



Imaging the Kaapvaal Craton boundary, South Africa, using Magnetotellurics

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Within the framework of the German-South African geo-scientific research initiative Inkaba yeAfrica several magnetotelluric (MT) field experiments were conducted along the Agulhas-Karoo transect in South Africa. This 600 km long transect is designed to cross several continental collision zones, in particular the boundary of the Kaapvaal Craton with the Namaqua-Natal Mobile Belt. MT data from 120 sites across the craton boundary were inverted to obtain a two dimensional electrical conductivity distribution on a lithospheric scale. The most intriguing feature of the inversion model is the distinct difference between relatively high electrical conductivities of the metamorphic rocks of the mobile belt and the extremely resistive rocks of the Kaapvaal Craton. The area of the craton transition is characterized by resistive blocks extending into the Earth's mantle intersected by zones of higher conductivity which seem to correlate with thrust and fault systems of the Gordonia Subprovince and the Marydale Terrane. Both tectonic structures are believed to have experienced a similar stress field to the adjacent Kaapvaal Craton. Petrological and seismological data in the area also show strong similarities with measurements on the craton rather than with results from the mobile belt. Based on the electrical conductivity of the Gordonia and Marydale rocks we believe that their composition is much more comparable to that of the Archean Kaapvaal rocks than to rocks of the Namaqua-Natal Mobile Belt. With our MT results the discussion of the location of the craton boundary at depth and possible geodynamic implications is resumed.