

New Views of the Early-Formed Ocean in the South Atlantic Conjugate Margins Based on PSDM Seismic

Danforth, Al ¹; Kumar, Naresh ²; Henry, Steven G. ³; Venkatraman, Sujata ⁴; Nuttall, Peter ⁴ (1) Consultant, Geological Advisor, ION Geophysical - GX Technology, Houston, TX. (2) Growth Oil and Gas, Richardson, TX. (3) Rift Institute for Teaching and Training, Las Cruces, NM. (4) ION Geophysical - GX Technology, Houston, TX.

A systematic review of deep penetration (25 - 40 km) PSDM regional seismic lines across the continental margins bordering the South Atlantic reveals new insights into the details of the geology of the early-formed ocean. This opportunity to analyze the regional geology is unprecedented. The data used in this study is ~80,000 km of 2-D seismic of AfricaSPAN, BrasilSPAN and ArgentinaSPAN projects acquired by GX Technology since 2004 in collaboration with governments and operators in the countries bordering the South Atlantic. These data represent over 200 transects of the margins, all with the same acquisition and processing parameters, permitting direct comparison over vast distances.

Although the primary focus of the surveys has been on evaluating the oil and gas potential of the margins, the basin-scale imaging of the oceanic and continental crust and of the geology of the marginal escarpments in depth offers a forum for the geoscience community to review the existing paradigms of continental rifting and breakup.

The lines on the margins when viewed in conjugate sets reveal hints of the geologic processes at work during the early opening of an ocean basin. In this paper we address what has been and can be learned from the seismic data regarding the:

- Nature and variability of the continent-ocean boundary (the COB).
- Nature of the early-formed "transitional" crust versus the "typical" oceanic crust formed at Mid-Ocean Ridge.
- Geometry and limits of SDRs.
- Sediment aprons on early-formed oceanic crust.
- Early rift and drift sedimentary sequences.
- Role of volcanic edifices.

The margins are segmented and can be broadly divided into extensional and oblique types, each with its characteristic geometry. The conjugate sets of seismic lines offer views of the correlative sedimentary sequences on either side of the early South Atlantic. The distribution and thickness of these sequences reveal new details of the geometry and relative timing of various stages in the early opening of the ocean. The resulting interpretation of the limits of continental and oceanic crust refines and challenges previously published "COBs" and reconstructions.