

Evidence Grows for Regional Jurassic Source in the MSGBC Basin of North West Africa

Occasional short releases by First Exchange Corporation on the MSGBC Basin #1
November 2018

In 2012 and 2014, when drilling new exploration wells in their Gadiaga onshore permit in northern Senegal, FORTESA International unexpectedly recovered light oil from two wells, Sa-6 and in KMN-1. Samples were geochemically analysed and found to be derived from a lacustrine source. The maturity of the associated gas implied an origin within the seismically picked, Lower Jurassic succession. Until that time, all hydrocarbons in Senegal were assumed to be Cretaceous sourced, although there were some uncertainties with biomarker correlations, and derived from fully marine sediments. Lower Jurassic sources had been previously predicted based on plate reconstructions and the regional consequences of oils of this age present in Nova Scotia, the East Coast USA, Suriname and Guyana. African occurrences were the Jurassic oil found in northern Mauritania in the RAB-1 well and Morocco at Cap Juby.

Subsequent work by FORTESA International and its geotechnical associates at First Exchange Corporation (FEC) has enhanced the initial Senegal records by encountering direct evidence for a regional, oil-prone, Middle to Lower Jurassic succession in the MSGBC Basin that stretches through Senegal from Mauritania as far south as Guinea (Figure 1). Beyond Guinea, the Guinea Fracture Zone transfers this same source section westwards across the Atlantic to Suriname.

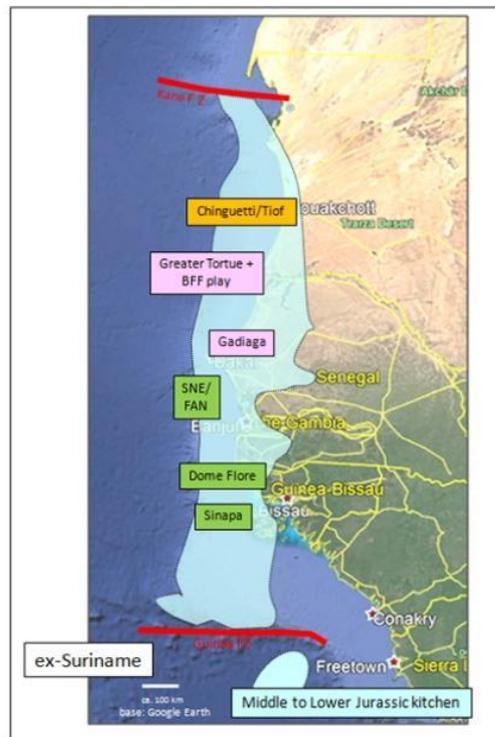


Figure 1. Example of FEC's predicted extent of this now identified Middle to Lower Jurassic, oil-prone source in the MSGBC Basin. Depicted are representative oil and gas discoveries.

The Lower Jurassic source basin occupies a trough located to the east of the Continental Ocean crust Boundary (COB) with a depocenter west of the subsequently formed Jurassic to early Cretaceous aged, carbonate bank (Figures 2 and 3) with an onshore wedge-out to the east. In addition, to the south in Guinea-Bissau and Guinea, where there was less sand input, source rocks of Middle Jurassic age appear to be present inboard of the then growing carbonate bank.

