Geophysical Research Abstracts,
Vol. 11, EGU2009-2848, 2009
EGU General Assembly 2009

Formation of the volcanic rifted margin off Argentina/Uruguay, South Atlantic

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The Federal Institute for Geosciences and Natural Resources (BGR), Germany has investigated the passive continental margins offshore Argentina and Uruguay since the early 90ies. Numerous marine geophysical surveys have meanwhile established a databasis of more than 25.000 km of regional multi-channel reflection seismic lines, accompanied with magnetic and gravity profiles.
These data 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). These deeply buried and 60-120 km wide SDRs were emplaced episodically as suggested by at least three superimposed SDRS units. Distinct along-margin variations in the architecture, volume, and width of the SDRs wedges correlate with large scale margin segmentation. We identify at least four domains bounded by the Falkland Fracture Zone/Falkland Transfer, the Colorado Transfer, the Ventana Transfer and the Salado Transfer. The individual transfer zones may have acted as barriers for propagating rifts during the SDR emplacement phase, selectively directing rift segments in left stepping patterns along the western South Atlantic margin. The rift segments are offset systematically in a left stepping pattern along the western South Atlantic margin. Albeit we found extensive variations in the architecture, style and extent of the seaward dipping reflector sequences a general trend is that the largest volumes are emplaced close to the proposed transfer zones and the width of the SDRs wedges decreases northward within the individual margin segments.
The different volcano-tectonic architectures of the margin segments and the distribution of the extruded magmas indicates that the emplacement of the volcanic material was controlled by the tectonic setting and the pre-rift lithosphere configuration within individual margin segments. We favour mainly melt generation from shallow sources as mechanism for the emplacement of large volumes of SDRs during breakup of the South Atlantic.