

Integrated Use Of Oil Seep Detection Techniques To Assess Exploration Risk In Deep-Water Frontier Areas Of The Santos Basin, Brazil

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This paper focuses on how different oil seep detection technologies come together to reduce exploration risk in deep-water frontier areas of the Santos Basin, Brazil.

RADARSAT-1 images were processed to identify potential natural oil slicks based on sea-surface radar textures. Seepage slicks were found to occur in two distinct tectonic domains: (1) shallow areas along the pre-Aptian hinge line; (2) deep offshore areas characterized by intense halokinesis.

A seabed piston coring surface geochemical study was undertaken; core locations were selected using seismic data and information about RADARSAT-1 seepage slicks. About 250 cores were acquired in water depths ranging from 100 m up to 3,000 m.

Modeled present-day migration routes using Temispak show that: (1) Oil seepage is expected to occur in shallower areas where lateral petroleum migration is channeled by regional carrier bed systems. This result is consistent with the presence of seepage slicks along the pre-Aptian hinge line; (2) Petroleum generated from source rocks in areas of active halokinesis migrate along faults flanking salt diapirs, reaching the sea floor in the lower platform/upper slope. Visible oil staining in cores and related seepage slicks at the ocean surface corroborate such an interpretation.