PBS-SEPM Technical Luncheon

August 16, 2022 – 11:30 AM

Ranchland Hills Golf Club - Vista Room

$25 Early Bird Rate - $35 Walk-In - $10 Student - $5 Virtual

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A Simple Method for Improved Paleoenvironmental Analyses of Shales

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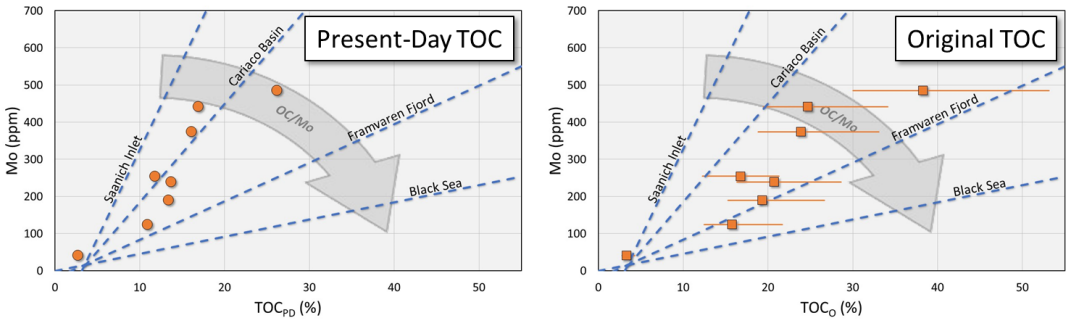
ABSTRACT:

Methods for reconstructing present-day TOC values to their original values are widely used in petroleum systems analysis. However, the importance of making these corrections appears to be underappreciated when TOC is used for paleoenvironmental interpretation. In this presentation I will demonstrate how differences between present-day TOC (TOC_{PD}) values (e.g., as measured via LECO and similar methods) and those at the time of deposition (TOC_O) can materially affect paleoenvironmental interpretations that use TOC as a variable (e.g., Mo vs TOC, S vs TOC). Two datasets, one from the Upper Cretaceous Eagle Ford Formation of South Texas and the other from the Upper Devonian Lower Bakken Shale of North Dakota, will be used to illustrate the importance of making the correction. The difference between TOC_{PD} and TOC_O depends on the thermal maturity of the deposits and the original kerogen type. There are uncertainties associated with defining the original organic matter type, and other unknowns that can affect the TOC reconstruction. As such, it is useful to present a range of possible TOC_O values, i.e., deliberately capture uncertainty, rather than assume that a precise TOC_O value can be defined.



These two graphs compare Mo vs TOC plots for the Lower Bakken Shale in North Dakota. They were constructed using measured (i.e., "present-day") TOC values (left) and using restored values of TOC (right). The restored values show a "best guess" estimate (square) and a range of possible TOC_O values (lines) based on the possible range of original organic-matter types. It is possible that TOC_O was nearly twice the present-day value for the Lower Bakken, leading to significant differences in the interpretation of the paleoenvironment.

BIOGRAPHY:

Bruce Hart is an Adjunct Professor at Western University in Ontario, Canada. He previously held positions with Equinor/Statoil, ConocoPhillips, McGill University, New Mexico Tech, Penn State, and the Geological Survey of Canada. During that time, he worked as a researcher, technical specialist and explorationist for shale plays, tight-gas sandstones, tight-oil plays, fractured carbonates and other unconventional targets on six continents. He toured as the AAPG/SEG Distinguished Lecturer in 2009–2010 and 2016–2017.