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Margin Segmentation and volcano-tectonic Architecture along the volcanic Margin off Namibia/South Africa, South Atlantic

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Several thousand kilometers of regional multichannel seismic data, acquired during several cruises by BGR along the continental margins off Namibia and South Africa (under the scope of the Inkaba ye Africa initiative) document that the Early Cretaceous South Atlantic continental break-up and initial sea-floor spreading were accompanied by large-scale, transient volcanism emplacing voluminous extrusives, manifested in the seismic data by huge wedges of seaward dipping reflectors (SDRs). The emplacement of the deeply buried, 60-120 km wide SDRs was probably episodic as documented by at least three superimposed SDRS units.

These different units are clearly traceable long the coast for $\sim$1450 km between the landward part of the Walvis Ridge (Abutment Plateau) and as far south as 35˚S. Further south of this latitude no indications for SDRS units are found in the reflection seismic sections. This abrupt change or transition from a magma-rich to a magma-starved continental margin took place at an inferred transform fault zones.

A compilation of marine magnetic data shows the same clear segmentation with strong magnetic anomalies over the continental margin north of 35˚S and inconspicuous anomalies in the South. The magnetic map also shows a transition from the enhanced amplitudes caused by the thick basaltic SDRs to ‘normal’ seafloor-spreading anomalies at magnetic chron M9 (134 Ma). This age marks the end of the most intense volcanic phase during breakup at the latitude of Cape Town. To the North this transition occurred slightly later which documents the often proposed progressive opening of the South Atlantic from South to North.

Distinct along-margin variations in architecture, volume, and width of the SDRs wedges are probably related to further margin segmentation and varying emplacement environments changing from subaerial to subaquatic. We suggest that mainly adiabatic decompression and melt generation from shallow sources can explain distinct along-margin variations in the volcano-tectonic architecture and volumes of extruded magmas.