000	-45.958	33.961	10.	5.0

ISCCD/NEIC	1992/11/23	19:57:22.6000	-1.594	67.491	10.	5.2
ISCCD/NEIC	1992/12/03	06:28:37.7000	-48.137	-9.878	10.	5.3
ISCCD/NEIC	1992/12/06	01:43:53.0000	10.865	57.291	10.	5.3
ISCCD/NEIC	1992/12/08	09:48:41.0000	-16.317	67.853	10.	5.0
ISCCD/NEIC	1992/12/11	06:57:26.8000	-15.068	67.094	10.	5.1
ISCCD/NEIC	1992/12/13	05:07:40.6000	-4.113	32.254	33.	4.6
ISCCD/NEIC	1992/12/15	04:24:54.3000	14.718	55.629	10.	5.0
ISCCD/NEIC	1992/12/16	09:49:40.9000	-17.136	66.916	10.	5.0
ISCCD/NEIC	1992/12/23	10:54:52.9000	-23.754	17.410	10.	5.0
ISCCD/NEIC	1992/12/26	19:52:24.9000	-0.564	-19.318	27.	5.8
ISCCD/NEIC	1992/12/31	06:23:26.2000	-34.947	-17.225	10.	5.1
ISCCD/NEIC	1993/01/07	07:42:26.3000	0.136	-16.972	10.	5.7
ISCCD/NEIC	1993/01/08	17:31:10.8000	13.006	49.351	10.	5.3
ISCCD/NEIC	1993/01/10	18:07:57.0000	-33.744	57.211	10.	5.0
ISCCD/NEIC	1993/01/16	05:03:54.6000	-20.337	66.318	10.	4.8
ISCCD/NEIC	1993/01/19	09:05:01.8000	-45.118	34.996	10.	5.4
ISCCD/NEIC	1993/01/21	01:15:33.3000	12.620	40.607	10.	4.9
ISCCD/NEIC	1993/02/13	02:25:49.7000	8.331	39.308	12.	5.0
ISCCD/NEIC	1993/02/18	10:10:48.4000	-0.457	-19.454	10.	5.2
ISCCD/NEIC	1993/02/20	00:31:53.3000	-7.740	22.213	16.	4.8
ISCCD/NEIC	1993/02/22	12:05:01.5000	-53.001	22.324	10.	4.8
ISCCD/NEIC	1993/02/27	12:38:50.3000	-0.573	-19.446	10.	4.9
ISCCD/NEIC	1993/03/05	13:04:21.2000	-36.361	52.721	10.	4.9
ISCCD/NEIC	1993/03/05	14:00:14.2000	-29.497	60.914	10.	5.5
ISCCD/NEIC	1993/03/16	22:59:45.8000	11.625	41.987	16.	5.6
ISCCD/NEIC	1993/03/18	07:39:58.7000	-10.510	-13.152	10.	4.9
ISCCD/NEIC	1993/03/20	06:30:25.9000	9.763	57.858	10.	5.1
ISCCD/NEIC	1993/03/29	06:57:19.5000	-53.039	27.396	10.	5.9
ISCCD/NEIC	1993/04/04	18:20:52.1000	-13.873	34.461	10.	4.6
ISCCD/NEIC	1993/04/05	01:57:30.8000	-20.410	67.905	10.	5.2
ISCCD/NEIC	1993/04/06	17:23:47.4000	-26.334	27.373	5.	4.7
ISCCD/NEIC	1993/04/07	11:22:45.8000	-35.419	54.023	21.	5.2
ISCCD/NEIC	1993/04/09	05:54:17.3000	-31.477	-13.591	10.	5.5
ISCCD/NEIC	1993/04/10	01:02:43.3000	-27.596	66.233	10.	4.9
ISCCD/NEIC	1993/04/11	19:41:42.4000	-3.846	35.638	28.	5.3
ISCCD/NEIC	1993/04/15	10:32:31.2000	-16.395	-14.293	10.	5.6
ISCCD/NEIC	1993/04/18	18:27:37.5000	-26.506	67.835	10.	4.8
ISCCD/NEIC	1993/04/20	06:16:49.1000	-29.125	61.263	10.	4.9
ISCCD/NEIC	1993/04/20	06:46:45.5000	-29.233	61.243	10.	5.1
ISCCD/NEIC	1993/04/23	16:35:40.4000	-13.304	44.582	10.	5.0
ISCCD/NEIC	1993/04/30	10:15:16.3000	-13.437	66.718	10.	5.0
ISCCD/NEIC	1993/05/02	02:09:25.8000	-17.352	-14.500	10.	5.6
ISCCD/NEIC	1993/05/02	17:58:23.0000	14.577	40.099	10.	4.8

ISCCD/NEIC	1993/05/06	20:35:55.6000	14.395	40.126	10.	5.1
ISCCD/NEIC	1993/05/07	15:02:21.6000	-11.702	-14.256	10.	4.9
ISCCD/NEIC	1993/05/10	10:54:59.5000	14.449	40.194	10.	5.1
ISCCD/NEIC	1993/05/10	15:54:16.9000	-49.661	-8.083	10.	5.2
ISCCD/NEIC	1993/05/13	18:20:49.7000	14.400	40.186	19.	4.9
ISCCD/NEIC	1993/05/28	11:06:12.6000	-27.264	66.474	10.	5.5
ISCCD/NEIC	1993/05/29	01:31:44.4000	-27.329	66.162	10.	5.2
ISCCD/NEIC	1993/05/29	08:31:50.3000	6.491	60.682	10.	5.0
ISCCD/NEIC	1993/06/02	03:00:18.4000	-46.471	33.954	10.	5.6
ISCCD/NEIC	1993/06/08	12:18:06.5000	-31.669	-15.695	10.	5.5
ISCCD/NEIC	1993/06/17	22:37:58.9000	-0.097	-16.614	10.	5.3
ISCCD/NEIC	1993/06/20	13:02:16.9000	-6.131	26.862	11.	4.9
ISCCD/NEIC	1993/06/20	22:18:08.0000	-10.577	-13.173	10.	5.2
ISCCD/NEIC	1993/07/13	23:31:20.3000	-42.697	42.192	10.	5.1
ISCCD/NEIC	1993/07/20	16:50:44.8000	-52.917	27.174	10.	5.1
ISCCD/NEIC	1993/07/21	00:30:16.9000	-0.087	-16.710	10.	5.5
ISCCD/NEIC	1993/07/23	18:54:53.1000	-5.469	35.784	10.	5.0
ISCCD/NEIC	1993/07/23	19:01:33.1000	-5.023	35.907	33.	5.1
ISCCD/NEIC	1993/07/25	15:05:19.6000	-17.844	-13.431	10.	5.2
ISCCD/NEIC	1993/07/31	02:32:45.8000	-4.397	28.361	10.	5.0
ISCCD/NEIC	1993/08/01	14:19:28.9000	-43.824	-16.235	10.	5.0
ISCCD/NEIC	1993/08/06	09:50:12.8000	-11.556	-13.236	10.	5.0
ISCCD/NEIC	1993/08/11	01:36:47.7000	-2.425	-12.362	10.	5.0
ISCCD/NEIC	1993/08/11	04:26:09.9000	-2.274	-12.410	10.	5.0
ISCCD/NEIC	1993/08/11	17:11:34.7000	-3.527	29.360	21.	4.8
ISCCD/NEIC	1993/08/22	01:53:04.7000	14.255	56.262	10.	4.8
ISCCD/NEIC	1993/09/03	10:50:54.0000	-3.995	34.059	33.	4.8
ISCCD/NEIC	1993/09/04	04:35:01.3000	-0.059	-16.587	10.	5.1
ISCCD/NEIC	1993/09/08	22:32:25.7000	-0.013	-16.654	10.	4.9
ISCCD/NEIC	1993/09/14	10:05:04.7000	-1.721	-13.412	10.	4.8
ISCCD/NEIC	1993/09/18	04:15:37.8000	5.347	37.561	10.	4.8
ISCCD/NEIC	1993/09/18	13:22:56.6000	0.247	-16.228	10.	5.2
ISCCD/NEIC	1993/09/21	08:21:21.8000	0.098	-16.091	10.	4.8
ISCCD/NEIC	1993/09/21	09:38:29.2000	0.067	-16.255	10.	4.9
ISCCD/NEIC	1993/09/21	13:09:08.5000	0.356	-16.394	10.	5.4
ISCCD/NEIC	1993/09/21	19:11:35.9000	11.478	39.638	15.	5.4
ISCCD/NEIC	1993/09/22	18:21:45.7000	-47.317	-13.437	10.	4.9
ISCCD/NEIC	1993/09/23	07:10:47.3000	0.070	-16.181	10.	4.9
ISCCD/NEIC	1993/09/23	14:33:16.8000	0.393	-16.216	10.	4.9
ISCCD/NEIC	1993/09/25	04:14:49.3000	-47.770	31.999	10.	5.0
ISCCD/NEIC	1993/09/26	23:47:10.2000	-31.148	-13.376	10.	5.0
ISCCD/NEIC	1993/09/28	22:30:49.7000	-2.526	28.602	10.	4.9
ISCCD/NEIC	1993/09/29	18:26:20.2000	-42.677	-18.385	10.	5.9

ISCCD/NEIC	1993/10/06	04:34:23.0000	8.037	58.914	10.	4.9
ISCCD/NEIC	1993/10/09	22:24:21.9000	11.712	57.660	10.	5.2
ISCCD/NEIC	1993/10/12	21:04:52.4000	13.048	51.063	10.	5.0
ISCCD/NEIC	1993/10/18	05:50:17.4000	0.633	30.215	33.	4.9
ISCCD/NEIC	1993/10/22	05:38:54.7000	-52.729	27.089	10.	5.2
ISCCD/NEIC	1993/11/03	13:18:10.8000	-7.123	67.916	10.	5.4
ISCCD/NEIC	1993/11/09	02:14:03.7000	14.353	53.744	10.	5.3
ISCCD/NEIC	1993/11/10	20:10:43.0000	-29.051	61.840	10.	5.1
ISCCD/NEIC	1993/11/11	06:41:59.2000	-40.902	43.297	10.	4.8
WHDF/NEIC	1993/11/18	17:52:08.3000	-35.703	-17.349	10.	4.9
ISCCD/NEIC	1993/11/18	17:52:09.8000	-35.095	-17.208	10.	5.1
ISCCD/NEIC	1993/11/19	18:06:33.5000	-0.034	-16.557	10.	4.9
ISCCD/NEIC	1993/11/25	20:24:00.7000	-0.963	-13.264	10.	5.7
ISCCD/NEIC	1993/12/01	22:04:22.3000	-12.781	44.766	10.	5.2
ISCCD/NEIC	1993/12/01	22:18:29.1000	1.494	66.765	10.	5.1
ISCCD/NEIC	1993/12/17	00:37:25.6000	5.311	61.523	10.	5.1
ISCCD/NEIC	1993/12/20	19:15:24.9000	-26.921	26.655	5.	4.8
ISCCD/NEIC	1993/12/20	20:22:34.1000	-26.913	26.699	5.	4.7
ISCCD/NEIC	1993/12/24	16:49:44.1000	-9.313	67.323	10.	5.0
ISCCD/NEIC	1993/12/27	03:41:30.4000	-0.124	-16.450	10.	4.8
ISCCD/NEIC	1994/01/04	12:39:26.7000	-26.840	26.708	5.	4.6
ISCCD/NEIC	1994/01/13	09:43:06.5000	-17.350	-14.486	10.	5.7
ISCCD/NEIC	1994/01/20	23:04:36.4000	-3.877	-11.976	10.	5.0
ISCCD/NEIC	1994/01/26	02:26:00.7000	5.314	37.411	10.	4.9
ISCCD/NEIC	1994/01/31	09:57:35.7000	-37.132	52.395	10.	5.2
ISCCD/NEIC	1994/02/05	16:45:43.2000	-27.649	65.628	10.	5.2
ISCCD/NEIC	1994/02/05	23:34:09.9000	0.593	30.037	14.	5.8
ISCCD/NEIC	1994/02/06	00:03:14.8000	3.826	27.162	10.	4.7
ISCCD/NEIC	1994/02/06	00:14:14.5000	5.524	25.222	10.	4.9
ISCCD/NEIC	1994/02/18	12:53:32.9000	14.290	56.233	10.	5.0
ISCCD/NEIC	1994/02/18	16:19:40.4000	14.133	56.248	10.	5.2
ISCCD/NEIC	1994/02/18	22:36:09.3000	13.803	56.045	10.	5.0
ISCCD/NEIC	1994/02/27	17:17:10.1000	-4.613	-11.663	10.	4.8
ISCCD/NEIC	1994/03/02	23:22:08.6000	3.504	63.809	10.	4.8
ISCCD/NEIC	1994/03/09	08:25:05.5000	-1.803	29.795	33.	4.8
ISCCD/NEIC	1994/03/17	17:27:32.4000	-36.154	52.427	10.	4.9
ISCCD/NEIC	1994/03/19	10:43:34.1000	8.344	58.588	10.	4.9
ISCCD/NEIC	1994/03/19	10:54:27.8000	8.281	58.542	10.	4.8
ISCCD/NEIC	1994/03/20	02:12:35.1000	0.462	30.170	19.	4.9
ISCCD/NEIC	1994/03/27	00:29:40.8000	-40.791	44.531	10.	5.1
ISCCD/NEIC	1994/03/27	12:30:35.9000	-0.301	-16.187	10.	4.8
ISCCD/NEIC	1994/04/05	19:04:07.8000	0.038	-16.731	10.	4.9
ISCCD/NEIC	1994/04/11	11:20:21.4000	11.735	42.859	16.	5.6

ISCCD/NEIC	1994/04/12	16:01:00.8000	-27.005	67.320	10.	4.9
ISCCD/NEIC	1994/04/13	14:24:20.4000	-19.869	-11.990	10.	4.8
ISCCD/NEIC	1994/04/24	02:57:10.7000	11.604	43.014	10.	5.3
ISCCD/NEIC	1994/04/24	09:52:57.6000	-9.052	30.396	30.	5.1
ISCCD/NEIC	1994/04/28	06:35:53.3000	11.486	45.938	10.	4.8
ISCCD/NEIC	1994/05/17	20:00:40.0000	-0.134	-16.608	10.	5.4
ISCCD/NEIC	1994/05/17	20:38:07.8000	-0.155	-16.451	10.	4.8
ISCCD/NEIC	1994/05/22	00:50:20.2000	0.011	29.928	10.	4.6
ISCCD/NEIC	1994/05/24	10:27:43.2000	-0.183	-16.440	10.	4.8
ISCCD/NEIC	1994/05/25	14:31:22.6000	-0.259	-16.461	10.	5.2
ISCCD/NEIC	1994/05/25	21:09:58.3000	5.407	61.318	10.	5.0
ISCCD/NEIC	1994/05/25	21:14:52.6000	5.589	61.186	10.	5.2
ISCCD/NEIC	1994/05/25	22:10:28.6000	5.426	61.068	10.	5.3
ISCCD/NEIC	1994/05/25	22:13:32.7000	5.776	61.413	10.	5.4
ISCCD/NEIC	1994/05/25	22:32:21.2000	5.705	61.159	10.	5.1
ISCCD/NEIC	1994/05/26	00:30:06.7000	5.679	61.528	10.	5.3
ISCCD/NEIC	1994/05/26	23:35:42.2000	14.768	54.842	10.	5.0
ISCCD/NEIC	1994/06/06	05:01:07.4000	-15.220	66.915	10.	4.8
ISCCD/NEIC	1994/06/10	10:46:52.9000	-29.498	-13.682	10.	5.0
ISCCD/NEIC	1994/06/17	05:15:30.9000	14.466	54.530	10.	5.0
ISCCD/NEIC	1994/06/26	01:22:42.5000	-37.393	47.717	10.	5.0
ISCCD/NEIC	1994/06/27	12:03:03.0000	-16.122	67.484	10.	5.1
ISCCD/NEIC	1994/07/03	21:44:44.6000	-48.219	31.542	10.	5.2
ISCCD/NEIC	1994/07/05	13:31:17.2000	-12.154	65.670	10.	5.0
ISCCD/NEIC	1994/07/08	17:10:14.2000	0.256	66.740	10.	5.1
ISCCD/NEIC	1994/08/07	14:14:22.9000	13.334	39.657	11.	4.9
ISCCD/NEIC	1994/08/18	00:45:47.2000	-7.433	31.751	25.	6.0
ISCCD/NEIC	1994/08/22	19:56:50.1000	4.525	35.034	10.	4.7
ISCCD/NEIC	1994/08/24	15:17:40.3000	-25.076	-13.594	10.	5.3
ISCCD/NEIC	1994/08/29	17:36:20.8000	-0.404	-19.172	10.	5.5
ISCCD/NEIC	1994/08/31	14:59:56.9000	1.603	31.002	10.	5.0
ISCCD/NEIC	1994/09/01	11:28:36.0000	-24.908	-13.658	10.	5.1
ISCCD/NEIC	1994/09/16	23:47:07.1000	-15.423	67.128	10.	5.1
ISCCD/NEIC	1994/09/17	00:04:33.0000	-15.449	67.038	10.	5.1
ISCCD/NEIC	1994/09/22	00:57:35.4000	-22.002	-12.800	10.	4.8
ISCCD/NEIC	1994/09/27	23:14:31.9000	-39.670	-15.716	10.	4.9
ISCCD/NEIC	1994/10/01	14:04:20.0000	13.116	50.416	10.	4.9
ISCCD/NEIC	1994/10/02	00:44:19.8000	-7.021	-13.113	10.	4.8
ISCCD/NEIC	1994/10/06	05:44:07.0000	-1.370	-14.976	10.	5.2
ISCCD/NEIC	1994/10/25	23:35:42.5000	-35.798	-17.768	10.	4.9
ISCCD/NEIC	1994/10/30	06:06:27.4000	-28.032	26.738	5.	5.6
ISCCD/NEIC	1994/10/30	16:29:07.9000	-54.100	7.836	10.	5.0
ISCCD/NEIC	1994/11/01	08:08:02.1000	-1.432	67.947	10.	5.0

ISCCD/NEIC	1994/11/10	10:56:02.5000	-1.219	67.461	10.	5.1
ISCCD/NEIC	1994/11/12	12:18:00.0000	-6.947	29.916	22.	4.9
ISCCD/NEIC	1994/11/14	11:27:56.1000	-0.028	-16.935	10.	5.2
ISCCD/NEIC	1994/11/16	14:01:37.2000	-11.474	-12.284	10.	4.8
ISCCD/NEIC	1994/11/16	21:34:52.0000	-10.182	-13.258	10.	5.1
ISCCD/NEIC	1994/11/20	02:57:01.5000	14.769	55.609	10.	5.0
ISCCD/NEIC	1994/11/22	17:10:24.2000	-0.230	-16.211	10.	5.0
ISCCD/NEIC	1994/11/29	19:48:58.1000	-36.495	-1.555	10.	5.3
ISCCD/NEIC	1994/12/12	21:49:15.7000	-38.977	46.586	10.	5.1
ISCCD/NEIC	1995/01/04	08:51:51.0000	10.117	56.669	17.	5.0
ISCCD/NEIC	1995/01/08	14:25:55.5000	-0.553	-13.761	10.	4.8
ISCCD/NEIC	1995/01/20	07:14:27.2000	7.160	38.441	14.	5.0
ISCCD/NEIC	1995/02/01	14:26:44.6000	-42.423	-18.458	10.	5.4
ISCCD/NEIC	1995/02/04	17:25:01.6000	-13.908	66.082	10.	5.0
ISCCD/NEIC	1995/02/08	12:15:49.2000	0.060	-16.672	10.	4.8
ISCCD/NEIC	1995/02/25	22:56:27.1000	2.942	64.934	10.	5.1
ISCCD/NEIC	1995/02/27	12:22:44.8000	-3.836	39.763	33.	4.9
ISCCD/NEIC	1995/03/04	17:56:38.0000	-13.972	-14.495	10.	5.4
ISCCD/NEIC	1995/04/08	10:44:57.3000	-25.092	36.770	10.	4.6
ISCCD/NEIC	1995/04/27	02:32:18.4000	-12.567	42.548	10.	4.8
ISCCD/NEIC	1995/04/27	15:59:32.6000	-42.488	-18.700	10.	5.1
ISCCD/NEIC	1995/04/28	17:44:13.5000	-1.904	55.622	10.	5.2
ISCCD/NEIC	1995/04/29	11:50:52.5000	-1.315	28.605	10.	5.1
ISCCD/NEIC	1995/05/04	11:43:04.2000	-10.424	-12.989	10.	4.9
ISCCD/NEIC	1995/05/05	09:17:28.7000	13.763	51.549	10.	4.9
ISCCD/NEIC	1995/05/06	20:59:03.2000	-17.039	66.945	10.	4.9
ISCCD/NEIC	1995/05/13	07:28:20.1000	-14.022	-14.250	10.	4.9
ISCCD/NEIC	1995/05/15	20:21:50.0000	13.140	49.531	10.	4.9
ISCCD/NEIC	1995/05/18	00:06:27.4000	-0.893	-21.996	12.	6.2
ISCCD/NEIC	1995/05/19	05:48:50.8000	-28.038	26.760	5.	4.7
ISCCD/NEIC	1995/05/20	04:18:59.8000	-26.938	26.665	5.	4.7
ISCCD/NEIC	1995/05/26	03:11:17.1000	12.115	57.939	62.	5.4
ISCCD/NEIC	1995/06/05	23:15:43.1000	12.160	57.848	10.	5.0
ISCCD/NEIC	1995/06/07	08:26:53.7000	-34.828	54.194	10.	4.9
ISCCD/NEIC	1995/06/07	11:43:14.9000	-0.308	-15.984	10.	4.9
ISCCD/NEIC	1995/06/08	18:33:23.3000	-54.050	8.212	10.	5.0
ISCCD/NEIC	1995/06/09	12:18:23.8000	-1.283	-14.184	10.	4.9
ISCCD/NEIC	1995/06/27	21:12:56.2000	-17.175	66.871	10.	5.0
ISCCD/NEIC	1995/07/01	04:10:55.1000	12.892	57.424	10.	5.2
ISCCD/NEIC	1995/07/07	10:40:03.5000	-53.449	9.114	10.	5.5
ISCCD/NEIC	1995/07/08	11:39:06.1000	4.308	62.400	10.	5.4
ISCCD/NEIC	1995/07/08	11:44:42.7000	4.327	62.439	10.	5.2
ISCCD/NEIC	1995/07/12	11:11:10.5000	8.386	58.510	10.	4.8

ISCCD/NEIC	1995/07/20	05:08:25.8000	-12.402	41.410	10.	5.1
ISCCD/NEIC	1995/07/22	13:31:53.5000	-13.966	34.820	10.	5.1
ISCCD/NEIC	1995/08/05	22:42:03.2000	-22.563	-10.778	10.	5.4
ISCCD/NEIC	1995/08/10	00:41:04.4000	-15.473	41.604	10.	5.1
ISCCD/NEIC	1995/08/17	23:24:59.4000	9.238	58.025	10.	4.9
ISCCD/NEIC	1995/08/17	23:39:22.0000	9.048	58.115	10.	5.0
ISCCD/NEIC	1995/08/27	17:51:00.2000	-48.004	32.018	10.	5.2
ISCCD/NEIC	1995/08/29	12:45:25.7000	-7.575	67.964	10.	4.9
ISCCD/NEIC	1995/09/08	16:03:37.5000	-9.126	67.322	10.	5.0
ISCCD/NEIC	1995/09/17	17:09:20.6000	-17.093	66.707	8.	5.6
ISCCD/NEIC	1995/09/17	22:55:10.2000	-17.327	66.461	10.	4.8
ISCCD/NEIC	1995/09/17	23:14:40.0000	-17.505	65.959	10.	5.0
ISCCD/NEIC	1995/09/22	08:51:49.5000	1.065	19.395	10.	5.7
ISCCD/NEIC	1995/09/25	17:04:49.2000	1.120	19.424	10.	5.5
ISCCD/NEIC	1995/09/30	20:46:05.9000	-13.826	34.407	33.	4.6
ISCCD/NEIC	1995/10/27	09:02:13.1000	-38.795	49.137	10.	4.8
ISCCD/NEIC	1995/10/27	09:03:16.2000	-37.784	49.884	10.	5.2
ISCCD/NEIC	1995/10/28	18:38:45.3000	-26.332	27.548	5.	4.7
ISCCD/NEIC	1995/11/05	01:45:21.1000	-37.478	51.467	10.	5.0
ISCCD/NEIC	1995/11/12	19:00:04.8000	-13.844	31.611	10.	4.8
ISCCD/NEIC	1995/11/24	20:21:11.8000	-53.433	25.208	10.	4.8
ISCCD/NEIC	1995/11/25	04:05:03.7000	-26.925	26.718	13.	4.9
ISCCD/NEIC	1995/11/26	17:31:02.8000	-11.283	-13.670	10.	4.8
ISCCD/NEIC	1995/12/07	17:48:16.5000	14.674	55.661	10.	5.2
ISCCD/NEIC	1995/12/07	18:03:15.7000	14.654	55.581	10.	5.0
ISCCD/NEIC	1995/12/07	18:15:46.3000	14.693	55.601	10.	4.9
ISCCD/NEIC	1995/12/07	18:45:48.5000	14.568	55.520	10.	5.0
ISCCD/NEIC	1995/12/08	23:40:49.4000	-4.474	38.794	10.	5.0
ISCCD/NEIC	1995/12/11	17:48:29.9000	-6.371	26.705	10.	5.2
ISCCD/NEIC	1995/12/11	17:54:39.4000	-6.224	26.714	10.	5.5
ISCCD/NEIC	1995/12/14	02:09:15.5000	-6.980	-12.657	10.	5.2
ISCCD/NEIC	1995/12/14	05:13:48.0000	-6.866	-12.726	10.	5.1
ISCCD/NEIC	1995/12/17	22:31:30.4000	-27.958	26.576	5.	4.7
ISCCD/NEIC	1996/01/03	16:56:22.5000	9.936	56.936	10.	4.8
ISCCD/NEIC	1996/01/07	15:43:06.6000	-2.863	67.866	10.	5.3
ISCCD/NEIC	1996/01/18	21:14:34.8000	10.113	56.714	25.	5.1
ISCCD/NEIC	1996/01/18	23:00:36.2000	-18.575	65.197	10.	5.0
ISCCD/NEIC	1996/01/27	01:27:53.1000	-0.633	-14.003	10.	4.9
ISCCD/NEIC	1996/01/29	10:27:07.6000	-0.943	-15.916	22.	5.0
ISCCD/NEIC	1996/01/31	21:12:47.5000	-4.570	-12.159	10.	4.8
ISCCD/NEIC	1996/02/09	02:33:29.6000	-31.785	57.968	10.	4.8
ISCCD/NEIC	1996/02/09	04:20:32.2000	-31.822	57.874	10.	5.1
ISCCD/NEIC	1996/02/14	05:42:16.8000	-13.847	-14.588	10.	4.8

