

Geochemistry of Barbados Oils, Gases and Petroleum Seeps: Implications for Barbados Petroleum Systems

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As part of an ongoing assessment of petroleum systems in the Caribbean, the U.S. Geologic Survey analyzed oils and gases collected from the Woodbourne Field in Barbados and petroleum seeps at several localities in Barbados. The Barbados oils are interpreted to originate from a Cretaceous marine shale based on biomarker, carbon isotope, and sulfur data of oils and petroleum seeps, and geochemical correlation with oils in Trinidad and Venezuela. This conclusion was also recently made by Exploration Consultants Limited and ConocoPhillips. Previous work had implied Tertiary source rocks for Barbados petroleum. Barbados oils and petroleum seeps exhibit uniform thermal maturity, but exhibit variations in sulfur content and API gravity. Biodegradation of the oils is a significant process in the Woodbourne Field, explaining the weight-percent sulfur and API gravity data. Gases from the Woodbourne Field are thermogenic in origin and appear to be co-generated with oil based on evaluation of thermal maturity from carbon isotope analyses. Biogenic gas is a minor component. Biodegradation is a minor process affecting Barbados gases. The presence of Cretaceous source rocks in the eastern Caribbean has profound implications for hydrocarbon potential in the region. The Cretaceous petroleum systems of Venezuela and Trinidad can be extended to Barbados and adjacent areas and implies deeper petroleum potential is present for onshore and offshore Barbados.
