

**Understanding the Influence of Plate tectonics, Paleo-geography, Climate, and Heat Flow on Pre-salt Petroleum Systems of the South Atlantic**  
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The nature of the break-up between the African and South American plates had a profound influence on petroleum systems in the South Atlantic Ocean. "Bottoms-up", scalable earth modeling and basin analysis is critical to determining the fundamental controls on source rock, reservoir distribution and geo-histories of the pre-salt plays. Crustal modeling and plate tectonic reconstructions for the conjugate margins of the Central South Atlantic demonstrate that continental extension was variable in time, space, and depth. From latest Barremian to Aptian, prior to the ultimate break-up of the continents, a depositional fairway existed between the Romanche fracture zone to the north and the Walvis Ridge to the south. Changes in plate motions, depth-dependent stretching, and sub-aerial volcanism in the Aptian led, in some cases, to very wide "hyper-extended" margins with extensive, partially restricted, "sag" basins that formed near sea level over highly attenuated, often volcanically intruded, crust. Both the source and reservoir for the prolific pre-salt plays in the Santos and Campos basins were deposited in these hyper-saline sag basins. Paleo-geographic models provide input to climate and drainage models, in order to determine both regional and local controls on reservoir distribution. Models for crustal extension, thinning, and uplift / subsidence can further be used to constrain thermal models for petroleum systems charge analysis.