ISCCD/NEIC	1996/02/16	09:44:58.4000	-1.496	-15.279	11.	6.2
ISCCD/NEIC	1996/02/18	23:49:28.1000	-1.266	-14.273	10.	6.3
ISCCD/NEIC	1996/02/19	02:28:32.1000	-1.199	-14.232	12.	5.6
ISCCD/NEIC	1996/02/28	10:03:07.2000	-51.858	40.337	10.	5.7
ISCCD/NEIC	1996/02/29	07:14:15.6000	-2.439	46.969	10.	5.0
ISCCD/NEIC	1996/03/05	21:08:31.6000	-17.629	-12.710	10.	4.8
ISCCD/NEIC	1996/03/14	21:47:57.8000	14.741	55.741	10.	5.0
ISCCD/NEIC	1996/03/15	02:06:41.8000	-35.313	-17.261	10.	5.0
ISCCD/NEIC	1996/03/16	04:15:30.6000	-41.579	-16.677	10.	5.2
ISCCD/NEIC	1996/03/22	18:45:25.8000	-26.399	-13.690	10.	5.1
ISCCD/NEIC	1996/03/24	08:24:24.3000	0.565	30.169	10.	5.0
ISCCD/NEIC	1996/03/28	07:28:28.1000	11.919	57.805	10.	5.8
ISCCD/NEIC	1996/03/29	10:41:24.7000	-33.630	-14.454	10.	5.2
ISCCD/NEIC	1996/04/08	09:31:39.5000	-52.759	27.183	10.	5.1
ISCCD/NEIC	1996/04/16	14:03:25.4000	-33.373	57.331	10.	5.1
ISCCD/NEIC	1996/04/20	09:56:03.7000	-40.471	44.700	10.	4.8
ISCCD/NEIC	1996/05/11	21:26:39.4000	-37.511	50.922	10.	5.1
ISCCD/NEIC	1996/05/28	18:13:16.2000	1.766	66.665	10.	4.8
ISCCD/NEIC	1996/05/31	09:36:17.7000	-13.760	34.366	10.	4.6
ISCCD/NEIC	1996/06/08	16:07:03.7000	-12.779	-14.639	10.	4.9
ISCCD/NEIC	1996/06/08	16:37:03.7000	-12.871	-14.686	10.	4.9
ISCCD/NEIC	1996/06/09	20:12:33.5000	-12.589	26.095	10.	5.0
ISCCD/NEIC	1996/06/15	10:02:41.3000	-16.461	41.638	10.	5.0
ISCCD/NEIC	1996/06/22	00:32:13.4000	-53.774	8.800	10.	5.9
ISCCD/NEIC	1996/07/14	09:01:53.3000	3.613	63.444	10.	4.8
ISCCD/NEIC	1996/07/19	23:43:03.9000	-48.247	31.642	10.	5.2
ISCCD/NEIC	1996/07/31	10:29:10.4000	-12.739	66.307	10.	5.1
ISCCD/NEIC	1996/07/31	22:30:35.5000	-27.600	65.547	10.	5.6
ISCCD/NEIC	1996/08/01	04:49:18.4000	-27.594	65.712	10.	5.1
ISCCD/NEIC	1996/08/03	09:51:38.8000	-27.530	65.627	10.	4.8
ISCCD/NEIC	1996/08/13	19:33:40.4000	-15.702	-13.200	10.	5.6
ISCCD/NEIC	1996/08/13	20:09:28.9000	-15.635	-13.104	10.	4.8
ISCCD/NEIC	1996/08/16	12:51:23.5000	-0.068	66.997	10.	4.9
ISCCD/NEIC	1996/08/16	12:56:32.4000	-0.032	66.997	10.	4.9
ISCCD/NEIC	1996/08/22	07:16:16.6000	-46.181	0.917	10.	4.8
ISCCD/NEIC	1996/08/22	19:37:09.4000	-17.315	66.762	10.	4.8
ISCCD/NEIC	1996/08/27	14:36:39.1000	-6.933	-12.724	10.	5.2
ISCCD/NEIC	1996/08/30	06:58:40.8000	-15.353	34.031	10.	4.7
ISCCD/NEIC	1996/08/30	23:00:30.9000	-3.333	-12.039	10.	4.9
ISCCD/NEIC	1996/09/18	23:50:36.0000	12.754	40.515	10.	5.0
ISCCD/NEIC	1996/09/20	17:37:06.3000	-53.083	9.696	10.	5.6
ISCCD/NEIC	1996/09/20	23:51:58.1000	-43.612	-16.258	10.	5.2
ISCCD/NEIC	1996/09/21	00:05:54.4000	-43.701	-16.096	10.	5.0

ISCCD/NEIC	1996/10/01	15:50:23.6000	12.434	58.066	10.	5.8
ISCCD/NEIC	1996/10/04	07:08:16.4000	-12.383	-14.725	10.	4.8
ISCCD/NEIC	1996/10/04	09:08:06.5000	-16.364	67.337	10.	4.9
ISCCD/NEIC	1996/10/06	07:44:59.7000	-43.417	39.181	10.	5.1
ISCCD/NEIC	1996/10/16	18:30:45.6000	12.699	40.539	10.	4.8
ISCCD/NEIC	1996/10/17	15:01:30.9000	-6.861	-12.752	10.	4.8
ISCCD/NEIC	1996/10/18	15:26:58.0000	-52.974	21.862	10.	5.2
ISCCD/NEIC	1996/10/21	03:20:21.4000	12.650	40.446	33.	4.8
ISCCD/NEIC	1996/10/25	16:05:13.8000	-20.065	67.342	10.	4.8
ISCCD/NEIC	1996/10/28	10:48:54.8000	-15.289	66.782	10.	4.8
ISCCD/NEIC	1996/10/31	19:38:53.4000	-0.259	-18.323	10.	4.8
ISCCD/NEIC	1996/11/01	14:38:04.6000	-0.233	-18.010	10.	4.9
ISCCD/NEIC	1996/11/14	10:42:57.0000	-25.860	-13.836	10.	5.2
ISCCD/NEIC	1996/12/11	12:50:07.7000	-27.894	26.809	5.	4.8
ISCCD/NEIC	1996/12/14	14:15:29.3000	-27.603	65.772	10.	4.9
ISCCD/NEIC	1996/12/20	03:53:22.2000	-5.288	35.828	10.	5.0
ISCCD/NEIC	1996/12/21	08:34:03.7000	-5.215	35.545	10.	4.8
ISCCD/NEIC	1996/12/23	23:21:04.2000	10.425	56.910	10.	4.8
ISCCD/NEIC	1996/12/25	12:20:46.0000	-26.975	26.797	5.	4.7
ISCCD/NEIC	1997/01/10	13:49:41.6000	-54.065	-1.872	10.	4.9
ISCCD/NEIC	1997/01/17	23:24:09.8000	-47.416	-13.451	10.	5.4
ISCCD/NEIC	1997/01/30	12:57:56.9000	-54.084	5.343	10.	4.8
ISCCD/NEIC	1997/02/09	03:08:25.9000	-52.556	18.507	10.	4.8
ISCCD/NEIC	1997/02/10	16:10:28.6000	-27.022	26.702	5.	5.2
ISCCD/NEIC	1997/02/11	07:38:37.9000	-2.723	29.112	10.	4.7
ISCCD/NEIC	1997/02/23	01:39:31.2000	-5.295	34.818	10.	4.6
ISCCD/NEIC	1997/02/27	20:22:55.2000	-52.199	16.789	10.	4.9
ISCCD/NEIC	1997/02/28	14:28:51.4000	-36.091	52.721	10.	4.9
ISCCD/NEIC	1997/03/04	17:24:17.2000	-10.559	66.297	10.	5.0
ISCCD/NEIC	1997/03/08	23:29:02.7000	11.748	43.263	10.	5.1
ISCCD/NEIC	1997/03/09	09:04:38.6000	-53.884	-1.560	10.	4.9
ISCCD/NEIC	1997/03/09	17:40:18.3000	11.696	43.550	10.	4.8
ISCCD/NEIC	1997/03/09	19:09:29.7000	11.579	43.314	10.	4.9
ISCCD/NEIC	1997/03/10	14:41:35.5000	-1.755	-12.238	10.	4.9
ISCCD/NEIC	1997/03/14	18:38:12.8000	-25.288	2.703	10.	5.3
ISCCD/NEIC	1997/03/20	02:17:05.4000	-1.648	-12.999	10.	5.0
ISCCD/NEIC	1997/03/20	07:44:59.7000	-26.807	26.358	5.	4.6
ISCCD/NEIC	1997/04/01	15:53:56.8000	-15.384	67.375	10.	4.9
ISCCD/NEIC	1997/04/04	10:25:32.7000	-14.388	62.586	10.	4.9
ISCCD/NEIC	1997/04/13	23:40:18.0000	-38.018	48.725	10.	4.8
ISCCD/NEIC	1997/04/14	01:07:36.9000	-38.018	48.559	10.	4.9
ISCCD/NEIC	1997/04/14	05:53:33.3000	-37.965	48.565	10.	5.1
ISCCD/NEIC	1997/04/14	09:29:26.6000	-38.074	48.482	10.	5.1

ISCCD/NEIC	1997/04/14	20:07:15.3000	-38.038	48.613	10.	4.8
ISCCD/NEIC	1997/04/15	05:09:33.9000	-38.086	48.519	10.	4.8
ISCCD/NEIC	1997/04/15	19:04:27.3000	-8.735	26.359	10.	5.0
ISCCD/NEIC	1997/04/17	01:33:15.7000	-31.898	57.301	10.	4.9
ISCCD/NEIC	1997/04/24	03:45:42.0000	-13.416	66.745	10.	4.8
ISCCD/NEIC	1997/04/25	09:11:34.6000	-48.342	-10.040	10.	5.3
ISCCD/NEIC	1997/04/28	10:56:51.6000	-29.638	60.818	10.	5.2
ISCCD/NEIC	1997/04/28	12:07:37.8000	-42.504	42.686	10.	5.7
ISCCD/NEIC	1997/05/03	23:32:31.2000	-22.564	-10.645	10.	5.0
ISCCD/NEIC	1997/05/16	17:50:09.6000	-0.029	-16.734	10.	4.9
ISCCD/NEIC	1997/05/17	00:26:14.6000	8.421	58.395	10.	5.1
ISCCD/NEIC	1997/05/19	20:05:37.3000	-0.059	-16.654	10.	4.8
ISCCD/NEIC	1997/05/21	20:23:01.0000	0.015	-16.759	10.	5.2
ISCCD/NEIC	1997/05/26	11:14:37.0000	5.886	61.228	10.	4.8
ISCCD/NEIC	1997/05/27	16:41:03.1000	2.504	31.604	10.	4.8
ISCCD/NEIC	1997/05/28	17:47:11.7000	-47.852	32.459	10.	5.0
ISCCD/NEIC	1997/05/30	20:35:28.2000	-54.096	6.049	10.	5.1
ISCCD/NEIC	1997/06/01	20:02:12.4000	-17.048	-14.094	10.	5.0
ISCCD/NEIC	1997/06/07	11:22:03.1000	14.059	51.694	32.	5.0
ISCCD/NEIC	1997/06/12	05:08:27.0000	-9.752	31.646	10.	4.6
ISCCD/NEIC	1997/06/13	08:07:11.5000	-53.134	9.372	10.	5.0
ISCCD/NEIC	1997/06/15	19:07:30.6000	-11.461	66.346	10.	4.9
ISCCD/NEIC	1997/06/21	09:00:52.8000	-16.156	67.283	10.	4.8
ISCCD/NEIC	1997/06/24	12:06:52.0000	-22.604	-10.653	10.	4.8
ISCCD/NEIC	1997/06/25	12:39:16.3000	-36.126	52.594	10.	5.0
ISCCD/NEIC	1997/06/26	12:06:04.6000	-31.950	57.290	10.	5.1
ISCCD/NEIC	1997/07/04	23:23:57.4000	-27.689	65.666	10.	5.0
ISCCD/NEIC	1997/07/05	03:38:08.9000	-27.510	65.743	10.	5.0
ISCCD/NEIC	1997/07/05	04:20:03.1000	-27.630	65.695	10.	4.9
ISCCD/NEIC	1997/07/05	09:40:16.8000	-27.760	65.724	10.	4.8
ISCCD/NEIC	1997/07/10	23:41:42.9000	-34.694	54.607	10.	5.3
ISCCD/NEIC	1997/07/18	01:45:12.3000	2.448	31.609	10.	4.7
ISCCD/NEIC	1997/07/18	02:44:24.7000	2.328	31.561	10.	4.6
ISCCD/NEIC	1997/07/18	02:50:02.4000	2.484	31.491	10.	4.7
ISCCD/NEIC	1997/07/18	03:17:24.1000	2.349	31.570	10.	4.8
ISCCD/NEIC	1997/07/19	13:45:19.4000	2.516	31.723	33.	4.7
ISCCD/NEIC	1997/07/19	14:21:37.5000	2.177	31.412	33.	4.6
ISCCD/NEIC	1997/07/21	08:45:49.1000	-26.857	26.619	5.	5.0
ISCCD/NEIC	1997/07/21	10:11:06.5000	-7.628	67.743	10.	4.8
ISCCD/NEIC	1997/07/29	11:25:05.0000	-27.894	26.703	5.	4.8
ISCCD/NEIC	1997/08/01	02:17:26.9000	-27.943	26.583	10.	4.8
ISCCD/NEIC	1997/08/04	09:04:58.9000	-42.790	-16.117	10.	4.9
ISCCD/NEIC	1997/08/08	17:16:23.2000	-44.603	35.404	10.	5.0

ISCCD/NEIC	1997/08/14	07:49:50.7000	-20.322	66.984	10.	5.2
ISCCD/NEIC	1997/08/26	08:43:27.2000	-6.998	-21.898	10.	5.4
ISCCD/NEIC	1997/09/01	12:36:29.5000	-1.590	-15.572	10.	5.1
ISCCD/NEIC	1997/09/01	22:59:28.6000	0.027	-16.806	10.	5.2
ISCCD/NEIC	1997/09/08	17:57:13.1000	-29.296	61.029	10.	5.2
ISCCD/NEIC	1997/09/10	20:27:41.0000	-52.797	19.683	10.	5.1
ISCCD/NEIC	1997/09/10	22:29:26.7000	-52.905	19.715	10.	5.3
ISCCD/NEIC	1997/09/11	01:11:02.8000	-52.765	19.526	10.	4.9
ISCCD/NEIC	1997/09/21	18:13:22.7000	-7.360	30.370	10.	5.7
ISCCD/NEIC	1997/09/21	22:48:06.1000	-7.332	30.345	10.	4.6
ISCCD/NEIC	1997/09/22	07:34:35.0000	0.050	-16.625	10.	4.8
ISCCD/NEIC	1997/09/25	00:05:23.2000	-26.367	27.406	5.	4.7
ISCCD/NEIC	1997/09/25	14:20:48.9000	-13.761	66.248	10.	5.3
ISCCD/NEIC	1997/09/25	17:25:55.5000	0.088	-16.547	10.	4.9
ISCCD/NEIC	1997/09/26	14:00:05.8000	0.124	-16.923	10.	5.1
ISCCD/NEIC	1997/10/04	18:41:49.0000	-26.542	67.775	10.	4.9
ISCCD/NEIC	1997/10/07	17:53:32.2000	-52.117	15.166	10.	5.3
ISCCD/NEIC	1997/10/10	06:25:55.9000	-11.791	28.700	33.	4.8
ISCCD/NEIC	1997/10/11	04:11:21.1000	-10.648	24.917	10.	4.7
ISCCD/NEIC	1997/10/27	07:46:02.7000	-0.127	-16.656	10.	4.8
ISCCD/NEIC	1997/10/30	06:31:13.6000	-52.936	22.375	10.	4.8
ISCCD/NEIC	1997/11/01	06:25:46.8000	-27.690	65.550	10.	5.2
ISCCD/NEIC	1997/11/02	14:44:11.5000	-27.718	65.879	10.	4.9
ISCCD/NEIC	1997/11/04	03:01:33.4000	-27.709	65.599	10.	5.1
ISCCD/NEIC	1997/11/06	20:06:36.7000	-34.993	-16.876	10.	4.9
ISCCD/NEIC	1997/11/09	04:33:35.5000	13.077	57.570	20.	4.8
ISCCD/NEIC	1997/11/10	12:47:33.9000	0.050	-16.893	10.	5.6
ISCCD/NEIC	1997/11/11	22:42:51.8000	-2.727	28.912	10.	4.7
ISCCD/NEIC	1997/11/21	23:24:07.0000	-4.827	29.383	10.	4.7
ISCCD/NEIC	1997/11/23	11:54:13.0000	-1.303	67.659	10.	4.9
ISCCD/NEIC	1997/12/04	02:17:08.8000	-2.533	67.973	10.	4.8
ISCCD/NEIC	1997/12/07	11:50:04.8000	-17.676	-14.083	10.	4.8
ISCCD/NEIC	1997/12/11	05:29:45.2000	-26.907	26.630	5.	4.9
ISCCD/NEIC	1997/12/11	14:01:14.1000	-0.833	-21.647	10.	4.8
ISCCD/NEIC	1997/12/12	16:42:46.5000	-26.865	26.498	5.	4.7
ISCCD/NEIC	1997/12/15	00:43:40.9000	12.942	58.042	26.	4.9
ISCCD/NEIC	1997/12/15	10:26:58.7000	-20.148	67.624	10.	5.2
ISCCD/NEIC	1997/12/29	05:12:21.5000	-52.145	28.096	10.	5.1
ISCCD/NEIC	1998/01/03	03:05:52.3000	-15.799	35.023	33.	4.6
ISCCD/NEIC	1998/01/03	06:10:08.3000	-35.474	-16.191	10.	5.4
ISCCD/NEIC	1998/01/11	06:32:56.4000	-7.955	30.626	33.	4.7
ISCCD/NEIC	1998/01/14	02:37:03.8000	-39.612	46.364	10.	4.8
ISCCD/NEIC	1998/01/15	10:19:25.7000	-29.317	-13.661	10.	4.8

ISCCD/NEIC	1998/01/19	07:08:30.7000	-39.836	45.884	10.	5.2
ISCCD/NEIC	1998/01/19	12:30:06.1000	-0.653	-20.109	10.	4.8
ISCCD/NEIC	1998/02/01	01:18:09.4000	-49.995	-6.292	10.	4.8
ISCCD/NEIC	1998/02/19	22:08:42.6000	-28.018	65.626	10.	4.9
ISCCD/NEIC	1998/02/22	16:07:43.7000	-22.470	-12.809	10.	4.8
ISCCD/NEIC	1998/02/27	02:39:11.3000	-53.901	-2.747	10.	4.8
ISCCD/NEIC	1998/03/01	06:58:24.0000	-12.330	-14.854	10.	5.4
ISCCD/NEIC	1998/03/01	12:31:20.3000	-6.766	-12.610	10.	4.9
ISCCD/NEIC	1998/03/05	02:59:43.3000	0.814	17.418	10.	5.4
ISCCD/NEIC	1998/03/10	07:38:24.5000	14.022	58.187	10.	4.9
ISCCD/NEIC	1998/03/15	02:39:18.9000	-35.025	-15.209	10.	4.8
ISCCD/NEIC	1998/03/22	01:08:57.4000	-11.430	66.245	10.	5.4
ISCCD/NEIC	1998/03/25	18:46:10.6000	-2.300	-12.357	10.	5.0
ISCCD/NEIC	1998/03/28	21:59:56.1000	-6.024	29.525	10.	5.3
ISCCD/NEIC	1998/03/29	07:14:58.9000	-0.239	-17.932	10.	5.5
ISCCD/NEIC	1998/04/09	23:26:52.6000	-12.245	67.846	10.	5.5
ISCCD/NEIC	1998/04/10	16:40:38.5000	-1.322	-15.651	10.	5.4
ISCCD/NEIC	1998/04/12	10:48:57.2000	-12.423	25.495	10.	4.7
ISCCD/NEIC	1998/04/13	08:40:18.6000	-0.080	-17.355	10.	4.8
ISCCD/NEIC	1998/04/25	06:07:23.4000	-35.266	-17.326	10.	5.5
ISCCD/NEIC	1998/04/26	14:16:52.2000	0.855	17.342	10.	5.5
ISCCD/NEIC	1998/05/04	03:30:19.6000	-46.691	-10.652	10.	5.0
ISCCD/NEIC	1998/05/07	02:18:29.6000	-1.778	-12.945	10.	5.0
ISCCD/NEIC	1998/05/08	14:00:53.9000	6.663	60.187	10.	5.1
ISCCD/NEIC	1998/05/16	22:50:42.4000	-27.600	65.697	10.	4.8
ISCCD/NEIC	1998/05/16	23:25:12.2000	-27.440	65.469	10.	4.8
ISCCD/NEIC	1998/05/17	10:37:55.4000	-27.650	65.479	10.	5.0
ISCCD/NEIC	1998/05/17	15:17:15.3000	-27.703	65.523	10.	5.1
ISCCD/NEIC	1998/05/17	17:04:48.8000	-27.591	65.589	10.	5.4
ISCCD/NEIC	1998/05/21	22:31:22.9000	-43.400	41.387	10.	5.4
ISCCD/NEIC	1998/05/22	03:37:53.7000	-43.693	41.446	10.	4.8
ISCCD/NEIC	1998/06/09	22:52:33.4000	-20.005	66.747	10.	4.8
ISCCD/NEIC	1998/06/12	13:47:29.5000	-37.257	-17.138	10.	5.1
ISCCD/NEIC	1998/06/18	04:17:54.9000	-11.572	-13.894	10.	5.4
ISCCD/NEIC	1998/06/24	10:44:30.8000	-37.295	-17.391	10.	5.7
ISCCD/NEIC	1998/07/09	00:47:25.3000	-26.614	-13.954	10.	4.8
ISCCD/NEIC	1998/07/09	16:23:41.7000	-1.368	-15.933	10.	5.3
ISCCD/NEIC	1998/07/10	08:20:32.6000	-1.328	-15.858	10.	5.0
ISCCD/NEIC	1998/07/13	07:05:04.9000	-27.940	26.871	10.	4.9
ISCCD/NEIC	1998/07/19	18:13:42.0000	-48.137	31.674	10.	4.9
ISCCD/NEIC	1998/07/19	20:45:55.9000	-36.160	53.372	10.	4.8
ISCCD/NEIC	1998/07/25	09:52:34.0000	-52.149	15.309	10.	5.0
ISCCD/NEIC	1998/07/26	03:38:24.5000	-0.768	-20.959	10.	5.1

ISCCD/NEIC	1998/08/01	09:10:02.5000	-31.087	-13.488	10.	4.9
ISCCD/NEIC	1998/08/04	11:46:50.1000	-52.924	21.795	10.	4.8
ISCCD/NEIC	1998/08/04	12:28:36.0000	-52.920	21.857	10.	5.1
ISCCD/NEIC	1998/08/04	17:48:20.9000	-52.909	22.028	10.	5.0
ISCCD/NEIC	1998/08/04	17:48:55.3000	-52.963	21.784	10.	5.1
ISCCD/NEIC	1998/08/15	05:41:24.7000	0.946	30.048	10.	4.7
ISCCD/NEIC	1998/08/15	14:57:28.2000	1.211	29.841	10.	4.7
ISCCD/NEIC	1998/08/15	15:57:45.6000	1.868	30.051	10.	4.6
ISCCD/NEIC	1998/08/15	17:29:16.5000	0.752	29.956	10.	4.8
ISCCD/NEIC	1998/08/16	04:47:40.2000	0.875	29.899	10.	4.7
ISCCD/NEIC	1998/08/16	05:34:33.8000	-15.690	-13.361	10.	5.0
ISCCD/NEIC	1998/08/17	08:02:06.3000	-3.184	-12.161	23.	4.9
ISCCD/NEIC	1998/08/18	10:50:33.4000	-43.189	-15.591	10.	4.9
ISCCD/NEIC	1998/08/21	16:10:53.3000	-26.968	26.512	5.	4.7
ISCCD/NEIC	1998/08/24	12:12:09.5000	-13.791	34.729	46.	4.8
ISCCD/NEIC	1998/09/25	15:51:31.5000	-26.904	26.574	5.	4.6
ISCCD/NEIC	1998/10/01	19:17:16.0000	14.367	53.772	10.	5.1
ISCCD/NEIC	1998/10/04	08:38:09.5000	-0.955	27.923	10.	4.6
ISCCD/NEIC	1998/10/05	17:36:56.0000	-29.137	-12.915	10.	4.9
ISCCD/NEIC	1998/10/14	22:48:06.5000	-34.624	8.889	10.	4.8
ISCCD/NEIC	1998/10/22	09:59:26.6000	-5.625	-11.528	10.	4.8
ISCCD/NEIC	1998/10/30	08:33:10.1000	-54.404	5.387	10.	5.0
ISCCD/NEIC	1998/11/05	18:31:25.4000	2.674	66.143	10.	4.9
ISCCD/NEIC	1998/11/10	18:10:14.1000	-27.639	65.506	10.	4.8
ISCCD/NEIC	1998/11/10	20:26:35.9000	-8.861	67.157	10.	5.0
ISCCD/NEIC	1998/11/11	10:19:09.2000	-27.642	65.644	10.	4.8
ISCCD/NEIC	1998/11/11	17:59:13.5000	-35.969	53.493	10.	5.0
ISCCD/NEIC	1998/11/17	20:17:59.3000	-26.804	26.497	5.	4.7
ISCCD/NEIC	1998/11/18	16:30:04.5000	-26.881	26.757	5.	4.8
ISCCD/NEIC	1998/11/23	19:16:45.5000	12.347	47.564	10.	5.0
ISCCD/NEIC	1998/12/02	23:41:17.8000	-9.144	67.459	10.	5.0
ISCCD/NEIC	1998/12/05	04:52:45.4000	-26.403	27.521	10.	4.9
ISCCD/NEIC	1998/12/14	23:54:05.6000	-0.408	67.166	10.	4.9
ISCCD/NEIC	1998/12/19	01:15:38.6000	-1.446	-13.096	10.	4.9
ISCCD/NEIC	1999/01/11	03:21:19.5800	14.287	56.611	33.	4.8
ISCCD/NEIC	1999/01/14	20:24:18.8300	-37.319	-17.020	10.	5.0
ISCCD/NEIC	1999/01/27	04:25:11.9700	-37.269	-17.043	10.	5.2
ISCCD/NEIC	1999/01/30	04:18:35.2100	-29.627	60.768	10.	5.0
ISCCD/NEIC	1999/02/05	04:23:08.2200	-6.661	-11.432	10.	5.0
ISCCD/NEIC	1999/02/06	23:27:00.5200	-5.646	29.284	10.	4.8
ISCCD/NEIC	1999/02/09	02:32:36.3600	-53.083	25.358	10.	4.8
ISCCD/NEIC	1999/02/14	12:44:16.8300	5.905	61.391	10.	5.0
ISCCD/NEIC	1999/02/14	13:14:22.9300	5.803	61.399	10.	4.8

ISCCD/NEIC	1999/02/27	12:38:08.8700	-49.777	-6.977	10.	4.8
ISCCD/NEIC	1999/02/27	12:55:13.1900	-49.243	-7.918	10.	5.2
ISCCD/NEIC	1999/03/14	17:52:58.6300	-7.197	67.869	10.	4.9
ISCCD/NEIC	1999/03/16	14:42:54.3600	0.029	-16.807	10.	5.0
ISCCD/NEIC	1999/03/27	18:04:43.5600	3.931	8.798	10.	4.8
ISCCD/NEIC	1999/03/27	19:03:56.1400	3.853	8.628	10.	4.7
ISCCD/NEIC	1999/03/27	22:32:45.2500	3.928	8.777	10.	4.7
ISCCD/NEIC	1999/03/28	20:12:34.8000	3.701	8.728	10.	4.8
ISCCD/NEIC	1999/03/28	20:38:52.1500	3.827	8.764	10.	4.9
ISCCD/NEIC	1999/03/30	11:43:51.4900	-1.177	27.580	10.	4.6
ISCCD/NEIC	1999/03/31	09:01:08.1300	-12.331	-14.840	10.	5.0
ISCCD/NEIC	1999/04/04	17:49:54.3200	0.538	29.398	10.	4.6
ISCCD/NEIC	1999/04/06	04:16:45.2000	-8.424	39.262	10.	4.9
ISCCD/NEIC	1999/04/13	20:41:27.4100	-22.936	39.695	10.	4.6
ISCCD/NEIC	1999/04/15	12:04:54.7600	-29.753	65.111	10.	4.8
ISCCD/NEIC	1999/04/20	18:28:16.5000	12.674	47.580	10.	4.8
ISCCD/NEIC	1999/04/20	18:28:16.5100	12.674	47.580	10.	4.8
ISCCD/NEIC	1999/04/20	19:13:20.1000	12.984	47.632	10.	4.8
ISCCD/NEIC	1999/04/20	19:13:20.1500	12.984	47.632	10.	4.8
ISCCD/NEIC	1999/04/22	22:19:36.9000	-27.953	26.635	5.	5.7
ISCCD/NEIC	1999/04/22	22:19:36.9700	-27.953	26.635	5.	5.7
ISCCD/NEIC	1999/04/23	22:18:24.3100	-18.893	-12.468	10.	4.8
ISCCD/NEIC	1999/04/26	12:10:11.9500	-25.602	-13.802	10.	4.9
ISCCD/NEIC	1999/05/06	06:54:46.1000	-11.215	66.078	10.	5.3
ISCCD/NEIC	1999/05/06	06:54:46.1200	-11.215	66.078	10.	5.3
ISCCD/NEIC	1999/05/07	02:10:41.9900	-7.506	31.605	10.	5.2
ISCCD/NEIC	1999/05/07	14:07:28.7400	-7.491	31.683	10.	5.6
ISCCD/NEIC	1999/05/09	12:28:11.1100	-10.885	66.630	10.	4.9
ISCCD/NEIC	1999/05/14	17:10:09.0300	-35.714	-15.891	10.	4.8
ISCCD/NEIC	1999/05/18	07:16:07.7200	-35.077	-15.152	10.	5.1
ISCCD/NEIC	1999/05/18	16:13:30.2200	7.583	59.454	10.	4.8
ISCCD/NEIC	1999/05/19	00:26:57.8100	7.657	59.613	10.	4.8
ISCCD/NEIC	1999/05/23	03:31:06.1100	1.625	66.865	10.	4.8
ISCCD/NEIC	1999/05/25	21:28:22.7100	-12.847	27.149	10.	4.6
ISCCD/NEIC	1999/06/03	11:09:45.0700	-8.469	38.559	33.	4.7
ISCCD/NEIC	1999/06/03	13:45:23.4700	-48.371	31.459	10.	5.0
ISCCD/NEIC	1999/06/06	04:33:33.9900	-8.117	67.879	10.	5.0
ISCCD/NEIC	1999/06/16	14:04:04.9500	-41.018	43.117	10.	4.8
ISCCD/NEIC	1999/06/17	01:13:37.2100	-40.868	43.156	10.	4.8
ISCCD/NEIC	1999/06/20	07:38:09.8000	-41.139	42.981	10.	5.5
ISCCD/NEIC	1999/06/22	17:51:36.5300	-40.084	45.895	10.	4.9
ISCCD/NEIC	1999/07/21	13:22:48.6000	-52.205	14.245	10.	4.8
ISCCD/NEIC	1999/08/04	05:40:22.9900	-52.151	14.400	10.	4.9

