

# The effects of salt on Lower Jurassic source rock maturation on the Scotian Margin

JUAN C. WONG, XIN YUE HU, RICARDO L. SILVA, AND GRANT D. WACH

*Basin and Reservoir Lab, Department of Earth Sciences, Dalhousie University, Life Sciences Centre,  
Halifax, Nova Scotia B3H 4R2, Canada*

Organic-rich intervals have been identified in the Mesozoic conjugate margins of the North and Central Atlantic. The depositional environments and paleogeography of the conjugate Western European and African domains contain a proven Lower Jurassic source rock succession. This suggests similar intervals may exist in the conjugate offshore Scotian Margin ( $280\,000\text{ km}^2$ ) though these have not been drilled. If present, there is an uncertainty of their source rock characteristics (quantity, quality, and maturity).

Salt basins are part of the evolution of rifted margins, as seen in the Gulf of Mexico, West Africa, the Persian Gulf, the North Sea, etc. which are known prolific petroleum systems basins. In the Scotian Basin, Lower Jurassic intervals overlie the evaporites of the latest Triassic (Rhaetian) Argo Formation that have mobilized since deposition. These salt structures produce thermal irregularities that would affect maturity of these potential source rocks.

To test the postulated Lower Jurassic source interval on the Scotian Margin for maturation and source rock potential, PetroMod™ by Schlumberger was used to build 2D models by using dip lines of the ION NovaSPAN™ geophysical dataset. These models display a variety of salt structures observed across the Scotian Basin. The problems of modelling salt are not well addressed in petroleum system models, and their complexity is often ignored or over simplified. These salt structures are a concern when using petroleum systems modeling as it may affect the maturity and quality of possible Lower Jurassic rocks. We can see the thermal effects that the salt has on each model that was tested with the models demonstrating the effect salt has in the Scotian Basin.

The results show that source rock quality and maturity in the Scotian Basin are affected by the salt mobilization, which affects the transformation ratio (organic matter to hydrocarbons) of the Lower Jurassic interval. These resulting compilations of models suggest a potential Lower Jurassic source rock in the Scotian Basin existing within the oil maturity window in the southwest, transitioning to a gas maturity window in the northeast. Determining the maturity of the source rocks reduces the risks related with ongoing and future petroleum exploration offshore Nova Scotia.