



## **Refined reconstructions on the opening of the South Atlantic: the Aptian Salt Enigma**

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Addressing the question of whether the salt accumulation was pre- or post-breakup is important for better understanding the evolution of the South Atlantic. Critical factors include: (1) reconstruction parameters, (2) the location of the continent-ocean-boundary (COB), (3) age of salt basins, and (4) shape and extent of the salt basins. The Aptian salt basins have received much attention due to their involvement in hydrocarbon trap development. The Aptian epoch lies within the Cretaceous Normal Superchron and therefore plate reconstructions must rely on interpolated rotation poles. It has been argued in the literature that Aptian salt basins from the two margins show a large overlap when the South Atlantic is reconstructed. The early Aptian apparent overlap has been estimated to be as much as 200 km, clearly too much to be caused by post-breakup (post-Aptian) continental stretching, or allochthonous mobilization of salt. This apparent overlap has led to models suggesting that the Aptian salt basins in the South Atlantic did not form in a 'single' basin but accumulated independently on both margins during and after break-up of the South Atlantic. Here we favor the hypothesis that Aptian Salt Basins are pre-breakup (syn-rift) and mainly confined to continental and/or subaerial basaltic substrates.

We tested different reference frame for Mesozoic-Cenozoic plate reconstructions and derived an internally consistent plate-tectonic model that quantifies intra-plate deformation, pre-drift extension, and the South Atlantic sea-floor spreading history: (1) Sea-floor spreading began in the southernmost South Atlantic during the Early Cretaceous (c. 135 Ma), coinciding closely in time with extrusion of the Paraná-Etendeka magmatic rocks. The Paraná-Etendeka flood basalt province was subsequently split in two during opening of the South Atlantic, although the magmatic Rio Grande Rise and the

Walvis Ridge provided a link between the two provinces, (2) Northward propagation of sea-floor spreading began along the Namibian segment c. 130-126 Ma, reaching the Rio Grande Rise-Walvis Ridge by Early Aptian time (c. 121 Ma), (3) Break-up of the Aptian Salt Basin north of the Walvis Ridge-Rio Grande Rise occurred at around 113-112 Ma, and (4) Full connection to the Central Atlantic occurred at c. 100 Ma. Consequences of predicted intraplate deformation of the South American continent will be discussed.