ISCCD/NEIC	1999/08/04	06:42:13.7800	-6.164	26.542	10.	4.7
ISCCD/NEIC	1999/08/06	17:22:46.9500	-8.537	21.540	10.	4.6
ISCCD/NEIC	1999/08/19	04:24:20.9600	-52.189	13.981	10.	4.8
ISCCD/NEIC	1999/08/19	19:07:50.8700	-20.268	67.736	10.	5.0
ISCCD/NEIC	1999/08/19	19:09:39.3500	-20.381	67.640	10.	4.8
ISCCD/NEIC	1999/08/20	03:43:08.2600	-20.529	67.980	10.	4.9
ISCCD/NEIC	1999/08/21	17:46:54.0700	-52.864	27.315	10.	4.8
ISCCD/NEIC	1999/08/24	03:09:48.2000	-20.229	67.718	10.	4.8
ISCCD/NEIC	1999/08/24	14:58:08.9400	-37.387	47.931	10.	4.8
ISCCD/NEIC	1999/08/29	00:46:13.4000	3.103	65.855	10.	5.8
ISCCD/NEIC	1999/08/29	00:46:13.4600	3.103	65.855	10.	5.8
ISCCD/NEIC	1999/08/30	13:50:02.7600	-41.157	42.817	10.	4.8
ISCCD/NEIC	1999/09/06	01:51:15.6200	-14.048	-14.483	10.	5.4
ISCCD/NEIC	1999/09/21	02:07:09.8800	-41.739	-16.251	10.	5.4
ISCCD/NEIC	1999/09/27	22:17:52.1500	-27.714	65.549	10.	4.9
ISCCD/NEIC	1999/09/28	02:15:18.9800	-27.673	65.492	10.	5.0
ISCCD/NEIC	1999/10/03	15:06:19.4700	-27.714	65.637	10.	4.9
ISCCD/NEIC	1999/10/11	14:24:20.4500	-26.961	26.667	10.	4.7
ISCCD/NEIC	1999/10/25	13:16:16.9100	-54.057	7.263	10.	4.9
ISCCD/NEIC	1999/11/02	23:18:18.8700	-52.967	25.805	10.	5.0
ISCCD/NEIC	1999/11/23	14:37:56.6600	9.732	57.122	10.	5.7
ISCCD/NEIC	1999/11/23	15:15:57.8100	9.716	57.054	10.	5.0
ISCCD/NEIC	1999/11/23	15:47:26.7200	9.717	57.047	10.	4.9
ISCCD/NEIC	1999/11/27	00:52:14.3200	9.680	57.101	10.	5.1
ISCCD/NEIC	1999/11/27	13:52:08.6600	-9.260	27.669	10.	4.6
ISCCD/NEIC	1999/12/12	17:28:07.6300	-22.414	-12.582	10.	5.3
ISCCD/NEIC	1999/12/12	19:32:44.6300	-22.366	-12.704	10.	4.8
ISCCD/NEIC	1999/12/15	19:12:33.6500	-20.116	67.447	10.	5.0
ISCCD/NEIC	1999/12/16	10:36:17.6300	-28.939	-13.342	10.	5.5
ISCCD/NEIC	1999/12/22	12:11:27.6200	-54.345	1.974	10.	5.1
ISCCD/NEIC	1999/12/25	07:52:27.7100	-12.916	-14.503	10.	5.0
ISCCD/NEIC	1999/12/28	07:30:33.9900	-7.711	67.773	10.	5.0
ISCCD/NEIC	1999/12/28	12:24:48.0600	-7.817	67.851	10.	4.8
ISCCD/NEIC	2000/01/04	00:25:05.8500	-16.134	35.959	10.	4.9
ISCCD/NEIC	2000/01/08	00:52:23.6200	-52.502	27.994	10.	4.8
ISCCD/NEIC	2000/01/18	21:33:02.4000	1.655	66.658	10.	5.0
ISCCD/NEIC	2000/01/20	10:51:17.4100	-0.235	-18.042	10.	4.8
ISCCD/NEIC	2000/01/22	21:14:31.7600	-17.657	66.857	10.	4.9
ISCCD/NEIC	2000/01/24	03:30:25.5200	-38.731	46.674	10.	4.8
ISCCD/NEIC	2000/01/26	03:00:01.9800	-27.039	27.182	5.	4.7
ISCCD/NEIC	2000/02/09	18:40:37.8300	-27.622	65.724	10.	5.0
ISCCD/NEIC	2000/02/10	01:35:01.9600	12.010	45.954	10.	5.0
ISCCD/NEIC	2000/02/10	14:18:41.2900	-27.585	65.728	10.	5.4

ISCCD/NEIC	2000/02/10	23:00:57.5300	-27.582	65.781	10.	5.5
ISCCD/NEIC	2000/02/11	22:41:59.5700	-27.643	65.683	10.	4.8
ISCCD/NEIC	2000/02/14	06:38:27.4800	11.904	46.061	10.	5.0
ISCCD/NEIC	2000/02/29	11:30:32.5600	-33.943	-14.575	10.	4.8
ISCCD/NEIC	2000/03/01	08:48:00.6500	-52.306	14.510	10.	5.0
ISCCD/NEIC	2000/03/02	02:44:51.7100	-2.582	27.826	10.	5.4
ISCCD/NEIC	2000/03/02	04:29:48.5600	-2.371	28.026	10.	5.0
ISCCD/NEIC	2000/03/03	05:03:20.2200	-2.432	28.012	10.	4.9
ISCCD/NEIC	2000/03/07	17:40:31.0000	-2.044	68.000	10.	5.2
ISCCD/NEIC	2000/03/07	17:40:31.0400	-2.044	68.000	10.	5.2
ISCCD/NEIC	2000/03/12	08:42:23.5700	-16.619	67.400	10.	4.9
ISCCD/NEIC	2000/03/17	11:51:17.5100	-52.964	25.013	10.	5.0
ISCCD/NEIC	2000/03/17	14:47:34.5000	-41.076	44.239	10.	4.9
ISCCD/NEIC	2000/03/17	14:47:34.5900	-41.076	44.239	10.	4.9
ISCCD/NEIC	2000/03/17	23:38:07.3800	-53.308	25.367	10.	4.9
ISCCD/NEIC	2000/03/22	07:02:28.3800	-12.194	65.769	10.	5.1
ISCCD/NEIC	2000/04/06	14:34:24.8500	12.500	47.446	10.	4.8
ISCCD/NEIC	2000/04/07	00:09:27.2300	-18.947	65.617	10.	4.8
ISCCD/NEIC	2000/04/07	06:15:33.5000	-9.364	66.867	10.	4.8
ISCCD/NEIC	2000/04/07	19:08:27.8300	-18.045	65.517	10.	5.5
ISCCD/NEIC	2000/04/17	19:27:38.7300	-52.617	18.490	10.	4.8
ISCCD/NEIC	2000/04/18	00:12:05.7800	-52.455	13.544	10.	5.4
ISCCD/NEIC	2000/04/19	23:17:30.4900	-52.955	10.270	10.	4.9
ISCCD/NEIC	2000/04/29	15:01:38.6500	-1.257	-15.936	10.	4.8
ISCCD/NEIC	2000/04/29	15:17:10.2200	-1.272	-15.922	10.	5.0
ISCCD/NEIC	2000/04/29	15:20:06.6700	-1.164	-15.871	10.	5.0
ISCCD/NEIC	2000/05/14	16:06:40.1800	-15.349	67.324	10.	4.9
ISCCD/NEIC	2000/05/14	16:15:31.2000	-15.236	67.232	10.	4.9
ISCCD/NEIC	2000/05/18	09:50:25.7300	-10.294	-13.167	10.	5.1
ISCCD/NEIC	2000/05/18	21:47:54.2100	13.292	50.773	10.	4.8
ISCCD/NEIC	2000/05/21	02:58:42.6600	-12.206	43.666	10.	5.1
ISCCD/NEIC	2000/06/12	22:44:27.2500	-5.028	-12.347	10.	4.8
ISCCD/NEIC	2000/06/14	21:16:38.0400	-4.917	-12.373	10.	5.2
ISCCD/NEIC	2000/06/16	17:59:03.3200	-7.983	-13.395	10.	5.1
ISCCD/NEIC	2000/06/16	21:23:13.2500	9.598	57.993	10.	5.1
ISCCD/NEIC	2000/06/18	20:45:20.0700	14.501	56.259	10.	5.2
ISCCD/NEIC	2000/06/22	18:57:56.6600	-4.487	-12.252	10.	4.8
ISCCD/NEIC	2000/06/24	12:37:12.4600	13.651	51.532	10.	5.2
ISCCD/NEIC	2000/07/08	02:19:55.9100	0.079	-16.308	33.	4.8
ISCCD/NEIC	2000/07/10	17:48:27.1700	-7.195	27.752	10.	4.8
ISCCD/NEIC	2000/07/11	23:35:46.8000	-43.804	41.321	10.	4.9
ISCCD/NEIC	2000/07/13	20:35:29.3000	-26.377	27.584	10.	4.7
ISCCD/NEIC	2000/07/14	05:22:01.7500	-0.914	-16.144	10.	5.1

ISCCD/NEIC	2000/07/15	03:13:23.0400	-0.440	-19.595	10.	5.2
ISCCD/NEIC	2000/07/15	03:58:10.4700	-54.104	7.939	10.	5.4
ISCCD/NEIC	2000/07/25	03:14:29.7900	-53.553	-3.169	10.	5.6
ISCCD/NEIC	2000/07/27	10:58:36.3500	-53.484	-3.211	10.	5.2
ISCCD/NEIC	2000/07/28	05:48:42.5900	-54.377	5.299	10.	5.2
ISCCD/NEIC	2000/07/29	00:04:34.8200	-27.873	26.608	10.	4.9
ISCCD/NEIC	2000/08/04	03:11:49.9700	-12.723	66.171	10.	5.0
ISCCD/NEIC	2000/08/04	03:14:10.9700	-12.776	66.252	10.	5.1
ISCCD/NEIC	2000/08/04	03:20:36.4000	-12.804	66.257	10.	4.9
ISCCD/NEIC	2000/08/06	21:38:28.5500	-26.387	27.603	5.	4.9
ISCCD/NEIC	2000/08/19	07:14:20.7400	-48.392	31.445	10.	4.8
ISCCD/NEIC	2000/08/31	08:17:26.4000	9.211	58.060	10.	5.0
ISCCD/NEIC	2000/09/05	07:11:30.0800	1.011	25.818	10.	4.7
ISCCD/NEIC	2000/09/08	01:34:41.4700	-39.841	41.762	10.	5.6
ISCCD/NEIC	2000/09/10	21:37:43.1500	-1.924	-12.961	10.	5.1
ISCCD/NEIC	2000/09/12	16:51:17.5300	-2.265	28.739	10.	4.6
ISCCD/NEIC	2000/09/14	22:18:32.2100	-33.813	56.343	10.	5.3
ISCCD/NEIC	2000/09/17	04:48:10.7600	-31.001	-13.290	10.	4.9
ISCCD/NEIC	2000/09/25	04:00:39.6700	-46.806	37.590	10.	5.6
ISCCD/NEIC	2000/09/30	09:52:33.7900	-27.667	65.747	10.	5.0
ISCCD/NEIC	2000/10/02	02:25:31.3100	-7.977	30.709	34.	6.1
ISCCD/NEIC	2000/10/02	09:38:48.8800	-8.053	30.273	33.	4.7
ISCCD/NEIC	2000/10/03	00:02:49.3000	-6.532	67.817	10.	4.8
ISCCD/NEIC	2000/10/03	02:39:31.0400	-7.145	67.998	10.	5.0
ISCCD/NEIC	2000/10/03	02:46:59.2500	-7.123	67.926	10.	5.3
ISCCD/NEIC	2000/10/03	18:04:31.5700	-7.032	67.951	10.	4.9
ISCCD/NEIC	2000/10/03	19:27:07.8000	-7.118	67.792	10.	4.8
ISCCD/NEIC	2000/10/05	23:08:34.5200	-8.038	30.520	33.	4.8
ISCCD/NEIC	2000/10/06	13:09:14.6200	-52.892	27.329	10.	4.9
ISCCD/NEIC	2000/10/07	01:39:08.3500	-7.995	30.680	33.	4.8
ISCCD/NEIC	2000/10/12	09:23:46.5600	-43.836	-15.891	10.	4.8
ISCCD/NEIC	2000/10/12	20:54:51.2700	-28.874	61.895	10.	5.3
ISCCD/NEIC	2000/10/18	02:34:22.2200	-10.425	66.737	10.	4.9
ISCCD/NEIC	2000/10/18	02:43:18.0800	-10.535	66.738	10.	5.3
ISCCD/NEIC	2000/10/21	08:24:42.3800	-7.420	-13.495	10.	5.1
ISCCD/NEIC	2000/10/21	11:35:59.1300	-47.347	-12.403	10.	5.2
ISCCD/NEIC	2000/10/23	12:02:12.9500	1.508	30.592	0.	4.8
ISCCD/NEIC	2000/10/26	03:20:52.0600	-10.410	-13.133	10.	4.8
ISCCD/NEIC	2000/10/31	10:05:48.8800	-54.033	8.397	10.	4.9
ISCCD/NEIC	2000/11/02	07:27:11.8200	-52.639	11.848	10.	5.0
ISCCD/NEIC	2000/11/23	19:14:46.2400	-35.028	54.097	10.	4.9
ISCCD/NEIC	2000/12/02	04:16:41.7500	-7.150	27.750	10.	5.0
ISCCD/NEIC	2000/12/15	10:01:19.9400	-5.506	29.622	10.	4.9

ISCCD/NEIC	2000/12/15	13:00:01.8700	-50.400	-6.883	10.	5.3
ISCCD/NEIC	2000/12/15	14:08:17.4800	-5.508	-11.528	10.	5.4
ISCCD/NEIC	2000/12/23	22:03:51.9500	-17.332	-16.676	10.	4.9
ISCCD/NEIC	2001/01/04	16:49:39.2600	-0.881	-14.297	10.	4.8
ISCCD/NEIC	2001/01/05	11:40:09.5600	-17.582	-13.568	10.	5.2
MHDF/NEIC	2001/01/18	07:23:37.1800	-13.773	66.187	10.	5.0
MHDF/NEIC	2001/01/24	05:34:32.4700	-0.596	-19.863	10.	5.5
ISCCD/NEIC	2001/01/25	12:43:54.7500	-52.655	27.761	10.	4.9
ISCCD/NEIC	2001/01/29	23:46:05.3300	-40.536	45.107	10.	4.8
ISCCD/NEIC	2001/01/31	15:17:58.7000	-17.154	-14.084	10.	5.1
MHDF/NEIC	2001/01/31	19:15:30.3500	0.466	29.494	28.	4.9
MHDF/NEIC	2001/02/03	17:05:12.2600	-16.856	28.513	15.	4.8
ISCCD/NEIC	2001/02/06	14:15:06.9100	-17.034	66.966	10.	4.9
MHDF/NEIC	2001/02/06	21:35:17.8700	-13.985	-14.388	10.	4.9
ISCCD/NEIC	2001/02/13	00:28:10.0600	-48.209	-9.947	10.	5.4
ISCCD/NEIC	2001/02/24	22:12:32.0100	-1.143	67.789	10.	5.1
ISCCD/NEIC	2001/02/26	06:03:29.6000	-43.310	39.283	10.	5.1
ISCCD/NEIC	2001/03/06	08:13:38.6200	-20.228	66.588	10.	4.8
ISCCD/NEIC	2001/03/06	15:12:47.1300	-52.571	27.915	10.	4.9
MHDF/NEIC	2001/03/07	18:10:58.6500	-6.810	-12.911	10.	5.3
ISCCD/NEIC	2001/03/08	00:54:57.4600	-6.262	-13.287	10.	4.8
ISCCD/NEIC	2001/03/08	04:57:22.5800	-1.023	67.637	10.	5.1
MHDF/NEIC	2001/03/25	07:14:09.5800	14.380	53.474	10.	5.1
MHDF/NEIC	2001/03/25	08:05:33.5400	14.302	53.428	10.	5.0
MHDF/NEIC	2001/03/25	08:24:27.3300	14.426	53.408	10.	4.8
ISCCD/NEIC	2001/03/25	17:06:22.2300	14.450	53.514	10.	4.8
MHDF/NEIC	2001/03/25	18:54:11.3800	-5.695	35.898	10.	4.6
ISCCD/NEIC	2001/03/27	10:58:34.6900	-53.273	25.643	10.	4.8
MHDF/NEIC	2001/03/31	17:47:48.1300	-31.005	-13.509	10.	4.9
MHDF/NEIC	2001/03/31	19:43:23.6100	-10.389	-13.089	10.	5.1
ISCCD/NEIC	2001/04/01	04:16:39.1000	-52.166	16.791	10.	4.9
MHDF/NEIC	2001/04/01	08:37:33.9200	-34.409	55.464	10.	5.4
ISCCD/NEIC	2001/04/01	11:44:07.5400	-34.349	55.491	10.	4.8
ISCCD/NEIC	2001/04/04	07:19:59.3500	-34.500	55.306	10.	4.9
ISCCD/NEIC	2001/04/04	07:26:32.3800	-34.397	55.340	10.	4.9
ISCCD/NEIC	2001/04/04	13:06:14.0500	-34.405	55.464	10.	5.4
ISCCD/NEIC	2001/04/08	10:54:10.0800	-25.090	67.705	10.	5.1
ISCCD/NEIC	2001/04/08	19:26:43.7900	-11.824	65.950	10.	5.0
MHDF/NEIC	2001/04/09	01:03:26.5000	-17.364	-14.165	10.	4.8
ISCCD/NEIC	2001/04/15	15:24:47.2600	-27.579	65.765	10.	4.8
ISCCD/NEIC	2001/04/15	22:38:36.7700	-34.074	56.936	10.	5.0
ISCCD/NEIC	2001/04/17	04:39:01.8600	-6.182	22.730	0.	4.8
ISCCD/NEIC	2001/04/19	00:44:10.4100	-14.785	66.222	10.	4.9

ISCCD/NEIC	2001/04/19	06:28:36.3100	-42.759	41.944	10.	4.9
MHDF/NEIC	2001/04/23	16:35:35.5200	13.274	50.471	10.	5.2
ISCCD/NEIC	2001/04/25	09:08:38.0200	-17.871	65.249	10.	4.9
ISCCD/NEIC	2001/05/03	15:26:36.4100	10.115	61.230	10.	4.8
ISCCD/NEIC	2001/05/04	01:10:48.9100	-33.508	57.296	10.	4.9
ISCCD/NEIC	2001/05/09	12:24:46.4800	-0.268	-18.192	10.	4.8
ISCCD/NEIC	2001/05/14	18:05:04.1100	-7.330	-13.425	10.	5.1
ISCCD/NEIC	2001/05/25	13:36:39.8900	-32.416	-14.296	10.	4.8
ISCCD/NEIC	2001/05/26	06:55:48.3100	-31.911	57.728	10.	4.8
ISCCD/NEIC	2001/05/31	20:23:42.8900	10.034	57.488	10.	4.8
MHDF/NEIC	2001/06/21	11:02:03.8000	-17.263	-14.134	10.	5.3
ISCCD/NEIC	2001/06/22	13:05:10.4300	-14.223	66.262	10.	4.9
MHDF/NEIC	2001/06/29	23:40:00.8500	0.292	29.972	10.	5.0
MHDF/NEIC	2001/07/03	23:54:22.9200	0.026	-16.482	10.	4.8
ISCCD/NEIC	2001/07/09	15:43:20.0800	-27.738	65.668	10.	4.8
ISCCD/NEIC	2001/07/10	02:00:06.4700	-27.740	65.493	10.	4.8
MHDF/NEIC	2001/07/12	06:12:16.7900	-7.429	-13.378	10.	5.6
MHDF/NEIC	2001/07/14	21:42:20.8400	14.699	55.640	10.	5.2
MHDF/NEIC	2001/07/15	02:52:32.3100	14.565	55.567	10.	4.8
MHDF/NEIC	2001/07/24	07:30:03.4500	14.354	56.622	10.	4.8
MHDF/NEIC	2001/07/25	19:47:06.7100	-11.694	-14.306	10.	4.9
MHDF/NEIC	2001/07/29	08:10:16.1900	3.743	63.722	10.	4.8
MHDF/NEIC	2001/07/29	11:31:53.2900	3.642	63.864	10.	4.8
MHDF/NEIC	2001/07/30	19:50:09.2200	-3.294	-12.183	10.	5.2
MHDF/NEIC	2001/07/31	22:22:22.2800	-26.915	26.611	5.	4.9
MHDF/NEIC	2001/08/01	22:29:02.5200	-27.729	64.261	10.	4.9
ISCCD/NEIC	2001/08/01	22:40:52.3800	-27.839	64.332	10.	5.0
MHDF/NEIC	2001/08/01	22:51:23.9200	-27.827	64.317	10.	5.0
MHDF/NEIC	2001/08/01	23:09:23.0100	-27.801	64.369	10.	5.0
ISCCD/NEIC	2001/08/05	09:26:04.3500	-27.734	64.432	10.	4.8
ISCCD/NEIC	2001/08/17	02:10:29.4700	-9.385	33.318	10.	4.6
ISCCD/NEIC	2001/08/18	14:46:23.8100	-52.498	26.470	10.	4.9
MHDF/NEIC	2001/08/26	14:11:08.2500	14.187	51.793	10.	5.1
MHDF/NEIC	2001/08/26	17:56:13.0800	-5.726	36.067	10.	4.8
MHDF/NEIC	2001/08/26	19:45:11.3300	-7.637	35.251	10.	4.6
MHDF/NEIC	2001/08/28	17:40:35.8500	-11.478	-13.251	10.	4.9
ISCCD/NEIC	2001/08/29	03:30:20.7700	-52.525	17.709	10.	4.9
MHDF/NEIC	2001/09/02	15:46:20.2100	14.066	51.690	10.	5.0
MHDF/NEIC	2001/09/24	01:29:07.4300	0.104	35.979	10.	4.7
MHDF/NEIC	2001/10/19	13:01:23.4200	-7.946	12.026	10.	5.3
MHDF/NEIC	2001/10/23	22:51:14.5000	-43.967	-16.195	10.	5.0
MHDF/NEIC	2001/10/23	23:22:30.8400	-43.941	-16.045	10.	5.3
MHDF/NEIC	2001/10/24	21:09:24.9700	-22.395	-10.648	10.	4.8

MHDF/NEIC	2001/10/28	08:20:47.7500	-7.296	-13.479	10.	4.9
ISCCD/NEIC	2001/11/01	01:40:15.5800	-13.774	66.240	10.	4.8
MHDF/ARO	2001/11/02	16:23:44.5900	11.794	43.188	5.	4.9
ISCCD/NEIC	2001/11/05	17:11:47.8300	-17.805	64.941	10.	5.0
ISCCD/NEIC	2001/11/08	17:42:55.3200	-27.759	65.664	10.	5.3
MHDF/NEIC	2001/11/15	01:03:06.0600	-1.587	-15.578	10.	5.5
ISCCD/NEIC	2001/11/29	15:55:31.9700	-46.866	-10.775	10.	4.8
MHDF/NEIC	2001/12/01	15:49:09.1900	-4.340	-12.248	10.	4.8
ISCCD/NEIC	2001/12/01	15:54:14.9700	-4.348	-12.281	10.	4.8
ISCCD/NEIC	2001/12/01	17:56:17.7400	-4.392	-11.974	10.	4.8
MHDF/NEIC	2001/12/01	20:52:01.0700	-4.365	-12.205	10.	4.8
MHDF/NEIC	2001/12/02	10:52:54.7500	-4.254	-12.273	10.	4.8
ISCCD/NEIC	2001/12/07	12:55:43.3900	-52.233	13.486	10.	4.9
ISCCD/NEIC	2001/12/13	23:12:02.2600	-53.438	24.864	10.	5.3
ISCCD/NEIC	2001/12/14	07:35:25.5000	-53.386	24.724	10.	5.2
ISCCD/NEIC	2001/12/14	10:58:05.9700	-53.430	24.954	10.	5.0
MHDF/NEIC	2001/12/16	23:52:02.4500	-12.556	33.090	10.	4.6
MHDF/NEIC	2001/12/20	02:53:34.5300	14.539	54.135	10.	5.0
ISCCD/NEIC	2001/12/20	14:28:31.5200	-52.424	17.561	10.	4.8
MHDF/NEIC	2001/12/22	14:14:01.9200	-40.163	45.398	10.	4.9
MHDF/NEIC	2002/01/04	13:02:18.8500	-0.136	29.758	10.	4.8
ISCCD/NEIC	2002/01/07	00:48:01.7800	-52.720	27.517	10.	5.0
ISCCD/NEIC	2002/01/08	05:32:19.3300	-29.268	24.112	5.	4.7
MHDF/NEIC	2002/01/17	20:01:29.2600	-1.684	29.077	15.	4.7
ISCCD/NEIC	2002/01/19	17:09:29.1700	-1.931	29.579	10.	4.6
MHDF/NEIC	2002/01/20	00:14:44.3900	-1.681	28.981	10.	4.9
ISCCD/NEIC	2002/01/20	13:07:11.4400	-45.923	34.891	10.	5.3
ISCCD/NEIC	2002/01/21	01:19:32.6000	-1.726	28.854	10.	4.6
MHDF/NEIC	2002/01/21	04:39:21.6200	-1.776	29.041	10.	4.9
MHDF/NEIC	2002/01/21	10:55:03.7200	-1.903	29.117	10.	4.7
MHDF/NEIC	2002/01/22	15:32:05.5900	-1.515	28.993	10.	4.9
MHDF/NEIC	2002/01/27	13:42:43.7400	0.775	29.716	10.	4.7
ISCCD/NEIC	2002/02/20	15:06:31.8100	-52.126	15.623	10.	4.9
ISCCD/NEIC	2002/02/20	15:53:23.9600	-52.125	15.721	10.	5.0
ISCCD/NEIC	2002/02/20	17:27:51.5200	0.392	67.182	10.	5.0
ISCCD/NEIC	2002/02/20	18:36:32.6800	-52.099	15.759	10.	4.8
ISCCD/NEIC	2002/02/20	18:38:53.1500	-52.080	15.841	10.	5.1
ISCCD/NEIC	2002/02/22	20:04:47.3700	-31.961	57.343	10.	4.9
ISCCD/NEIC	2002/02/28	03:05:16.9500	-27.982	26.789	5.	4.8
ISCCD/NEIC	2002/03/02	03:14:48.2500	-34.885	-16.494	10.	4.8
ISCCD/NEIC	2002/03/02	03:14:54.6700	-35.717	-17.620	10.	4.9
ISCCD/NEIC	2002/03/05	15:19:02.2000	-10.147	-13.260	10.	4.8
ISCCD/NEIC	2002/03/05	17:07:42.3500	-11.779	24.762	10.	5.1

