

NORSAR

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

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SEMIANNUAL TECHNICAL SUMMARY

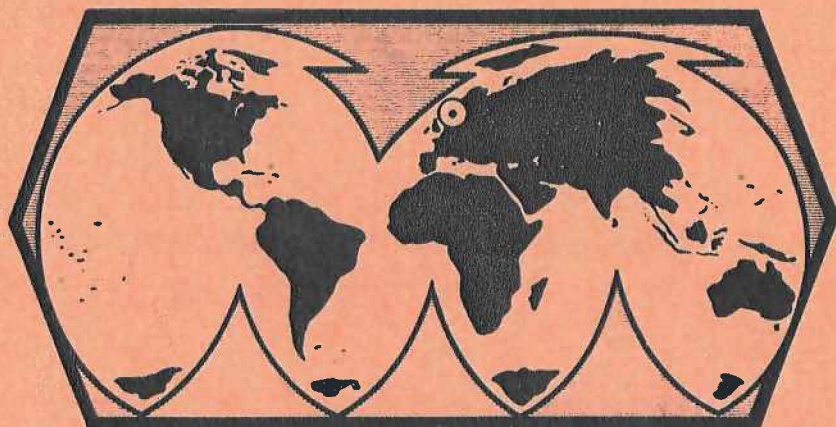
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VI.10 Seismicity of East Africa

As part of a seismic risk analysis for a planned dam project in Stiegler's Gorge, Tanzania, NTNF/NORSAR has conducted an extensive study of the seismicity and tectonics of Eastern Africa. Seismologically, this is a very interesting region as it encompasses the East African Rift System, and it has consequently been the subject of numerous studies in the past (see, e.g., Maasha and Molnar, 1972). Fig. VI.10.1 shows the distribution of seismicity in the area covered by the present investigation, based on a catalogue of 4069 known earthquakes compiled by NTNF/NORSAR. The high seismic activity along the rift zones may be clearly identified; however, it is of interest to note that the seismic activity shows wide distribution also outside this main system. In this respect, the seismicity of East Africa shows clear similarities to what has been observed in other intraplate areas such as Northern Europe, Russia and Northeast America.

Special attention was given in the NTNF/NORSAR study to comparing the earthquake magnitudes reported by various agencies to those calculated from NORSAR recordings. Fig. VI.10.2 shows a plot of NORSAR versus PDE (Preliminary Determination of Epicenters, U.S. Geological Survey) reported magnitudes. Although the data base is limited due to the short time period covered (6 years), it is evident that, relatively speaking, PDE shows a systematic positive magnitude bias, which is most pronounced for NORSAR magnitudes of about 4.0. We attribute this to the network magnitude bias problem discussed, e.g., by Ringdal (1976). Similar results were found when comparing NORSAR m_b to those of other agencies such as the International Seismological Centre (ISC). This is consistent with observations from other regions, and it appears that earthquakes with a PDE or ISC reported m_b of 5.0 or above in many cases will have a considerable positive bias, sometimes as much as a full magnitude unit relative to a hypothetical 'true' magnitude.

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References

- Maasha, N., and P. Molnar (1972): Earthquake fault parameters and tectonics in Africa. *J. Geophys. Res.*, 77, 5731-5743.
- Ringdal, F. (1976): Maximum-likelihood estimation of seismic magnitude. *Bull. Seism. Soc. Amer.*, 66, 789-802.

