



THE SESIMISITY OF EASTERN CAPE PROVINCE FROM 1970-1979

Mpho Mogoswane, I. Saunders and C.J.S. Fourie
 Department of Environmental Water and Earth Sciences

ABSTRACT

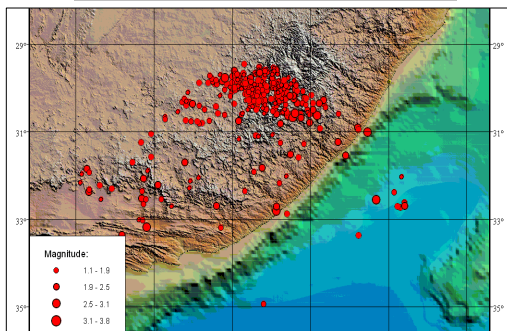
The fundamental purpose of this study is to look at the seismicity of Eastern Cape Province. Seismicity of any region is studied through the accurate location of earthquakes within the area. The basis of this study is basically the earthquake bulletins compiled from routine seismic analysis. The bulletins consists of phase information observed at different seismological stations. The aim of this study is to re-evaluate the phase readings and location of the instrumentally recorded earthquakes in the Eastern Cape Province during the period of 1970 to 1979. Seisan analysis earthquake software for analyzing earthquake from analog data. The results of this study can be used to determine the seismic hazard and risk determination. The results obtained were not acceptable as there was less seismological stations in the Eastern Cape Province. My recommendations is the SANSN should build more stations to get accurate results.

Introduction

Aim of study

- ❖ Re-evaluate event phase readings and re-locate the earthquake epicenters.
- ❖ Determine hypocenter depth of each event using ray tracing (Chapman *et al.*, 1988) and identify additional seismic phases after relocation.
- ❖ Determine fault plane solutions through a grid search method (Snook *et al.* 1988).
- ❖ Determine moment tensor solution time domain seismic moment inversion (Dreger, 2003) for earthquakes $M > 4.0$.

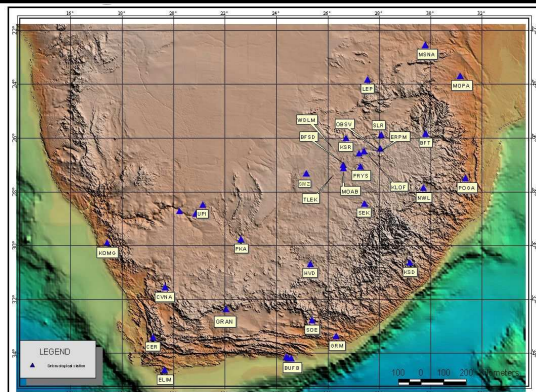
Seismicity of Eastern Cape before re-location



Methodology

- ❖ The earthquake bulletin was searched to compile the data, also compiled from SANSN and ISC online catalogue.
- ❖ Seisan earthquake analysis software to process the data (Havskov, 2011).
- ❖ Used the software to plot and analysis the earthquake signals.
- ❖ Refined the original analysis by re-picking seismic phases.
- ❖ Identify inaccurate phase readings (large time residuals and apply weighting – identify timing errors).
- ❖ Re-locate earthquakes and calculate magnitudes.
- ❖ Depth determinations.
- ❖ Fault plane mechanism (FOCMEC, FPFIC, HASH, INVRAD and PINV).
- ❖ Determined errors related to data.

Seismological Stations of the SANSN Network

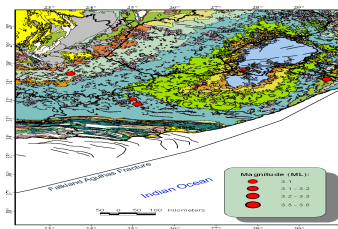


Acknowledgements

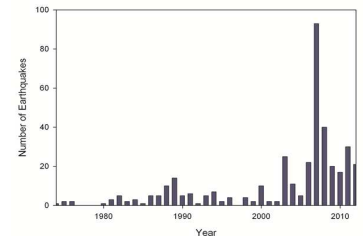
Contact details Thank you to AEON and Inkaba yeAfrica for this opportunity

Contact Details: mphomogoswane@gmail.com

Geology and Seismicity of Eastern Cape after re-location

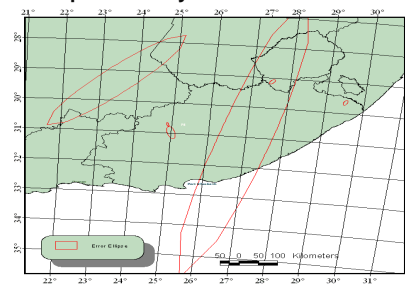


Yearly Distribution



Results

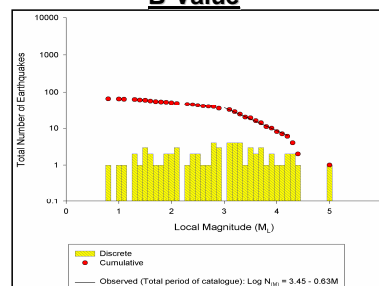
- ❖ Data used for this study was obtained from the Seismology Unit of the Council for Geosciences which is responsible for the operation of the South African National Seismograph Network (SANSN).
- ❖ A total of 63 seismic events were confirmed over a period of 19 years. This study covers a period of 9 years.



Error Ellipses

- ❖ Compiled from SANSN and ISC online catalogue
- ❖ Error in location unacceptable (red big ellipses).

B-Value



• B-Value is expressed by Gutenberg-Richter law ($\log N = a - bM$) which shows the relationship between the magnitude and total number earthquakes.

Where;

• N is the number of events having a magnitude $\geq M$

• a and b are constants

Conclusions

- ❖ The Eastern Cape Province is not well endowed with large valuable deposits meaning less mines.
- ❖ Therefore most of seismic events occurring are naturally induced, which were caused by the movement of Cape Fold Belt from Cape Town extending to Eastern Cape Province.
- ❖ The information gathered from this study can be used for seismic hazard and risk determination.

References

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086 110 2421 • www.tut.ac.za

Tshwane University of Technology
 Private Bag X680
 Pretoria 0001

