

Enhancing hydrocarbon allocation using rock pyrolysis data

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Summary

An important aspect of reservoir characterization using geochemistry includes the allocation and apportionment of hydrocarbon streams. This is particularly relevant to understand the contribution from different streams into the produced hydrocarbon mixture from a well/field. In this respect, a critical challenge in reservoirs like those found in the Montney Formation is the migration events that often overprint the original signature of hydrocarbon sources. A complimentary approach to address this issue may be applying the same statistical tools on the material that is left behind in the rock. This residual organic matter is routinely characterized via rock pyrolysis to obtain information about organic matter type, content, and maturity. In this study, a first source apportionment model has been built using pyrolysis data from Alberta, and four main sources were identified. Key characteristics of these sources will be discussed.

Methods

This study includes rock pyrolysis data (e.g. rock-eval and/or Hawk) that have been made available by the Open Government Program of Alberta (1). Selected algorithms have been applied to process the data using the chemometrics modeling software Pirouette.

Results

Figure one shows the relative distribution of four sources in the Montney Formation, Alberta. For 80% of the samples, source 2 represents more than 50% of total organics. This may correspond to migrated bitumen, which has been suggested to be the main source of produced hydrocarbons in the Montney (2). Sources 3 and 4 represent more than 40% of organics in the remaining 20% of samples, particularly in the west. These sources could be contributions from younger strata as previously suggested (e.g. the Doig Formation, the Gordondale Member) (3,4). Finally, source 1 is ubiquitous to all areas, but present typically below 20% of total organics. This last source might correspond to original organic matter from the Montney Formation (kerogen), which has been indicated to provide a minor contribution to total hydrocarbons (5).

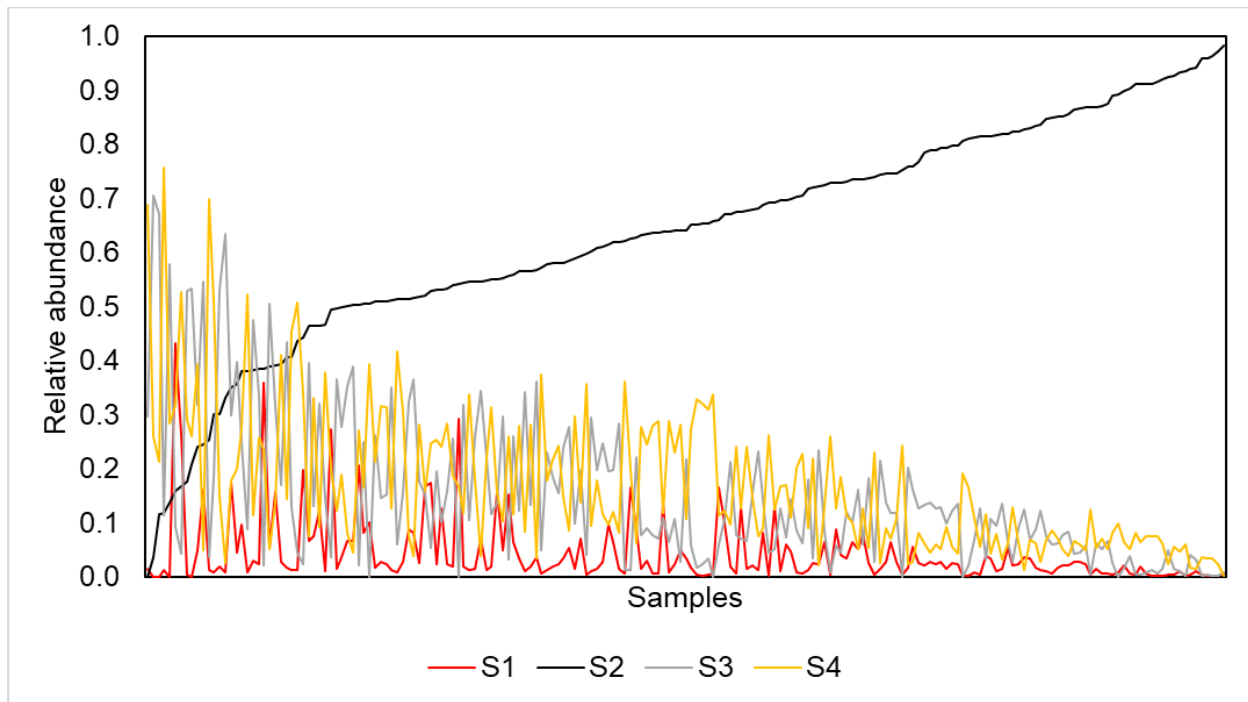


Figure 1. Relative contribution from four sources into total organics in Montney core samples from Alberta.

References

- (1) Alberta Government, 2016. Rock Eval and Total Organic Carbon of Sedimentary Rocks in Alberta (tabular data, tab-delimited format). https://open.alberta.ca/opendata/gda-dig_2013_0003
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