Thermal Modelling of the Central Scotian Slope: The Effects of Salt Diapirs on Heat-flow

Eric Negulic[1], Hans Wielens[2], Mladen Nedimovic[1], Keith Louden[3]
[1]*Dept. of Earth Sciences, Dalhousie Univ., Halifax, Nova Scotia, B3H 4J7*
[2]*GSC Atlantic, Bedford Inst. of Oceanography, Dartmouth Nova Scotia, B2Y 4A2*
[3]*Dept. of Oceanography, Dalhousie Univ., Halifax, Nova Scotia, B3H 4J*

The Scotian Slope has undergone significant deformation due to differential loading above the thick (~2 km) Early Jurassic Argo salt. This deformation has resulted in the growth of numerous large salt diapirs and canopies. Salt has a thermal conductivity up to three times that of most sedimentary rocks and thus salt diapirs act as low resistance thermal conduits transporting heat upwards, resulting in dramatic surface heat-flow variations. Unlike the Scotian shelf, whose heat flow is well sampled by boreholes, only a few older and relatively poorly-constrained heat-flow measurements have been taken on the Scotian slope. Understanding the salt distribution and associated heat-flow variations is important as local heat-flow anomalies can have implications for hydrocarbon maturation. Our goal was three fold:

- Interpret the locations and extent of salt diapirs in the central Scotian Slope from available seismic data;
- Model the heat-flow in the study area bounded by four seismic lines;
- Select regions for future heat-flow measurements to be taken in July, 2008.

Three 2D seismic lines from the GXT NovaSpan survey and one 2D Lithoprobe line were interpreted including picks of stratigraphic boundaries and outlines of all salt bodies. A 4D thermal model was created based on the seismic interpretations using PetroMod software to predict the regional heat-flow trends and the local effects of salt diapirs on heat-flow in the study area. From this model locations for future heat-flow measurements were selected to be taken on a field program in July 2008.