Geophysical Research Abstracts
Vol. 15, EGU2013-5847, 2013
EGU General Assembly 2013

A preliminary electrical image of the passive continental margin at the Kaoko Belt in Northern Namibia and the Walvis Ridge derived from an amphibian magnetotelluric study

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Imaging the subsurface electrical conductivity structure and studying the magmatic and tectonic processes occurred during the breakup of the supercontinent Gondwana, are objectives of the amphibian magnetotelluric (MT) investigations of the Southern African passive continental margin in Northern Namibia.
The onshore experiment consists of 167 sites in a ∼140 km wide and ∼260 km long EW trending corridor from the Atlantic Ocean onto the Congo Craton across the major tectono-stratigraphic units of the Kaoko Belt. It was extended offshore by measurements along two transects parallel and perpendicular to the Walvis Ridge.
The MT data are generally of a high quality but large diagonal components of impedance tensor, phases over 90° at some sites and a strong variability of transfer functions within short distances indicate three-dimensional structures in the crust and upper mantle. Such 3D effects are observed particularly in the Western Kaoko Zone in the vicinity of the prominent Neoproterozoic shear zones (Purros Mylonite Zone, Three Palm Mylonite Zone). Thus, we apply a two-part inversion strategy: In areas and frequency ranges where the 3D effects are not dominant, we apply 2D inversion of data sub-sets in order to identify the prominent conductivity features and assess their resolution and robustness; however, the entire data set can only be explained by 3D inversion.
The 2D models of the crust beneath the profile from the Walvis Ridge onto the Congo Craton reveal a spatial correlation of resistive zones with the Archean Craton and the Northern Platform. Zones of high electrical conductivity seem to correlate with surface expressions of prominent faults of the Kaoko Belt.
First 3D inversion models will complement the 2D results.