

## The Role of Petroleum Geochemistry for the Evaluation of Petroleum Systems in Deep-Water

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Geochemistry plays a critical role in petroleum exploration in deep water areas of Brazilian sedimentary basins. Petroleum systems characterization involves classification of oil families and detailed oil/source rock correlation based on state-of-the-art analytical methods, including biomarkers, carbon isotope composition of individual compounds and diamondoids. Modeling of source rock kitchens and their evolution through time are calibrated with thermal data, including visual kerogen analysis and kinetic measurements, which are, in turn, correlated to thermal evolution of oils, oil shows and gases. Several migration scenarios are modeled, considering variations in petrophysical properties, fault conductivities and evolution. Oil quality prediction is a key issue in deep water prospects. Several oil accumulations have been affected by the process of biodegradation, resulting in large accumulations of heavy oil. Among several other controls, reservoir temperature and oil mixing are the most important ones. Areas with recent petroleum charges, which occurred when reservoirs were at temperatures higher than 80°C are more prone to the accumulation of light oils. Coupling migration pathways history and thermal evolution of the basin are quite successful for that purpose. Prospective areas are further identified by piston core anomalies; oil seeps are analyzed and integrated with oil families classification and interpretation of satellite images.

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