shallow Precambrian resistor to be correlative with granites outcropping in the Llano uplift. While indeterminate southeast of Taylor, autochthonous Ouachita foreland facies is interpreted to overly Precambrian basement of similar resistivity at least as far southeast as the rimming gravity high.

Several other resistive and conductive zones are indicated in the Precambrian basement, including a resistive zone which rises to the southeast from a depth of approximately 50,000 ft (15,240 m) near Georgetown to 10,000 ft (3,050 m) into the core of an antiformal basement structure coincident with the rimming gravity high.

MURRAY, STEPHEN P., and HARRY H. ROBERTS, Louisiana State Univ., Baton Rouge, LA

Control of Accretion Processes on Tiran Strait Sill by Evaporation-Driven Current Dynamics

The Strait of Tiran (~4.5 km, 2.8 mi, wide), linking the Red Sea and the Gulf of Aqaba, is characterized by 4 small, shallow carbonate platforms separated from the Sinai coast by the deep (≈280-m, 920-ft) Enterprise passage and from the Saudi Arabia coast by the shallow (≈75-m, 250-ft) Grafton passage.

Intense evaporation (3.5-5.0 m/yr, 11.5-16.5 ft/yr) in the interior basin of the Gulf of Aqaba suggests the presence in the strait of an inverse stratified flow, similar to the Strait of Gibraltar. As no direct observations of currents existed, 12 current meters were deployed for 5 weeks across the 2 deep passages in winter 1982. Other physical data included salinity-temperature-depth (STD) transects and wind and tide measurements.

The deeper Enterprise passage shows a remarkably steady, strongly developed 2-layered flow structure, with upper layer net inflows of 30-40 cm/sec (12-16 in./sec) and lower layer net outflows of 55-60 cm/sec (22-24 in./sec); the shallow Grafton passage is completely in the upper layer, with net flows of 30-40 cm/sec (12-16 in./sec) directed northerly into the Gulf against the wind.

High-resolution seismic profiles, side-scan sonar data, echo-sounder profiles, and direct observations of the bottom indicate morphological responses in sill geometry and sedimentation patterns that reflect controlling dynamics. For example, morphological features associated with the shallow sill channels are controlled by the upper-layer gulfward flow. Current and salinity data in the deep passage suggest outflow-oriented features that are as yet unconfirmed by seismic profiles. Bottom samples suggest that sill accretion is accomplished primarily by the buildup of coralline algae, as well as stabilization of coarse bottom sediments by both organic and inorganic cements. Another striking feature is the occurrence of large and numerous patch reefs on the windward (northern) slope of the shallow platform margins. Storm wave forces on the platform front apparently dislodge carbonate blocks that function as substrates for thriving patch reefs. These processes are likely characteristics of entrances to tectonic troughs in early stages of ocean-basin formation.

NEESE, DOUGLAS G., and JOHN D. PIGOTT, Univ. Oklahoma, Norman, OK

In-Situ Rock/Water Geochemistry of Holocene Marine Radial Ooid Environment, Lizard Island, Great Barrier Reef, Australia

Although most marine ooids have concentric structure and aragonitic composition, radial-structural aragonite ooids occur in Lizard Island. Radial ooids are confined to the lagoonal sediment south of Lizard Island in water depths of 0-7 m (0-23 ft). Primary bed forms vary from minor current ripples to nondescript. Ooids comprise up to 18% of the subarkosic sands and are found in an environment protected from open-ocean energy by patch and fringing reefs. Ooids are dark gray and are frequently bored by endolithic algae. Compound and asymmetric forms are common. Individual aragonite crystals may range up to 12 μm in length.

