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## **Petroleum Geochemistry as an Exploration Tool as Applied to the South Atlantic Margin**

Petroleum geochemistry is a fundamental component of regional exploration and production programs and is as important to basin analysis as an understanding of regional structural fabric, regional evolution of the structural elements and regional stratigraphic relationships. Oil geochemistry is applied here to better understand and predict the occurrence of crude oil in the marginal basins of southeast Brazil. This approach is supplemented by results obtained from other exploration tools such as surface geochemistry and basin modeling. For exploration companies to be successful in this area, a firm understanding of the operative petroleum systems is necessary to make intelligent choices with regard to projects and lease acquisition.

A regional oil study that utilizes the detailed analysis of a representative suite of samples is an excellent way of identifying, evaluating and comparing the various petroleum systems that have contributed to the reserves of a large area. The regional petroleum systems within a specific study area can be evaluated by first determining the number of effective source units within a region by establishing the number of compositionally distinct oil families. Since crude oils are the compositional derivatives of their sources, oil geochemistry can be used to determine the number of discrete sources in a basin and their respective stratigraphic and areal distribution, source age, lithology, organic input (marine, non-marine, lacustrine), thermal maturity, oil quality and depositional environment. In addition, areas with overlapping petroleum systems can be identified in relation to possible oil mixing from two or more sources.