est, yet most under-explored source rock–reservoir packages in the western United States. Numerous geologists have studied the Chainman Shale–Diamond Peak Formation, yet the depositional setting of these formations, a factor critical to effective exploration for these attractive targets, is still controversial. In 1974, F. G. Poole suggested that the entire sequence was deposited as turbidites at abyssal depths, calling these rocks "Antler flysch." B. R. Wilson and S. W. Laule thought these same sediments were largely nearshore marine to fluvial molasse sediments. Regional studies in east-central Nevada reveal 2 dramatically different facies within the Mississippian: a turbidite facies consisting of incomplete Bouma sequences, interturbidite shales, and disordered conglomerates; and a fluvial-deltaic facies consisting of well cross-bedded,, nearshore marine sandstones and fluvial conglomerates, nonmarine to shallow-marine shales, and marine limestones. In several areas these 2 facies are separated by only a few miles, yet structural juxtaposition is not likely. Rather, it appears the turbidite facies is older than the shallow-water facies and represents Early Mississippian in-fill of the narrow Antler trough. The fluvial-deltaic facies represents regressive deposition that prograded over the Antler trough in Late Mississippian time. Both facies contain rich source rocks and the more widespread fluvial-deltaic facies contains numerous reservoirs and potential stratigraphic traps.

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Role of Microcomputer Geologic Work Station in Exploration: Case Study

Microcomputer-based geologic work stations are becoming increasingly popular and are proving to be effective and efficient tools in exploration. They allow an explorationist to produce interactively many different types of maps and to formulate and test multiple geologic models. Maps can be updated and reproduced rapidly with the addition of data points.

To illustrate the power and versatility of microcomputer work stations, data from Raven Creek field were used to generate several sequences of maps that use a progressively larger number of data points, simulating the increasing number of wells available through time. The map sequences bring out early the nature of the Raven Creek oil trap, even with fewer data points than might be expected.

Sequences of several different maps were made for this study. These include isopach, trend, and residual maps of the Opeche, porosity and permeability distributions in the Minnelusa sands, structural contour maps (Minnelusa and Minnekahta), facies maps, as well as structural and stratigraphic cross sections. Perspective block diagrams were useful in visualizing many of these maps.

These maps, cross sections, and diagrams, and the changes in them brought about by sequentially adding data through time, show how an explorationist can rapidly formulate, test, and refine geologic and exploration models. The speed, versatility, and interactivity of the work station lets this be done in minimal time.

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High-Resolution Seismic Stratigraphy of North Carolina Continental Margin, Cape Fear Terrace: Sea Level Cyclicity, Paleobathymetry, and Gulf Stream Dynamics

A high-resolution seismic stratigraphic study of the Cape Fear Terrace (outer continental shelf off North Carolina) combined with biolithostratigraphic data has yielded a chronostratigraphic framework of the Quaternary sequences that comprise this portion of the North American continental margin.

The Cape Fear Terrace is an anomalous, point-source, prograding, shelf-margin feature that has experienced positive relief through much of the Quaternary. This upbuilding or outbuilding followed a period of active, early Pliocene, submarine erosion in which the ancestral Gulf Stream cut an erosional path beneath the present shelf margin. The terrace was originally built up during a relative lowstand of sea level with the construction of a shelf-edge deltaic feature. Severe modification of this delta front occurred during a relative highstand of sea level as the Gulf Stream began to impinge upon the margin. The anomalously thick accumulation of shelf-edge sediments acted as a barrier to flow, inducing complex flow patterns of the Gulf Stream. Excavation of these sediments yielded a terrace feature with preferential erosion on the upstream side.

Subsequent deposition in the terrace region may have resulted during fairly highstands of sea level, as evidenced by the presence of active seaward-prograding sand waves in the terrace region today. Once this shelf-edge bathymetric irregularity (the terrace) had been established, the Gulf Stream acted as a dynamic force inducing cellular flow structures within the shelf environment, which enabled sediments to be transported seaward along the paleo-shoals complex.

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Sources and Distribution of Late Pleistocene Sand, Northern Gulf of Mexico Shelf

A completed 3-yr study of the sources and consequent distribution of late Pleistocene sand on the northern Gulf shelf clarifies paleogeography and alluvial identification. Techniques used to determine the sources of sand are: the Fourier technique (which differentiated sands from different source terranes on the basis of the shapes of quartz sand grains), mineralogic analysis (which identified the composition of the source terranes that contributed each quartz-shape type), and an evaluation of the source terranes drained by each of the southern United States rivers (thereby linking each shape type to a particular river). These data and the mapped distribution of sand deposited on the shelf by each of these rivers during the late Pleistocene lowstand indicate distribution patterns have not been modified by modern shelf currents to any great extent, and thus record the late Pleistocene paleogeography of the shelf. These distributions show, among other things, the locations of the late Pleistocene alluvial valleys of each of the southern United States rivers, and identify the sources of shelf-edge deltas off the coasts of Texas and Lousiana that were detected by shallow seismic analysis.

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Significance of Eolian Quartzose Sheet Sands on Emergent Carbonate Shelves: Permian of West Texas-New Mexico

Permian (Leonardian-Guadalupian) regressive peritidal to shallow-marine carbonate sequences in the Permian basin of west Texas and New Mexico contain thin, widespread quartzose sand bodies. Due to their lack of diagnostic sedimentary and biogenic features, these sand bodies are of enigmatic origin. Several lines of evidence (sedimentologic, petrographic, facies relations, Quaternary comparisons) argue against the deposition of such blanket sands by fluvial or neritic processes and for their eolian origin. Our studies indicate that such units are dominated by progradational eolian sheet deposits with lesser preserved occurrences of cross-bedded dune, wadi, and evaporite-pan facies. These facies were deposited on arid, wind-dominated exposed flats adjoining deep basins. They represent short-lived cycles of shelf emergence (sea level fall) and rapid rates of sand accumulation that interrupted longer periods of highstand carbonate sedimentation.

The low preservation potential and paucity of eolian stratification in these deposits are inherent in such depositional systems due to: (1) removal of dunes from the shelf section because of their migration to the shelf margin, and subsequent transport into adjacent basins, (2) textural homogenization by organisms and repeated periods of evaporite crystal growth disruption and dissolution, and (3) additional bioturbation and/or physical reworking as the sands prograded into outer-shelf lagoons and during subsequent shelf transgression. Thus, the absence of "typical" eolian stratification cannot be used to exclude an eolian origin for thin, widespread sands, particularly in mixed carbonate-siliciclastic shelf systems. Conceptually, the occurrence of massive sheet sands may be the sole remaining evidence of eolian activity in such systems. The implications of this model can be extended beyond this particular Permian occurrence to numerous other polylithic shelf sequences in the record.