To assess the environment of formation, in-situ diurnal chemical measurements were made in the ooid and interstitial and ambient waters. Critical parameters examined in a 28-hr period were temperature, pH, P_{CO_2}, Cl ‰, $A_{Ca^{2+}}$, and $A_{CO_3^{2-}}$. Cyclic diurnal changes occur in both water systems, with the ambient water experiencing the greatest changes. Measured extremes for the ambient water are day = 25.3°C, P_{CO_2} of $10^{-5.08}$, and Alk_c of 2.52 meq; night = 22.3°C, P_{CO_2} of $10^{-4.98}$, and Alk_c of 4.31×10^{-3} meq. The $A_{Ca^{2+}}$ (2.6×10^{-3}) and Cl ‰ (19.24 ‰) are essentially time invariant. The P_{CO_2} ranges from atmospheric saturation in the day to supersaturation during the night. Both ambient and pore waters are supersaturated with respect to aragonite ($\Omega_{ARAG\text{-}ambient} = 2.8$ to 4.4; $\Omega_{ARAG\text{-}porewater} = 3.1$ to 4.1). Our findings suggest alkalinity consumption by carbonate precipitation occurs during the day and is greatest in the upper 10 cm (4 in.) of ooid sands.

This physical/chemical environment differs from other monitored classic ooid localities and is diagnostic of marine radial-structured aragonite ooid growth.

NEESE, KEVIN J., Louisiana State Univ. and Louisiana Geol. Survey, Baton Rouge, LA

Stratigraphy of Transgressive Barrier Island Arc

Isles Dernieres, a Holocene transgressive barrier island arc on the Louisiana coast formed as a result of dominant marine processes reworking deposits of the abandoned Caillou distributaries of the early Lafourche delta lobe. The island system exhibits a variable transgressive and regressive stratigraphy throughout its framework, which is discriminate from comparable Atlantic coast transgressive barrier sequences. Continuous subsidence and storm breaching divide the island system into 3 major island segments: Western, Central, and Eastern Isles Dernieres, each of which is separated by locally interjacent tidal inlets.

Vibracore data reveal that Western Isles Dernieres represents a series of accreting sand spits that resulted from the erosion and longshore transport of the abandoned distributary channel deposits from the central deltaic headland. This 3 to 4-m (10 to 13-ft) thick sequence of sand spits and associated marsh deposits overlies interdistributary silts and clays. Central Isles Dernieres is a fluvial-deltaic complex that exhibits marsh and tidal-flat deposits capping a relatively thick sequence of levee and interdistributary bay sediments. A relatively thin beach-ridge plain lies locally submerged beneath sand spit and marsh deposits of Eastern Isles Dernieres. This beach-ridge plain formed during a regressive phase of island evolution. Erosion of the beach-ridge plain above the effective wave base presently provides an active sand source for the downdrift accreting sand spit at the eastern end of Isles Dernieres.

A high preservation potential of the western and eastern transgressive sequences of Isles Dernieres is probably due to rapid subsidence and the consequent in-place drowning of the island segments. In contrast, Atlantic coast barrier counterparts often exhibit incomplete transgressive sequences owing to continued shoreface erosion.

NEHRING, RICHARD, NRG Associates, Pacific Palisades, CA

Estimating Reserve Growth: Opportunities and Challenges for Petroleum Resource Assessment

Historically, efforts at petroleum resource assessment have concentrated on assessing amounts remaining to be discovered in unknown fields. Today the most important methodological frontier in petroleum resource assessment is assessing reserve growth in known fields. During the past 10 yr, most of our reserve additions have come from the growth of old fields, not the discovery of new ones. In the contiguous United States, most of our recoverable resource potential of crude oil, and possibly of natural gas as well, is in known fields. To the conventional sources of reserve growth (extensions and new pool discoveries), recent improvements in economics and technology have added such diverse phenomena as infill drilling, well stimulation in tight formations, enhanced oil recovery, reduced abandonment pressures and production levels, and development of known but previously subeconomic areas and pools. The reserve appreciation models customarily used to estimate reserve growth fail to capture the effects of these and other recent developments. No single method will suffice in future assessment efforts, because the mechanisms of reserve growth have become too diverse. New methods must be tailored to the specific characteristics of each type of reserve growth. Economics must be considered explicitly. Improvements in field data bases are a fundamental prerequisite for the successful development and application of new methods.