MLA-SEM analysis of well cuttings from Newfoundland and Labrador offshore basins

D. H. C. Wilton[1], M. Feely[2], A. Costanzo[2], J. Hunt[2], and D. Norris[3]

1. Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador A1B 3X5 Canada

2. Earth and Ocean Sciences, School of Natural Sciences, National University of Ireland, University Road, Galway LL32 8FA, Ireland

3. Nalcor Energy Limited, 500 Columbus Drive, St. John's, Newfoundland and Labrador A1B 0C9, Canada

Mineral Liberation Analysis-Scanning Electron Microscope (MLA-SEM) of well cuttings were undertaken to ascertain whether quantifiable data on their mineralogy and physical characteristics could provide insight into potential stratigraphic breaks within the sample set analysed. These insights can be utilized to evaluate stratigraphic relationships within the wells analysed and potentially establish a framework to build a mineralogical database for Newfoundland and Labrador's offshore region. A total of 236 well cuttings samples were analyzed with 176 from seven legacy wells offshore Labrador and 60 samples from three offshore Newfoundland wells. Sandstone lithologies were sampled preferentially, due to the multi-phase analysis with a National University of Ireland, Galway (NUIG) fluid inclusions study.

The MLA-SEM data defined mineralogy, sorting, and angularity of grains within each sample. Mineralogical Associations (MAs) were established for sample subgroups within each well to define intervals with discernible mineralogical attributes that might provide inter-well stratigraphic insights. These MAs can be further assessed for their physical characteristics such as grain size, sorting, and angularity in defining stratigraphic packages within each well. Also mapped were diagenetic cement types and amounts that provide insight into the dynamic fluid system affecting the areas from where the samples were taken. Results from this study, paired with fluid inclusion analysis completed by NUIG, suggest that hydrocarbon-bearing fluid inclusion samples were derived from well-sorted, mature intervals.

Further advancement of the MLA-SEM cuttings analysis technique could offer stratigraphic insights within frontier exploration regions of Newfoundland and Labrador's offshore. Future analysis may be incorporated with provenance studies to provide insight into sediment input terranes, as well as establish distinct mineralogical differences within stratigraphically complex regions. Further work on broader stratigraphic intervals may lead to mineralogically defined stratigraphic successions that would be of great support to previous work completed within this frontier region.

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