are of low cohesive strength. The influence of sediment strength and previous sediment faulting on the development of draped sediments and rim synclinal structures remain outstanding concerns.

LERCHE, I., Univ. South Carolina, Columbia, SC, and J. J. O'BRIEN, Sohio Petroleum Co., San Francisco, CA

Processes Involved in Salt-Dome Development II: Thermal, Gravitational, and Chemical Effects

The quantitative investigation of processes involved in salt dome development include thermal, gravitational, and chemical effects of uprising salt domes. We find that (a) there must be a positive-temperature anomaly occurring around the upper flanks of a salt dome but that organic maturation is typically so low that the resulting enhanced maturation is still insignificant for hydrocarbon generation, (b) there must be a negative temperature anomaly occurring around the lower flanks of a salt dome that significantly inhibits overmaturation of hydrocarbons and so enlarges the hydrocarbon window, (c) the magnitude of the negative gravity anomaly associated with a salt dome, that is predicted by an equilibrium model of gravitational instability is much smaller than the observed values, implying that salt domes are inhibited in their development either by lateral sediment strength, undercompaction of the overlying or surrounding sediments, or by the available supply of salt, (d) the 4 major current suggestions for cap-rock formation discussed in the literature have serious deficiencies; none of them is capable of supplying enough anhydrite for the observed thicknesses of cap rocks. Permeability enhancement by 2 orders of magnitude is required for any of these processes to be viable. A method for producing such an enhancement is based on fluid characteristics in a generalized sandstone and shale section.

LESCHAK, P., D. PRUSAK, and J. MAZZULLO, Texas A&M Univ., College Station, TX

Sources and Distribution of Upper Pleistocene Sand, Eastern United States Atlantic Shelf

A 2-yr study of the sources and distribution of upper Pleistocene and Holocene sand on the eastern United States shelf between the Bay of Fundy and Cape Hatteras reveals that 3 sand types are found on this shelf: (1) glacially transported, very angular sands, (2) fluvially transported, well-rounded sands derived from unlithified coastal plain deposits, and (3) fluvially transported, moderately angular sands derived from lithified sedimentary and crystalline rocks of the Appalachian and New England areas. For the most part, the distribution of these sand types reflects the late Pleistocene paleogeography of this shelf. Glacial sands are found in the areas of upper Pleistocene till, moraine, and outwash-plain deposits east and northeast of the Hudson Canyon; the 2 fluvial sands are found in coast-normal stripes that correspond to the ancestral paths of the many rivers that traversed this shelf during the late Pleistocene. The preservation of relict paleogeographic patterns of these sorts are an indication of diffusive transport of sand through most of this shelf. The exceptions to this are found in the shallow waters of Nantucket Shoals and Georges Bank, where glacial sands are presently being advected to the southwest by the strong tidal currents that prevail.

LEVIE, DONALD S., JR., Phillips Oil Co., Houston, TX

Deep-Water Hydrocarbon Potential of Georges Bank Trough

Characterization of the petroleum potential for Georges Bank Trough has been based primarily on limited organic geochemical data that indicate the area of recent drilling activity behind the paleoshelf edge to be poor in organic carbon and $C_{15}+$ extract values, with predominantly terrestrial kerogen types. Maturation data also suggest an inadequate thermal history for hydrocarbon generation in the area. It is possible that the effects of heat flow from the New England Seamount Chain may contribute to hydrocarbon generation in the Georges Bank Trough—a relationship that may also exist between the Newfoundland Seamount Chain and the Hibernia area of the Grand Banks. Also, comparisons can be drawn between the Atlantis Fracture Zone bordering the Georges Bank Trough and the Romanche-St. Paul Fracture Zone off the Ivory Coast. In the latter region, restricted anoxic environments with sediments rich in marine kerogen types have been identified, as have both structural and stratigraphic trapping mechanisms. Within this rhombochasm configuration, reservoir lithologies of sandstone and carbonate turbidites, fractured deep-water chalks, and reefal limestones should occur.

The relationships of seamount to fracture zone, as applied to the rhombochasm model for the Georges Bank Trough, should enhance the hydrocarbon potential of the lower Mesozoic sediments seaward of the paleoshelf edge and thus classify this area as a future major hydrocarbon province.

LEVY, JOEL B., Exxon Co., USA, New Orleans, LA

Major Discoveries in Eolian Sandstone: Facies Distribution and Stratigraphy of Jurassic Norphlet Sandstone, Mobile Bay, Alabama

Recent exploratory and development drilling in Mobile Bay, southwest Alabama, has proven prolific gas production from the Norphlet sandstone at depths greater than 20,000 ft with individual well tests of 10-27 MMCFGD. Excellent reservoir qualities are a function of preserved primary porosity and permeability developed in an eolian setting.

In Mobile Bay, thick eolian sediments (200-600 ft) lie directly on Pine Hill or Louann evaporites. Three facies of the Norphlet have been recognized: (1) a thin (20-30 ft) basal wet sand flat or sabkha facies, (2) a massive dune facies, and (3) a thin (30-40 ft) upper marine reworked facies.

The wet sand flat or sabkha facies is characterized by irregular to wavy horizontally bedded sandstone associated with adhesion ripples. It is probably sporadically developed in response to localized wet lows during earliest Norphlet deposition.

The majority of the Norphlet section is characterized by massive wedge-planar and tabular-planar cross-stratified sandstone, interpreted to be stacked dune and dry interdune deposits. Individual dune sets range in height from a few feet to 90 ft. Cross-bed sets exhibit internal stratification patterns similar to large- and small-scale dunes described by G. Kocurek and R. Dott, Jr.

The marine reworked facies is characterized by structureless to diffuse or wavy laminated sandstone that reflects a reworking of the dune deposits by the ensuing Smackover transgression.

Reservoir quality is affected by textural properties determined by depositional processes associated with these various facies. Diagenetic patterns further reducing reservoir quality occur in the depositionally less-porous sediments. Dune facies sediments exhibit the best reservoir qualities. Variations of reservoir quality within the dune facies are related to dune height and dune versus interdune accumulations.

LEW, L. R., and R. P. SAUERMANN*, Pennsylvania State Univ., University Park, PA, and J. DE BOER, Wesleyan Univ., Middletown, CT

New Evidence Suggesting Segmentation of Cocos Plate

Compilation and analysis of geophysical and geological data indicate that the Cocos plate consists of three segments that have individual poles of rotation and independent motion vectors.

Contoured heat-flow and gravity maps of the region delineate the boundaries of the segments within the Cocos plate. These segments have different focal-plane solutions along the Middle America Trench and different sedimentary-basin configurations within the Central America–Mexico island arc. Recent studies of seismic data from the region also have suggested that the subducted Cocos plate consists of three segments.

The proposed northern and central segments are separated by the northeast-trending Siqueros–Tehuantepec Ridge fracture zone. The proposed central and southern segments are separated by the northeast-trending Costa Rica fracture zone that is located just northwest of the Cocos Ridge and extends from the Galapagos rift to the central valley of Costa Rica. Poles of rotation and relative motion vectors have been calculated with respect to the Caribbean plate for each segment. The northern segment is moving N75°E, oblique to the trench; the central segment is moving N50°E, perpendicular to the trench; the southern segment is moving north, perpendicular to the trench.

The Siqueros-Tehuantepec and Costa Rica fracture zones appear to join with "tectonized" zones that dissect the Central America–Mexico island arc and extend across the Caribbean plate, suggesting that it too is segmented. Structural and stratigraphic data from the sedimentary basins