ISCCD/NEIC	2002/03/06	14:25:58.5900	-35.530	-17.614	10.	4.9
ISCCD/NEIC	2002/03/12	02:25:18.4500	-1.126	26.633	10.	4.6
ISCCD/NEIC	2002/03/21	16:05:31.7300	-26.496	27.346	5.	4.6
ISCCD/NEIC	2002/03/23	00:52:07.3800	-26.877	26.574	5.	4.8
ISCCD/NEIC	2002/03/23	03:25:59.1800	-35.261	-15.868	10.	4.8
ISCCD/NEIC	2002/04/07	07:41:38.4500	-1.352	-15.344	10.	4.8
ISCCD/NEIC	2002/04/10	00:13:43.2200	-44.132	-15.993	10.	5.4
ISCCD/NEIC	2002/04/10	07:02:39.3800	-43.800	-15.951	10.	4.9
ISCCD/NEIC	2002/04/10	10:04:50.6500	-44.176	-15.860	10.	5.3
ISCCD/NEIC	2002/04/10	15:03:16.3500	-43.807	-16.003	10.	4.8
ISCCD/NEIC	2002/04/10	16:24:53.4400	-44.152	-15.898	10.	4.8
ISCCD/NEIC	2002/04/10	17:37:24.9200	-43.984	-15.883	10.	4.8
ISCCD/NEIC	2002/04/10	19:11:54.0700	-44.028	-15.894	10.	4.8
ISCCD/NEIC	2002/04/10	20:18:27.4900	-5.445	30.181	33.	4.7
ISCCD/NEIC	2002/04/10	21:47:22.0100	-43.992	-15.909	10.	5.2
ISCCD/NEIC	2002/04/11	02:47:12.4300	-12.353	-14.656	10.	4.8
ISCCD/NEIC	2002/04/12	18:09:44.9300	-30.819	59.535	10.	4.9
ISCCD/NEIC	2002/04/15	20:36:57.4400	-44.961	-16.075	10.	5.0
ISCCD/NEIC	2002/05/12	11:00:12.5900	-17.819	-13.992	10.	4.8
ISCCD/NEIC	2002/05/13	08:32:46.9600	14.657	54.248	10.	5.0
ISCCD/NEIC	2002/05/13	13:20:48.4300	-12.499	-14.717	10.	5.0
ISCCD/NEIC	2002/05/14	08:09:17.0700	14.795	54.307	10.	4.9
ISCCD/NEIC	2002/05/18	15:15:08.8000	-2.907	33.733	10.	5.2
ISCCD/NEIC	2002/05/20	20:32:23.4600	-32.735	57.175	10.	4.9
ISCCD/NEIC	2002/05/21	09:41:55.7000	14.664	54.213	10.	5.0
ISCCD/NEIC	2002/05/23	23:33:03.4500	-35.469	-16.212	10.	4.8
ISCCD/NEIC	2002/05/27	16:22:36.4300	-26.962	26.715	5.	5.0
ISCCD/NEIC	2002/05/29	11:11:28.8200	-3.080	33.902	10.	4.9
ISCCD/NEIC	2002/06/11	17:58:01.6200	-40.511	-16.682	10.	5.0
ISCCD/NEIC	2002/06/15	13:23:08.2400	-53.222	23.571	10.	4.9
ISCCD/NEIC	2002/06/16	17:59:20.5700	-53.340	23.685	10.	5.1
ISCCD/NEIC	2002/06/25	19:55:58.8900	-4.830	-12.266	10.	4.9
ISCCD/NEIC	2002/06/25	20:15:57.6200	-5.038	-12.296	10.	5.2
ISCCD/NEIC	2002/06/25	21:47:23.7200	-4.928	-12.384	10.	5.2
ISCCD/NEIC	2002/06/25	21:48:40.2100	-26.945	67.193	10.	5.1
ISCCD/NEIC	2002/06/25	22:59:11.8900	-4.955	-12.384	10.	5.1
ISCCD/NEIC	2002/06/26	01:00:11.4600	-4.775	-12.336	10.	4.8
ISCCD/NEIC	2002/06/26	01:25:27.6800	-4.922	-12.329	10.	4.8
ISCCD/NEIC	2002/06/26	03:24:50.3100	-4.908	-12.363	10.	4.8
ISCCD/NEIC	2002/06/26	06:38:13.4700	-4.742	-12.304	10.	4.9
ISCCD/NEIC	2002/06/30	04:08:01.3700	8.738	58.199	10.	5.0
ISCCD/NEIC	2002/06/30	04:17:08.7300	8.689	58.160	10.	5.0
ISCCD/NEIC	2002/07/02	16:58:28.0700	-47.491	-11.819	10.	4.8

ISCCD/NEIC	2002/07/10	11:04:05.1400	-5.409	35.810	10.	4.7
ISCCD/NEIC	2002/07/11	12:05:26.7100	-1.653	-13.057	10.	4.8
ISCCD/NEIC	2002/07/11	12:42:17.5200	-1.635	-12.928	10.	4.8
ISCCD/NEIC	2002/07/11	12:44:09.5600	-1.512	-12.994	10.	4.8
ISCCD/NEIC	2002/07/12	03:16:55.4300	-26.412	29.015	5.	4.7
ISCCD/NEIC	2002/07/13	06:50:37.8400	-14.102	-14.143	10.	4.9
ISCCD/NEIC	2002/07/13	07:05:16.4000	-13.870	-14.493	10.	4.9
ISCCD/NEIC	2002/07/15	15:02:07.0600	-43.901	-15.996	10.	5.0
ISCCD/NEIC	2002/07/16	14:50:14.4600	-11.650	41.071	10.	5.1
ISCCD/NEIC	2002/07/19	10:46:57.3900	1.566	66.851	10.	5.3
ISCCD/NEIC	2002/07/22	17:15:12.0100	-53.472	25.401	10.	4.8
ISCCD/NEIC	2002/07/25	13:19:17.5400	4.187	62.608	10.	4.9
ISCCD/NEIC	2002/08/08	21:17:11.7000	13.649	40.001	10.	4.9
ISCCD/NEIC	2002/08/09	22:08:42.9900	11.818	43.651	10.	5.0
ISCCD/NEIC	2002/08/10	09:45:41.8800	12.128	43.885	10.	5.0
ISCCD/NEIC	2002/08/10	15:56:02.0400	13.654	39.813	10.	5.2
ISCCD/NEIC	2002/08/13	07:47:42.5900	14.761	55.816	10.	5.3
ISCCD/NEIC	2002/08/13	08:43:38.7300	14.743	55.722	10.	4.8
ISCCD/NEIC	2002/08/13	08:47:29.4000	14.892	55.738	10.	5.1
ISCCD/NEIC	2002/08/13	08:49:55.3100	14.876	55.766	10.	5.0
ISCCD/NEIC	2002/08/14	16:29:30.8600	14.703	55.831	10.	5.2
ISCCD/NEIC	2002/08/14	16:31:51.4000	14.750	55.841	10.	5.1
ISCCD/NEIC	2002/08/24	02:14:20.2100	14.570	56.331	10.	4.8
ISCCD/NEIC	2002/08/24	07:31:41.8800	-0.013	-17.815	10.	4.8
ISCCD/NEIC	2002/08/31	16:20:17.2100	-33.761	56.591	10.	4.8
ISCCD/NEIC	2002/08/31	22:52:33.1900	-9.737	34.313	10.	4.9
MHDF/NEIC	2002/09/01	17:14:59.8900	14.284	51.945	10.	5.2
MHDF/NEIC	2002/09/02	00:21:36.5900	14.133	51.938	10.	5.0
MHDF/NEIC	2002/09/08	03:36:41.5600	-30.109	60.926	10.	5.4
MHDF/NEIC	2002/09/08	09:16:40.4600	13.026	57.764	10.	4.9
MHDF/NEIC	2002/09/08	23:03:45.2900	-1.225	-14.634	10.	5.3
MHDF/NEIC	2002/09/20	18:37:09.0400	-18.578	65.316	10.	4.8
MHDF/NEIC	2002/09/26	12:55:29.7800	-19.648	-12.014	10.	5.3
ISCCD/NEIC	2002/10/07	18:10:50.9300	13.615	50.922	33.	4.8
ISCCD/NEIC	2002/10/13	02:08:05.3800	-5.523	35.781	10.	4.7
ISCCD/NEIC	2002/10/13	04:46:32.8400	-5.414	35.928	10.	4.7
ISCCD/NEIC	2002/10/22	06:38:48.1700	-43.978	39.017	10.	5.2
ISCCD/NEIC	2002/10/23	01:14:59.8500	11.156	57.348	10.	4.9
ISCCD/NEIC	2002/10/24	07:12:18.4000	-1.822	28.979	10.	5.3
ISCCD/NEIC	2002/10/24	08:03:15.8100	-2.013	29.014	10.	5.0
ISCCD/NEIC	2002/10/24	10:19:22.0300	-2.020	28.975	10.	4.8
ISCCD/NEIC	2002/10/24	11:40:17.8300	-2.015	28.973	10.	4.7
ISCCD/NEIC	2002/10/26	12:56:47.7100	-1.572	29.155	10.	4.7

ISCCD/NEIC	2002/11/04	03:19:18.3800	-5.525	36.035	10.	5.5
ISCCD/NEIC	2002/11/04	08:25:54.5600	-5.779	36.082	10.	4.9
ISCCD/NEIC	2002/11/08	18:45:14.9600	-17.690	-13.347	10.	4.9
ISCCD/NEIC	2002/11/09	02:05:48.0200	-25.761	-13.630	10.	4.8
ISCCD/NEIC	2002/11/10	03:43:27.9300	-37.537	51.118	10.	4.9
ISCCD/NEIC	2002/11/20	05:33:20.0600	-43.357	40.361	10.	4.8
ISCCD/NEIC	2002/11/27	02:34:03.0300	-14.183	66.218	10.	4.8
ISCCD/NEIC	2002/11/27	23:33:26.8700	-5.553	35.613	10.	4.7
ISCCD/NEIC	2002/11/29	06:03:49.9800	10.063	57.431	10.	5.0
ISCCD/NEIC	2002/12/01	11:18:32.4800	12.279	39.744	10.	4.9
ISCCD/NEIC	2002/12/06	08:52:22.6500	-28.111	62.751	10.	5.1
ISCCD/NEIC	2002/12/13	13:24:25.9400	-1.852	29.041	10.	4.7
ISCCD/NEIC	2002/12/21	13:18:37.5300	10.454	56.852	10.	4.8
ISCCD/NEIC	2002/12/21	14:12:35.6900	-10.651	-13.210	10.	4.9
ISCCD/NEIC	2002/12/22	11:35:20.4500	1.986	66.794	10.	5.0
ISCCD/NEIC	2002/12/22	14:10:02.6500	-52.684	12.737	10.	4.8
ISCCD/NEIC	2002/12/23	02:50:38.2700	-1.724	34.971	10.	4.9
ISCCD/NEIC	2002/12/23	11:55:24.0300	-15.145	66.905	10.	4.9
ISCCD/NEIC	2002/12/28	05:00:31.2600	-20.562	67.020	10.	4.8
ISCCD/NEIC	2002/12/28	07:03:22.6400	-20.350	67.024	10.	4.9
ISCCD/NEIC	2002/12/30	23:06:53.1100	-37.223	52.198	10.	4.8
MHDF/NEIC	2003/01/10	23:45:45.5100	-5.427	35.784	33.	4.7
MHDF/NEIC	2003/01/11	07:30:06.4500	-4.887	-11.606	10.	5.1
MHDF/NEIC	2003/01/20	04:21:19.1300	-5.597	36.004	10.	4.6
MHDF/NEIC	2003/01/27	17:56:25.8300	-46.048	35.057	10.	5.6
ISCCD/NEIC	2003/02/01	15:24:47.9800	-0.926	27.592	10.	4.9
ISCCD/NEIC	2003/02/11	19:42:10.8600	-52.363	12.933	10.	5.1
ISCCD/NEIC	2003/02/13	05:59:10.5800	-6.726	-11.802	10.	5.3
ISCCD/NEIC	2003/02/13	08:23:47.2400	-12.914	-14.544	10.	5.0
ISCCD/NEIC	2003/02/14	23:17:52.2200	-54.471	5.742	10.	5.4
ISCCD/NEIC	2003/02/22	11:37:45.9100	-46.104	34.675	10.	5.1
ISCCD/NEIC	2003/03/04	21:06:07.9800	-36.008	53.330	10.	4.8
ISCCD/NEIC	2003/03/05	10:49:23.9800	-34.319	58.140	10.	4.9
ISCCD/NEIC	2003/03/10	23:26:25.3900	-5.256	35.950	10.	4.6
ISCCD/NEIC	2003/03/14	22:13:18.9000	-1.465	-15.733	10.	4.8
ISCCD/NEIC	2003/03/20	06:15:20.5800	-2.418	29.560	10.	5.2
ISCCD/NEIC	2003/03/22	07:55:48.3600	-20.124	67.028	10.	5.1
ISCCD/NEIC	2003/03/23	18:09:26.5600	-13.763	14.273	0.	4.8
ISCCD/NEIC	2003/03/24	18:12:54.0000	-14.324	66.234	10.	4.9
ISCCD/NEIC	2003/03/24	18:18:19.4900	-14.220	66.244	10.	4.8
MHDF/NEIC	2003/04/05	22:48:19.9500	-3.615	29.750	10.	4.8
MHDF/NEIC	2003/04/06	18:17:40.6500	-15.368	67.234	10.	5.2
MHDF/NEIC	2003/04/10	16:03:56.0800	-5.555	29.507	10.	5.0

MHDF/NEIC	2003/04/11	05:07:07.1200	-15.270	67.180	10.	4.9
MHDF/NEIC	2003/04/14	21:44:25.0400	6.797	61.510	10.	4.8
MHDF/NEIC	2003/04/15	16:26:46.7200	-20.057	66.930	10.	4.9
MHDF/NEIC	2003/04/17	14:50:48.5800	-54.624	1.432	10.	5.5
MHDF/NEIC	2003/04/23	10:18:57.4300	-53.037	21.724	10.	4.8
MHDF/NEIC	2003/04/30	00:47:08.8100	-54.405	5.032	10.	5.1
ISCCD/NEIC	2003/05/14	10:46:14.4400	-17.123	66.894	10.	4.8
ISCCD/NEIC	2003/05/21	06:22:44.9200	-10.021	34.199	0.	5.0
ISCCD/NEIC	2003/05/29	18:19:55.3500	-17.546	66.427	10.	4.8
ISCCD/NEIC	2003/06/05	13:14:23.4900	-13.728	-14.616	10.	4.9
ISCCD/NEIC	2003/06/06	06:59:44.2600	-0.721	-16.086	10.	5.0
ISCCD/NEIC	2003/06/08	12:57:56.2500	-16.305	67.071	10.	4.9
ISCCD/NEIC	2003/06/14	03:10:23.1200	-5.507	36.072	10.	5.1
ISCCD/NEIC	2003/06/30	20:42:10.2500	-6.825	29.802	0.	4.7
ISCCD/NEIC	2003/07/05	17:06:40.0800	-32.250	57.579	10.	4.8
ISCCD/NEIC	2003/07/08	08:51:27.0700	-7.077	-21.828	10.	5.0
ISCCD/NEIC	2003/07/19	15:10:35.6700	-41.962	-16.455	10.	5.0
ISCCD/NEIC	2003/07/19	23:05:01.8200	-26.425	27.333	5.	4.6
ISCCD/NEIC	2003/07/23	16:53:35.2900	-15.545	-13.260	10.	5.3
ISCCD/NEIC	2003/07/23	20:07:05.2100	-15.660	-13.242	10.	5.1
ISCCD/NEIC	2003/07/30	05:43:19.4000	-31.923	57.578	10.	5.1
ISCCD/NEIC	2003/08/01	01:37:13.7900	-54.647	1.253	10.	5.1
ISCCD/NEIC	2003/08/05	18:56:50.7100	-0.521	29.446	10.	5.3
ISCCD/NEIC	2003/08/21	04:53:02.0500	14.667	52.240	10.	4.9
ISCCD/NEIC	2003/08/25	02:05:57.9900	-0.512	29.309	10.	4.6
ISCCD/NEIC	2003/09/01	00:39:03.0200	-4.198	30.074	10.	4.8
ISCCD/NEIC	2003/09/05	07:46:48.2100	-54.715	1.089	10.	5.0
ISCCD/NEIC	2003/09/05	11:35:28.1200	-1.547	55.927	10.	5.0
ISCCD/NEIC	2003/09/05	16:16:59.9900	-1.444	55.954	10.	4.9
ISCCD/NEIC	2003/09/23	16:10:22.5500	-22.969	-13.657	10.	5.1
ISCCD/NEIC	2003/10/05	09:05:03.0600	-19.934	-11.780	10.	5.1
ISCCD/NEIC	2003/10/05	18:29:11.0100	-19.960	-11.750	10.	5.0
ISCCD/NEIC	2003/10/07	16:54:16.5400	-46.813	-10.703	10.	5.3
ISCCD/NEIC	2003/10/11	09:34:15.1100	13.958	51.765	10.	4.9
ISCCD/NEIC	2003/10/11	11:32:44.6000	-27.825	26.679	5.	4.8
ISCCD/NEIC	2003/10/11	23:08:45.1600	-1.415	-15.046	10.	4.9
ISCCD/NEIC	2003/11/09	22:56:25.5500	-0.472	-19.692	10.	4.9
ISCCD/NEIC	2003/11/13	21:18:11.3500	-14.958	31.278	5.	4.9
ISCCD/NEIC	2003/11/25	05:40:07.9400	3.874	63.378	10.	5.1
ISCCD/NEIC	2003/11/27	06:18:36.7300	0.653	67.085	10.	5.1
ISCCD/NEIC	2003/12/07	00:11:02.2700	-5.400	35.415	10.	4.9
ISCCD/NEIC	2003/12/08	00:07:32.4700	9.772	57.851	10.	4.8
ISCCD/NEIC	2003/12/08	14:00:54.9500	3.563	63.710	10.	4.9

ISCCD/NEIC	2003/12/15	22:28:53.8400	-9.178	67.257	10.	4.8
ISCCD/NEIC	2003/12/21	20:30:41.4100	-5.383	-11.430	10.	4.9
ISCCD/NEIC	2004/01/03	23:17:52.4800	11.511	43.041	10.	4.9
ISCCD/NEIC	2004/01/04	00:09:46.0600	11.640	43.192	10.	5.1
ISCCD/NEIC	2004/01/14	11:26:18.5500	-36.629	53.413	10.	5.2
ISCCD/NEIC	2004/01/15	05:19:28.2200	-43.270	39.717	10.	4.8
ISCCD/NEIC	2004/02/05	21:35:35.5500	0.957	30.451	10.	4.8
ISCCD/NEIC	2004/02/13	21:32:23.6300	-38.901	-15.843	10.	5.1
ISCCD/NEIC	2004/02/22	14:20:27.8200	13.187	50.839	10.	4.8
ISCCD/NEIC	2004/02/24	02:14:34.0300	-3.393	29.558	10.	4.7
ISCCD/NEIC	2004/02/27	13:45:25.7400	-18.822	-12.563	10.	4.9
ISCCD/NEIC	2004/02/28	05:23:54.4200	-18.732	-12.562	11.	5.7
ISCCD/NEIC	2004/03/03	20:24:44.7400	-0.733	-16.131	10.	5.1
ISCCD/NEIC	2004/03/14	14:07:56.2400	-10.403	34.426	10.	4.9
ISCCD/NEIC	2004/03/17	06:40:57.1700	-7.043	-13.012	10.	5.0
ISCCD/NEIC	2004/03/18	20:37:44.6300	2.094	31.401	30.	4.7
ISCCD/NEIC	2004/03/19	16:09:18.3600	-34.907	54.386	10.	4.9
ISCCD/NEIC	2004/03/19	18:35:00.9000	-34.530	55.212	10.	4.9
ISCCD/NEIC	2004/03/19	19:08:49.8100	-34.419	55.173	10.	4.8
ISCCD/NEIC	2004/03/19	19:39:16.9300	-34.643	54.928	10.	4.9
ISCCD/NEIC	2004/03/19	21:08:20.6800	-34.427	55.197	10.	5.0
ISCCD/NEIC	2004/03/23	20:54:59.2000	-26.909	26.760	5.	4.6
ISCCD/NEIC	2004/04/03	10:10:04.8800	13.806	51.549	10.	5.0
ISCCD/NEIC	2004/04/04	18:04:34.7100	-3.425	-12.277	10.	5.2
ISCCD/NEIC	2004/04/07	14:49:52.5300	-9.307	67.087	10.	5.1
ISCCD/NEIC	2004/04/20	00:52:49.1800	3.092	65.227	10.	4.9
ISCCD/NEIC	2004/04/24	11:45:42.4700	-22.192	-11.898	0.	5.3
MHDF/NEIC	2004/05/05	05:24:18.6900	-7.408	-13.483	8.	4.9
MHDF/NEIC	2004/05/11	22:22:00.7900	4.923	62.109	10.	4.8
MHDF/NEIC	2004/05/12	09:45:45.6400	-12.716	26.004	10.	4.7
MHDF/NEIC	2004/05/12	10:22:00.3900	-12.727	26.042	10.	4.7
MHDF/NEIC	2004/05/12	23:23:54.4300	-1.614	-15.290	10.	4.9
MHDF/NEIC	2004/05/13	20:17:47.9600	-36.791	-20.816	10.	5.2
MHDF/NEIC	2004/05/15	18:54:17.3600	-47.719	32.126	10.	4.9
MHDF/NEIC	2004/05/16	11:21:46.0200	-2.877	29.490	10.	4.7
MHDF/NEIC	2004/05/20	07:58:23.7900	-52.266	13.991	10.	5.2
MHDF/NEIC	2004/05/26	11:20:59.7700	-52.543	18.769	10.	4.8
MHDF/NEIC	2004/05/26	19:52:37.9900	-52.664	18.614	10.	4.9
MHDF/NEIC	2004/05/27	03:52:07.4300	14.628	54.869	10.	5.1
MHDF/NEIC	2004/05/27	13:34:01.0400	-52.764	18.405	10.	4.8
MHDF/NEIC	2004/05/27	15:11:37.5100	-14.199	-14.427	10.	4.9
MHDF/NEIC	2004/05/27	20:49:27.1600	-52.618	18.626	10.	5.1
ISCCD/NEIC	2004/06/27	12:51:50.3500	-40.921	43.306	10.	5.6

ISCCD/NEIC	2004/06/28	00:54:05.2100	-40.774	43.319	10.	5.1
ISCCD/NEIC	2004/07/02	11:57:09.6300	-8.975	67.614	10.	5.1
ISCCD/NEIC	2004/07/06	15:02:54.8800	-11.776	-13.375	10.	4.9
ISCCD/NEIC	2004/07/06	15:09:41.2600	-11.601	-13.654	10.	4.9
ISCCD/NEIC	2004/07/06	15:31:52.9600	-11.725	-13.523	10.	5.1
ISCCD/NEIC	2004/07/09	15:37:53.2100	-39.536	-16.072	10.	5.3
ISCCD/NEIC	2004/07/13	05:37:50.7200	-29.891	-13.873	10.	4.8
ISCCD/NEIC	2004/07/17	03:38:57.7800	-40.700	43.229	10.	5.0
ISCCD/NEIC	2004/07/29	22:21:06.9100	-37.309	-12.371	18.	4.8
ISCCD/NEIC	2004/07/31	07:57:32.1300	-15.073	66.928	16.	4.9
ISCCD/NEIC	2004/07/31	08:53:28.6800	-15.133	66.933	10.	5.1
ISCCD/NEIC	2004/08/04	03:46:16.9000	-40.779	43.201	10.	5.3
ISCCD/NEIC	2004/08/07	08:12:48.6800	-47.072	-11.146	10.	4.8
ISCCD/NEIC	2004/08/10	19:10:19.4600	-52.500	13.704	10.	4.9
ISCCD/NEIC	2004/08/14	09:56:04.7900	-27.983	63.490	10.	4.8
ISCCD/NEIC	2004/08/17	16:23:17.2600	-20.001	66.314	10.	4.9
ISCCD/NEIC	2004/08/21	20:11:48.9000	-10.592	34.425	10.	4.9
ISCCD/NEIC	2004/08/31	18:22:08.0400	-18.225	34.927	0.	4.7
ISCCD/NEIC	2004/09/06	10:44:38.2000	-26.779	26.513	10.	4.9
ISCCD/NEIC	2004/09/08	15:40:23.6400	-52.157	-4.966	10.	5.2
ISCCD/NEIC	2004/09/11	00:53:09.2400	-39.476	-15.832	10.	4.8
ISCCD/NEIC	2004/09/13	06:39:56.3900	-21.367	-11.717	10.	4.9
ISCCD/NEIC	2004/09/19	14:24:33.2300	-2.252	67.825	10.	4.9
ISCCD/NEIC	2004/09/19	23:24:19.9400	-17.714	64.732	10.	5.3
ISCCD/NEIC	2004/09/21	02:47:43.2500	-53.185	23.463	10.	4.9
ISCCD/NEIC	2004/09/21	03:39:37.0700	-53.266	24.148	10.	4.8
ISCCD/NEIC	2004/09/28	13:39:50.5700	-12.833	-14.687	10.	4.9
ISCCD/NEIC	2004/09/28	13:43:26.1100	-13.236	-15.060	10.	5.4
ISCCD/NEIC	2004/09/28	19:25:02.5400	-52.433	26.563	10.	5.3
ISCCD/NEIC	2004/10/12	14:59:10.2500	-28.855	-12.702	10.	4.9
ISCCD/NEIC	2004/10/16	01:29:15.0600	-46.368	33.683	10.	5.0
MHDF/NEIC	2004/11/02	03:02:21.6500	-44.627	-15.705	10.	4.9
MHDF/NEIC	2004/11/16	09:27:20.9900	-52.657	28.171	10.	4.9
MHDF/NEIC	2004/11/22	00:42:41.1400	-52.656	25.855	10.	4.8
MHDF/NEIC	2004/11/27	08:49:03.3500	-45.841	-20.548	10.	5.1
ISCCD/NEIC	2004/12/08	08:50:31.7900	-7.394	30.443	10.	4.9
ISCCD/NEIC	2004/12/13	04:09:03.9800	0.775	30.169	0.	4.8
ISCCD/NEIC	2004/12/15	19:35:30.8200	-24.360	-13.271	10.	5.0
ISCCD/NEIC	2005/01/04	19:44:12.0200	-10.354	41.012	10.	5.0
ISCCD/NEIC	2005/01/04	19:58:06.8900	-10.407	41.494	0.	5.1
ISCCD/NEIC	2005/01/06	03:28:51.0000	-52.570	27.612	10.	5.2
ISCCD/NEIC	2005/01/08	17:57:17.2700	-29.424	-12.961	10.	4.9
ISCCD/NEIC	2005/01/13	10:04:57.6900	0.640	17.391	10.	4.6

