simultaneous trapping of 2 immiscible fluids. Theoretical analysis of the PVT properties of coexisting immiscible fluids demonstrates that the isochores for the 2 different fluids must intersect at the temperature *and* pressure of entrapment of the inclusions. Calculation of the PVT properties of each fluid requires detailed chemical analyses of both fluids. Recent results from new analytical techniques, especially capillary column gas chromatography to analyze hydrocarbon inclusions and laser Raman spectroscopy to analyze gases in aqueous inclusions, demonstrate that this approach to paleotemperature studies can be widely applicable in sedimentary environments.

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Sonograph Mosaic of Northern California and Southern Oregon Exclusive Economic Zone

During June 15 to July 9, 1984, the third leg of the cooperative U.S. Geological Survey–Institute of Oceanographic Sciences GLORIA survey of the conterminous United States Exclusive Economic Zone (EEZ) collected digital acoustic data off northern California and southern Oregon. The region covered during leg 3 extends from the 200-m isobath westward to the 375-km (200-nmi) EEZ boundary and from about 39° to 43°N. The survey used the IOS GLORIA long-range side-scan sonar, a 2-channel airgun seismic reflection system, and 3.5 kHz and 10 kHz high-resolution seismic systems. The GLORIA data were collected in a pattern that permitted overlapping coverage so that a mosaic of the sonographs could be constructed. These sonographs were slant-range and anamorphically corrected aboard ship, and a mosaic was constructed at a scale of 1:375,000.

Among the most striking geomorphic features revealed in this segment of the EEZ is the Mendocino transform fault, which extends for more than 120 nmi along the northern base of the Mendocino fracture zone and delineates the southern boundary of the Gorda plate. Other features clearly revealed are the complex geometry of the Gorda rift valley, and the subparallel flanking ridges and dramatically deformed base of the continental slope at the eastern boundary of the Gorda plate. The data are presently being processed by image analytical techniques to enhance the fine-scale features such as sediment waves, slumps, and areas of differing sedimentary facies.

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Paleoenvironmental Data as Exploration Tool in Lower Miocene of Offshore Texas

Most paleontological reports based on foraminiferal assemblages in well cuttings include an interpretation of the environment of deposition of the sediments penetrated. For an individual well, these data may be summarized as a paleoenvironmental curve. Data on a group of wells can be synthesized into paleoenvironmental maps and cross sections—useful tools for predicting sand distribution. These maps, used independently or in conjunction with net sand maps, can indicate the locations of ancient delta systems, hence sand sources. Paleoenvironmental cross sections graphically display transgressions and regressions.

The lower Miocene sediments in the Mustang Island and Matagorda Island areas of offshore Texas were deposited in a wide range of shelf and upper slope paleoenvironments. Paleoenvironmental maps, based on about 50 wells, suggest that a number of major delta systems developed in the Mustang Island and Matagorda Island areas during the early Miocene. Electric-log data show that thick pods of sand are associated with each of these ancient delta systems. Paleoenvironmental cross sections indicate that, although the section just above *Siphonina davisi* in southern Mustang Island is strongly regressive, the equivalent section in eastern Matagorda Island is transgressive. Determination of such transgressive/regressive trends is vital to predicting the dip position of potential reservoir sands. A cross section through Matagorda block 622 illustrates that a considerable thickness of deep-water sediments can overlie an older, shallower water, sandy interval. Therefore, the penetration of a thick sequence of deep-water shales does not necessarily indicate that underlying prospective sections will not be encountered.

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Origin of Na-Ca-Cl Brines in Jurassic and Cretaceous Reservoirs of Gulf Coast

Na-Ca-Cl brines in Jurassic and Cretaceous reservoirs in the Gulf Coast have been attributed to the diagenesis of concentrated Jurassic seawater related to Louann Salt deposition and alternatively to the diagenesis of brines produced by halite dissolution. These brines contain up to 35,000 mg/L Ca, up to 4,000 mg/L Mg, from 400 to 2,400 mg/L Br, and up to 13,000 mg/L K. Mutual relationships of Na, Cl, total divalent cations minus sulfate and bicarbonate, K, and Br are similar to those in seawater that has been evaporated past the initial stage of halite deposition, particularly when the K content of the brine exceeds 5,000 mg/L. The concentrations of divalent cations and K increase, and the mutual relationships of all the dissolved salts become increasingly similar to those in seawater with increasing proximity to bedded salt. The abundance of authigenic K-feldspar in rocks above the salt beds explains the relatively rapid decrease in the K content of the brines upsection. The Ca and K contents of Jurassic Gulf Coast brines are similar to those in Na-Ca-Cl brines in feldspar-poor carbonate sequences in other basins.

C. S. Land and D. R. Prezbindowski suggested in 1980 that the Na-Ca-Cl brines in the Edwards formation of Texas originated from halite dissolution and gained Br from halite recrystallization, Ca from the albitization of plagioclase, and K from the alteration of K-feldspar. Since the Br content of the brines is high and the Br content of halite is low (generally < 100 ppm), Br would have to be stripped from an enormous volume of (impermeable) salt and transferred to a relatively small volume of fluid. Mass-balance calculations indicate that Br would have to be stripped from more than 7.5 km of salt to account for the bromide in the brines of the Mississippi salt basin. If Ca and K in Na-Ca-Cl brines are derived from feldspars, these elements should increase in concentration relative to chloride with increasing distance from the source of NaCl. This is the reverse of the field relations in Mississippi, where unaltered authigenic K-feldspar is present in rocks above the salt, and the K content of the brines decreases relative to Cl with increasing distance from the halite. Finally, it is not clear how 3 completely independent processes can operate to produce such an excellent match to the dissolved constituents of evaporated seawater over such a wide geographic area and in strata with varying amounts of feldspar. The simplest genetic model is that Gulf Coast Na-Ca-Cl brines formed from evaporated seawater and evolved to their present composition accompanying the processes of dolomitization and loss of sulfate.

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Hybrid Eolian Dunes of William River Dune Field, Northern Saskatchewan, Canada

A series of northwest-southeast aligned, large-scale (up to 30 m high) eolian dunes, occurring in a confined (600 km^2) desert area in northern Saskatchewan, Canada, was examined in the field. Observations were made of dune morphology and internal structure, and patterns of sand movement on the dunes were analyzed in relation to wind events during the summer of 1981.

Present cross-sectional profiles exhibit steeper northeast slopes, the lower segment of which are intermittently covered by psammophilous grasses. Dune structure is dominated by northeast-dipping accretion laminae. Three ^{14}C dates from organic material cropping out on the lower southwest slopes reveal that the dunes have migrated as transverse bed forms at rates of roughly 0.5 m/yr during the last few hundred years. However, a progressive increase in height, bulk, and symmetry along the dune axis from northwest to southeast, suggests an along-dune component of sand transport. This view is supported by (1) field measurements of airflow and along-dune sand transport patterns on 2 dunes, and (2) the present-day wind regime (1963-78). Dominated by north-northeast to northeast winds from January to June and by west-southwest winds from July to December, the resultant potential sand transport vector is toward the southeast, virtually identical to the dune axis.

The dunes are viewed as a hybrid type, forming in response to a combination of transverse and longitudinal processes and are probably not uncommon in many deserts. The discordance between the dune structure