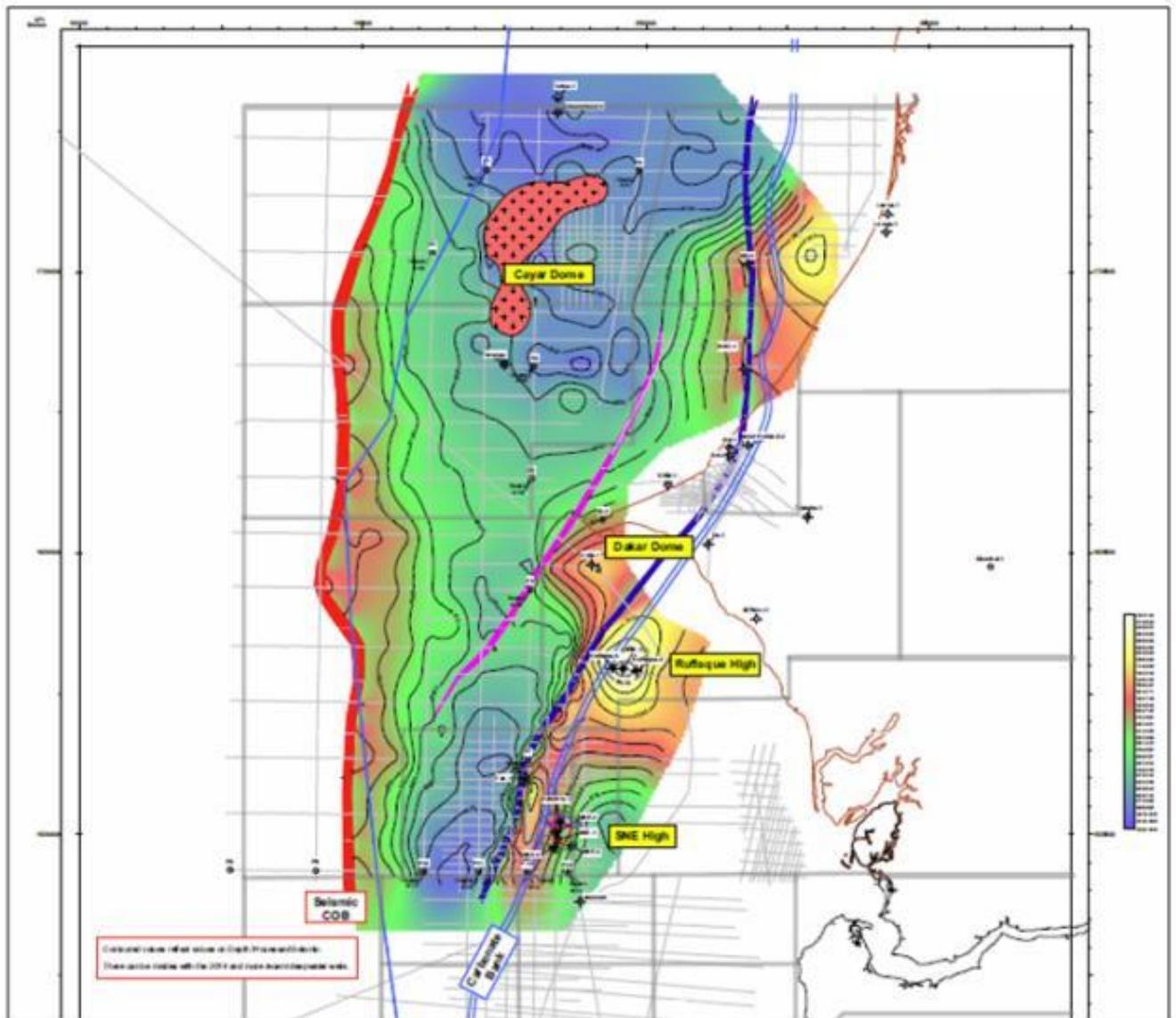


Figure 2. The Lower Jurassic depocenter in northern Senegal.

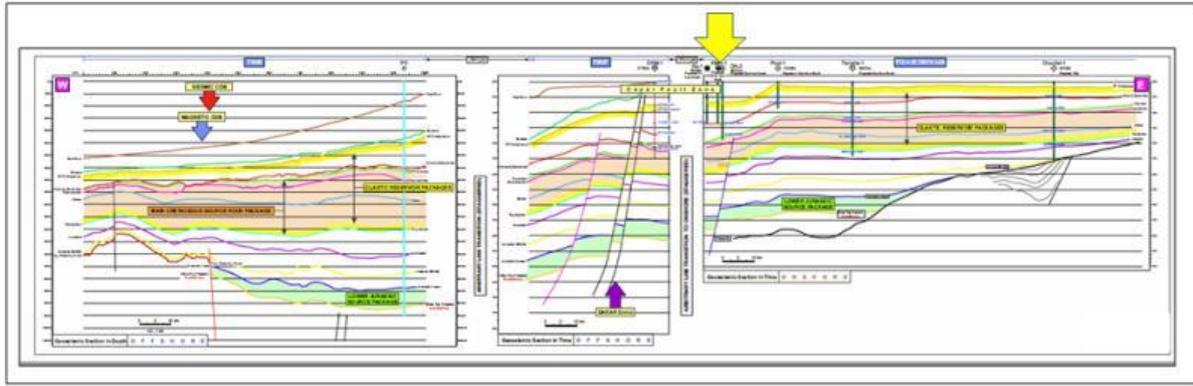


Figure 3. FEC's MSGBC Basin transect running east to west just north of Dakar (Senegal). The Lower Jurassic source section is colored green, the mid-Cretaceous source units are mainly gas-prone in this area and are colored orange to reflect their mixed origin. The yellow arrow locates the KMN-1 well with its lacustrine derived oil. Cenozoic aged, Dakar Dome uplift west of the bank edge has concealed on this profile the normally upstanding carbonate bank.

