

Predicting clastic plays on the USA eastern seaboard — does the northwest African margin offer insight into potential plays?

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Clastic plays are proven within middle Cretaceous reservoirs of northwest Africa (Yakaar, SNE, and Tortue fields), the conjugate margin of the USA eastern seaboard. Strong tectonostratigraphic framework similarities on both sides of the Central Atlantic highlight the relevance of these African analogues when predicting plays on the USA margin. Given the potential expansion of offshore drilling, the prospective prize is clear. But do similar plays to those in northwest Africa exist along the USA Eastern Seaboard? To answer this, we have analyzed more than 8400 km of seismic data, alongside well data, in the context of regional palinspastic tectonostratigraphy. The work covers Georges Bank, Baltimore Canyon Trough, and Carolina Trough.

During the Early–Middle Cretaceous, there was uplift on both sides of the Central Atlantic. In northern Senegal and Mauritania, Albian–Cenomanian uplift of the West African Craton resulted in the deposition of clastic reservoirs of the Yakaar, SNE, and Tortue fields. Along the USA margin, significant terrigenous input from uplift of the Appalachians occurred during the middle Cretaceous. This resulted in increased potential for clastics in shelfal, slope, and basin floor settings as shown by coarse clastics in the Hudson Canyon 857-1, Hudson Canyon 642-2 and COST B-3 wells. Broad deltaic depocentres developed, and seismic data show potential updip pinchout traps, bypass of the shelf, and localized shelf uplift. These create geometries similar to the drape anticline and subcrop traps of the SNE North oil field in Albian sandstones offshore Senegal. However, vertical migration is a critical risk.

Charge is a key risk because of the burial depth of potential source rocks (Late Triassic–Early Jurassic synrift lacustrine, Jurassic, and Cretaceous OAE marine source rocks). Gas shows are present in eight of the 51 wells previously drilled in the Baltimore Canyon Trough. Early Jurassic source rocks, deposited in a restricted seaway related to the early rift phase of the Central Atlantic, are proven to produce oil in North Africa, but maturity evaluation indicates some ambiguity as to the hydrocarbon source at Tortue and Yakaar. Integration of geochemical data with our seismic-derived depth framework indicates where the hydrocarbon phase from Jurassic source rocks is more likely to be oil on the USA margin. This includes localized areas of the shelf, and the deeper Georges Bank Basin and Carolina Trough, where overburden is thinner.