ISCCD/NEIC	2005/01/15	05:13:10.6700	-5.991	39.221	10.	5.1
ISCCD/NEIC	2005/01/27	23:31:03.6400	-4.615	-10.390	10.	4.8
ISCCD/NEIC	2005/01/29	21:01:09.0400	-1.626	-15.516	10.	4.9
ISCCD/NEIC	2005/02/03	04:27:52.8000	-20.223	67.452	10.	5.1
ISCCD/NEIC	2005/02/04	12:15:51.9600	-29.630	-13.836	10.	4.8
ISCCD/NEIC	2005/02/17	23:08:46.9600	-26.915	26.546	5.	4.9
ISCCD/NEIC	2005/02/25	05:11:59.9300	-48.840	-8.587	10.	5.0
ISCCD/NEIC	2005/02/25	07:47:18.7700	-54.084	6.942	10.	5.2
ISCCD/NEIC	2005/02/25	09:07:42.9500	-53.976	6.993	10.	4.8
ISCCD/NEIC	2005/02/25	09:56:48.4000	-53.936	7.253	10.	4.8
ISCCD/NEIC	2005/03/09	10:15:31.8300	-26.913	26.789	5.	5.0
ISCCD/NEIC	2005/03/19	11:49:18.4400	4.181	11.023	10.	4.6
ISCCD/NEIC	2005/03/28	00:01:30.5100	-0.299	-20.776	10.	5.1
ISCCD/NEIC	2005/03/28	17:49:09.8700	-17.796	65.765	10.	4.8
ISCCD/NEIC	2005/03/31	05:19:52.5000	-54.064	7.781	10.	5.3
ISCCD/NEIC	2005/04/05	19:58:41.9400	-54.054	7.024	10.	5.1
ISCCD/NEIC	2005/04/07	05:36:50.2800	-8.732	67.523	10.	4.8
ISCCD/NEIC	2005/04/07	19:02:34.7100	11.979	46.253	10.	4.8
ISCCD/NEIC	2005/04/09	15:53:52.8700	-53.446	25.316	10.	5.1
ISCCD/NEIC	2005/04/12	13:55:52.7800	-10.508	-13.088	10.	4.9
ISCCD/NEIC	2005/04/21	01:15:08.8400	-52.191	13.695	10.	5.0
ISCCD/NEIC	2005/04/22	03:46:06.0500	-10.226	-13.193	10.	5.1
ISCCD/NEIC	2005/05/01	06:15:18.7300	4.406	62.417	10.	4.8
ISCCD/NEIC	2005/05/08	19:51:19.1400	-35.122	-17.266	10.	5.2
ISCCD/NEIC	2005/05/10	06:40:22.1300	-42.737	42.333	10.	5.0
ISCCD/NEIC	2005/05/25	11:02:22.5700	-34.091	-14.722	10.	4.9
ISCCD/NEIC	2005/05/26	22:34:32.3800	-13.737	66.197	10.	4.9
ISCCD/NEIC	2005/06/05	01:09:12.2300	-53.127	22.177	10.	4.9
ISCCD/NEIC	2005/06/05	12:04:32.2700	-53.004	22.319	10.	5.1
ISCCD/NEIC	2005/06/09	13:57:08.9500	4.683	17.504	10.	4.7
ISCCD/NEIC	2005/06/23	11:50:57.8100	-20.197	67.589	10.	4.8
ISCCD/NEIC	2005/06/24	13:54:36.0700	-1.070	-13.421	10.	4.9
ISCCD/NEIC	2005/07/03	14:55:52.4700	4.851	62.111	10.	4.8
ISCCD/NEIC	2005/07/16	05:03:39.7600	1.596	66.711	10.	4.8
ISCCD/NEIC	2005/07/21	19:17:49.5900	-8.130	-13.492	10.	5.3
ISCCD/NEIC	2005/07/23	02:24:49.8400	-38.559	47.646	10.	5.0
ISCCD/NEIC	2005/08/06	05:36:10.5400	-7.101	67.879	10.	4.8
ISCCD/NEIC	2005/08/15	07:53:42.5900	-1.684	-13.054	10.	5.3
ISCCD/NEIC	2005/08/18	04:55:56.4300	2.458	66.385	10.	4.8
ISCCD/NEIC	2005/08/19	13:04:03.9500	-31.447	58.586	10.	5.4
ISCCD/NEIC	2005/08/27	17:40:14.5900	-30.468	60.006	26.	5.1
ISCCD/NEIC	2005/08/31	08:18:26.9100	-14.590	66.111	10.	4.9
ISCCD/NEIC	2005/09/20	02:17:59.7700	12.416	40.466	10.	4.8

ISCCD/NEIC	2005/09/21	14:57:26.5000	12.535	40.465	10.	4.9
ISCCD/NEIC	2005/09/21	20:04:52.2800	12.545	40.499	10.	4.8
ISCCD/NEIC	2005/09/22	03:12:34.0700	12.697	40.461	10.	5.0
ISCCD/NEIC	2005/09/22	10:14:24.3700	12.627	40.499	10.	4.8
ISCCD/NEIC	2005/09/22	13:58:44.4000	12.702	40.553	10.	4.9
ISCCD/NEIC	2005/09/22	16:19:42.8800	-40.868	43.255	10.	5.3
ISCCD/NEIC	2005/09/22	19:18:06.4100	-54.214	1.949	10.	4.9
ISCCD/NEIC	2005/09/22	19:51:52.5500	12.398	40.442	10.	4.8
ISCCD/NEIC	2005/09/23	04:57:51.0700	12.550	40.598	10.	4.8
ISCCD/NEIC	2005/09/23	20:26:32.0200	12.575	40.472	10.	4.8
ISCCD/NEIC	2005/09/24	03:25:25.7800	12.732	40.427	10.	4.8
ISCCD/NEIC	2005/09/24	05:15:33.9400	12.674	40.519	10.	5.0
ISCCD/NEIC	2005/09/24	05:36:11.4500	12.501	40.461	10.	4.8
ISCCD/NEIC	2005/09/24	06:58:28.0200	12.572	40.569	10.	5.2
ISCCD/NEIC	2005/09/24	07:36:08.4600	12.617	40.535	10.	5.0
ISCCD/NEIC	2005/09/24	08:20:48.9600	12.543	40.389	10.	4.9
ISCCD/NEIC	2005/09/24	09:17:15.6200	12.514	40.361	10.	4.8
ISCCD/NEIC	2005/09/24	23:05:20.3900	12.386	40.662	10.	4.8
ISCCD/NEIC	2005/09/25	00:37:28.5600	12.447	40.603	10.	5.0
ISCCD/NEIC	2005/09/25	01:10:58.6600	12.260	40.513	10.	4.9
ISCCD/NEIC	2005/09/25	08:18:42.5500	12.441	40.495	10.	4.9
ISCCD/NEIC	2005/09/25	10:02:12.7300	12.366	40.505	10.	5.2
ISCCD/NEIC	2005/09/25	10:07:58.0000	12.447	40.621	10.	4.8
ISCCD/NEIC	2005/09/25	11:20:03.7600	12.421	40.578	10.	5.1
ISCCD/NEIC	2005/09/25	16:22:02.2900	12.436	40.617	10.	4.8
ISCCD/NEIC	2005/09/26	09:33:54.2400	12.429	40.602	10.	5.2
ISCCD/NEIC	2005/09/26	13:28:33.3200	12.386	40.578	10.	4.9
ISCCD/NEIC	2005/09/26	20:30:01.5200	12.458	40.538	10.	5.0
ISCCD/NEIC	2005/09/26	21:25:01.8600	12.338	40.617	10.	4.9
ISCCD/NEIC	2005/09/28	16:31:35.7000	12.443	40.634	10.	5.1
ISCCD/NEIC	2005/09/29	11:52:19.4000	12.423	40.578	10.	4.8
ISCCD/NEIC	2005/10/02	23:24:41.9400	12.020	40.537	10.	5.0
ISCCD/NEIC	2005/10/12	14:10:34.6000	-27.011	26.769	2.	4.8
ISCCD/NEIC	2005/10/18	00:23:40.5600	-34.793	54.725	10.	4.9
ISCCD/NEIC	2005/10/20	17:06:34.0400	-49.190	31.030	10.	4.8
ISCCD/NEIC	2005/10/24	00:59:06.0000	13.032	57.454	10.	4.9
ISCCD/ISC	2005/11/02	00:46:43.0100	-54.367	5.166	10.	5.1
ISCCD/ISC	2005/11/04	12:25:00.6300	-35.726	53.377	5.	5.0
ISCCD/ISC	2005/11/04	16:06:06.9300	-52.909	21.044	10.	4.8
ISCCD/ISC	2005/11/09	12:37:27.4600	-46.967	33.306	10.	4.9
ISCCD/ISC	2005/11/09	15:07:19.2300	-52.684	18.386	10.	5.0
ISCCD/ISC	2005/11/11	04:21:39.5100	-48.300	-10.162	10.	4.8
ISCCD/ISC	2005/11/11	17:10:48.6900	-39.657	-15.846	10.	4.8

ISCCD/ISC	2005/11/14	12:57:28.6600	-43.797	41.500	10.	5.0
ISCCD/ISC	2005/11/22	09:48:43.6700	-14.870	66.784	10.	5.4
ISCCD/ISC	2005/11/22	09:57:06.7100	-14.956	66.770	10.	5.4
ISCCD/ISC	2005/12/05	10:43:18.6400	-31.940	57.316	10.	5.0
ISCCD/ISC	2005/12/05	23:15:26.9400	-6.078	29.441	10.	4.7
ISCCD/ISC	2005/12/06	05:53:08.1900	-6.088	29.532	18.	5.3
ISCCD/ISC	2005/12/07	05:46:43.6100	-14.105	-13.832	10.	4.9
ISCCD/ISC	2005/12/08	03:16:32.3000	-6.225	29.441	10.	5.0
ISCCD/ISC	2005/12/08	11:51:21.2600	-6.530	29.377	10.	4.8
ISCCD/ISC	2005/12/09	23:30:23.7200	-6.129	29.601	19.	5.5
ISCCD/ISC	2005/12/10	05:33:46.3500	-34.884	54.056	10.	4.9
ISCCD/ISC	2005/12/14	13:10:21.5600	-37.504	51.387	7.	4.8
ISCCD/ISC	2005/12/15	22:08:28.1600	-6.231	29.309	10.	4.7
ISCCD/ISC	2005/12/19	13:24:26.9800	5.744	61.037	10.	5.1
ISCCD/ISC	2005/12/19	15:52:59.8000	5.727	60.980	10.	5.2
ISCCD/ISC	2005/12/24	04:09:43.5000	-10.673	66.457	8.	4.9
ISCCD/ISC	2005/12/30	14:19:18.7300	-10.624	66.429	10.	4.9
ISCCD/ISC	2006/01/09	20:59:38.9600	-6.085	29.620	27.	5.3
ISCCD/ISC	2006/01/12	09:34:58.8800	9.756	57.599	10.	4.8
ISCCD/ISC	2006/01/15	06:49:41.5000	-54.068	7.028	10.	5.2
ISCCD/ISC	2006/01/27	08:25:36.1100	13.272	50.708	10.	4.8
ISCCD/ISC	2006/02/02	00:05:56.7500	-48.418	31.592	9.	4.8
ISCCD/ISC	2006/02/06	18:50:50.3900	-10.339	29.154	27.	4.9
ISCCD/ISC	2006/02/11	07:29:08.1000	9.970	56.799	10.	5.2
ISCCD/ISC	2006/02/11	21:49:15.1200	-25.405	-1.192	10.	4.8
ISCCD/ISC	2006/02/17	13:24:04.4200	-1.618	-15.100	17.	5.0
ISCCD/ISC	2006/02/18	14:59:05.3400	-6.494	-11.048	10.	4.9
ISCCD/ISC	2006/02/20	19:26:49.8700	-10.329	-13.246	10.	5.2
ISCCD/ISC	2006/02/20	19:27:33.4200	-10.408	-13.133	10.	5.1
ISCCD/ISC	2006/02/22	22:19:09.3200	-21.311	33.549	16.	6.5
ISCCD/ISC	2006/02/22	22:26:55.2400	-21.151	33.183	29.	5.4
ISCCD/ISC	2006/02/22	22:29:02.8200	-21.277	33.480	10.	4.9
ISCCD/ISC	2006/02/22	22:36:47.6500	-21.334	33.297	34.	4.8
ISCCD/ISC	2006/02/22	23:05:04.8600	-21.731	33.204	10.	4.6
ISCCD/ISC	2006/02/22	23:26:38.6800	-22.035	33.713	10.	4.8
ISCCD/ISC	2006/02/22	23:44:51.8100	-21.292	33.325	17.	4.7
ISCCD/ISC	2006/02/23	01:17:58.6000	-21.231	32.709	10.	5.0
ISCCD/ISC	2006/02/23	01:23:42.5400	-21.404	33.377	14.	5.3
ISCCD/ISC	2006/02/23	02:22:09.2800	-21.350	33.481	16.	5.3
ISCCD/ISC	2006/02/23	04:04:04.7300	-54.593	1.612	10.	5.5
ISCCD/ISC	2006/02/23	08:26:00.8400	-21.528	33.096	10.	4.7
ISCCD/ISC	2006/02/23	13:06:21.6900	-46.879	33.625	10.	4.9
ISCCD/ISC	2006/02/23	21:32:06.2800	-21.255	33.447	10.	5.0

ISCCD/ISC	2006/02/24	23:24:40.1900	-21.242	33.323	12.	4.8
ISCCD/ISC	2006/02/25	00:16:18.2200	-20.420	67.832	10.	5.0
ISCCD/ISC	2006/02/28	00:42:06.1900	-21.813	33.397	10.	4.9
ISCCD/ISC	2006/02/28	02:20:20.2300	-15.060	67.041	11.	4.8
ISCCD/ISC	2006/02/28	02:45:15.9600	-35.500	54.242	10.	5.2
ISCCD/ISC	2006/02/28	03:57:34.2800	-21.837	33.498	11.	4.6
ISCCD/NEIC	2006/03/05	02:08:34.8700	-21.441	33.288	10.	4.6
ISCCD/NEIC	2006/03/06	01:29:47.1300	-21.285	33.180	10.	4.6
ISCCD/NEIC	2006/03/08	00:05:26.2900	-21.423	33.074	10.	4.6
ISCCD/NEIC	2006/03/09	03:41:21.9800	-3.466	28.276	10.	4.6
ISCCD/NEIC	2006/03/12	01:12:29.3200	-21.411	32.668	10.	4.7
ISCCD/NEIC	2006/03/12	08:17:34.2100	-5.475	35.716	10.	4.6
ISCCD/NEIC	2006/03/12	17:11:18.0300	-33.227	56.950	10.	5.4
ISCCD/NEIC	2006/03/14	07:25:29.1600	-21.242	33.238	10.	4.8
ISCCD/NEIC	2006/03/15	09:40:56.4100	-0.881	67.583	10.	4.8
ISCCD/NEIC	2006/03/15	11:52:54.0700	-21.187	33.527	10.	5.3
ISCCD/NEIC	2006/03/15	14:19:48.0000	-21.155	33.584	7.	5.5
ISCCD/NEIC	2006/03/17	07:29:07.3000	-21.479	33.305	10.	4.8
ISCCD/NEIC	2006/03/19	16:23:42.8700	-21.718	33.555	12.	4.9
ISCCD/NEIC	2006/03/19	16:24:08.8800	-21.023	33.549	10.	4.6
ISCCD/NEIC	2006/03/22	11:35:13.0500	-21.344	33.258	10.	5.0
ISCCD/NEIC	2006/03/22	15:07:53.6000	-14.104	-14.389	10.	4.8
ISCCD/NEIC	2006/03/23	06:14:41.5100	-21.244	33.456	10.	5.0
ISCCD/NEIC	2006/03/30	03:14:40.7400	-1.311	-15.921	10.	5.0
ISCCD/NEIC	2006/04/04	02:13:27.7500	-21.256	33.333	10.	4.6
ISCCD/NEIC	2006/04/08	22:03:03.9200	-0.253	-18.142	10.	5.0
ISCCD/NEIC	2006/04/09	11:06:04.5700	-13.752	-14.501	10.	4.8
ISCCD/NEIC	2006/04/10	23:03:36.5400	-1.781	67.776	10.	4.9
ISCCD/NEIC	2006/04/11	03:09:44.2200	-16.156	67.895	10.	5.0
ISCCD/NEIC	2006/04/14	18:41:39.4900	-21.412	33.651	26.	5.3
ISCCD/NEIC	2006/04/15	08:01:44.3900	-21.306	33.247	10.	4.6
ISCCD/NEIC	2006/04/16	15:12:23.7100	-19.970	66.596	10.	4.8
ISCCD/NEIC	2006/04/20	07:57:11.1800	-22.528	-12.746	10.	4.8
ISCCD/NEIC	2006/04/20	15:12:18.3700	-49.426	-8.068	10.	4.8
ISCCD/NEIC	2006/04/20	16:50:15.2900	-49.348	-7.923	10.	4.8
ISCCD/NEIC	2006/04/25	03:31:07.4600	-52.399	13.041	10.	4.8
ISCCD/NEIC	2006/04/27	04:18:28.1400	0.338	30.078	10.	5.3
ISCCD/NEIC	2006/04/29	20:57:37.8100	-26.962	26.651	5.	4.7
ISCCD/NEIC	2006/04/30	03:08:49.4700	12.822	49.100	10.	4.9
ISCCD/NEIC	2006/05/01	22:41:51.2600	-11.434	-13.142	10.	4.8
ISCCD/NEIC	2006/05/06	00:43:36.6300	-16.689	66.336	10.	4.8
ISCCD/NEIC	2006/05/10	03:29:46.3900	-52.794	10.073	10.	5.1
ISCCD/NEIC	2006/05/12	18:12:18.9300	-21.293	33.447	20.	4.8

ISCCD/NEIC	2006/05/15	13:56:12.8800	-21.430	33.483	10.	4.6
ISCCD/NEIC	2006/05/15	16:54:45.9500	-14.597	66.346	10.	4.8
ISCCD/NEIC	2006/05/15	17:40:34.0800	-14.708	66.274	10.	4.8
ISCCD/NEIC	2006/05/15	21:34:08.2500	-14.712	66.220	10.	5.1
ISCCD/NEIC	2006/05/15	22:22:10.5000	-14.587	66.378	10.	4.8
ISCCD/NEIC	2006/05/23	07:24:22.9300	-30.962	-13.392	10.	4.8
ISCCD/NEIC	2006/05/26	11:35:23.6800	-37.434	51.290	10.	5.1
ISCCD/NEIC	2006/05/26	11:52:39.4000	-37.428	51.271	10.	5.1
ISCCD/NEIC	2006/05/29	15:30:37.8500	0.343	30.114	24.	4.8
ISCCD/NEIC	2006/06/03	12:04:11.5700	-54.105	7.436	10.	4.8
ISCCD/NEIC	2006/06/08	06:17:25.3100	-21.353	33.423	9.	4.9
ISCCD/NEIC	2006/06/09	23:17:27.8800	-47.750	32.612	22.	5.6
ISCCD/NEIC	2006/06/09	23:27:51.4300	-47.060	32.980	10.	5.0
ISCCD/NEIC	2006/06/10	20:25:19.2300	-4.807	29.402	10.	4.7
ISCCD/NEIC	2006/06/20	00:42:23.8800	-17.628	-13.936	10.	4.9
ISCCD/NEIC	2006/06/23	10:41:17.6400	-47.159	32.457	10.	4.8
ISCCD/NEIC	2006/06/23	10:41:56.6600	-47.178	32.508	10.	5.2
ISCCD/NEIC	2006/06/24	10:22:09.0600	-17.718	41.826	1.	5.0
ISCCD/NEIC	2006/06/24	16:52:18.9900	14.514	56.247	10.	5.0
ISCCD/NEIC	2006/06/25	04:51:56.8900	-17.695	41.814	10.	5.1
ISCCD/NEIC	2006/06/25	13:27:49.5100	-38.625	-16.167	10.	4.9
ISCCD/NEIC	2006/06/30	01:07:28.0600	-21.110	33.258	10.	5.1
ISCCD/NEIC	2006/06/30	01:11:55.4700	-20.994	33.482	10.	4.6
ISCCD/NEIC	2006/07/06	15:11:25.1900	-24.724	-13.423	10.	4.8
ISCCD/NEIC	2006/07/08	16:12:38.0000	-21.469	33.048	10.	4.6
ISCCD/NEIC	2006/07/09	12:20:08.9100	-19.974	66.264	10.	4.8
ISCCD/NEIC	2006/07/10	07:21:37.8800	-11.627	-13.432	10.	5.3
ISCCD/NEIC	2006/07/11	18:48:14.9100	-21.096	33.307	10.	5.0
ISCCD/NEIC	2006/07/12	14:44:45.9600	-8.548	67.814	10.	5.1
ISCCD/NEIC	2006/07/12	23:06:20.2600	-17.640	65.769	10.	5.1
ISCCD/NEIC	2006/07/13	05:36:36.6900	-8.355	30.317	30.	4.8
ISCCD/NEIC	2006/07/15	10:04:31.0000	-9.692	25.391	10.	4.7
ISCCD/NEIC	2006/07/22	19:47:42.5500	-17.716	-13.312	10.	4.8
ISCCD/NEIC	2006/07/25	11:08:46.4700	-14.284	66.112	10.	4.8
ISCCD/NEIC	2006/07/29	02:03:16.9800	13.070	51.015	10.	5.0
ISCCD/NEIC	2006/07/30	07:59:44.8500	-6.319	29.773	10.	4.6
ISCCD/NEIC	2006/08/01	12:01:43.4400	-7.070	-12.828	10.	5.0
ISCCD/NEIC	2006/08/03	12:09:28.7700	-21.339	33.100	10.	4.7
ISCCD/NEIC	2006/08/08	15:46:36.7400	-26.882	26.675	5.	4.7
ISCCD/NEIC	2006/08/16	08:00:13.8500	14.083	56.750	22.	5.1
ISCCD/NEIC	2006/08/16	18:38:59.3400	-28.815	61.736	7.	5.6
ISCCD/NEIC	2006/08/17	08:38:17.6800	-28.892	61.625	10.	5.4
ISCCD/NEIC	2006/08/19	04:04:35.4300	-54.324	5.181	10.	4.8

ISCCD/NEIC	2006/08/19	16:05:59.6900	-28.923	61.540	10.	5.1
ISCCD/NEIC	2006/08/19	16:07:13.9700	-28.951	61.431	10.	4.9
ISCCD/NEIC	2006/08/19	16:10:50.0100	-28.920	61.570	10.	4.8
ISCCD/NEIC	2006/08/21	08:34:22.9200	-28.945	61.581	10.	4.9
ISCCD/NEIC	2006/08/23	00:53:34.0800	-21.270	33.402	20.	5.1
ISCCD/NEIC	2006/08/23	01:59:42.9900	-21.286	33.400	20.	4.6
ISCCD/NEIC	2006/08/29	11:17:34.3700	-52.522	27.863	10.	5.2
ISCCD/NEIC	2006/08/30	16:13:39.7100	-17.650	65.943	10.	4.8
ISCCD/NEIC	2006/08/31	05:44:03.6300	-17.230	-15.336	10.	4.8
ISCCD/NEIC	2006/09/17	07:30:11.1000	-17.694	41.827	10.	5.5
ISCCD/NEIC	2006/09/17	13:24:54.4800	-17.707	41.811	10.	5.0
ISCCD/NEIC	2006/09/24	22:56:21.0700	-17.741	41.811	6.	5.6
ISCCD/NEIC	2006/10/05	14:41:49.9500	-37.486	51.023	10.	5.1
ISCCD/NEIC	2006/10/06	04:42:36.9800	-23.683	-12.910	10.	4.8
ISCCD/NEIC	2006/10/06	07:18:19.5600	14.556	55.846	10.	5.0
ISCCD/NEIC	2006/10/07	02:23:03.8700	6.183	60.753	10.	5.0
ISCCD/NEIC	2006/10/07	02:24:43.8900	6.116	60.750	10.	4.8
ISCCD/NEIC	2006/10/07	03:21:07.3500	6.161	60.703	10.	5.1
ISCCD/NEIC	2006/10/09	18:19:33.7300	-51.030	29.024	10.	5.4
ISCCD/NEIC	2006/10/12	19:47:57.5300	-26.861	26.730	5.	4.8
ISCCD/NEIC	2006/10/24	03:04:28.8900	-13.790	-14.574	10.	5.2
ISCCD/NEIC	2006/11/07	08:33:59.6700	-27.551	-13.360	10.	5.1
ISCCD/NEIC	2006/11/08	17:13:06.0400	14.758	54.645	10.	4.8
ISCCD/NEIC	2006/11/13	08:53:57.7500	-12.509	-14.773	10.	5.3
ISCCD/NEIC	2006/11/13	14:31:53.8500	-15.070	66.984	10.	4.8
ISCCD/NEIC	2006/11/17	23:42:40.8100	-12.718	-14.695	10.	5.1
ISCCD/NEIC	2006/11/20	19:54:29.6700	-52.880	22.595	10.	4.8
ISCCD/NEIC	2006/11/20	20:16:06.2400	-21.133	33.112	10.	5.1
ISCCD/NEIC	2006/11/22	05:20:46.9600	-37.081	-17.317	10.	5.0
ISCCD/NEIC	2006/11/24	16:25:58.7700	-26.418	27.263	5.	4.6
ISCCD/NEIC	2006/11/25	06:53:31.5600	-7.737	30.499	10.	4.9
ISCCD/NEIC	2006/12/03	08:19:51.3100	-0.538	-19.738	10.	4.9
ISCCD/NEIC	2006/12/03	19:27:09.6900	-44.786	-15.294	10.	4.9
ISCCD/NEIC	2006/12/06	12:05:49.5000	-43.044	41.762	10.	5.0
ISCCD/NEIC	2006/12/15	13:19:06.6400	13.817	51.658	10.	4.8
ISCCD/NEIC	2006/12/19	19:48:35.5600	-25.724	-13.890	10.	4.8
ISCCD/NEIC	2006/12/21	09:07:46.2600	12.039	43.550	10.	5.0
ISCCD/NEIC	2006/12/25	10:29:11.1100	-27.346	66.586	10.	4.9
ISCCD/NEIC	2006/12/30	08:30:49.7900	13.313	51.365	15.	5.9
ISCCD/NEIC	2006/12/30	08:57:07.0600	13.665	51.760	10.	5.3
ISCCD/NEIC	2006/12/30	11:08:59.1200	13.897	51.694	10.	4.9
ISCCD/NEIC	2006/12/30	14:22:12.6900	13.544	51.602	10.	4.9
ISCCD/NEIC	2006/12/30	14:26:48.7600	13.755	51.700	10.	4.8

ISCCD/NEIC	2007/01/01	00:31:45.0200	1.232	67.117	10.	5.1
ISCCD/NEIC	2007/01/01	04:55:23.1400	13.680	51.641	10.	4.8
ISCCD/NEIC	2007/01/07	10:14:37.6100	-17.665	65.734	10.	4.8
ISCCD/NEIC	2007/01/09	20:52:23.8700	14.374	56.470	10.	4.9
ISCCD/NEIC	2007/01/17	23:18:49.8000	10.125	58.708	8.	5.8
ISCCD/NEIC	2007/01/23	04:16:07.3700	-43.139	41.647	10.	5.4
ISCCD/NEIC	2007/02/13	00:58:19.4400	-4.768	-12.439	10.	5.0
ISCCD/NEIC	2007/02/19	02:33:43.0100	1.750	30.758	19.	5.6
ISCCD/NEIC	2007/02/26	08:48:59.3900	9.974	42.876	10.	4.9
ISCCD/NEIC	2007/02/26	23:49:53.7300	-44.770	35.495	10.	5.3
ISCCD/NEIC	2007/02/27	03:47:12.1100	-44.836	35.123	10.	5.0
ISCCD/NEIC	2007/03/03	11:54:26.3700	-41.798	-16.112	10.	5.2
ISCCD/NEIC	2007/03/03	18:08:53.2900	13.799	57.087	10.	5.1
ISCCD/NEIC	2007/03/09	07:27:31.2200	-11.428	66.255	10.	5.8
ISCCD/NEIC	2007/03/11	19:40:56.3900	-32.089	57.093	10.	5.0
ISCCD/NEIC	2007/03/15	16:26:04.4100	-16.938	67.045	10.	4.8
ISCCD/NEIC	2007/03/21	22:44:59.9100	10.518	57.079	10.	4.8
ISCCD/NEIC	2007/03/22	14:21:37.5800	-52.851	27.645	10.	4.8
ISCCD/NEIC	2007/03/24	07:39:38.6500	-42.625	42.035	10.	5.3
ISCCD/NEIC	2007/03/24	13:35:24.1500	-6.043	-10.832	10.	4.8
ISCCD/NEIC	2007/03/24	13:38:21.0000	-5.693	-11.526	10.	4.9
ISCCD/NEIC	2007/03/28	21:17:10.6500	-6.268	29.673	8.	5.8
ISCCD/NEIC	2007/04/01	15:25:56.1500	-3.419	-11.961	10.	5.1
QED/NEIC	2007/04/04	00:56:53.0000	-3.317	-13.379	10.	5.1
ISCCD/NEIC	2007/04/05	20:48:53.4000	-21.187	55.658	10.	5.3
ISCCD/NEIC	2007/04/07	05:20:49.6300	-39.787	46.178	10.	4.9
ISCCD/NEIC	2007/04/08	23:11:16.0600	14.451	53.807	10.	4.9
ISCCD/NEIC	2007/04/12	17:39:55.2400	-13.819	34.896	14.	4.8
ISCCD/NEIC	2007/04/24	18:21:12.8300	-16.475	67.328	10.	4.8
ISCCD/NEIC	2007/04/30	15:38:52.5400	-53.999	6.081	10.	5.1
ISCCD/NEIC	2007/05/06	17:44:40.4600	-7.666	-13.563	10.	4.8
ISCCD/NEIC	2007/05/15	05:43:45.8300	-54.411	5.668	10.	5.1
ISCCD/NEIC	2007/05/19	00:12:16.4300	-31.897	57.352	10.	4.8
ISCCD/NEIC	2007/05/22	21:48:00.2900	-6.447	30.819	10.	4.7
ISCCD/NEIC	2007/06/08	08:44:02.0700	-14.107	67.163	10.	4.9
ISCCD/NEIC	2007/06/11	17:13:44.1000	-35.687	-16.144	10.	5.0
ISCCD/NEIC	2007/06/18	23:51:10.2900	-12.466	41.832	10.	5.1
ISCCD/NEIC	2007/06/23	11:54:54.5900	-12.183	46.476	10.	5.2
ISCCD/NEIC	2007/06/27	19:41:05.4000	-34.428	58.290	10.	4.8
ISCCD/NEIC	2007/07/05	13:26:23.3500	-42.603	-19.656	10.	5.4
ISCCD/NEIC	2007/07/08	22:01:45.1800	-28.877	-12.846	10.	4.8
ISCCD/NEIC	2007/07/14	12:23:27.9400	-2.845	36.067	10.	4.6
ISCCD/NEIC	2007/07/15	11:24:21.4400	-2.933	36.241	10.	5.2