The evidence for a Jurassic regional source within Senegal and the three countries to the south now comprises:

- 1) Reappraisal of the biomarkers in the ex-Tullow wells in the Dakar area, plus the Dome Flore region.
- 2) Similar biomarkers in a previously unknown oil seep in littoral Guinea-Bissau.
- 3) Biomarkers with Jurassic carbonate affinities in Guinea described by Hyperdynamics.
- 4) Piston-core anomalies across the Guinea Marginal Plateau in regions where the known mid-Cretaceous sources are immature and where the underlying older Jurassic section is modelled by FEC to be oil mature. At one anomalous location there is a seabed biogenic mound and shallow gas. Elsewhere there are gas chimneys. The piston core samples were collected in-conjunction with FEC by TDI-Brooks in 2001 and interpreted by FEC in 2018 into an integrated study which demonstrates an active Petroleum System.

At a time when the recent giant oil and gas discoveries in Senegal are a global focus and a key well is drilling in The Gambia at Samo-1, this new Jurassic source opens multiple new exploration possibilities within the wider MSGBC Basin and offers the potential for it to become a new Superbasin. Regional reservoir objectives are summarized in Figure 4. More details on these opportunities, together with the Jurassic source succession, may be obtained from First Exchange Corporation whose contact details are provided below.

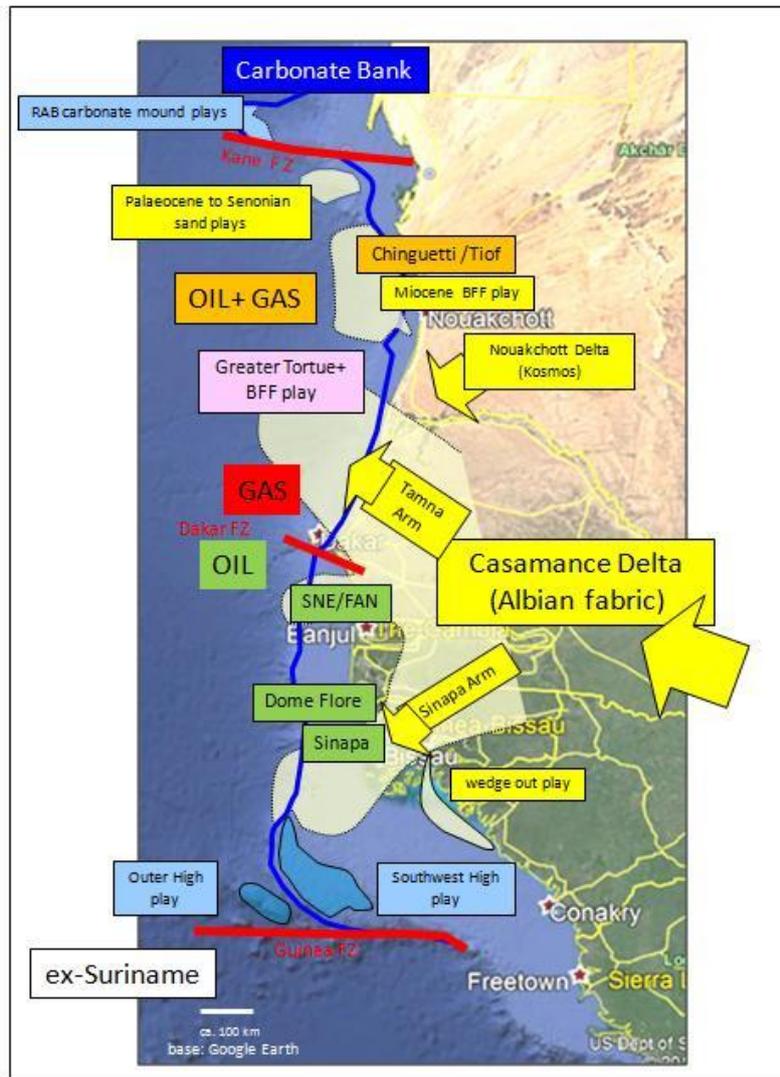


Figure 4. Reservoir opportunities in the MSGBC Basin. Oil plays predominate to the south of the Dakar Fracture Zone, Gas or Condensates plays are dominant offshore in the north. Oil plays in this northern region lie onshore, as encountered in the KMN-1 well.

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