

## **DEFINITION OF HYDROCARBON MICROSEEPAGE AREAS USING LANDSAT-TM IMAGES, TUCANO BASIN, NORTHEASTERN BRAZIL**

1ALMEIDA FILHO, R. and 2MIRANDA, F. P. 1National Institute for Space Research, Sao Jose dos Campos, Brazil; 2Petrobras Research & Deveopment Center, Rio de Janeiro, Brazil

A geochemical soil gas survey has identified several anomalous microseepage areas in the North Tucano basin. The leakage of hydrocarbon and associated fluids to the surface is a well-documented process that may produce a number of geochemical alterations in rocks and soils that overlay oil/gas deposits, resulting in a particular mineral assemblage. Some of these microseepage-induced minerals show diagnostic spectral features that allow their remote identification. Landsat-TM images were examined for the possibility that hydrocarbon microseepage areas could be detected under the physiographic conditions of the study area. Principal component analysis technique was used as an attempt to eliminate spectral redundancy among the six reflective Landsat-TM bands. The first and the second principal components were discarded due to the dominant contribution of the albedo of the scene and the greenness of the vegetation cover, respectively. The sixth PC was also not considered due to the high signal-to-noise ratio. A color composite image combining third (R), fourth (G), and fifth (B) principal components, enhanced through intensity/hue/saturation color transforms, permitted the delineation of areas of hydrocarbon microseepage. This Landsat color composite was merged with a high-resolution digitized aerial photograph to create a hybrid product that allowed a precise definition of the target areas.