ISCCD/NEIC	2007/07/15	20:42:11.5200	-2.880	36.161	10.	5.3
ISCCD/NEIC	2007/07/15	21:10:07.9500	-2.810	36.106	10.	4.6
ISCCD/NEIC	2007/07/16	01:46:26.5400	-5.594	35.783	10.	4.6
ISCCD/NEIC	2007/07/16	13:48:29.7600	-2.727	36.001	10.	4.7
ISCCD/NEIC	2007/07/16	14:23:34.3600	-2.633	35.991	10.	4.9
ISCCD/NEIC	2007/07/17	18:27:51.3900	-2.782	36.190	10.	5.0
ISCCD/NEIC	2007/07/18	10:29:17.2700	-2.736	35.927	10.	4.8
ISCCD/NEIC	2007/07/18	11:11:16.5600	-2.634	36.002	11.	4.9
ISCCD/NEIC	2007/07/18	17:25:52.2900	-2.774	36.094	10.	4.8
ISCCD/NEIC	2007/07/20	20:00:07.4400	-52.563	25.986	10.	5.1
ISCCD/NEIC	2007/07/22	00:36:24.4800	-2.726	35.894	10.	4.7
ISCCD/NEIC	2007/07/25	15:39:07.7700	-2.514	36.218	10.	4.6
ISCCD/NEIC	2007/07/26	18:54:37.1900	-2.677	36.012	10.	4.9
ISCCD/NEIC	2007/07/28	15:16:22.4500	-54.068	7.965	10.	4.8
ISCCD/NEIC	2007/07/28	16:13:43.5900	-54.130	7.881	10.	5.1
ISCCD/NEIC	2007/07/28	17:46:28.7200	-54.157	7.908	10.	4.9
ISCCD/NEIC	2007/07/30	11:54:53.3800	-2.394	36.395	10.	4.7
ISCCD/NEIC	2007/07/31	11:17:53.7100	-45.724	35.036	10.	4.8
ISCCD/NEIC	2007/07/31	21:09:21.7100	-2.898	36.292	10.	4.7
ISCCD/NEIC	2007/08/02	07:19:23.1400	-52.444	17.647	10.	5.4
ISCCD/NEIC	2007/08/05	07:46:24.4600	2.767	66.290	10.	4.8
ISCCD/NEIC	2007/08/05	08:18:39.6200	2.654	66.359	10.	4.9
ISCCD/NEIC	2007/08/05	12:55:49.8700	-2.736	36.003	10.	4.7
ISCCD/NEIC	2007/08/05	14:21:45.5000	2.825	66.311	10.	4.8
ISCCD/NEIC	2007/08/05	17:09:06.4000	2.640	66.347	10.	4.9
ISCCD/NEIC	2007/08/06	00:27:40.3000	2.709	66.406	10.	4.9
ISCCD/NEIC	2007/08/06	03:57:18.5300	2.652	66.228	10.	5.0
ISCCD/NEIC	2007/08/06	08:40:26.2700	2.687	66.333	10.	4.8
ISCCD/NEIC	2007/08/06	09:32:28.3700	2.481	66.274	10.	5.1
ISCCD/NEIC	2007/08/06	10:07:44.0700	2.523	66.295	10.	4.8
ISCCD/NEIC	2007/08/07	10:23:02.6600	-2.865	35.993	10.	4.8
ISCCD/NEIC	2007/08/07	21:11:09.9000	2.627	66.306	10.	4.8
ISCCD/NEIC	2007/08/07	21:27:04.1600	2.491	66.102	10.	4.8
ISCCD/NEIC	2007/08/11	06:32:54.5000	-5.545	-11.546	10.	5.0
ISCCD/NEIC	2007/08/11	14:21:51.1500	-43.223	-19.851	10.	4.8
ISCCD/NEIC	2007/08/12	08:01:27.4500	-5.588	-11.479	10.	4.8
ISCCD/NEIC	2007/08/12	19:22:52.5100	-37.523	-17.579	10.	5.1
ISCCD/NEIC	2007/08/13	20:22:13.7000	-31.073	-13.397	10.	4.8
ISCCD/NEIC	2007/08/16	01:20:31.2100	-12.362	-14.864	10.	5.1
ISCCD/NEIC	2007/08/16	14:18:24.6000	-3.522	-12.153	10.	5.2
ISCCD/NEIC	2007/08/16	14:44:04.0200	-3.588	-11.798	10.	4.8
ISCCD/NEIC	2007/08/17	16:20:35.6700	-4.943	-10.807	10.	4.8
ISCCD/NEIC	2007/08/17	16:26:40.3100	-3.015	-11.575	10.	4.8

ISCCD/NEIC	2007/08/18	01:00:20.8200	13.251	49.548	10.	4.8
ISCCD/NEIC	2007/08/18	07:44:02.0300	-2.825	36.207	10.	5.2
ISCCD/NEIC	2007/08/19	12:59:40.4100	-2.613	-12.277	10.	4.9
ISCCD/NEIC	2007/08/20	02:56:48.0100	-2.710	36.292	10.	5.3
ISCCD/NEIC	2007/08/20	07:15:35.7900	-2.622	36.120	10.	4.6
ISCCD/NEIC	2007/08/20	12:37:06.6600	-0.256	-18.175	10.	5.7
ISCCD/NEIC	2007/08/24	23:45:55.0000	-2.614	36.224	10.	4.9
ISCCD/NEIC	2007/09/07	09:19:53.1800	2.710	66.194	10.	4.9
ISCCD/NEIC	2007/09/07	09:56:39.9900	2.714	66.237	10.	5.0
ISCCD/NEIC	2007/09/07	23:20:00.5200	-2.239	28.730	10.	4.6
ISCCD/NEIC	2007/09/08	14:15:33.0000	-2.644	36.109	10.	4.8
ISCCD/NEIC	2007/09/10	00:26:43.6400	-2.683	36.119	10.	4.7
ISCCD/NEIC	2007/09/13	00:49:16.0700	-43.924	-16.282	10.	5.3
ISCCD/NEIC	2007/09/14	17:39:05.4300	-21.053	33.223	10.	4.6
ISCCD/NEIC	2007/09/15	07:30:02.0400	2.737	66.142	10.	5.0
ISCCD/NEIC	2007/09/16	14:01:47.6800	-11.812	42.082	3.	5.2
ISCCD/NEIC	2007/09/19	06:48:25.6500	-54.805	-1.573	10.	4.8
ISCCD/NEIC	2007/09/19	17:16:46.2700	-32.243	-13.922	10.	5.3
ISCCD/NEIC	2007/09/21	14:24:49.9600	-47.398	-13.467	10.	4.8
ISCCD/NEIC	2007/09/26	18:39:34.8200	-7.074	-11.713	10.	5.2
ISCCD/NEIC	2007/10/01	05:15:14.8400	9.898	57.550	10.	5.0
ISCCD/NEIC	2007/10/08	08:18:41.8100	-42.010	-16.245	10.	5.4
ISCCD/NEIC	2007/10/09	07:22:22.6200	-54.679	1.011	10.	4.8
ISCCD/NEIC	2007/10/19	19:18:05.0400	-6.842	-12.279	10.	4.8
ISCCD/NEIC	2007/11/08	01:39:08.8400	-15.916	34.737	10.	4.8
ISCCD/NEIC	2007/11/09	14:56:00.1000	-8.546	32.258	10.	4.6
ISCCD/NEIC	2007/11/14	15:31:49.6700	-1.122	-12.661	10.	4.8
ISCCD/NEIC	2007/11/15	05:10:09.8100	-30.956	59.307	10.	4.8
ISCCD/NEIC	2007/11/17	08:42:19.7800	-1.193	-13.162	10.	5.0
ISCCD/NEIC	2007/11/23	19:18:47.4000	-53.270	9.426	10.	5.1
ISCCD/NEIC	2007/11/27	07:51:06.8200	-4.668	-12.176	10.	4.8
ISCCD/NEIC	2007/11/27	10:13:49.6500	-1.356	-13.290	10.	5.7
ISCCD/NEIC	2007/11/29	02:59:10.4400	-21.166	33.260	10.	5.3
ISCCD/NEIC	2007/11/30	20:04:23.7200	9.621	57.836	10.	4.9
ISCCD/NEIC	2007/12/06	10:25:45.9900	-9.365	66.909	10.	4.9
ISCCD/NEIC	2007/12/13	18:51:58.9600	-40.983	-16.672	10.	5.1
ISCCD/NEIC	2007/12/17	02:53:29.4500	-9.107	67.291	10.	4.9
ISCCD/NEIC	2007/12/23	05:18:01.5000	4.762	36.228	10.	4.6
ISCCD/NEIC	2007/12/23	12:56:13.0200	-4.043	39.253	10.	5.1
ISCCD/NEIC	2007/12/23	23:47:50.9700	-16.928	-14.364	10.	4.8
ISCCD/NEIC	2007/12/24	09:20:48.5500	-53.955	-2.325	10.	5.0
ISCCD/NEIC	2007/12/24	09:30:11.2600	-2.895	36.154	10.	4.7
ISCCD/NEIC	2008/01/14	01:20:02.6900	-35.400	53.878	10.	5.5

ISCCD/NEIC	2008/01/19	13:30:31.1800	-7.602	37.773	10.	4.8
ISCCD/NEIC	2008/01/21	02:49:11.9800	-10.534	41.556	10.	5.0
ISCCD/NEIC	2008/01/21	15:28:35.3900	-10.566	41.571	10.	4.9
ISCCD/NEIC	2008/02/03	10:56:09.7400	-2.403	28.973	10.	5.1
ISCCD/NEIC	2008/02/03	11:00:07.0800	-2.294	28.983	10.	4.9
ISCCD/NEIC	2008/02/03	11:12:12.6900	-21.320	33.090	10.	5.1
ISCCD/NEIC	2008/02/03	11:37:48.9800	-2.503	28.981	10.	4.8
ISCCD/NEIC	2008/02/04	00:24:35.1400	-2.432	28.880	10.	4.6
ISCCD/NEIC	2008/02/05	17:29:08.3400	-2.526	28.890	10.	4.7
ISCCD/NEIC	2008/02/06	16:10:34.2900	-24.759	-13.306	10.	4.8
ISCCD/NEIC	2008/02/07	05:45:29.4900	-12.051	65.706	10.	5.0
ISCCD/NEIC	2008/02/14	02:07:46.7700	-2.404	28.918	10.	5.4
ISCCD/NEIC	2008/02/14	07:33:16.8800	-54.423	5.352	10.	5.3
ISCCD/NEIC	2008/02/15	04:04:53.0500	-2.423	28.820	10.	4.7
ISCCD/NEIC	2008/02/26	14:14:30.9300	-10.296	-13.372	10.	4.9
ISCCD/NEIC	2008/02/27	02:07:59.1400	-2.392	28.966	10.	4.6
MHDF/NEIC	2008/03/03	18:01:40.7500	14.229	56.566	10.	5.5
MHDF/NEIC	2008/03/03	18:04:28.2700	14.222	56.700	10.	4.8
MHDF/NEIC	2008/03/06	07:35:35.3700	-5.414	36.013	10.	4.9
MHDF/NEIC	2008/03/07	08:06:21.2500	-21.862	-11.778	10.	4.9
MHDF/NEIC	2008/03/08	18:47:35.4600	-36.607	52.435	10.	4.8
MHDF/NEIC	2008/03/13	13:28:44.8500	-45.492	35.008	10.	5.3
MHDF/NEIC	2008/03/15	02:26:22.0100	-19.216	27.479	6.	4.7
MHDF/NEIC	2008/03/16	09:12:24.8200	-54.347	6.212	10.	4.8
MHDF/NEIC	2008/03/29	00:09:40.2500	-21.076	33.158	10.	4.7
MHDF/NEIC	2008/04/01	11:05:23.7100	-38.942	46.309	10.	5.5
MHDF/NEIC	2008/04/03	13:36:29.0300	-25.664	-13.726	10.	4.9
MHDF/NEIC	2008/04/09	19:12:01.6800	-37.998	49.109	10.	4.9
MHDF/NEIC	2008/04/10	17:41:33.9600	-33.182	-15.998	10.	4.9
MHDF/NEIC	2008/04/12	08:49:54.1100	-15.254	67.058	10.	5.1
MHDF/NEIC	2008/04/12	08:50:17.5300	-14.506	67.075	10.	5.1
MHDF/NEIC	2008/04/16	20:28:46.4700	-16.386	-13.859	10.	5.0
MHDF/NEIC	2008/04/18	15:31:54.6900	-52.864	21.081	10.	4.9
MHDF/NEIC	2008/04/20	07:30:44.2600	-3.668	26.073	10.	5.2
MHDF/NEIC	2008/04/25	02:43:00.9200	-1.071	-13.344	10.	4.8
MHDF/NEIC	2008/04/26	12:38:59.4600	13.904	51.658	10.	4.9
MHDF/NEIC	2008/04/26	14:48:47.1000	-21.347	16.887	10.	4.8
MHDF/NEIC	2008/04/26	21:58:24.2800	-20.082	66.489	10.	4.9
MHDF/NEIC	2008/04/27	14:35:29.2300	-35.464	-16.597	10.	5.1
MHDF/NEIC	2008/04/29	00:06:59.2000	11.683	42.986	10.	4.8
MHDF/NEIC	2008/04/29	01:07:31.0400	11.715	42.808	10.	4.8
MHDF/NEIC	2008/04/29	09:00:13.4400	-54.362	5.784	10.	5.0
MHDF/NEIC	2008/05/19	03:16:13.6200	-47.781	31.965	10.	5.4

MHDF/NEIC	2008/05/24	13:21:29.8900	-0.304	-18.813	10.	5.0
MHDF/NEIC	2008/05/25	02:07:51.8600	-12.905	-14.651	10.	4.8
MHDF/NEIC	2008/05/30	10:44:11.7300	-54.744	0.987	10.	5.2
MHDF/NEIC	2008/06/01	00:31:14.9500	-54.816	0.979	10.	5.2
MHDF/NEIC	2008/06/02	02:06:47.4700	-37.102	-17.301	10.	4.9
MHDF/NEIC	2008/06/02	02:17:17.5200	-37.602	-17.635	10.	5.0
MHDF/NEIC	2008/06/11	12:30:04.1000	-33.101	-15.859	10.	5.0
MHDF/NEIC	2008/06/13	20:06:46.4600	-17.836	-13.493	10.	5.0
MHDF/NEIC	2008/06/19	07:25:16.9800	-4.617	29.495	10.	4.7
MHDF/NEIC	2008/06/28	08:56:57.3500	-33.099	-16.037	10.	5.4
MHDF/NEIC	2008/06/28	11:41:29.2400	-33.090	-15.989	10.	4.8
MHDF/NEIC	2008/07/01	10:38:09.2700	-33.075	-16.007	10.	5.0
MHDF/NEIC	2008/07/05	16:34:28.0300	-36.276	52.444	10.	4.8
MHDF/NEIC	2008/07/11	09:28:17.8300	-11.598	-14.486	10.	5.0
MHDF/NEIC	2008/07/15	05:07:11.9000	-47.366	-12.170	10.	5.2
MHDF/NEIC	2008/07/20	08:21:42.1700	4.867	62.088	10.	5.3
MHDF/NEIC	2008/07/27	21:15:42.4000	-0.253	-18.287	17.	5.8
MHDF/NEIC	2008/08/11	18:32:27.2600	2.586	66.249	10.	5.1
MHDF/NEIC	2008/08/11	23:38:38.3100	-1.020	-21.843	13.	5.4
MHDF/NEIC	2008/08/16	07:25:56.9300	5.717	61.212	10.	5.2
MHDF/NEIC	2008/08/16	08:20:21.0000	5.711	61.333	10.	5.0
MHDF/NEIC	2008/08/16	08:26:23.9900	5.519	61.303	10.	5.1
MHDF/NEIC	2008/08/17	15:39:08.3900	-52.873	-4.453	10.	5.0
MHDF/NEIC	2008/08/22	07:47:39.5800	-17.769	65.394	6.	5.6
MHDF/NEIC	2008/08/24	07:35:10.8600	8.150	59.039	10.	5.2
MHDF/NEIC	2008/08/25	03:19:05.0500	8.084	59.086	10.	4.8
MHDF/NEIC	2008/08/26	08:07:08.5300	-52.533	26.417	10.	5.0
MHDF/NEIC	2008/08/27	06:46:19.4800	-10.751	41.469	10.	5.9
MHDF/NEIC	2008/08/28	15:22:18.9400	-0.134	-17.626	10.	5.2
MHDF/NEIC	2008/08/28	15:22:23.2000	-0.252	-17.358	12.	5.7
MHDF/NEIC	2008/08/30	00:43:15.2100	3.696	63.449	10.	4.8
MHDF/NEIC	2008/09/01	08:28:19.8500	-18.614	65.376	10.	4.8
MHDF/NEIC	2008/09/02	14:14:56.9500	8.723	58.398	10.	4.9
MHDF/NEIC	2008/09/05	19:07:38.2900	-1.171	-13.955	10.	5.5
MHDF/NEIC	2008/09/08	22:06:25.4000	-22.449	-12.490	10.	4.8
MHDF/NEIC	2008/09/15	15:50:51.5100	-4.979	30.149	10.	4.8
MHDF/NEIC	2008/09/17	21:03:40.0500	-28.203	-12.860	10.	4.9
MHDF/NEIC	2008/09/19	08:58:05.5300	-17.002	-16.500	10.	4.8
MHDF/NEIC	2008/09/19	21:17:35.1800	-7.112	-13.004	10.	4.8
MHDF/NEIC	2008/09/20	07:58:15.4600	14.131	50.333	10.	4.8
MHDF/NEIC	2008/09/21	09:13:55.0400	-14.077	-13.937	10.	4.8
MHDF/NEIC	2008/09/24	17:12:15.7800	-22.709	-12.764	10.	5.2
MHDF/NEIC	2008/09/24	17:24:47.0000	-22.704	-12.875	10.	4.9

MHDF/NEIC	2008/09/26	18:46:18.5700	3.074	65.316	10.	5.5
MHDF/NEIC	2008/09/26	19:59:50.1400	3.004	65.548	10.	4.8
MHDF/NEIC	2008/10/01	14:15:53.5100	-0.806	33.743	25.	4.7
MHDF/NEIC	2008/10/05	00:02:12.6300	-1.126	29.118	4.	5.2
MHDF/NEIC	2008/10/17	10:57:15.6700	12.335	40.646	10.	4.8
MHDF/NEIC	2008/10/21	21:12:30.9600	-10.378	-13.141	10.	4.8
MHDF/NEIC	2008/10/21	23:04:36.4600	0.071	-17.574	10.	4.9
MHDF/NEIC	2008/10/26	04:56:11.0300	-5.528	-11.493	10.	4.9
MHDF/NEIC	2008/10/31	13:30:01.6600	-11.483	66.514	10.	5.2
MHDF/NEIC	2008/10/31	13:45:26.6300	-11.471	66.359	10.	4.8
MHDF/NEIC	2008/11/11	12:18:12.7700	1.591	66.703	10.	5.1
MHDF/NEIC	2008/11/11	22:46:38.3900	0.019	67.088	10.	5.0
MHDF/NEIC	2008/11/13	11:07:23.1300	-6.366	26.858	10.	5.0
MHDF/NEIC	2008/11/14	02:05:09.9000	-53.794	8.727	12.	5.7
MHDF/NEIC	2008/11/14	02:43:54.2900	-53.830	8.578	10.	5.1
MHDF/NEIC	2008/11/20	18:17:17.1600	14.610	55.739	10.	4.8
MHDF/NEIC	2008/11/22	18:49:42.3800	-1.230	-13.933	10.	5.9
MHDF/NEIC	2008/11/25	01:19:47.5300	-46.781	-10.723	10.	5.0
MHDF/NEIC	2008/11/25	15:05:38.1600	-21.919	33.405	10.	4.9
MHDF/NEIC	2008/12/03	21:15:00.4300	-6.396	-11.131	10.	4.9
MHDF/NEIC	2008/12/09	09:58:17.5700	14.358	56.532	10.	4.8
MHDF/NEIC	2008/12/14	09:43:10.7300	-7.346	30.128	10.	5.1
MHDF/NEIC	2008/12/15	16:50:44.9900	-16.173	67.508	10.	5.0
MHDF/NEIC	2008/12/16	10:19:40.0200	-16.289	67.125	10.	5.1
MHDF/NEIC	2008/12/19	14:25:05.0700	-7.061	-12.945	10.	4.9
MHDF/NEIC	2008/12/20	21:05:16.2000	-31.193	-13.338	4.	5.8
MHDF/NEIC	2008/12/20	22:13:48.0700	-31.120	-13.419	10.	5.3
MHDF/NEIC	2008/12/29	12:11:45.4900	-1.191	67.556	10.	5.2
MHDF/NEIC	2009/01/07	23:02:45.5400	-53.057	9.543	10.	4.8
MHDF/NEIC	2009/01/08	22:47:01.7300	-53.263	9.292	10.	4.8
MHDF/NEIC	2009/01/09	03:44:38.8000	10.437	56.962	10.	5.4
MHDF/NEIC	2009/01/13	01:04:42.6400	-13.147	66.078	10.	5.5
MHDF/NEIC	2009/01/19	09:19:06.9300	-38.794	-15.880	10.	4.8
MHDF/NEIC	2009/01/19	10:27:12.4400	-38.958	-15.705	10.	4.9
MHDF/NEIC	2009/01/19	15:10:21.2800	-39.012	-15.868	10.	4.9
MHDF/NEIC	2009/01/20	11:50:17.7400	-5.414	35.743	10.	4.9
MHDF/NEIC	2009/01/21	06:27:57.4900	-20.175	66.411	10.	5.2
MHDF/NEIC	2009/01/23	02:16:38.3300	-33.082	-15.868	10.	4.9
MHDF/NEIC	2009/02/03	15:48:53.4200	-3.895	34.853	10.	5.1
MHDF/NEIC	2009/02/09	09:06:37.2800	10.033	57.184	10.	4.8
MHDF/NEIC	2009/02/15	23:27:23.8500	-20.192	66.359	10.	4.8
MHDF/NEIC	2009/02/18	00:09:18.8300	-52.963	20.885	10.	5.1
MHDF/NEIC	2009/02/19	00:28:50.3600	-14.347	66.135	10.	5.4

MHDF/NEIC	2009/02/24	00:46:40.4200	-0.255	-18.315	10.	5.0
MHDF/NEIC	2009/03/09	09:47:18.7800	-16.600	-11.076	10.	5.2
MHDF/NEIC	2009/03/12	11:47:45.8700	-52.933	27.204	10.	5.5
MHDF/NEIC	2009/03/16	01:38:01.5900	0.028	-17.458	10.	4.9
MHDF/PRE	2009/03/16	14:05:42.3000	-26.949	26.753	2.	5.0
MHDF/NEIC	2009/03/22	05:52:28.4200	-12.931	-14.590	10.	5.1
MHDF/NEIC	2009/03/22	06:06:35.9700	-12.826	-14.553	10.	4.9
MHDF/NEIC	2009/03/22	06:35:15.3800	-12.869	-14.620	10.	4.9
MHDF/NEIC	2009/03/22	08:02:26.7400	-12.867	-14.560	10.	4.8
MHDF/NEIC	2009/03/22	12:54:51.3600	-12.738	-14.687	10.	5.3
MHDF/NEIC	2009/03/22	12:56:21.2700	-12.400	-14.929	10.	4.9
MHDF/NEIC	2009/03/23	04:28:21.7600	9.796	57.819	10.	5.1
MHDF/NEIC	2009/03/26	18:43:47.5800	-6.775	-12.537	10.	5.2
MHDF/NEIC	2009/03/26	19:13:36.4200	-6.860	-12.424	10.	5.0
MHDF/NEIC	2009/03/27	10:00:47.1400	-12.804	-14.551	10.	5.1
MHDF/NEIC	2009/04/10	06:51:47.4800	-18.467	65.940	10.	5.2
MHDF/NEIC	2009/04/11	10:23:26.4400	-49.304	-8.218	10.	4.8
MHDF/NEIC	2009/04/14	01:48:35.7300	-0.434	-19.731	10.	4.8
MHDF/NEIC	2009/04/15	10:20:04.6200	12.348	58.071	10.	5.6
MHDF/NEIC	2009/04/15	14:07:09.9800	-18.492	65.951	10.	5.2
MHDF/NEIC	2009/04/16	05:17:19.4400	-12.446	65.209	10.	5.2
MHDF/NEIC	2009/04/21	19:41:16.8300	14.255	56.266	10.	4.9
MHDF/NEIC	2009/04/21	19:45:03.7900	14.434	56.283	10.	5.4
MHDF/NEIC	2009/04/21	19:47:25.1600	14.390	56.194	10.	5.2
MHDF/NEIC	2009/04/21	20:08:43.3700	14.461	56.294	10.	5.0
MHDF/NEIC	2009/04/21	20:18:32.8700	14.378	56.234	10.	5.0
MHDF/NEIC	2009/04/28	01:04:40.1100	14.163	53.506	10.	4.8
WHDF/NEIC	2009/05/05	02:40:00.3600	-43.521	-16.120	10.	5.2
WHDF/NEIC	2009/05/11	14:32:30.3700	-30.054	-13.899	10.	5.2
WHDF/NEIC	2009/05/12	12:38:30.8900	-12.429	65.138	10.	5.5
WHDF/NEIC	2009/05/13	22:23:44.4100	-5.544	-11.395	10.	4.9
WHDF/NEIC	2009/05/19	03:17:01.6100	-7.136	67.958	10.	4.8
WHDF/NEIC	2009/05/19	03:26:23.3400	-47.349	-13.367	10.	5.0
WHDF/NEIC	2009/05/26	01:18:54.6600	-34.791	54.525	10.	5.2
WHDF/NEIC	2009/05/26	05:39:15.1400	-7.671	67.831	10.	5.1
WHDF/NEIC	2009/05/27	02:50:23.6200	-33.074	-15.947	10.	5.1
WHDF/NEIC	2009/06/03	04:36:42.6700	-37.943	49.275	10.	5.1
WHDF/NEIC	2009/06/04	17:25:25.5000	-45.833	35.139	16.	5.5
WHDF/NEIC	2009/06/07	00:01:07.7700	-5.549	-11.366	10.	4.9
WHDF/NEIC	2009/06/07	17:48:39.2200	-36.696	-20.074	10.	5.2
WHDF/NEIC	2009/06/11	08:55:03.6000	-24.965	-13.619	10.	5.0
WHDF/NEIC	2009/06/16	20:05:56.9900	-54.366	5.871	10.	5.8
WHDF/NEIC	2009/06/24	11:12:21.9700	0.175	-16.878	10.	5.2

