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From the Cape Fold Belt into the Kaapvaal Craton: A magnetotelluric transect covering South Africa's continental accretion processes

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Within the framework of the German - South African geo-scientific research initiative Inkaba yeAfrica several geophysical field experiments were conducted along the Agulhas-Karoo Transect in South Africa. This 600km long transect is designed to cross the Cape Fold Belt (CFB) with the Kango and Outshoorn Basin, the Namaqua-Natal Mobile Belt, the Karoo Basin and the transition into the Kaapvaal Craton. The Beattie Magnetic Anomaly and the Southern Cape Conductive Belt, two of the Earth's largest continental geophysical anomalies, are situated in the Namaqua Natal Mobile Belt and extend across the entire southern African continent in east-west direction. Magnetotelluric imaging reveals structural details of both geophysical anomalies and the collision zone between the Namaqua Natal Mobile Belt and the Cape Fold Belt, at a scale of the entire crust. The maximum of the Beattie Magnetic Anomaly coincides with a narrow zone of high conductivity at 7 to 12 km depth. The new MT results suggest that the crustal architecture of the Namaqua-Natal Mobile Belt is complex with depths highly conductive synforms in mid-crustal depths which could represent large sulfide deposits.

The Kaapvaal Craton and the Cape Fold Belt are generally characterized by low electrical conductivities, with the exceptions of the Mesozoic/Cenozoic inliers, the Kango and Outshoorn Basins, which appear as regions of high electrical conductivity and low velocity anomalies.