



Imaging the crustal structures of southernmost Africa using wide angle seismics

J. Stankiewicz (1), T. Ryberg (1), A. Schulze (1), M. Weber (1), M.J. de Wit (1)

(1) GeoForschungsZentrum Potsdam

One of the projects within the framework of Inkaba ye Africa, a research initiative between German and South African geoscience research communities, is the Agulhas-Karoo transect. This 800km north-south off-onshore transect runs from the offshore Agulhas Plateau onto the South African coast, through the Cape Fold Belt, Beattie Magnetic Anomaly, the Karoo Basin, the Great Escarpment and into the Kaapvaal Craton. Among the number of geophysical measurements taken along the transect are two wide-angle on-shore seismic lines collected in April and May 2005. The lines run roughly parallel to each other approximately 200 km apart, starting at Mossel Bay and St. Francis, respectively, and running about 200 km north to Fraserburg and Graaf Reinet. At each line 48 receivers were used to record data from 13 shots. The profiles cross a wide variety of geological terranes, such as the Karoo mudstones, Cape Fold Belt quartzites, as well as the Precambrian Congo and Kaaimans inliers. They also cross the Beattie Magnetic Anomaly, an east-west orientated feature more than 1000 km long first reported almost a century ago, but still not fully understood. The overall quality of data is very good. First (P-wave) arrivals were manually picked on the available traces, and tomographic inversion was done using these travel times. The ray coverage allowed to create the P-wave velocity model to depths of up to 30km. We find excellent correlation of the shallow features with surface rock type. Deeper down we can identify boundaries between geological groups. These include a blind Paleozoic thrust fault and the unconformity between the Cape Supergroup and the Namaqua-Natal Metamorphic Complex. The geometry of the listric Kango and Gamtoos Faults is clearly seen to a depth of 15 km. We also observe a high velocity anomaly that could relate to the source of the Beattie Magnetic Anomaly.