

## **Data integration using GIS in the Tucano basin, Brazil, as an aid to hydrocarbon exploration**

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Data acquired in different formats and cartographic projections were integrated using image processing and GIS techniques in a study area comprising 6,800 km<sup>2</sup> in the northern part of the Tucano Basin. Geologic knowledge of the region is available only at a reconnaissance level. Such a data set includes digital remote sensing images (Landsat-5/TM), geologic maps, topographic maps, seismic sections and corresponding structural contour maps, gravity data (residual grid and boundary lines), outcrop information (structure and lithology) and surface geochemistry (gasometry).

Mapping of geologic units was substantially improved through the Landsat-5/TM image interpretation. Lithologic discrimination was facilitated by the absence of land use in the investigated area; the homogeneous, sparse and dry vegetation cover enhanced the geomorphic and spectral expression of the lithologic units. The interpretation of Landsat-5/TM images, perspective views of merged images, stereoscopic views and shading relief derived from digital elevation models allowed the identification of subtle lineaments and of a prominent geomorphic feature of circular shape. Statistical lineament analysis allowed the definition regionally significant trends. Joint interpretation of geologic and geophysical data using GIS demonstrated that some of these trends are the surface expression of rift and/or basement faults reactivated during post-rift times. The circular geomorphic feature was interpreted as the result of karstification induced by post-rift tectonics. The surface distribution of geochemical anomalies is controlled either by structures related to post-rift reactivation or by the outcropping pattern of permeable sandstones. None of these relationships were readily apparent prior to data integration within the GIS.