GEOLOGIC INTERPRETATION OF SEISMIC AND DEEP-SOUNDING ELECTROMAGNETIC IMAGES OF THE NAMIBIAN PASSIVE MARGIN

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Integrated geophysical studies of the passive margin in Namibia have yielded interpretive crustal sections across the continent-ocean transition and the continental crust in an area reactivated by plume-related igneous activity.Highlight of the onshore-offshore traverses is the existence of a 150-200 km zone of thick (25 km) igneous crust at the ocean-continent transition zone. Seismic velocities are consistent with high-Mg basalt, which require greater than 20 - 25% partial melting of peridotite. This is in good agreement with plume-generated melts. The top of this zone is formed by wedges of seaward-dipping reflectors whose p-wave velocities and magnetic signature indicate extrusive basalts. The continental crust in NW Namibia is 35- 40 km thick. High-velocity anomalies extend to MOHO beneath the Cretaceous intrusive complexes Cape Cross and Messum. These are interpreted as magma conduit zones intruded by basaltic magma. Seismic tomographic images of the upper crust beneath Messum allow subsurface mapping of different magma types within the conduit.Broadband magnetotelluric and GDS data along a 33-site profile show a highly resistive upper crust typical for crystalline basement of the Damara belt. The 2-D resistivity model shows narrow, subvertical conductors which correspond to major transcrustal shear zones. Such zones were probably established in the late Precambrian Damara orogeny. Some have been reactivated in the Cretaceous and controlled the emplacement of diabase dike swarms and the Erongo intrusive complex.