

Clumped isotope geothermometry of an Ordovician carbonate reef mound, Hudson Bay Basin.

J.J. JAUTZY¹, M.M. SAVARD¹, D. LAVOIE¹, O.H. ARDAKANI², A. SMIRNOFF¹, R. DHILLON³, W.F. DEFLIESE⁴

¹ *Geological Survey of Canada, Québec, QC, Canada.*

² *Geological Survey of Canada, Calgary, AB, Canada*

³ *Queen's University, Kingston, ON, Canada*

⁴ *Texas A&M University, College Station, TX, USA.*

Recent fluid inclusion micro-thermometry, apatite fission track as well as Rock-Eval analyses have been done on the upper Ordovician sedimentary sequence of the Hudson Bay Basin, the largest intracratonic basin in North America, in an attempt to better constrain part of its diagenetic history. While apatite fission tracks and organic maturity indicators tend to show relatively low maximum burial temperatures (60 to 80°C), evidence of oil slicks and gas shows are reported across the Hudson Bay. Moreover, fluid inclusions suggest homogenization temperature for recrystallized syn-sedimentary marine calcite and late pore-filling burial calcite of $118 \pm 25^\circ\text{C}$ and $93 \pm 10^\circ\text{C}$, respectively. These data suggest that locally, high temperature basal brines have interacted with the initial marine carbonates, with the production of secondary porosity later filled with calcite precipitating at lower temperature during burial.

This carbonate reef sequence provides an interesting geological framework where to test the application of clumped isotope thermometry against independent geothermometers. Here, we will present clumped isotope data acquired on late calcite cements and recrystallized marine phases using two different preparation techniques allowing different sampling resolution. By comparing the clumped isotopic data with the other thermal indicators, we will discuss the diagenetic history of the site and the effect of sampling resolution on the observed trends.