Seismic Attribute Analysis in Paleozoic Hydrothermal Dolomite

Uwe Strecker[1]*, Matthew Carr*[2]*, Steve Knapp*[3]*, Maggie Smith*[2]*, Richard Uden*[2]*, Gareth Taylor*[2]*, and M. Turhan Taner*[2]*. (1) Rock Solid Images, 2600 S Gessner Ste 650, houston, TX 77063, phone: 713-783-5593, u.strecker@rocksolidimages.com, (2) Rock Solid Images, 2600 S. Gessner, Suite 650, Houston, TX 77063, (3) Offshore Operations, formerly at Seitel Data, 50 Briar Hollow Lane, 7th Floor West, Houston, TX 77027*

To optimize geophysical subsurface interpretation, it proves beneficial to place seismic attributes into their proper geological context. This case study captures prognostic exploration play characteristics for populating a geological model within which each dominant reservoir property is expressed as a risk parameter that in turn can be resolved by a seismic attribute. Seismic attribute analysis permits illumination of specific subsurface compartments and associated reservoir properties, specifically: 1.) fractures, 2.) dolomitization, and 3.) high porosity. For instance, fracturing can be detected via low similarity values (event terminations) and dip azimuth maps, whereas the transition from tight limestone (non–reservoir) to porous dolomite (reservoir) is paralleled by a characteristic impedance reduction coupled with a subtle polarity reversal. Variant composite seismic signals can be binned using artificial neural network topology. Some wells drilled on impedance anomalies encounter intraformational shale plugs that resonate at identical impedance values to porous dolomite, thus decreasing the predictive power of impedance as a diagnostic attribute. However, this increased stratigraphic complexity is resolved by geological data indicating that dolomitization should preferably occur at the formation base. Application of this model doubles the chance of setting pipe in this North American play. A novel look at applied subsurface interpretation firmly based on geological models would lend itself to widespread use in the seismic attribute analysis of carbonates hosted by the Arabian platform.