Proof

CONTROL ID: 1205692

TITLE: Lithospheric geometries revealed through electromagnetic imaging: SAMTEX (Southern Africa MagnetoTelluric Experiment) observations and results

PRESENTATION TYPE: Assigned by Committee (Oral or Poster) [Invited]

CURRENT SECTION/FOCUS GROUP: Tectonophysics (T)

CURRENT SESSION: T32. Mantle Dynamics and Lithospheric Structure of the African Plate

AUTHORS (FIRST NAME, LAST NAME): Alan G. Jones[1], Mark R Muller[1], Robert L Evans[2], Marion P Miensopust[1], David Tshepo Khoza[1]

INSTITUTIONS (ALL): 1. Dublin Institute for Advanced Studies, Dublin, Ireland.
2. Woods Hole Oceanographic Institution, Woods Hole, MA, United States.

Title of Team: The SAMTEX Team

SPONSOR NAME: Alan Jones

ABSTRACT BODY: The Southern African Magnetotelluric Experiment (SAMTEX) is imaging the properties and geometries of the lithosphere below southern Africa to depths of 200+ km. Electrical conductivity is highly sensitive to ambient temperature, and to the presence of an interconnected conducting phase, such as a solid phase like graphite or sulphides, a fluid phase like partial melt, or bound water through hydrogen diffusion. Thus, primary geometrical information can be readily obtained from lithospheric-scale MT experiments about the three-dimensional variation in conductivity that can be related to formation and deformation processes. One important piece of information easily obtained from MT data is the depth to the lithosphere-asthenosphere boundary (LAB), due to the sensitivity of conductivity to small fractions (<1%) of partial melt and/or of some hundreds of ppm of bound water.

SAMTEX measurements have been made at a total of more than 750 MT sites over an area in excess of a million square kilometres, making it by far the largest-ever regional MT project undertaken. One of the most significant results from SAMTEX is the mapping of the LAB beneath the Archean cratons and bounding mobile belts of Southern Africa, particularly of the previously unknown regions of Namibia and Botswana. The LAB is shallow (150 km) beneath the mobile belts, deep (250 km) in the centres of the cratons, and transitional at the edges. Diamondiferous kimberlites are located primarily where lithosphere is transitional in thickness, or where there is a change in its anisotropy properties, both of which are craton edge effects.

The electrical properties of the continental mantle derived from SAMTEX data can be compared with seismic ones derived from data from the South African Seismic Experiment (SASE) of the Kaapvaal Project. Generally there is very good predictive linear agreement between seismic velocity and log(conductivity), indicative of both being influenced by the same bulk property factors, such as temperature, Mg# and composition.

(No Image Selected)

(No Table Selected)

INDEX TERMS: [8103] TECTONOPHYSICS / Continental cratons, [8110] TECTONOPHYSICS / Continental tectonics: general, [1515] GEOMAGNETISM AND PALEOMAGNETISM / Geomagnetic induction.