

## **Magma Emplacement and the 3D Geometry of Igneous Bodies in Rift Basins: Insights from the Bornu Basin, Onshore NE Nigeria**

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Recent studies of regional unconformities in the circum-South Atlantic tectonic plates have linked unconformity age to the timing of changes in the azimuth of oceanic fracture zones, caused by plate interactions during opening of the South Atlantic. This observation is significant, proposing that a plate boundary geodynamic processes are transmitted into and expressed in plate interiors. However, it is not yet clear if and how other geologic events, such as intra-plate magmatism, may be linked to changes in the oceanic fracture azimuthal geometry. Here we use 2D and 3D seismic reflection, geochemical, borehole datasets and outcrop observations from the Bornu Basin, one of several intra-continental rift basins located in NE Nigeria to constrain the 3D geometry of igneous bodies and magmatic emplacement processes. This allows us to link South Atlantic plate boundary geodynamics and magmatism in the surrounding continental rift basins.

Seismic attributes, reflection intensity, relative acoustic impedance, were used to identify and map igneous intrusions. Saucer-shaped sills are the most common type of intrusion, although en-echelon sills, up to 1.4 km in length, were also identified. The 3D geometry of the sills reveals the detailed structural components like inner sill, inclined sheets and outer sill. A mapped bifurcating network of the sills suggests magma emplacement process through upward and outward propagation. Seismic-stratigraphic observations indicate that igneous activity occurred in the Early Cretaceous, Late Cretaceous and Paleogene corresponding to the timing of major azimuth changes observed in the Kane Oceanic fracture zone in the South Atlantic Ocean. Overall, our study, suggests a possible influence of plate boundary geodynamics on intra-plate magmatism as reflected in the link between the time of changes in the azimuth of oceanic fracture zones and magmatic emplacement observed in the tectono-stratigraphy of the intra-continental rift basins.