

served events, respectively. The average vertical separation during episodes of normal and reverse faulting was 1.90 and 0.24 mm, respectively. The cumulative vertical separation recorded during episodes of reverse faulting was 20% of that recorded during episodes of normal faulting.

Events occurred at different times along the same fault. This suggests that faults that have not been demonstrated to be active still must be considered to be capable of moving at any time at possibly damaging rates.

The events appear to be caused primarily by differential compaction and expansion of the Chicot aquifer in response to changes of its piezometric surface. Lesser causes may be the release of tectonic extensional strain energy, the depressuring of hydrocarbon reservoirs, and the movement of salt domes.

REINSON, GERALD E., and PETER S. ROSEN,
Geol. Survey Canada, Dartmouth, Nova Scotia

Depositional Sequence in Subarctic Sandy Beach Face,
Central Labrador

Beach-face deposits on the strand-plain coast near Michael River, Labrador, contain four distinct units. The basal unit 1 (60 cm thick) is a graded sequence of well-mixed sand and gravel near the bottom and medium-grained laminated sand at the top. It is disconformably overlain by unit 2 (20 cm thick) which consists of fine to medium-grained sand with contorted and disrupted laminations and small pods of loosely packed sand. Unit 3 (25 cm thick) is a chaotic gravel and sand sequence devoid of sedimentary structures, whereas the uppermost unit 4 (20 cm thick) consists of well-laminated, fine to medium-grained sand.

The stratigraphic sequence is interpreted as follows. Unit 1 represents the normal berm accretionary phase of late summer 1977, and unit 2, the foreshore accretionary phase during early winter. In early winter, the wetted beach surface begins to freeze and a deposit of interlaminated sand and ice forms under the continuous action of swash-backwash. This deposit is later deformed, owing to volume reduction and loading, during thawing. Small sediment-laden ice blocks, which are washed up and incorporated into the accreting laminated sequence, are represented by porous sand pods when the ice medium melts. Unit 3 is the remnant of ice-rafting and ice-push deposits which accumulated during ice breakup in spring 1978, whereas unit 4 records the normal foreshore swash-backwash accretionary phase of early summer 1978. The fact that freeze and breakup events are recorded within a complete yearly cycle of beach-face accretion indicates that such events could be preserved in the rock record under rapidly aggrading summer-beach conditions similar to those at Michael River.

REYNAUD, R., P. R. LOUIS, and J. LACAZE,
SNEA(P), Chambourcy, France

Deltaic Facies Recognition on Seismic Data

Seismic sections relating to shelf facies generally display parallel or slightly divergent reflections. An analy-

sis of internal parameters (such as continuity amplitude, frequency, and phase), areal associations, and external geometry of each unit allows a direct prediction of the nature of the deposits.

In the Niger delta, diagnostic seismic facies relate to each environment (marine, littoral marine, littoral, sea marginal, and fluvial). These seismic facies are also closely related to the electrofacies. Seismic models have been computed for several types of environment and comparison to the real section supports the interpretation.

REYNOLDS, RICHARD A., and RICHARD E. CASEY,
Rice University, Houston, Tex.

Neogene Radiolarian Biostratigraphy and Paleo-Oceanography of North Boundary Currents

Deep Sea Drilling Project (DSDP) cores from offshore Japan and California, land-based sections from California, and Holocene sediment samples from surrounding areas have been used to develop radiolarian biostratigraphies and to interpret paleo-oceanographic conditions for the Neogene of the Japan Current (a western boundary current) and the California Current (an eastern boundary current). Our studies suggest that (1) the present-day characteristics of boundary currents (western being deeper, narrower, swifter, and less productive than eastern boundary currents) have varied greatly throughout the Neogene, but are tied one to another; and (2) both mid-latitude regions can be correlated biostratigraphically to low latitudes. The Japan region is most correlative to low-latitude radiolarian biostratigraphic zones. The developed biostratigraphy of the region and inferred paleo-oceanographic trends aid in correlation of the California region to low-latitude radiolarian biostratigraphies. Comparison of material from boundary-current regions with equatorial and subpolar North Pacific DSDP material suggests that tectonic events such as the uplift of Panama may be tied to the observed Neogene changes in these boundary-current regions. These studies have also been instrumental in indicating radiolarian taxa that may be used to suggest relative paleodepth of deposition and eutrophic conditions in these boundary-current regions.

REYNOLDS, RICHARD L., and MARTIN B. GOLDHABER,
Texaco Inc., Houston, Tex.

Marcasite in Roll-Type Uranium Deposits

Iron disulfide minerals occur in anomalously high concentrations in uranium-bearing zones of roll-type uranium deposits and are thus important components of the geochemical system that governs formation of these uranium orebodies. These high concentrations have been interpreted by previous workers as resulting from an ore-stage generation of sulfide superimposed upon a pre-ore generation. We have examined petrographically over 500 polished sections from five roll-type deposits, three from Texas and two in Wyoming, and have recognized both pre-ore and ore-stage generations of iron disulfides in each deposit. The two generations may be distinguished by textural relations. In each deposit, marcasite is present as an ore-stage sulfide; in