PART 5

CONCLUSIONS

Several concepts and ideas have materialized during the course of this work. It is then identified here as knowledge gaps and areas where future work should be concentrated in order to improve the earthquake hazard characterization for the country.

They have been categorized and defined as follows:

- Earthquake Catalogue
    - No earthquake exceeding magnitude 6.3 has been recorded since 1969, the start of the instrumental network. Possible study areas to look into include:
        - 1) Overestimation of the magnitudes of historical earthquakes
        - 2) The M_L scale of the network is underestimating earthquake magnitude (note that M_L saturates at larger magnitudes, and other magnitudes like *Ms* or *Mw* should be used);
        - 3) South Africa is in a stable continental region setting where the return period for earthquakes of $M_L > 6$ is longer than the approximately 50 years of observation, and stresses need to accumulate before the onset of another large earthquake.
    - Depths and focal mechanisms of earthquakes need to be determined and routinely published.
    - Microseismic monitoring needs to be undertaken of active regions such as the Ceres and Koffiefontein areas and active fault regions in the Cape Fold Belt

    - The current number of stations and their configuration allows for a very limited detection capability of the network. As a result the location of events can be poor, and the ability to detect micro-earthquakes on active structures is rather limited. A denser network of seismic monitoring stations is required to improve the sensitivity and location accuracy of recorded earthquakes.
    - A comprehensive study is required to distinguish mining-related earthquakes from earthquakes of natural tectonic origin in the database. Furthermore, analytical techniques should be adopted in the SANSN to distinguish these events as they are reported.

- Seismotectonic Zonation
    - Quaternary sediments, especially those providing evidence of neotectonic and paleoseismicity, need to be dated and mapped across the country.
    - Refinement of the zonation should be made once improvement in the earth science database is made

- Seismic Hazard Modelling
    - Methods that take the incompleteness and uncertainty of the earthquake catalogs into account should be used in the analysis of earthquake hazard parameters
    - A seismic hazard assessment for key cities in South Africa is needed
    - Map population risk and vulnerability zones in order to prioritize high risk areas
    - Ground motion attenuation relationships should be developed for the country