

High resolution Sequence Stratigraphy: A tool for improved reservoir delineation in passive margin settings -- Examples from the divergent margins of the South Atlantic Salt Basin

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Seismic and Sequence Stratigraphy have long been recognized as valuable tools for understanding the occurrence and distribution of sand-prone and shale-prone lithologies within a chrono-stratigraphic framework of sequence boundaries and flooding surfaces. Early workers focused on the third-order sequence architecture of passive margin continental shelves and slopes, comprising depositional cycles of one to three million years. More recent work has emphasized the importance of high-frequency or fourth-order sequences, less than one million years in duration.

In the last several years, exploration and development activity utilizing high resolution 3-D seismic and exploration well data from the continental slopes of West Africa and the eastern margin of South America has confirmed the controlling influence of high-frequency depositional cycles on the distribution of Tertiary deep-water reservoirs. Reservoir-prone, third-order lowstand systems tracts are comprised of leveed, confined and distributary channel complexes deposited during fourth-order lowstands. Mapping the internal architecture of these high-frequency sequences yields a very high resolution picture of the vertical and lateral distribution of flow-unit scale reservoir elements in the subsurface.

Significant reservoir variations observed, both between and along the South Atlantic Continental margins, are a function of provenance and other components of the sediment delivery system. These factors influence both the volume and texture of sediment entering each depositional basin during lowstand times and are important influences on facies type and reservoir quality.