When Seismic is not enough: Improving Success by Integrating High-Resolution Surface Geochemical data with Seismic data

Dietmar Schumacher
Geo-Microbial Technologies, Inc.
deet@gmtgeochem.com

Seismic data are unsurpassed for imaging trap and reservoir geometry, however; in many geological settings seismic data yield no information about whether a trap is charged with hydrocarbons. In other settings, the quality of seismic data is poor due to unfavorable geology or surface conditions. For this presentation we will review the results of integrated seismic and geochemical surveys (1) over pinnacle reefs East Texas, (2) Pennsylvanian channel sandstones in Oklahoma, (3) in the Ft. Worth basin of North Texas, (4) Morrow channel sands in the OK-TX panhandles, (5) Jonah Field area of Wyoming, (6) over a large, nearly depleted field in Venezuela, and (7) from areas of thick volcanic cover in the Columbia basin of Washington.

Geochemical data acquired over the pinnacle reefs clearly discriminates between hydrocarbon-charged reefs and dry or non-commercial reefs. Gridded hydrocarbon microseepage data over Pennsylvanian channel sandstones in OK and TX distinguished between charged and uncharged reservoirs and/or reservoir compartments. In the Fort Worth basin, geochemical evaluation of a seismically defined Ordovician Ellenburger structural trap identified a minor seepage anomaly associated with it and an extensive microseepage anomaly over a nearby structural low. Subsequent drilling yielded a dry hole on the "high" and discovered a new Park Springs Conglomerate (Pennsylvanian) field in the area of the seismic "low." Results of the Jonah Field-Pinedale survey document the presence of a strong microseepage anomaly over these tight gas accumulations, and identify geochemical leads for future evaluation. In Venezuela, survey results identified areas of bypassed pay within the field, and several new drilling opportunities outside present field boundaries. Lastly, the Columbia basin data identified several areas of extensive hydrocarbon microseepage from beneath the thick basalt cover.

Applications such as these require close sample spacing and are most effective when results are integrated with subsurface data. High-resolution microseepage surveys offer a flexible, low-risk and low-cost technology that naturally complements traditional geologic and seismic methods.