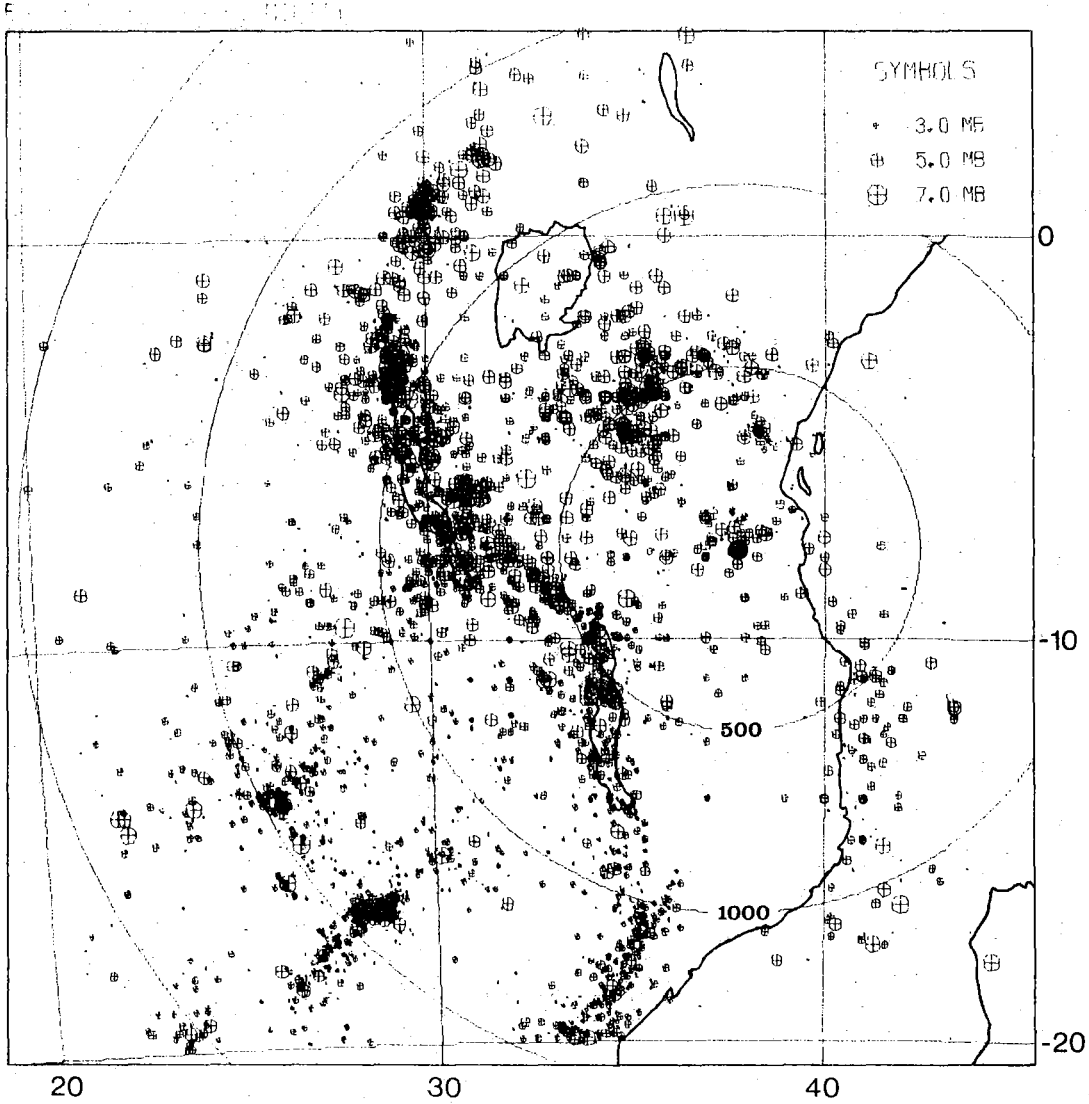


Fig. VI.10.1 Locations of all 4069 events in the NINF/NORSAR earthquake catalogue for Eastern Africa.

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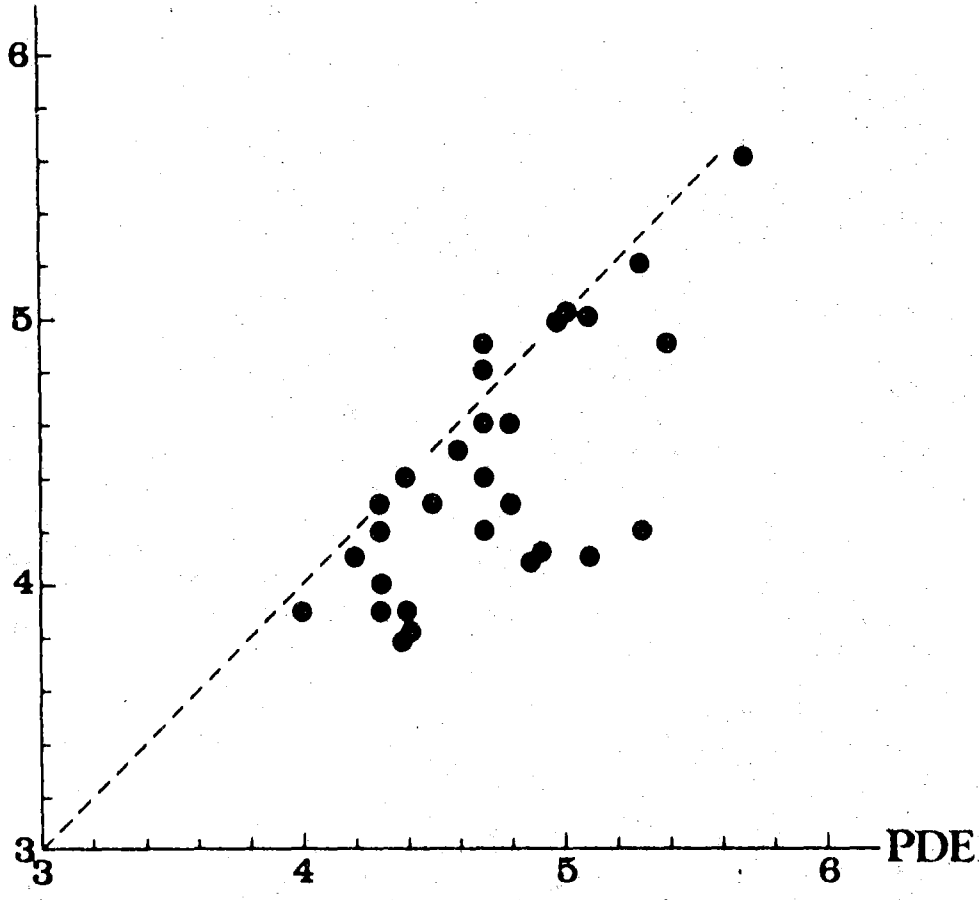


Fig. VI.10.2 Comparison between magnitudes of Eastern Africa earthquakes as reported by PDE and NORSAR.