
Tweaking Pangea's Breakup: Triassic to Present Plate Tectonic Reconstructions Integrating Recent Geologic, Geophysical, and Hydrocarbon Data from the Atlantic and Gulf of Mexico Conjugate Margins

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ABSTRACT

We have used GIS to compile and georeference recent geologic and geophysical data relevant to better constrain a continuous, plate reconstructions of the breakup of Pangea starting in the late Triassic about 200 million years ago. We have built on global plate reconstructions by previous workers with updates or 'tweaks' added in the following areas: (1) improved maps of continent-ocean boundaries with estimated areas of pre-breakup stretching in order to reduce continental overlap problems; (2) better defined volcanic vs. non-volcanic margins and their ages; (3) compilation of radial dikes related to the Central Atlantic Magmatic Province (CAMP) and restoration of the original, sub-circular 'starburst' of radial dikes in North America, Africa, and South America; (4) linear, geologic 'piercing points' used to precisely match conjugate margins the South Atlantic; (5) matching of unique oil families across South Atlantic conjugate margins; (6) improvement of Gulf of Mexico opening based on recent marine gravity data showing its central ridge-transform system and extent of ocean crust; (7) realignment of salt basins on conjugate margins in the Gulf of Mexico and Atlantic; (8) compilation of key anomalies and magnetic highs on conjugate margins; (9) compilation of large igneous provinces and hotspot tracks and their ages; (10) compilation of all producing oil and gas areas and natural seeps; (11) identification of major source and reservoir rocks; and (12) estimates of critical moment for areas of oil and gas production. The reconstructions and cross sectional margin profiles are used to support fundamental crustal-scale asymmetries across conjugate margins imparted during the rift phase that act as important constraints on petroleum exploration.

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