

Multiple Jurassic source intervals in the subsurface of offshore Nova Scotia, Canada

ROB FORKNER¹, ANDREA FILDANI¹, NICHOLAS ETTINGER¹, AND JOHN M. MOLDOWAN²

1. *Equinor Research and Technology, 6300 Bridge Point Parkway, Austin, Texas 78730, USA*

2. *Biomarker Technologies, Inc., 638 Martin Avenue, Rohnert Park, California 94928, USA*

One of the major risks when exploring for hydrocarbons is the presence of viable source rocks. This may be considered the highest risk to the success of hydrocarbon exploration efforts offshore Nova Scotia, particularly the presence of Jurassic source rocks. To de-risk source rock presence and properly characterize their depositional environments, detailed geophysical and organic geochemical analyses were performed.

The geologic evidence compiled from seismic mapping and facies analysis led us to hypothesize the presence of marine source rock facies along the continental margin of Nova Scotia at both Lower and Upper Jurassic levels. High amplitude reflections consistent with the possible occurrence of organic-rich mudrocks were identified at interpreted lower and upper Jurassic intervals. The Lower Jurassic source is interpreted to be concentrated in fault-related half grabens slightly inboard of the subsequent Jurassic reef margin. The presence of this potential source outboard of these intervals is also hypothesized. Later Jurassic source rock is likely more regional in extent.

Comprehensive organic geochemical analyses were also undertaken to better link oils to source rocks. Eight oil samples from the Sable Island area were analyzed. We interpret the presence of at least two source rocks having contributed to the bulk of the hydrocarbon volumes in our sample set. One source rock deposited in the middle to late Jurassic and likely relates to the oil window component of the samples as well as the Upper Jurassic reflections interpreted in seismic. The second source rock is older, possibly Early Jurassic in age, has a unique diamondoid composition, and is interpreted to relate to source rock accumulation in fault-related half grabens.