

## **Case Examples of Geophysical and Geochemical Data Integration: Enhancement of Prospect Structural Interpretation**

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Geophysical data interpretations render information on fault trends, structural closures and stratigraphic truncations, but may not effectively resolve elements of reservoir charge and seal risk. Surface geochemical survey methods are available which provide information on reservoir hydrocarbon emanation and presence, and by inference allow evaluation of charge and seal risk. However, geochemical leads alone are not preferred exploration targets due to the inability of depth attribution of anomalies at the surface.

Through integration of geophysical data and the amplified geochemical image of hydrocarbon microseepage from reservoir to surface, a more thorough understanding of reservoir potential and risk is achievable. Refinements to geophysical data interpretations are occasionally possible. This integration of data assumes increasing importance as challenging geological conditions are encountered in the subsurface (thick evaporite sections, volcanics). Another benefit comes with higher confidence in structural and stratigraphic interpretations in areas of relatively flat seismic wave reflection. Overall, better exploration program outcome is possible by the combination of these data types.

A time-integrated sample method for hydrocarbon detection, including compounds from ethane to phytane measured over a survey area, provides a robust data set allowing for delineation of charge and background areas. These results are then compared to regional structural interpretations. Case examples are demonstrated, where geochemical data was used to enhance the structural understanding of exploration plays. These include (1) an area where flat seismic reflection led to uncertainty in the configuration of potential closure, in which geochemical data was used to infer more accurate prospect boundaries; and (2) an area of thick salt section, where geochemical results imply unresolved bounding fault trends. In addition, a third case is exhibited in which geochemical anomalies are seen to correspond with regional fault/fracture lineaments in a potential resource gas play.