

Geochemical Exploration in Northern South America: Recent Successes from Venezuela, Colombia, and Peru

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Abstract

Detailed geochemical and research studies document that hydrocarbon microseepage from petroleum accumulations is common, predominantly vertical (with obvious exceptions in some geologic settings), and dynamic (responds quickly to changes in reservoir conditions). Since microseepage is nearly vertical, the extent of an anomaly at the surface can approximate the productive limits of the reservoir at depth. Furthermore, the detailed pattern of seepage can reflect reservoir heterogeneity, discriminate between charged and uncharged compartments, and identify areas of bypassed pay.

Results of recent microbial and soil gas surveys in Venezuela, Colombia, and Peru establish the value of hydrocarbon microseepage data for high-grading prospects and aiding field development projects. These surveys were conducted in the Eastern Venezuela basin, the Maracaibo-Catatumba basin in western Venezuela, the Guajira and Cesar Rancheria basins in northern Colombia, the Middle Magdalena Valley basin in central Colombia, and the Lancones basin in northwestern Peru. Results from the underexplored Lancones basin identified structures that warrant additional study due to strong hydrocarbon indications. The Guajira survey documented previously unrecognized oil potential in a basin currently known only for its biogenic dry gas. Results from eastern Venezuela and Cesar Rancheria successfully discriminated prospects on basis of probably hydrocarbon charge. Surveys over two old oil fields in western Venezuela and in the Middle Magdalena Valley identified bypassed pay and several new drilling opportunities.

High-resolution microseepage surveys offer a flexible, low-risk and low-cost environmentally friendly technology that not only complements traditional geologic and seismic data, but adds value to such data. Properly integrated with other exploration data, their use has led to discovery of new reservoirs.