Chlorite diagenesis in reservoir sandstones of the Lower Missisauga Formation, offshore Nova Scotia

Kathleen Gould[1], Georgia Pe-Piper[1], and David J.W. Piper[2]
1. Department of Geology, Saint Mary's University, Halifax, NS, B3H 3C3 Canada <kathleen.gould@smu.ca>¶ 2. Geological Survey of Canada Atlantic, Bedford Institute of Oceanography, Dartmouth, NS, B2Y 4A2 Canada

Diagenetic chlorite rims on quartz grains preserve porosity by preventing the formation of secondary, pore-filling quartz overgrowths in wells from the Venture and Thebaud fields. Elsewhere, in the Norwegian Sea and the US Gulf Coast, such chlorite rims have been interpreted as an early burial diagenetic feature related to the input of iron from rivers or volcanic activity, or to later diagenesis by basinal fluids. The purpose of this study is to evaluate which hypothesis is applicable to the Scotian Basin.

A set of 45 sandstone samples from conventional cores were analyzed for mineralogy in thin section, mineral composition by electron microprobe, whole-rock chemistry, and X-ray diffraction.

From analytical data, it can be argued that a precursor iron-rich clay has diagenetically altered to form chlorite rims during early burial diagenesis, before widespread precipitation of pore-filling kaolinite and quartz overgrowths.

The depositional environment, including the degree of bioturbation, may influence formation of early Fe-rich clay coatings. The quality of the final chlorite rim depends on the sea floor diagenetic environment, apparent from the correlation between the quality of chlorite rims and phosphorus. The conditions that favour precipitation of phosphate must also result in Fe-rich clay coatings and may also make some coatings a better precursor than others for the conversion to chlorite during burial diagenesis. The presence of other Fe-rich minerals may also indicate an abundant supply of iron in the early diagenetic environment.

Atlantic Geology, 2008, Volume 44, Number 1