



The seismicity of southern Madagascar from the temporary SELASOMA network

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Madagascar is considered as a key region with respect to the assembly and break-up of the supercontinent Gondwana. Following the collision between East- and West-Gondwana (~700-650 Ma), its position was central to the Pan-African orogeny. Madagascar then separated from East Africa and later from the Indian and Antarctic plates until these processes came to a halt about 69 Ma ago. Today, Madagascar consists of different tectonic units; the eastern parts (two thirds of the island) are composed mainly of Precambrian rocks, whereas the western part is dominated by sedimentary deposits. Furthermore, southern Madagascar is characterized by several NS to NW-SE trending shear zones. To increase our understanding of these structures and related tectonic processes, we installed a dense temporary seismic network in southern Madagascar (i.e. the SELASOMA project). It consisted of 25 broadband and 25 short-period stations, which were in operation for up to 2 years between 2012 and 2014. The broadband stations crossed the island along an East-West profile; during the second year the eastern section was supplemented by a network of short-period stations.

Here, we present results of the analysis of the local seismicity. Based on the data obtained during the second year of the deployment, from May 2013 to May 2014, we located ~180 events with magnitudes between ML 0.4 - 4.1. The majority of the earthquakes occur in the upper crust (<20 km) while some isolated but well-defined events are located in the lower crust. Focal mechanisms were obtained for a limited number of events (~10). These do not show a uniform pattern, as some events exhibit strike-slip mechanisms, while others are characteristic of normal faulting with E-W trending T axes. The latter agree with results from previous studies which attributed the normal faulting processes to the ongoing East-West extension of the island, possibly mediated by an asthenospheric upwelling below the center of Madagascar. The sparsity of the observed focal mechanisms does not allow us to confirm or discard the recent hypothesis of a (diffuse) plate boundary which is thought to extent through the island.