

Geochemical Exploration in Deserts of North Africa and the Middle East: Strategies for Success

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Abstract

Desert environments are well suited for hydrocarbon microseepage surveys. Both soil gas and microbial methods are effective in deserts, however, we recommend avoiding areas with moving sand dunes. Hydrocarbon microseepage surveys in deserts require careful planning and implementation. Microseepage data are inherently noisy and require adequate sample density to distinguish between anomalous and background areas. To optimize the recognition of a seepage anomaly, the sampling pattern and sample density must reflect survey objectives, expected size and shape of the target, expected variation in surface measurements. Defining background values adequately is an essential part of anomaly recognition and delineation. Undersampling and/or the use of improper analytical techniques is a major cause of ambiguity and interpretation failures.

Results of microbial and soil gas surveys in the deserts of North Africa, the Middle East, and South Asia are presented here. These results illustrate the value of hydrocarbon microseepage data for high-grading basins, plays, and prospects. Reconnaissance surveys in Oman and Pakistan illustrate the value of such surveys to high-grade seismic leads and prospects, and identify areas that warrant further evaluation. Surveys in Algeria and Tunisia document hydrocarbon microseepage to the surface in spite of the presence of 200-400 meters of halite above Triassic reservoirs. Surveys in Yemen and Ethiopia survey illustrate the use of geochemical ground-truthing inferred seep-induced remote sensing anomalies. Results from surveys in Algeria, Egypt, Yemen, and Saudi Arabia successfully discriminated prospects on basis of hydrocarbon charge. Geochemical exploration surveys such as these are most effective when results are integrated with subsurface data.