

INTERACTIVE GEOLOGIC MODELLING

Stephen A. Krajewski¹, Ron Budros² and J. Douglas Glaeser³

ABSTRACT

Interactive geologic modelling software packages are now available for use on stand-alone personal computer hardware systems. These packages are affordable to company and independent geologists; are user-friendly; and, can construct complex geological and geophysical models for comparison with real-world data. More importantly, the software allows explorationists freedom to use geologic concepts for developing and fine-tuning appropriate models for identifying new prospects and extending producing fields.

Three case histories demonstrate the interactive geologic (seismic) modelling process on personal computers. First is the updip Jurassic Smackover Formation of the Gulf Coast. The geologic model consists of a regressive shoreline migrating across a shallow marine platform. Seismic modelling helps to determine seismic acquisition parameters; seismic resolution of porosity; and facies relationships.

Second is the Permian Minnelusa Formation of the Powder River Basin. The geologic model includes an eolian dune complex cut by a regional erosional unconformity, and an overlying impermeable shale. Seismic modelling enables generation of synthetic seismic data for known geologic conditions (Raven Creed field); and substitution of fluids and lithologies in producing horizons. Modelled output can enhance seismic interpretation of similar Minnelusa plays in the basin.

The third example is from the Silurian reef trend in the Michigan Basin. The geologic model consists of a Niagrian pinnacle reef encased in Salina evaporites and carbonates. Seismic modelling allows generation of synthetic seismic data for comparison with field seismic data to obtain a best fit interpretation. Also, encasing stratigraphy variations can be modelled for other reef trend locations.

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¹Industrial Ergonomics Incorporated, Arvada, Colorado.

²Lithos Exploration, Houston, Texas.

³Glaeser Exploration Consultants Incorporated, New York, New York.

Poster session presentation.