WHDF/NEIC	2009/06/25	12:34:17.8200	-23.811	-13.434	10.	5.3
WHDF/NEIC	2009/06/27	15:45:49.1500	-33.201	-15.935	13.	5.6
WHDF/NEIC	2009/06/28	00:04:22.4600	-31.763	58.379	10.	5.2
WHDF/NEIC	2009/06/30	06:56:16.6700	-16.842	-14.404	10.	5.1
WHDF/NEIC	2009/07/02	03:20:49.1400	-11.633	-14.159	10.	5.2
WHDF/NEIC	2009/07/03	06:03:36.9700	-11.708	-14.069	10.	4.8
WHDF/NEIC	2009/07/03	19:01:15.7600	-49.650	-8.130	10.	4.9
WHDF/NEIC	2009/07/03	20:28:15.0400	-49.752	-8.045	10.	5.5
WHDF/NEIC	2009/07/07	16:31:41.0600	-26.740	67.478	10.	5.6
WHDF/NEIC	2009/07/10	20:00:16.2900	-48.862	-8.359	10.	4.8
WHDF/NEIC	2009/07/11	01:54:32.0000	-14.046	-13.919	10.	4.9
WHDF/NEIC	2009/07/19	03:28:21.0400	-41.657	42.250	10.	4.8
WHDF/NEIC	2009/07/20	23:01:12.6300	-6.546	29.913	10.	5.0
WHDF/NEIC	2009/07/21	19:55:45.0200	-13.671	66.110	10.	5.2
WHDF/NEIC	2009/07/30	08:34:42.8000	-22.988	-13.568	10.	4.8
WHDF/NEIC	2009/07/30	14:48:06.4600	1.292	30.496	10.	4.6
WHDF/NEIC	2009/07/31	08:14:39.7200	-20.974	14.928	10.	5.1
WHDF/NEIC	2009/08/05	06:28:31.8800	-8.764	67.497	10.	5.0
WHDF/NEIC	2009/08/14	12:06:55.9800	-5.484	29.797	33.	4.6
WHDF/NEIC	2009/08/29	13:59:06.0300	12.920	57.600	10.	5.3
WHDF/NEIC	2009/09/04	22:16:47.5000	-48.301	31.670	10.	5.4
WHDF/NEIC	2009/09/21	14:01:57.6800	-44.520	37.430	10.	4.8
WHDF/NEIC	2009/09/26	04:22:27.5400	-29.557	60.852	10.	5.3
WHDF/NEIC	2009/09/26	13:26:37.6000	-7.533	30.452	10.	5.4
WHDF/NEIC	2009/09/28	12:13:17.4600	-25.629	-13.748	10.	5.4
WHDF/NEIC	2009/10/02	06:31:15.6300	-52.343	13.606	10.	4.8
WHDF/NEIC	2009/10/06	18:31:52.9000	-4.043	34.867	10.	4.6
WHDF/NEIC	2009/10/07	01:40:48.5700	-3.970	34.766	10.	4.7
WHDF/NEIC	2009/10/08	14:29:06.7000	-17.826	35.044	10.	4.6
WHDF/NEIC	2009/10/08	19:09:38.6100	-4.878	-11.593	10.	5.1
WHDF/PRE	2009/10/09	19:27:57.1000	-26.438	27.440	2.	4.7
WHDF/NEIC	2009/10/12	03:15:47.2800	-17.099	66.688	10.	6.2
WHDF/NEIC	2009/10/18	00:39:43.2100	0.563	30.145	10.	5.0
WHDF/NEIC	2009/10/23	11:37:54.1400	-12.392	65.208	10.	5.4
WHDF/NEIC	2009/11/01	20:26:18.5500	14.070	51.868	10.	5.0
WHDF/NEIC	2009/11/02	18:48:33.6400	-52.911	10.195	10.	4.9
WHDF/NEIC	2009/11/05	07:12:32.4400	12.108	45.907	10.	5.5
WHDF/NEIC	2009/11/05	08:05:49.7500	12.101	45.903	10.	5.1
WHDF/NEIC	2009/11/08	13:52:20.5600	-49.146	-9.884	10.	4.8
WHDF/NEIC	2009/11/08	20:35:21.4300	6.700	60.263	10.	5.5
WHDF/NEIC	2009/11/09	00:21:38.9400	-43.462	39.613	10.	5.5
WHDF/NEIC	2009/11/10	00:45:53.9600	-41.071	44.416	10.	4.9
WHDF/NEIC	2009/11/11	10:18:17.7500	-18.742	65.653	10.	4.8

WHDF/NEIC	2009/11/14	00:51:33.2100	-38.493	-15.649	10.	5.0
WHDF/NEIC	2009/11/14	04:47:02.6300	-6.852	29.841	10.	5.3
WHDF/NEIC	2009/11/14	04:50:17.2900	-6.779	29.823	10.	5.5
WHDF/NEIC	2009/11/14	22:02:45.5100	5.903	61.224	10.	5.7
WHDF/NEIC	2009/11/14	22:11:37.8100	5.987	61.212	10.	5.3
WHDF/NEIC	2009/11/18	01:42:47.7400	-53.965	6.484	10.	5.5
WHDF/NEIC	2009/11/19	00:05:24.5300	-46.061	34.930	10.	5.0
WHDF/NEIC	2009/11/20	08:00:30.6800	13.261	50.828	10.	5.0
WHDF/NEIC	2009/11/20	16:28:23.5800	-3.637	25.204	10.	4.8
WHDF/NEIC	2009/11/20	19:31:26.1100	-0.180	-18.002	5.	5.4
WHDF/NEIC	2009/11/22	20:39:09.2300	-10.158	33.769	10.	4.6
WHDF/PRE	2009/11/29	01:04:46.9000	-26.944	26.781	2.	4.6
WHDF/NEIC	2009/11/29	14:15:03.3700	-52.741	26.332	10.	4.8
WHDF/NEIC	2009/11/30	02:54:48.2000	-2.419	-11.756	10.	5.1
WHDF/NEIC	2009/12/02	04:20:36.5900	-20.518	64.524	10.	5.3
WHDF/NEIC	2009/12/03	04:04:42.2200	-47.972	31.988	10.	4.8
WHDF/NEIC	2009/12/06	17:36:36.2100	-10.129	33.855	10.	5.7
WHDF/NEIC	2009/12/06	17:43:52.3300	-9.933	33.908	10.	4.6
WHDF/NEIC	2009/12/06	17:55:13.7800	-10.012	33.984	10.	4.8
WHDF/NEIC	2009/12/06	17:58:15.4600	-10.171	33.968	10.	5.3
WHDF/NEIC	2009/12/06	18:29:14.9800	-10.131	33.915	10.	5.2
WHDF/NEIC	2009/12/06	19:36:41.6400	-10.105	33.947	10.	5.1
WHDF/NEIC	2009/12/07	03:35:40.4000	-10.132	33.908	10.	5.0
WHDF/NEIC	2009/12/07	09:31:44.7500	-10.113	33.837	10.	5.0
WHDF/NEIC	2009/12/07	18:09:38.7000	-10.079	33.756	10.	4.6
WHDF/NEIC	2009/12/08	03:08:57.2400	-9.948	33.878	8.	5.9
WHDF/NEIC	2009/12/09	00:49:39.2800	14.522	56.226	10.	4.8
WHDF/NEIC	2009/12/09	16:00:43.3300	-0.642	-21.072	10.	5.5
WHDF/NEIC	2009/12/11	04:49:09.3900	-10.087	33.861	10.	5.0
WHDF/NEIC	2009/12/11	20:06:24.6000	-10.000	33.847	10.	4.6
WHDF/NEIC	2009/12/12	02:27:03.7800	-9.942	33.911	10.	5.3
WHDF/NEIC	2009/12/12	03:34:40.3400	-17.553	-13.254	10.	4.8
WHDF/NEIC	2009/12/18	07:32:59.6600	-17.730	65.867	10.	5.0
WHDF/NEIC	2009/12/19	23:19:15.5500	-10.108	33.818	6.	6.0
WHDF/NEIC	2009/12/29	04:29:51.1800	-33.816	56.390	10.	5.0

Appendix C. Seismological Stations used.

PASSCAL Deployment YB			PASSCAL Deployment XB		
BB01	-28.307	24.7542	CM01	2.389	9.834
BB02	-28.3823	24.5885	CM02	2.698	13.289
BB03	-28.408	24.6248	CM04	2.979	11.959
BB04	-28.4045	24.5895	CM05	2.942	9.914
BB05	-28.4412	24.5798	CM06	2.385	11.268
BB06	-28.4521	24.6241	CM07	3.87	11.456
BB07	-28.4161	24.6923	CM08	3.909	9.863
BB08	-28.4285	24.6288	CM09	4.234	9.328
BB09	-28.4494	24.6377	CM10	4.223	10.619
BB11	-28.467	24.5471	CM11	3.98	13.188
BB12	-28.5288	24.7108	CM12	4.481	11.634
BB13	-28.5394	24.7355	CM14	4.422	14.358
BB14	-28.5404	24.6768	CM15	5.034	9.933
BB15	-28.5825	24.8975	CM16	5.48	10.572
BB16	-28.5801	24.539	CM17	5.546	12.312
BB17	-28.5595	24.7077	CM18	5.723	9.355
BB18	-28.6702	24.9376	CM19	5.975	11.232
BB19	-28.602	24.8324	CM20	6.225	10.054
BB20	-28.6327	24.6847	CM21	6.467	12.62
BB21	-28.6256	24.6711	CM22	6.477	13.268
BB22	-28.6306	24.7844	CM23	6.37	10.793
BB23	-28.6453	24.8238	CM24	6.523	14.288
BB24	-28.6427	24.6323	CM25	6.76	11.811
BB25	-28.6718	24.8834	CM26	7.265	13.548
BB26	-28.6718	24.968	CM27	7.359	12.667
BB27	-28.6743	24.5217	CM28	8.469	13.237
BB28	-28.6946	24.5613	CM29	9.347	13.385
BB29	-28.7047	24.8436	CM30	9.757	13.95
BB30	-28.7963	24.8662	CM31	10.327	15.262
BB31	-28.7937	24.9256	CM32	10.619	14.372
BB32	-28.8146	24.9778			

PASSCAL Deployment XA		
SA01	-34.2945	19.246
SA02	-33.7351	20.2663
SA03	-33.6619	21.3354
SA04	-32.8505	19.6206
SA05	-32.605	21.5346
SA07	-31.9776	20.2262
SA08	-31.9103	22.0729
SA09	-30.9221	22.9861
SA10	-30.9724	23.9136
SA11	-29.965	20.9466
SA12	-29.8486	22.2533
SA13	-29.9788	23.1396
SA139	-25.8519	26.2662
SA14	-29.8682	24.0226
SA15	-29.9038	25.0323
SA155	-22.8786	28.3402
SA16	-28.9503	22.1951
SA169	-22.2623	29.2134
SA17	-28.9321	23.2257
SA18	-28.6328	24.3056
SA19	-28.9056	24.8328
SA20	-29.0221	26.1953
SA22	-27.9662	22.0091
SA23	-27.9304	23.4046
SA24	-27.8833	24.2365
SA25	-27.8459	25.1259
SA26	-27.5456	26.1803
SA27	-27.8625	27.2943
SA28	-27.8982	28.0656
SA29	-26.9317	23.0349
SA30	-27.0715	24.1651
SA31	-26.9952	25.0209
SA32	-26.8655	26.2845
SA33	-26.8986	27.1793
SA34	-26.8	28.1
SA35	-27.0183	29.0883
SA36	-26.8771	30.1249
SA37	-25.9705	23.7212
SA38	-25.9334	25.0846
SA39	-25.8952	26.1514

PASSCAL Deployment XA (continued)		
SA40	-25.8981	27.149
SA42	-25.665	29.2223
SA43	-25.7868	30.0669
SA44	-26.0321	30.9022
SA45	-24.8792	26.1644
SA46	-24.8382	27.1092
SA47	-24.8469	28.1618
SA48	-24.8948	29.2163
SA49	-24.9597	30.3091
SA50	-23.8722	27.1662
SA51	-23.8628	28.1567
SA52	-23.7983	28.8975
SA53	-24.1134	29.3328
SA55	-22.98	28.2981
SA56	-23.0059	29.0743
SA57	-22.9811	30.0202
SA59	-24.8373	24.464
SA60	-23.8519	24.9594
SA61	-23.9481	24.022
SA62	-24.8505	25.135
SA63	-23.6583	26.082
SA64	-22.9694	26.2017
SA65	-22.8183	27.2218
SA66	-21.9005	26.3727
SA67	-21.8859	27.2736
SA68	-21.9504	28.1878
SA69	-22.3048	29.2661
SA70	-21.0883	26.3352
SA71	-20.9258	27.1408
SA72	-20.143	28.6113
SA73	-21.8537	30.2776
SA74	-21.923	30.9357
SA75	-20.8601	28.9991
SA76	-20.6361	29.8464
SA77	-20.7557	30.9191
SA78	-19.4671	30.7723
SA79	-20.0211	30.5173
SA80	-19.9593	31.3179
SA81	-30.9251	21.2681
SA82	-30.9771	22.2466

IRIS/USGS			AA AfricaArray		
ABPO	-19.018	47.229	AAUS	9.035	38.767
TSUM	-19.2022	17.5838	ANKE	9.5927	39.7339
TRIS	-37.0578	-12.3159	CNG	-26.2917	32.1883
SUR	-32.3797	20.8117	CVNA	-31.4821	19.7617
SHEL	-15.9588	-5.7457	DESE	11.118	39.635
RER	-21.159	55.746	GRM	-33.313	26.5733
NAI	-1.2739	36.8037	GSN	-22.5667	17.1
MSEY	-4.6737	55.4792	HARE	-17.704	31.009
MSKU	-1.6557	13.6116	HVD	-30.605	25.4967
MBAR	-0.6019	30.7382	KTWE	-12.814	28.209
MBO	14.391	-16.955	MOPA	-23.5173	31.3977
LSZ	-15.2779	28.1882	POGA	-27.346	31.707
LBTB	-25.0151	25.5966	SEK	-28.3233	27.625
KMBO	-1.1268	37.2523	TEZI	-15.747	26.016
FURI	8.8952	38.6798	UPI	-28.3619	21.2527
DBIC	6.6702	-4.8566	ZOMB	-15.3833	35.35
CRZF	-46.43	51.861			
BOSA	-28.6141	25.2555			
BNG	4.435	18.547			
BGCA	5.1764	18.4242			
ATD	11.53	42.847			
ASCN	-7.9327	-14.3601			
KOWA	14.4967	-4.014			

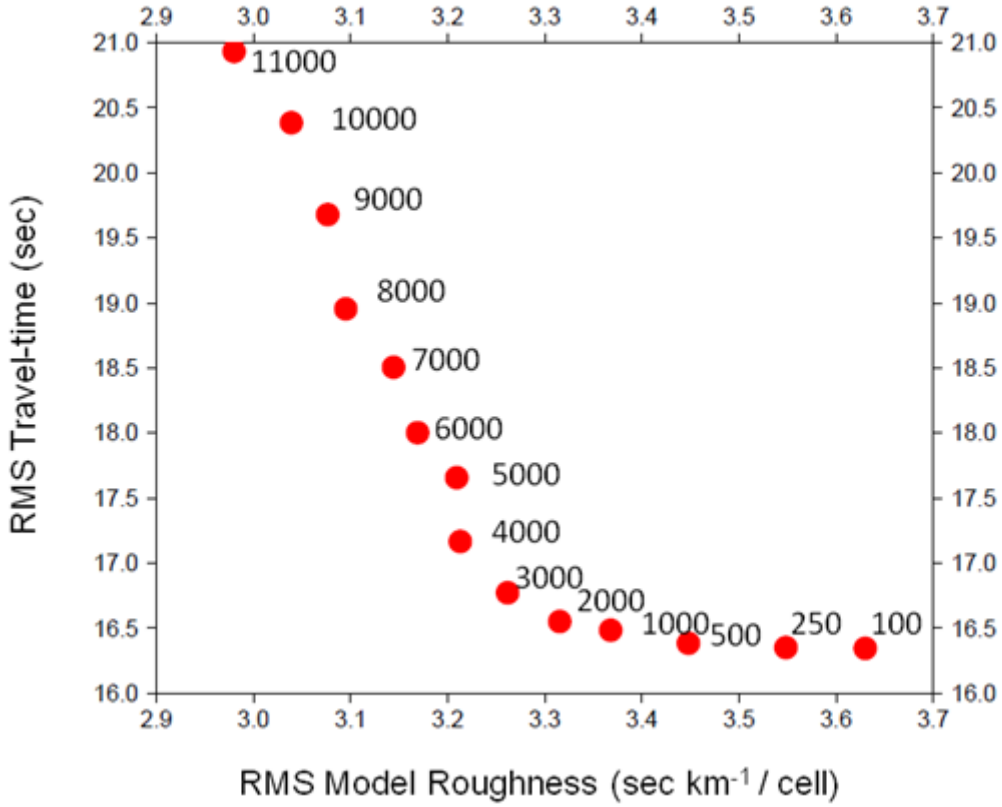
PASSCAL Deployment ZP			PASSCAL Deployment XD		
BEND	0.581	31.392	AMBA	-8.106	33.2588
BIHA	-2.638	31.316	BASO	-4.3238	35.1382
BKBA	-1.364	31.812	GOMA	-4.8392	29.6927
BUTI	1.819	31.326	HALE	-5.3018	38.617
FOPO	0.663	30.282	INZA	-5.1168	30.3988
GEIT	-2.881	32.217	KIBA	-5.3223	36.5695
HAMA	-3.832	32.642	KIBE	-5.3775	37.4763
JNJA	0.446	33.182	KOMO	-3.8422	36.7192
KATE	-0.138	29.871	KOND	-4.904	35.7965
KBLE	-1.254	29.992	LONG	-2.7252	36.6983
KGMA	-4.878	29.633	MBWE	-4.961	34.3462
KIBO	-3.583	30.713	MITU	-6.0192	34.056
MALE	1.07	34.167	MTAN	-7.9073	33.3203
MAUS	-2.741	36.704	MTOR	-5.2508	35.4007
MKRE	-4.282	30.424	PAND	-8.9835	33.2415
MLBA	-1.838	31.67	PUGE	-4.7145	33.1842
PIGI	0.231	32.319	RUNG	-6.9372	33.518
ROTI	1.626	33.6	SING	-4.6403	34.7315
SULU	-4.573	30.087	TARA	-3.8892	36.0163
TUND	-9.2958	32.7712	TUND	-9.2958	32.7712
			URAM	-5.0878	32.0832

PASSCAL Deployment XI			PASSCAL Deployment YJ		
ANGA	-2.5	36.8	ADEE	7.7909	39.9068
ARBA	6.0672	37.5564	ADUE	8.5403	38.9019
BAHI	11.5743	37.3934	AMME	8.3031	39.0934
BDAR	9.6721	39.5254	ANKE	9.5927	39.7339
BELA	6.9286	38.4702	AREE	8.9385	39.4188
BIRH	9.6723	39.5253	ASEE	7.9729	39.1317
BUTA	8.1171	38.3824	AWAE	8.9895	40.1659
CHEF	6.1613	38.2101	BEDE	8.9086	40.771
DELE	8.4393	36.3259	BORE	8.7458	39.554
DIYA	11.8343	39.5956	CHAE	9.3118	38.7624
DMRK	10.308	37.729	DIKE	8.0627	39.5566
FICH	9.7822	38.7372	DONE	8.509	39.5504
GOBA	7.027	39.982	DZEE	8.7803	38.9959
GUDE	8.9665	37.7652	GEWE	10.0045	40.5739
HERO	7.0263	39.2769	INEE	9.8954	39.1431
HIRN	9.2224	41.1059	KOTE	9.3875	39.3961
HOSA	7.564	37.8573	MECE	8.5938	40.3241
JIMA	7.684	36.831	MEKE	8.1623	38.833
KARA	10.4224	39.9348	MELE	9.3106	40.2008
KIBO	-3.583	30.713	MIEE	9.2416	40.7581
KITU	-1.373	38.0021	NURE	8.7312	39.7956
NAZA	8.568	39.2907	SENE	9.1466	39.0166
NEKE	9.089	36.5235	SHEE	9.9996	39.8946
TALE	0.9792	34.976	WOLE	8.5339	37.9822
TEND	11.7925	41.0043			
TERC	7.1446	37.1747			
WANE	10.1694	40.6491			

PASSCAL Deployment ZE			AN Angola Craton		
AFME	13.204	40.8585	DUNDO	-7.4083	20.84
AWAE	8.9895	40.1659	LUBAN	-14.9059	13.4483
BERE	12.1707	41.1886	MAUN	-19.9011	23.527
CHIE	11.5979	40.0188	MONG	-15.254	23.1508
DIGE	12.3279	40.2734	PORTQ	-8.6388	13.5546
FINE	12.0681	40.316	RUDU	-17.9093	19.762
HARE	11.6072	40.884			
MEGE	11.4906	41.3381			
MILE	11.4238	40.765			
SEHE	12.0401	40.9769			
SEME	11.7926	41.0044			
SILE	12.407	41.1879			
TRUE	12.4841	40.3161			

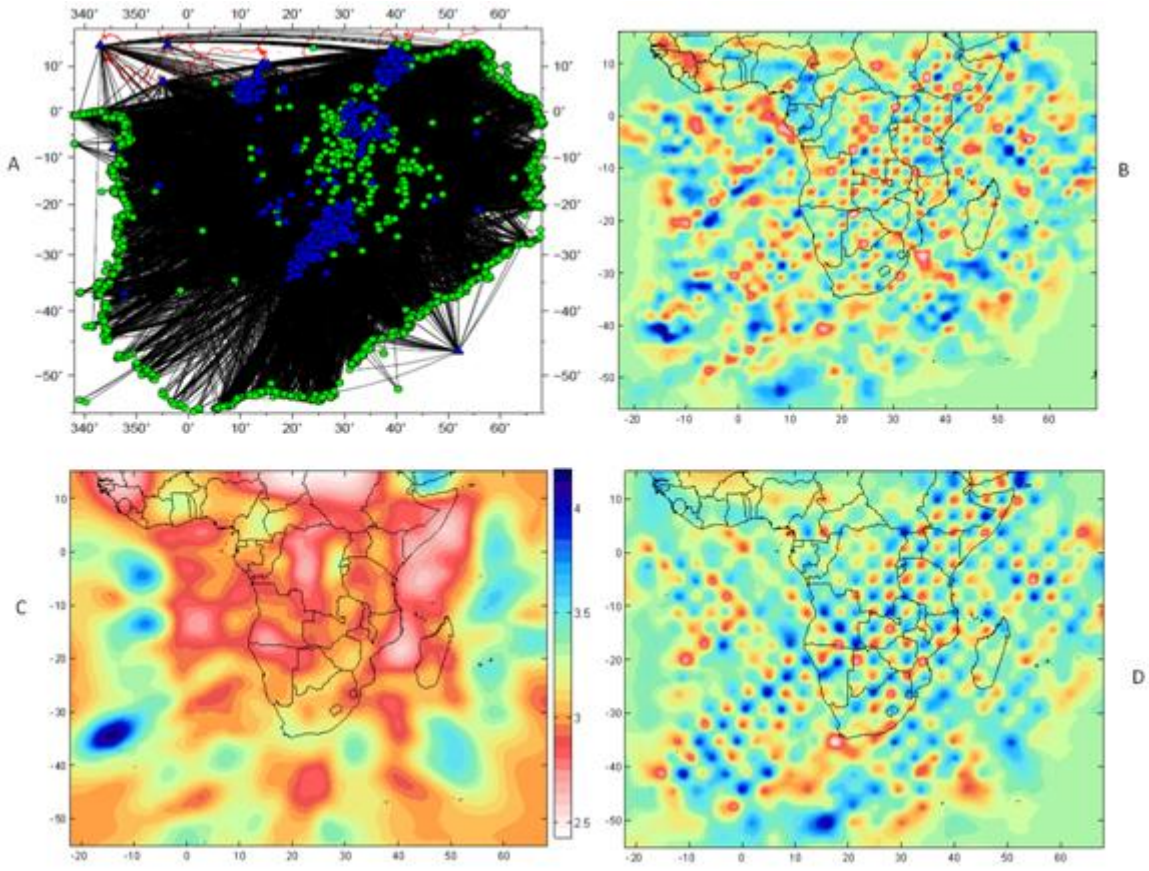
PASSCAL Deployment ZF			Geofon deployment TE		
ABAE	13.3535	39.7636			
ADTE	11.1221	40.757	BRAN	-21.359	14.749
ADYE	13.6353	38.9813	CAPN	-21.759	13.968
AKEE	10.8883	39.168	LEON	-23.435	18.743
DERE	11.1179	39.6353	OUTN	-20.151	15.689
ELLE	11.2579	40.3784	WATN	-20.612	17.335
GASE	11.6813	38.9211			
GEWE	10.0045	40.5739			
HALE	-5.3018	38.617			
KOBE	12.1506	39.6298			
KORE	10.4265	39.9344			
MAYE	12.7833	39.5343			
MISE	9.2368	40.7591			
QATE	9.3959	41.4691			
SEKE	12.6216	39.0334			
SMRE	13.1977	39.2112			
SRDE	11.9579	41.3099			
WLDE	11.8243	39.5874			
WUCE	11.5116	39.6065			

Appendix D. Trade-off curve

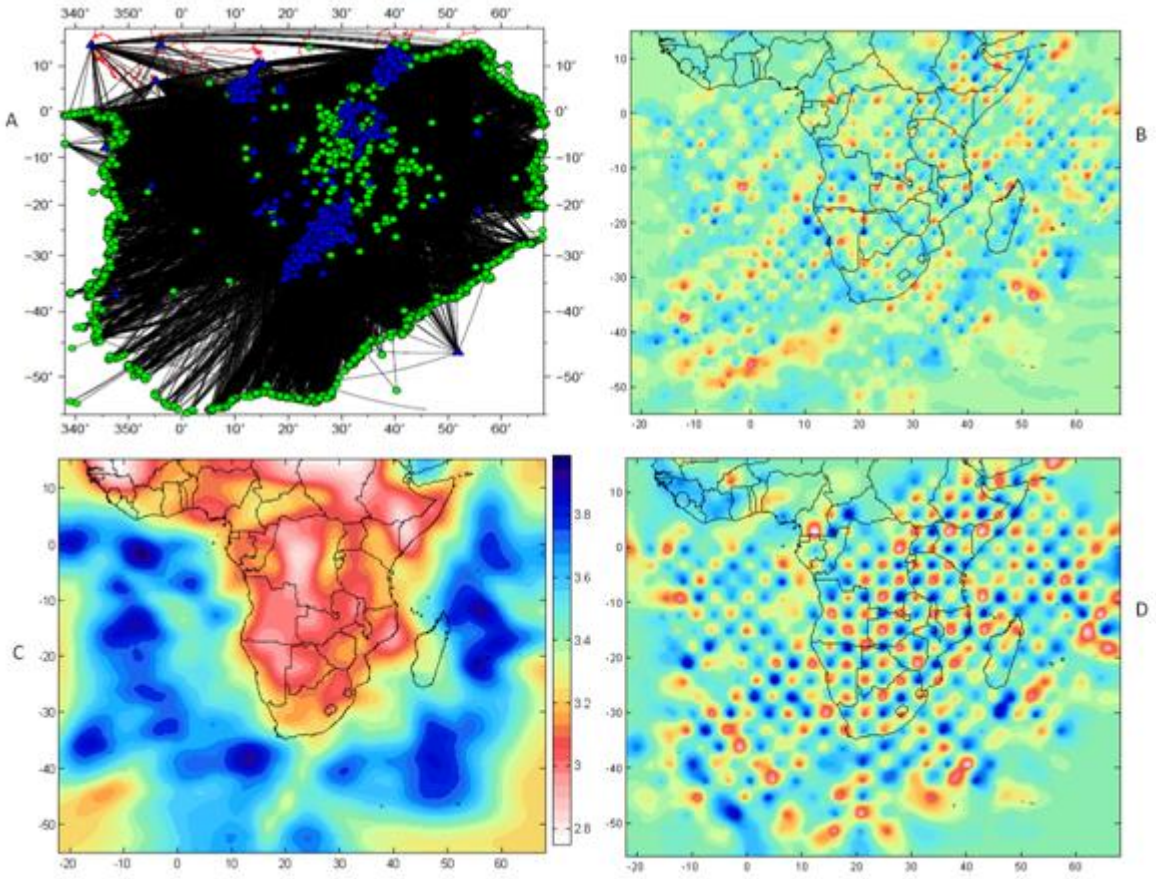


Appendix E. Gallery of 2D group velocity maps

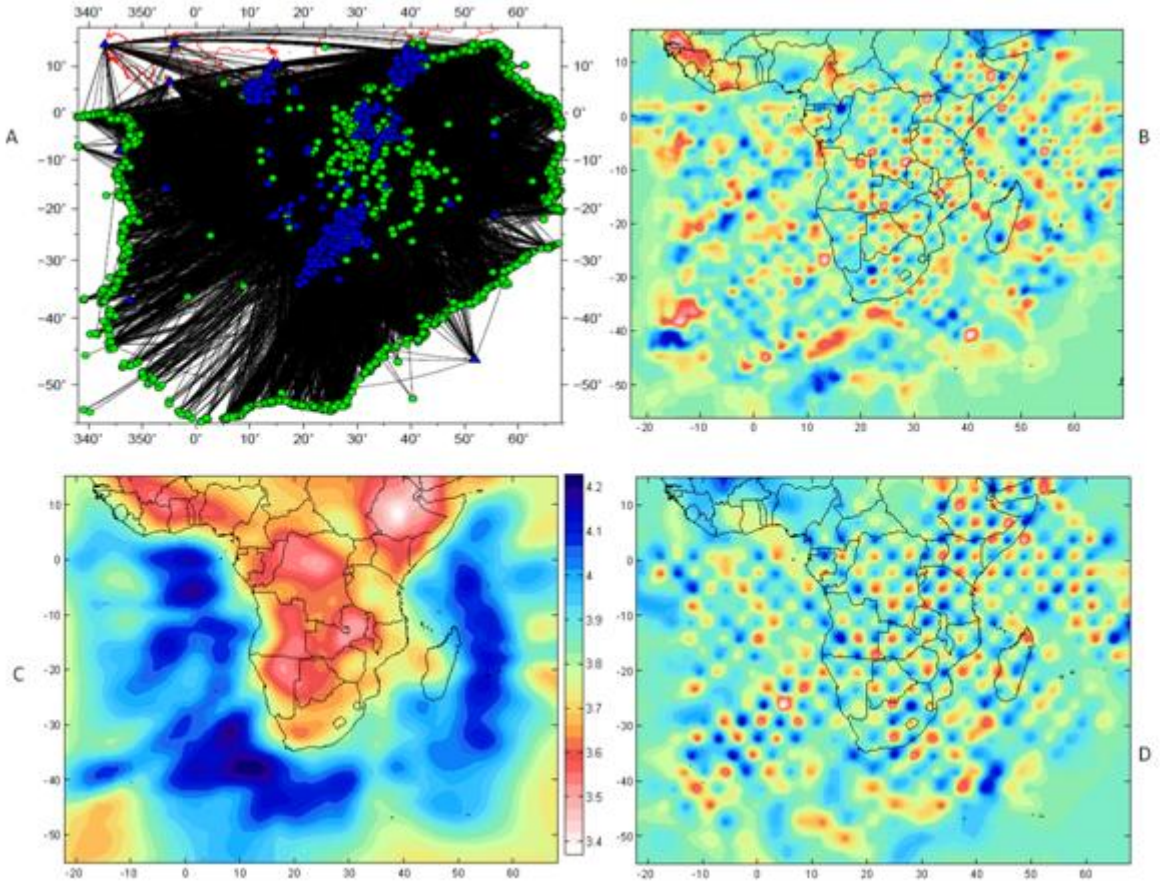
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 10s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



