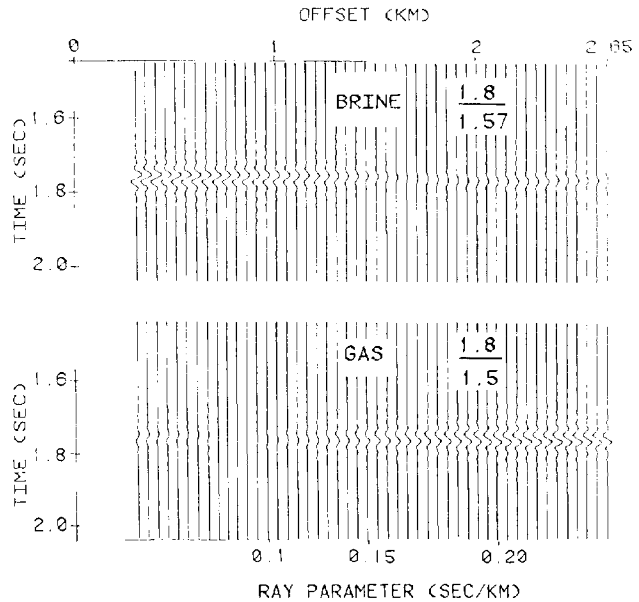

Synthetic seismograms after normal moveout correction for a hypothetical 20-m (66 ft) high impedance sand reservoir in shale. Ratio of compressional velocity to shear velocity in this model is 1.8 for shale, 1.57 for brine sand, and 1.5 for gas sand. Variation in reflectivity with offset in this model is a first order effect over normal recording range.

ture of the effects of compressional and shear velocity variations.

The expected variation in reflectivity with offset in clastic basins suggests that we should seriously question our conventional processing and interpretation assumptions in these areas. It also suggests that conventional seismic reflection data might yield a shear impedance image and an improved compressional impedance image rather than the currently employed hybrid impedance image.

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Lacustrine and Paludine Facies: Cretaceous Baum Limestone, South-Central Oklahoma

The Lower Cretaceous Baum Limestone in the Arbuckle Mountains of south-central Oklahoma was deposited in lacustrine and paludine settings near the Cretaceous shoreline. The unit rests unconformably on folded Pennsylvanian rocks and is overlain by and grades into the Paluxy Formation, a sandstone deposit with numerous *Ophiomorpha* burrows. The lacustrine lithofacies include the following: (1) massive micrite containing charophyte fragments and ostracodes; (2) intraformational conglomerate composed of rounded micrite clasts in a micritic matrix; (3) rounded peloids and coated peloids; (4) laminated micrite; and (5) conglomerate composed of clasts derived from Paleozoic rocks within a micritic matrix. Disintegration of charophytes that grew in the littoral zone of the lake produced the massive micrite. Intraformational conglomerates and peloids represent reworking of massive micrite whereas the other conglomerates represent fluvial influx. The coated peloids and laminated micrite probably formed as a result of algal activity in the shallow margins of the lake.

Features found within the paludine facies include: (1) brecciated micritic limestone that probably formed as a result of shrinking and swelling due to an oscillating phreatic water table; (2) subspherical nodules of micrite (peds) separated by red shale (plasma) that represent pedogenic alteration of exposed lacustrine mud; and (3) subcylindrical columns composed of micritic limestone representing root-casts. These paludine features formed as a result of pedogenic processes in a marsh that rimmed the shallow lake where the lacustrine facies accumulated.

The lacustrine and paludine facies are not grouped into sequences similar to those reported from some modern and ancient lacustrine carbonate deposits, but alternate in an apparently random pattern. Comparison with modern carbonate-dominated lacustrine systems indicates that the facies in the Baum Limestone have no precise counterparts, although they are most similar to facies in temperate-region marl lakes.

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Seismic Expression of Carbonate to Terrigenous Clastic Sediment Facies Transitions of Western Florida Shelf

Transitions from carbonate to terrigenous clastic sedimentary deposits are commonplace in the Mesozoic-Cenozoic section of the northwestern Florida shelf. On a regional scale, these transitions are responsible for a large seismic velocity variation between the areas of the Destin dome and the Middle Ground arch. In the Destin region, clayey shales and sands are more prevalent, interspersed with carbonates and evaporites, with the result that seismic transmission velocities are relatively low. Toward the south on the Middle Ground arch, the increased carbonate-evaporite content of the section results in much higher velocities. An example of this variation is that a reflection two-way travel time of 2 sec corresponds to a depth from 2.5 to 2.8 km (1.5 to 1.7 mi) in the Destin area while this same reflection time corresponds to a depth of 4 km (2.5 mi) in the vicinity of the Texaco 2516 well on the Middle Ground arch. Analyses of stacking velocities indicate that the transition is a gradual one to the north and west of Middle Ground arch.

On a local scale, transitions or terminations related to facies changes, erosion, or sediment body geometries are a potentially important factor in prediction of reservoir rock on the as yet uncondemned, 12 km(7.4 mi) broad, deep structural culmination west of the Destin tests and on the untested, 9 km (5.5 mi) broad, deep structure 20 km (12.4 mi) south of the Destin dome. The deep Exxon test on the Destin dome encountered 20 m (66 ft) of Norphlet quartz sand with porosity ranging from 20 to 30% and permeability of 1 darcy. This potentially excellent reservoir bed at a depth of 5,224 m (17,138 ft) is more than 150 m (492 ft) below the deep structural crest on the Destin dome. The Sun test, 25 km (15.5 mi) east of the Exxon well, penetrated 6 m (19.6 ft) of Smackover oomoldic dolomite with porosities of 13 to 15% and failed to find any Norphlet sand as it bottomed in Louann salt immediately below the Smackover. A study of a combination of velocity analyses, density and velocity logs, and synthetic seismograms allows speculations that the deep Destin dome and the structure on its south flank are still viable exploration prospects.

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Significance of Limestone-Shale, Rock-Stratigraphic Contacts—The Connecting Links Between Areas of Contemporaneous Carbonate and Terrigenous Detritus Sedimentation

In undisturbed depositional sequences one rarely, if ever, observes lateral change directly from mud-supported carbonate