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Case Studies Using Sequence Stratigraphy on an Interactive 3-D Seismic Workstation

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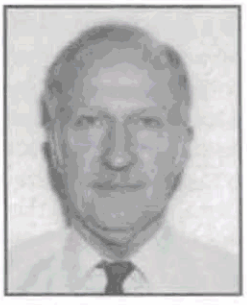
Interpretation of 2-D and 3-D seismic data using workstations has greatly enhanced our exploration and exploitation efforts. The ratios of successful/nonsuccessful wells have improved, and finding costs have been reduced. The primary emphasis of these efforts has been structural interpretations, however. This has been dictated largely by the available software. The stratigraphic component has been underutilized and not exploited. Review of many case histories that describe the traps as being structural shows stratigraphy to be a significant component of the traps.

Stratigraphic analysis of seismic data on workstations is now possible; software is available from several sources. We have applied these tools to interpretation problems in the Gulf of Mexico, North Sea, North Africa, South America, and southeast Asia. The methodology involves describing and assigning values for seismic attributes such as the external geometry, internal reflection configuration, amplitude, and continuity to areas bounded horizontally by horizons and vertically by internal partitions ("schzaaM" lines). These attributes and well data are used to make lithofacies, systems tracts, and depositional environment predictions for each interval of interest. The predictions are then interactively projected to map view. Their values are electronically contoured to produce maps of the seismic facies, external geometry, continuity, amplitude, systems tracts, lithofacies, and depositional environments; these can easily be plotted at various scales. It is also possible to effect a chronostratigraphic analysis and restore missing intervals.

We will present case histories from the Gulf of Mexico and North Sea that will show the application of these types of analyses to carbonate ramps, deltaic clastics, submarine fans, and basin inversion and erosion.

Biographical Sketches



Brad Macurda received his Ph.D. in Geology from the University of Wisconsin in 1963. He was a professor at the University of Michigan until 1978 and a member of the Seismic Stratigraphy Group of Exxon Production Research from 1978 to 1981. Dr. Macurda has been with The Energists in Houston since 1981 where he is currently a principal and executive Vice-President. He conducts extensive training courses in the sequence and seismic facies analysis of both carbonates and clastics.

Gary Jones received his B.S. in Geophysical Engineering from the Colorado School of Mines in 1977. He has acquired and processed data with several contracting firms, explored for oil and gas for several mid-sized independents, and now works as a geophysicist for Landmark Graphics Corporation. Mr. Jones' role at Landmark is to design 3-D visualization-based interpretation software for exploration, production, and reservoir characterization. ■