Identification and Characterization of Deepwater Petroleum Systems using surface geochemistry technology: a broader approach

V.O. Elias¹*; M.R.Mello¹; J.M. Macedo¹; P.W. Brooks¹

¹ANALYTICAL SOLUTIONS, Rua Professor Saldanha, 115, Jardim Botânico, Rio de Janiero, RJ, Brazil, 22461-220. E-mail: vladimir@anasol.com.br

Oil and gas seeps are of great significance to deep offshore petroleum exploration and especially in ultra deep frontier areas. The basic assumption for the use of oil and gas seeps in offshore petroleum prospecting is that hydrocarbons from deep sedimentary sequences can migrate, either directly from source rocks or from reservoirs, to the seafloor. Geochemical analysis of surface and near-surface sediments in a generative basin should therefore, detect a surface expression of the underlying hydrocarbons.

The traditional analytical methodology used to identify hydrocarbon seeps includes sample routine screening methods using total hydrocarbon analysis by gas chromatography (GC-FID), total scanning fluorescence (TSF) and headspace measurements. Selected samples are then analyzed by gas chromatography-mass spectrometry (GC-MS) for biomarker identification. Our experience shows that this methodology may not be applied to all basins. In Brazilian offshore areas, for example, microseeps are the main type of hydrocarbon seepage. In these areas microseeps can only be identified by a broader approach using sophisticated high resolution analytical techniques employing sorbed gases, microbiology, gas chromatography, high resolution mass spectrometry-mass spectrometry and diamondoids. The integration of these techniques allows the detection of low-levels of migrated hydrocarbons never detected before and adds critical constrains to old routine screening methods.