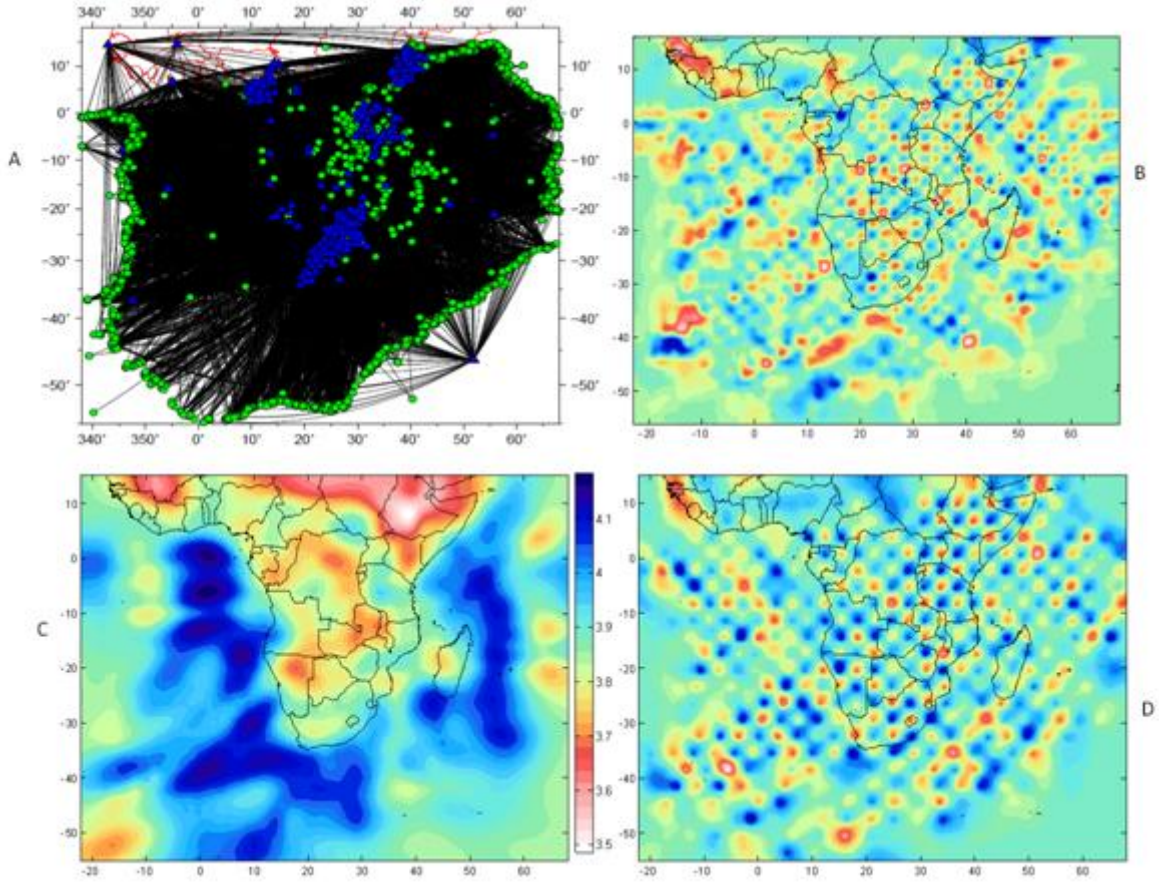
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 20s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



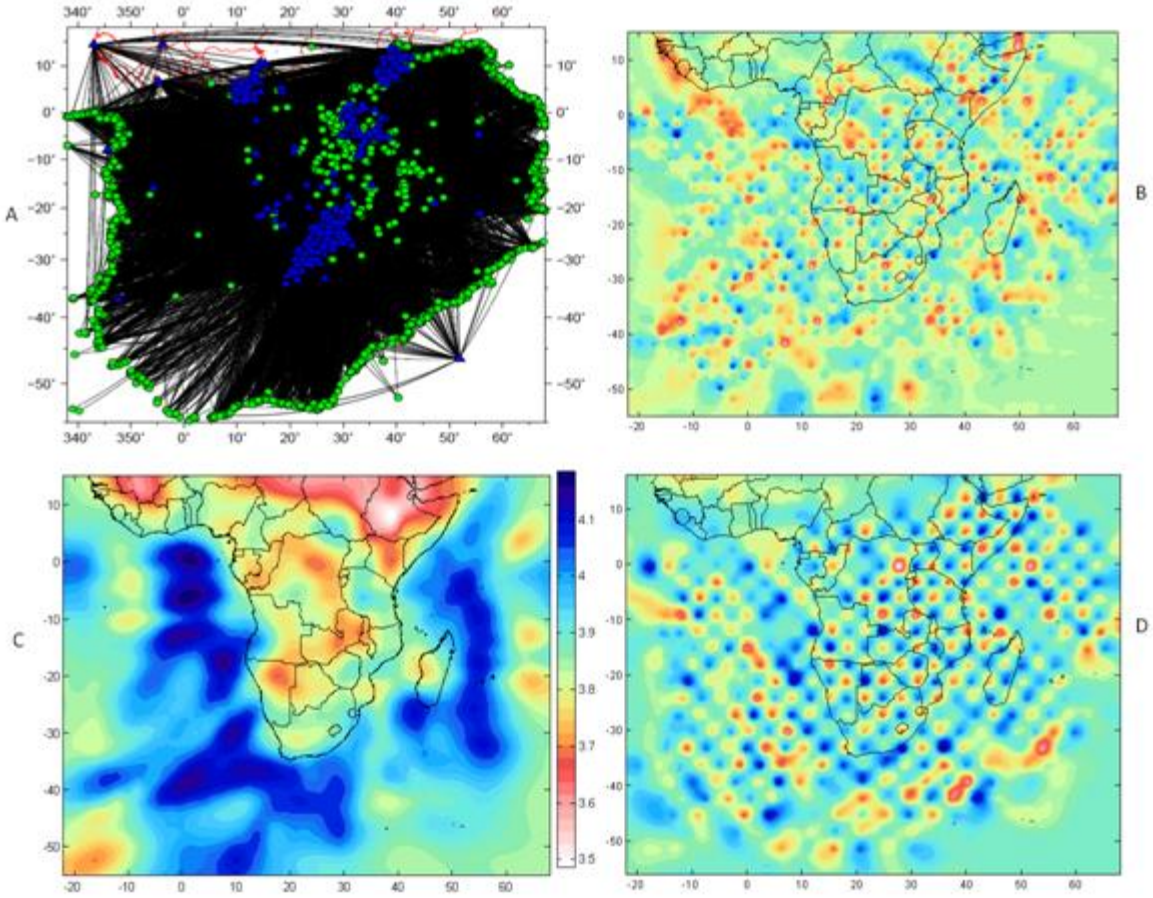
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 30s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



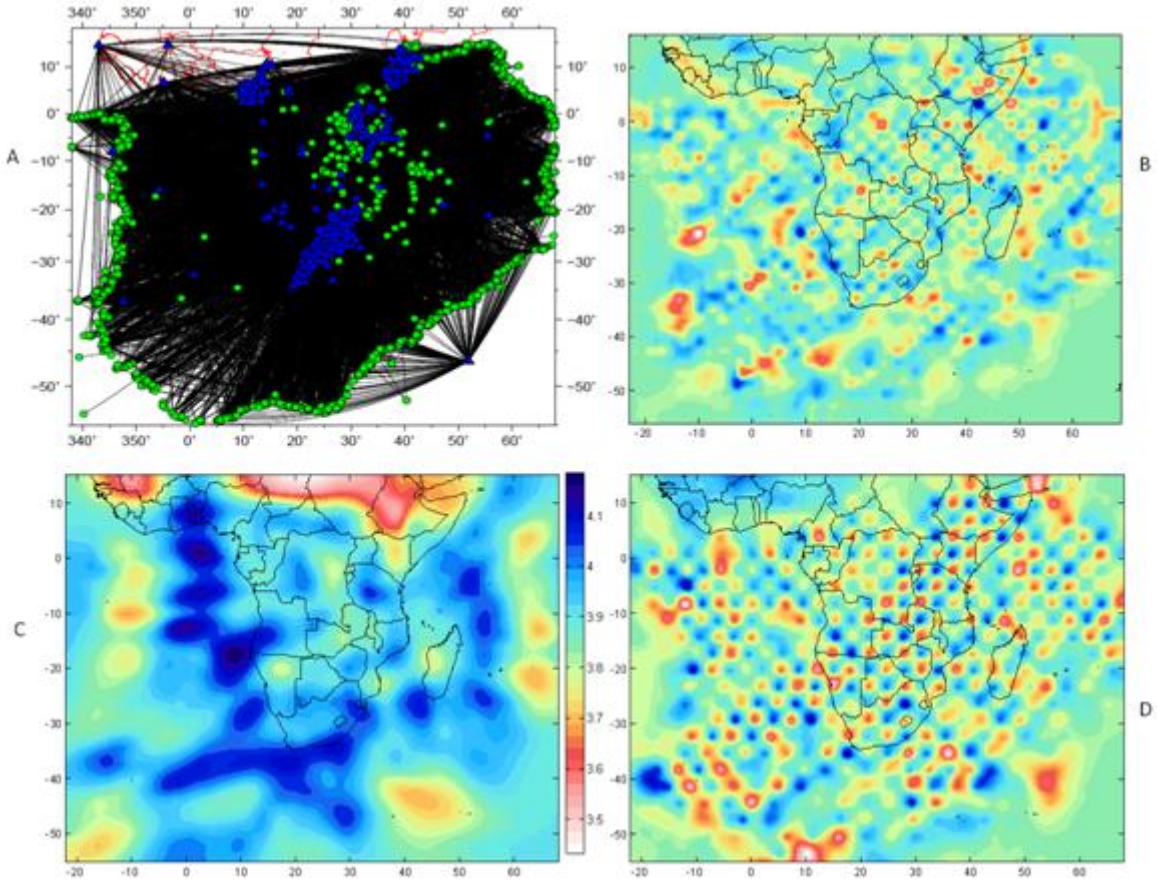
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 40s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



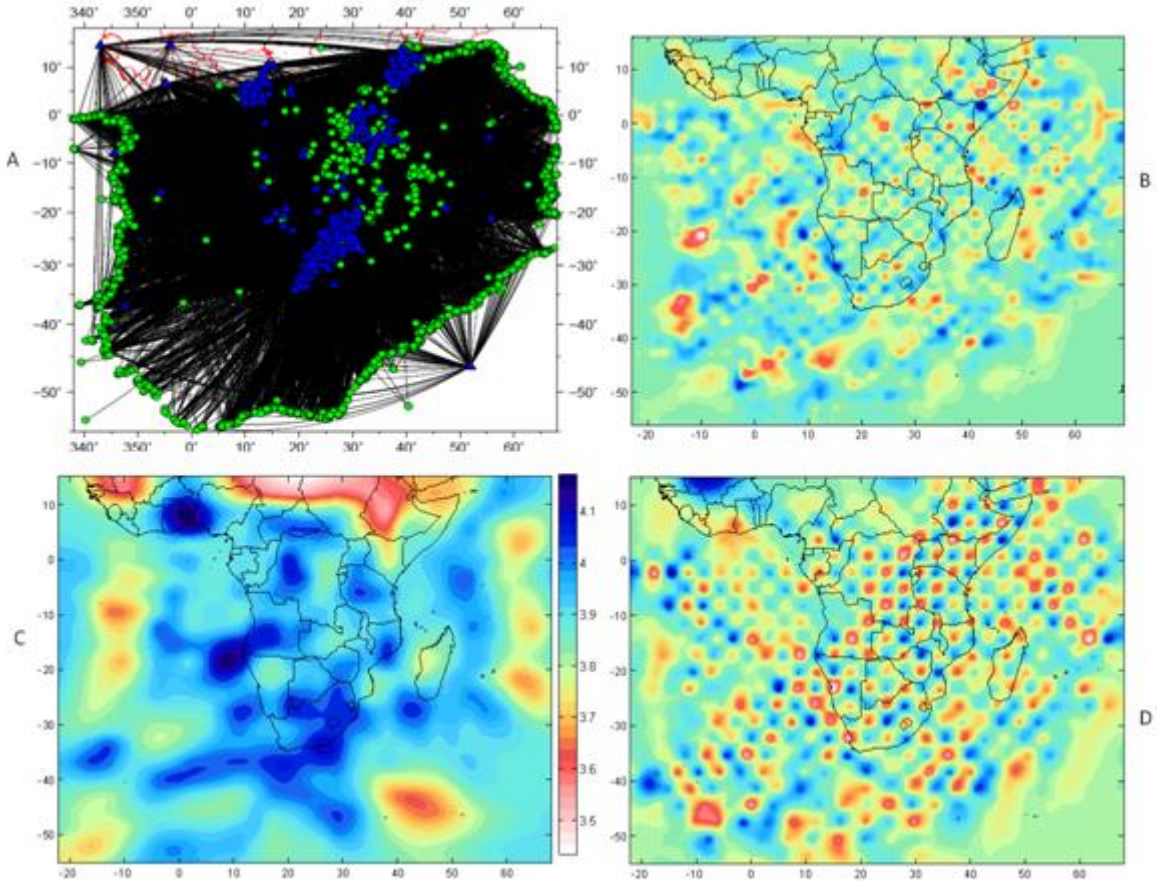
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 50s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



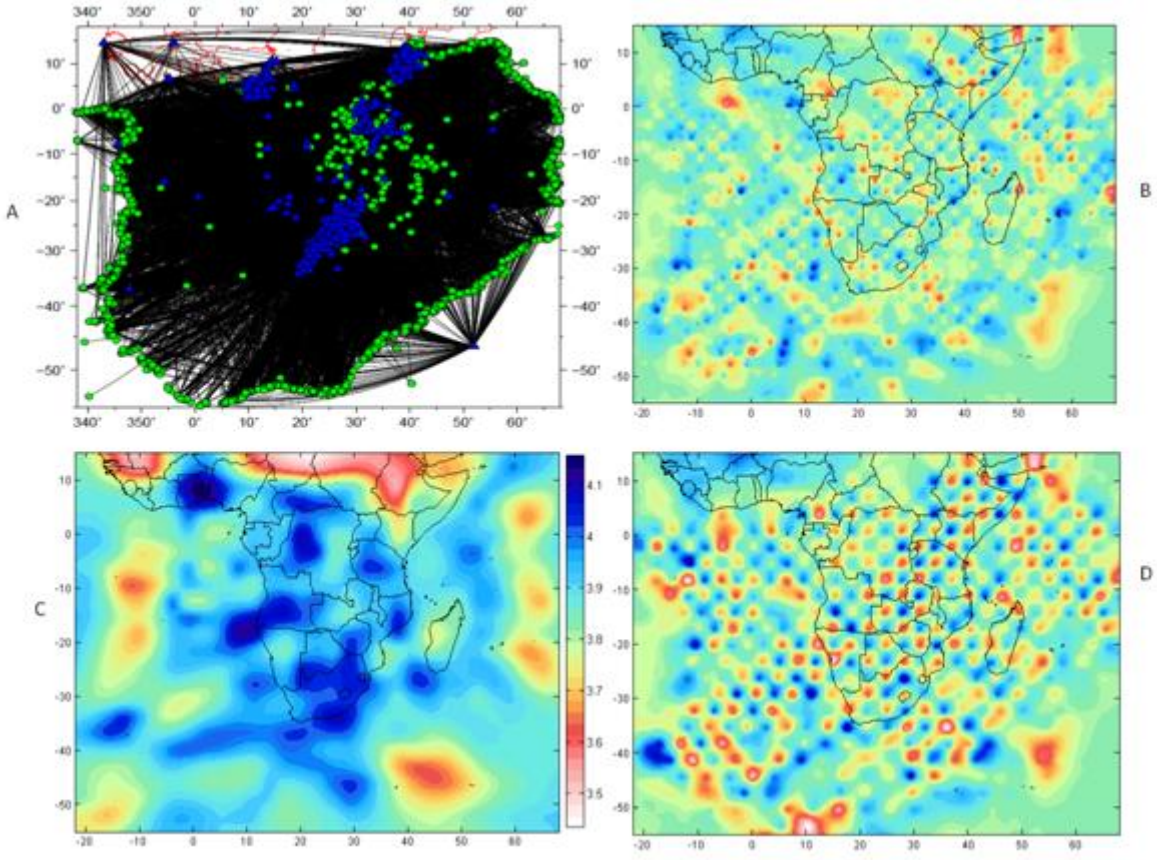
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 60s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



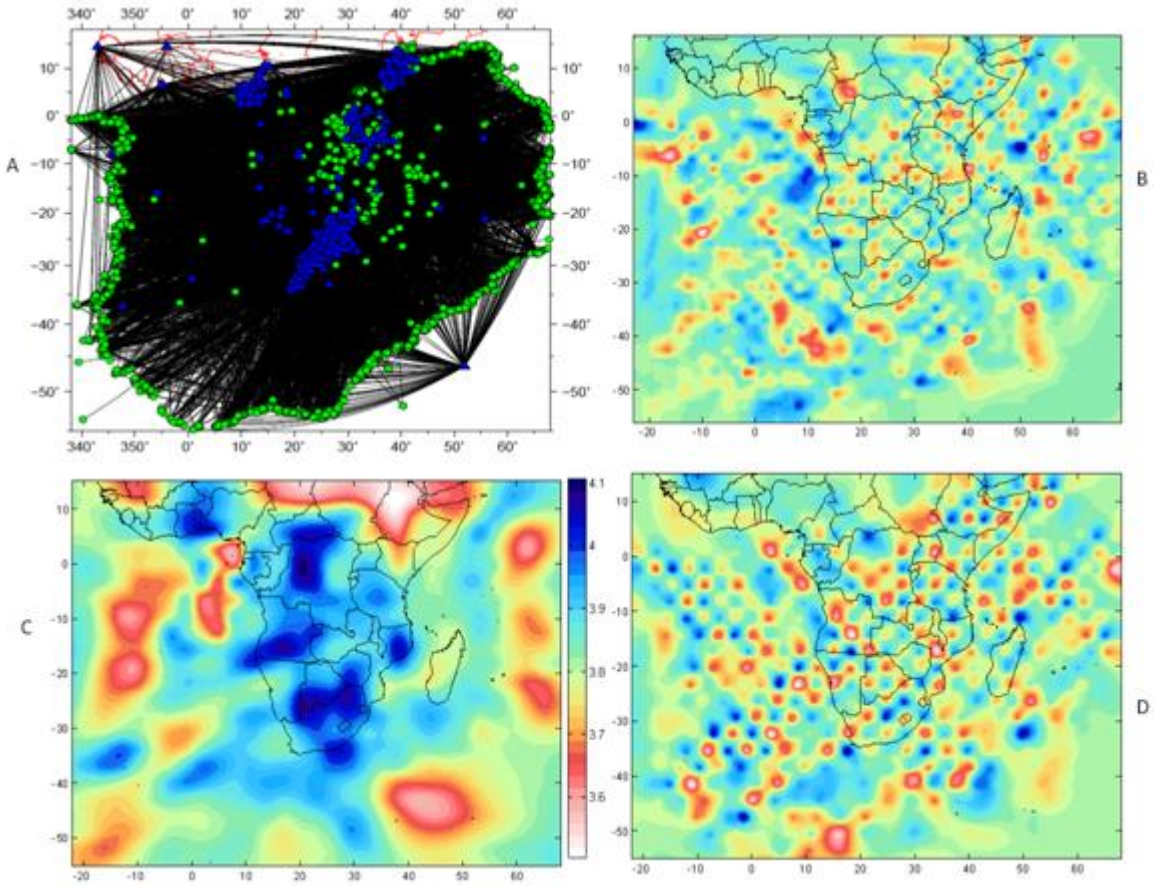
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 70s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



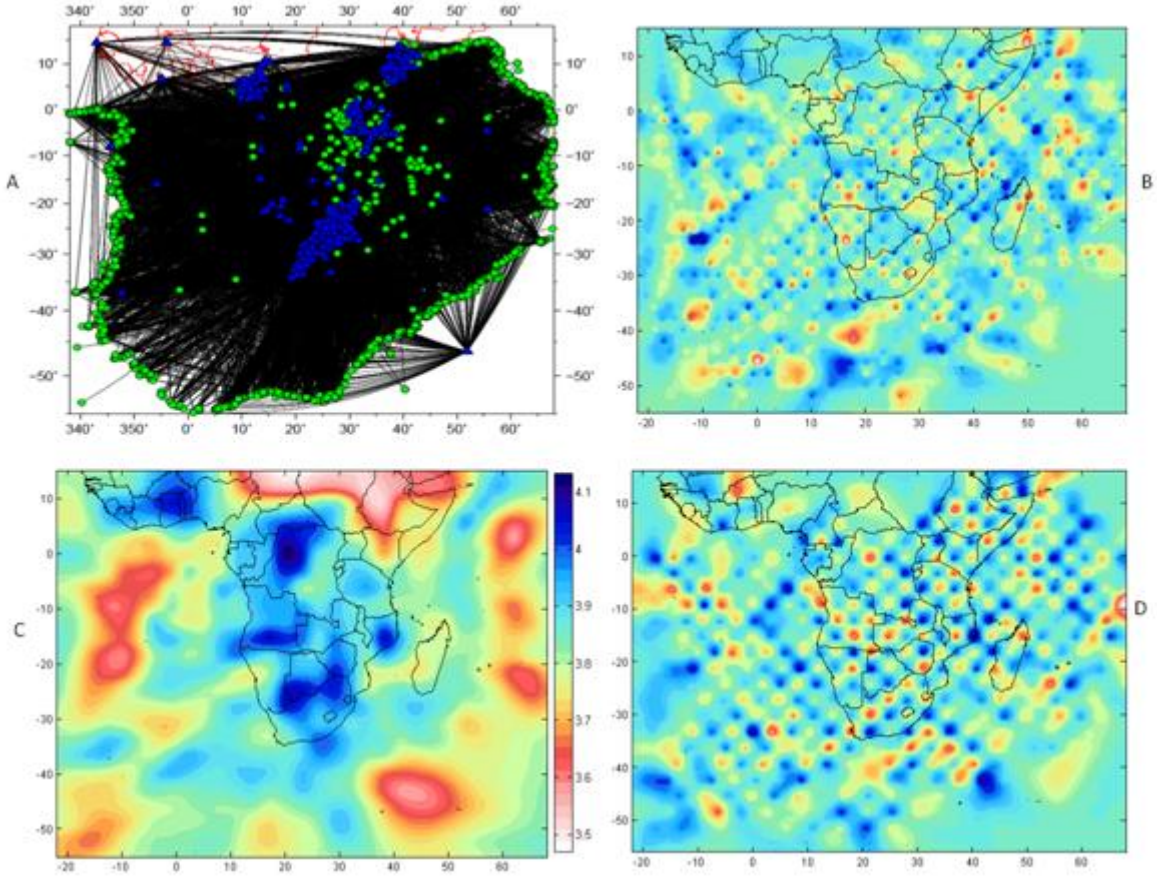
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 80s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



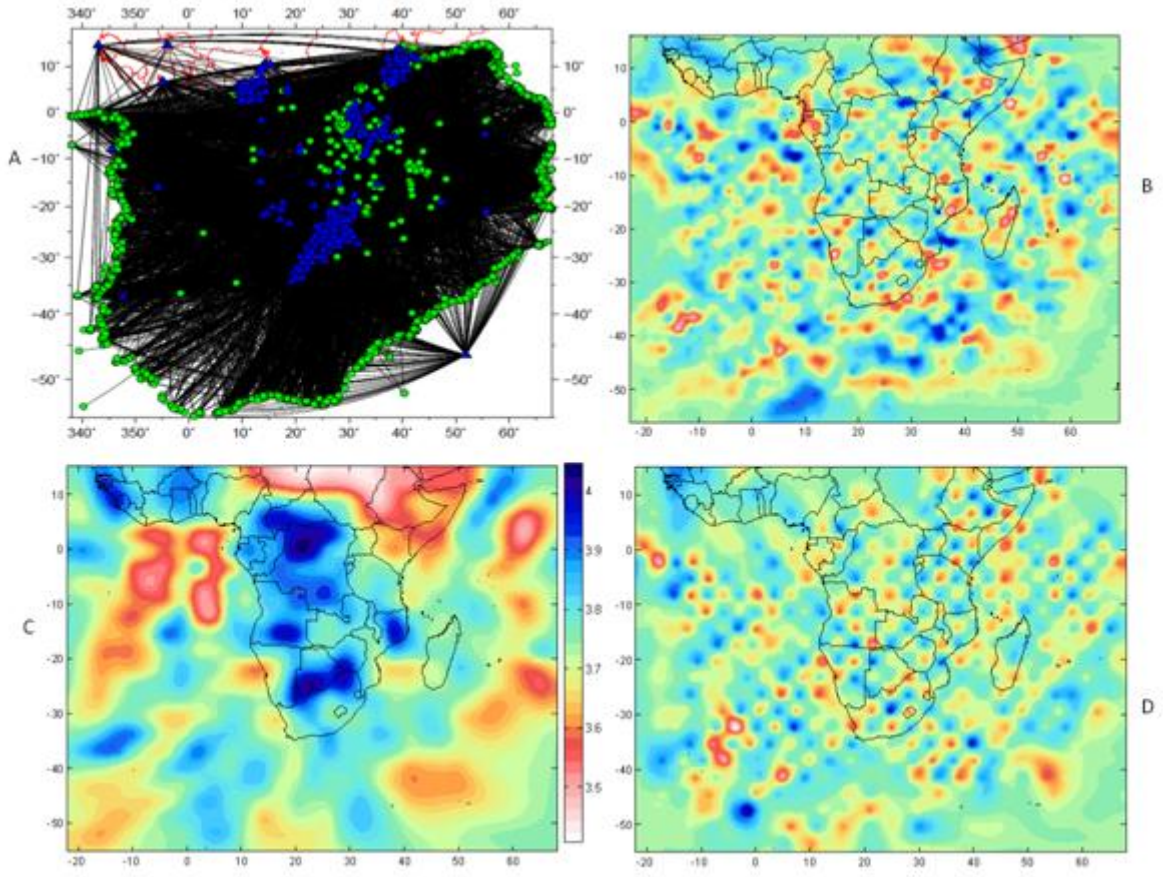
Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 90s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 100s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 110s. The grid block sizes are 2x2 degrees and 3x3 degrees in the checkerboard tests (C) and (D), respectively.



Ray path coverage (A), group velocity model (B) and checkerboard (C and D) test for 120s. The grid block sizes are 3x3 degrees and 4x4 degrees in the checkerboard tests (C) and (D), respectively.