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Crustal Structure of the Southern Margin of the African Continent: Results from Geophysical Experiments.

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A number of geophysical onshore and offshore experiments were carried out along a profile across the southern margin of the African Plate in the framework of the Inkaba yeAfrica project. Refraction seismic experiments show that Moho depth decreases rapidly from over 40 km inland to around 30 km at the present coast, before gently thinning out towards the Agulhas-Falkland Fracture Zone, which marks the transition zone between continental and oceanic crust. In the region of the abruptly decreasing Moho depth, in the vicinity of the boundary between the Namaqua-Natal Mobile Belt and the Cape Fold Belt, lower crustal P-wave velocities up to 7.4 km/s are observed. This is interpreted as metabasic lithologies of Precambrian age in the Namaqua-Natal Mobile Belt, or mafic intrusions added to the base of the crust by younger magmatism. The velocity model for the upper crust has excellent resolution. It is consistent with the known geological record, and also reveals a number of new features. These include a high velocity anomaly north of the centre of the Beattie Magnetic Anomaly. A joint interpretation of the velocity model with an electrical conductivity model, obtained from magnetotelluric studies, makes it possible to correlate this feature with a highly resistive body. Furthermore, a synclinal low velocity feature was identified in the Mesoproterozoic basement beneath the front of the Cape Fold Belt, south of the above mentioned feature. The northern edge of this feature correlates with the second magnetic body necessary to account for the BMA's signature.