



EAGLE - THE CONTROLLED SOURCE EXPERIMENT

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In January 2003, a wide-angle reflection / refraction seismic project was carried out over the north-eastern section of the Main Ethiopian Rift as part of the international EAGLE (Ethiopia Afar Geoscientific Lithospheric Experiment) programme. EAGLE comprises a combination of passive and controlled source seismic experiments to determine the geometry and kinematics of a continental rift immediately prior to break-up, enabling the development of magmatic margin break-up models. A total of ~900 seismic instruments were deployed along two 450km profiles, one along the axis of the Ethiopian Rift into the south-west corner of Afar; and a second across the rift, extending north and south across the uplifted, flood basalt covered, Ethiopian plateau. The two profiles intersect over the Nazret volcanic segment in the rift. This may be indicative of the transition from continental style rifting in which strain is accommodated on the rift bounding border faults, to a state where strain and magmatism have migrated to a narrow zone within the rift, a necessary pre-cursor to break-up. A further ~300 instruments were deployed in a 100x100km² array around the intersection of the two profiles. A total of 16 borehole and 2 lake shots were fired into the network over a period of four days. The principal objectives of the controlled source project were to examine crustal strain, the distribution of crustal magmatic intrusions, the influence of pre-rift crustal property variations on rift development and also to provide a crustal seismic velocity distribution to improve images of the deep mantle, as well as earthquake locations derived from the EAGLE passive arrays.