very easy to use. In addition, several separate models for each well were generated and the results compared statistically in a very short span of time.

Results from several formations, including the Mancos "B" in western Colorado, are presented in detail to illustrate the advantage of the use of interactive graphics software.

The degree of success achieved in solving these problems indicates that the use of an interactive computer system in this manner is not only valid, but merits more widespread application.

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Ordovician Red River Formation, Eastern Montana and Western North Dakota: Relationships Between Lithofacies and Production

Ordovician Red River cores were examined from 16 wells across western North Dakota and eastern Montana plus core from 8 wells in Brush Lake field area, Sheridan County, Montana. Several distinctive basinwide carbonate lithofacies record at least three cycles of upward shoaling or restricted conditions. The oldest and best developed of these cycles consists of a fossiliferous burrowed carbonate mudstone member overlain by a nonfossiliferous, finely laminated micro- or crypto-crystalline dolomite member. The cycle is completed by an anhydrite of regional extent. The thickest development of porous dolomite is in the lowest cycle of the Red River. This cycle contains most of the Red River oil reserves of the study area.

Porosity distribution is directly related to patterns of dolomitization in the carbonate members of each cycle. In northeast Richland County, Montana, an area of dense well control, net porosity isopach maps of each member of the lowest cycle show alternating bands of porous and nonporous carbonates. These bands are oriented northeast-southwest. Bands of good porosity development in the burrowed member occur between bands of good porosity in the overlying laminated member. A classification system based upon these patterns of dolomitization is used to analyze statistically the occurrence of porosity in the lowest cycle.

Regional anhydrites, nonporous carbonate rocks and kerogenites within these cycles have formed adequate seals for the trapping of Red River oil.

Fifty percent of Red River structural growth occurred during upper Interlake time in northeast Montana. Rejuvenation of this growth occurred through Cretaceous time.

Black kerogenous limestones in the burrowed member of the lowest cycle may be the source of Red River oil.

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Seismic Stratigraphy and Sedimentation, Magdalena Fan, Southern Caribbean Sea

Multi- and single-channel seismic records from the Magdalena Fan reveal six seismic sequences in the entire sediment column (with thickness from >5.5 to 2.5 secs two-way traveltime). Although sediments were deposited in the Magdalena Fan since about the Late Cretaceous, terrigenous sedimentation became important only in later Cenozoic time during the deposition of the upper three units following the Andean uplifts. However, the uppermost seismic sequence is the fan unit, most influenced by influx of terrigenous sediments and deposited subsequent to the major uplift of Andes in Pliocene time. The morphologic and shallow acoustic (3.5 kHz) characteristics of this fan unit are: (1) upper fan, 1/50 to 1/100 gradients, with channels having well-developed levees and with several subbottom reflectors; (2) middle fan, 1/100 to 1/200 gradients, occurrence of numerous channels with very subdued levees and several subbottom reflectors; and (3) lower fan, <1/200 gradients having small channels and relatively smooth sea floor with few or no subbottom reflectors. Large irregular to regular hyperbolic echoes and sediment waves are very common in the upper, middle, and to some extent the lower fan, and have resulted from slumping and other downslope mass movements. On multichannel seismic records, the upper fan exhibits conspicuous channel-levee migration and onlapping and coalescing wedge-shaped reflection patterns (from levee deposits). The middle fan is characterized by the presence of chaotic and discontinuous reflection patterns which resulted from the presence of numerous channels and the hyperbolae and sediment waves of the type recorded on 3.5 kHz records. The lower fan region has continuous and smooth reflection patterns. Within the topmost seismic unit, several episodes of increased terrigenous sediment influx have resulted in a seaward progradation of different fan regions in Pliocene-Pleistocene times.

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Terrigenous and Carbonate Clastic Facies in a Transgressive Sequence Over Volcanic Terrain

The Kawainui marsh in Hawaii and its adjacent broad barrier accretion plain has been deposited over a former coralline algal-coral reef embayment surrounded by high slope volcanic hills. In late Holocene time, littoral transport formed a beach accretion plain which cut off the former marine embayment leading to deposition of lagoonal and deltaic facies which were eventually covered by a dense salt marsh formed of *Scirpus* sp. and "California" grass. A core program was used to obtain data for a three dimensional analysis of the resultant transgressive coastal environmental lithosomes. By use of a large number of radiocarbon dates and three relatively important archeological sites surrounding the marsh, the late Holocene settings and times of deposition of the various sedimentary environmental units were determined. This transgressive sequence began at least 5,000 years before present and continues to build landward and upward. The vertical stratigraphic sequence from top to bottom includes salt marsh peats, lagoonal marine muds or terrigenous deltaic deposits, in some areas a basal marsh peat, and a coralline algal-coral reef tract, underlain by basalts. The adjacent barrier accretion sands overlie a coralline algal-coral reef tract underlain by basalts. Preservation potential of such a sequence in a volcanic terrain appears to be fairly high as deposits of many previous high sea stands have been identified in the Hawaiian Island chain. Final burial under deep marine muds or oozes will eventually occur as the islands subside as evidenced by the previous history of the Hawaii-Midway Island chain. Buried similar sequences of transgressive coastal sedimentary facies should be anticipated along other volcanic terrains such as the Kelvin chain (Mytilus seamount) off the eastern Atlantic coast of North America, the Jordan Knoll in the southeast Gulf of Mexico, the Tonga-Fiji volcanic arc, and other similar geologic settings.

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Grand Rapids Formation, North-Central Alberta: An Example of Nearshore Sedimentation in a High Energy, Shallow, Inland Sea