

The Use of Leading-Edge Complementary Tools and Integrated Models Applied to Petroleum Exploration in Offshore Basins

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Leading-edge complementary tools associated with the direct detection of hydrocarbons in the surface of offshore sedimentary basins has been successfully integrated with data derived from high-resolution geochemical data of well samples to build reliable petroleum systems models. The integrated results have been used as fundamental exploration guide because they were able to provide detailed quantitative characteristics of the petroleum systems present in an area. These complementary tools include satellite images, seabed piston cores, and high-resolution geochemical analysis of sea surface oil slicks. The sophisticated treatment of various satellite images over the same area is able to provide images of "clusters" of oil slicks that allow the identify the precise location of seeps in the sea bottom, as well as provide a qualitative assessment of present-day charge of hydrocarbons in the area. Many such examples were found in the Gulf of Mexico and were confirmed by seabed piston cores. The coupling between what is observed from the satellite clusters with the conventional seismic surveys, specially 3D which allows the extraction of seismic coherence, allows a precise selection of sites for piston coring with objective use in exploration. Moreover, the oil slicks are also sampled in the sea by the same ship that is collecting piston cores, analyzed by the same high-resolution techniques used in oil samples, and correlated with the results obtained from the collected piston cores. These different tools are complementary to each other and enhance the reliability of quantitative models by discretizing diverse sources and types of hydrocarbons and therefore allows to characterize the main exploratory characteristics of offshore basins.
