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Documentation of a New Petroleum System in the South Atlantic

New geochemical data from four shelf wells indicate the presence of Cenomanian and Turonian, marine, oil-prone source rocks in the Orange River Basin, R. S. A. The petroleum system related to these source rocks is distinct and separate from the previously recognized Aptian petroleum system that sourced the gas produced from fluvial reservoirs on the shelf. Paleo-climate models for Cenomanian-Turonian time suggest the onset of upwelling near the shelf/slope in this region, and the presence of organically enriched marine strata may be related to these upwelling systems.

Preliminary 1-D hydrocarbon generation models suggest that in waters depths greater than about 1000m, Cenomanian-Turonian sediments may still be in the oil window. Oil generated from the Cenomanian-Turonian would therefore have been available for migration up dip along carrier beds into deep-water, basin-floor fan reservoirs. Possible reservoir facies in this newly identified petroleum system include amalgamated fan channel systems with marine shales as the seals. Traps for the hydrocarbons were formed when reservoir intervals were involved in shelf-edge collapse during the Coniacian through Santonian. Rotational structures related to this collapse are large: one structure imaged on new 3-D data has over 145 km² of areal closure with over 750m of vertical relief. Additionally, there are other structures of similar magnitude as the play extends along strike to the north with a series of trapping structures and overlapping fan lobes.