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Stress orientations and tectonic regime using focal mechanisms from low magnitude earthquakes in East Africa

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There is only limited information on the stress regime in East Africa available, primarily due to a lack of earthquake source mechanism information. However, East Africa is a zone of moderate seismicity and source mechanisms can be determined by using regional moment tensor inversion.

Routinely, source mechanisms are calculated teleseismically by the CMT group in Harvard for events in East Africa down to about mb 5.0. The World Stress Map (WSM) uses these solutions to determine the tectonic regime and the approximate orientation of the maximum horizontal stress. Thus the potential of new stress data is limited to the focal mechanisms of approximately two events greater mb 5.0 per year.

We lower the magnitude threshold for the estimation of focal mechanisms to around mb 4.5 by using available waveform data for regional moment tensor inversion. The number of stations recording the considered events averages three to eleven where source receiver distances are up to 2500 km. The inversion quality depends on the period range of used data. Only periods higher than 40 s can be used in such a widespread station setting. We show the results of the moment tensor inversion for earthquakes smaller mb 5.0. Predominantly strike slip and normal faulting mechanisms are found. Stress orientations of the maximum horizontal stress and the tectonic regime are estimated. They show a prevailing pattern of extensional regime in East Africa.