ciently large to allow hydrocarbon maturation at depth, if suitable organic material is present.

Our initial results suggest that the Aleutian basin deserves further exploration as a site for possible hydrocarbon accumulations.

CROUCH, JAMES K., U.S. Geol. Survey, Menlo Park, CA

Speculations on Hydrocarbon Potential of Deep-Water Basins in Outer Southern California Borderland

Significant accumulations of hydrocarbons may be present within Miocene and younger strata that fill several deep-water basins in the outer southern California borderland. Multichannel seismic reflection and sonobuoy refraction profiles across one of these basins (informally termed Patton basin) reveal a moderately thick sedimentary section overlying acoustic basement. Patton basin lies between the northern segments of the Patton and Santa Rosa-Cortes Ridges and has an average seafloor depth of about 1,200 m. The sedimentary section within Patton basin ranges from 1.6 to 3.5 km in thickness, with the thickest part (2 to 3.5 km) located at the northern end of the basin. Tanner basin, which joins Patton basin at the south, probably contains a greater thickness of sediment.

Strata that crop out on the adjacent ridges can be traced beneath Patton basin on acoustic-reflection profiles. Based on samples from these ridges, acoustic basement within the basin consists of rocks that are assigned to the Franciscan assemblage. Acoustic basement is overlain unconformably by about 1,500 m of lower and middle Miocene strata. These strata are faulted and folded and are in turn unconformably overlain by as much as 2,000 m of less deformed late middle Miocene and younger strata. Overall, the basin appears to have stratigraphic and structural characteristics that are similar to the hydrocarbon-producing parts of the onshore Santa Maria basin.

Several characteristics of the Patton basin sediment make this basin and adjacent outer borderland basins favorable targets for hydrocarbon exploration: (1) Organic geochemical analysis of bottom samples from outcrops and well data indicate that the lower and middle Miocene strata filling the lower half of the basin are good to excellent potential source rocks. (2) Based on seismic reflection profiles and a nearby DSDP Site, sandstone of good reservoir quality may unconformably overlie the older strata. (3) Data from DSDP Site 467 suggest that strata within the borderland basins have been subjected to higher temperatures than time-equivalent, marginally mature strata that crop out on adjacent ridges. (4) Numerous structural and stratigraphic traps are present.

DAMASSA, SARAH PIERCE, Winchester, MA

Palynomorphs From Holocene Sediments of Basins in Southern California Continental Borderland

A suite of 17 box core samples taken along an onshore-offshore transect across the southern California continental borderland representing Tanner, Santa Monica, San Pedro, Santa Catalina, and San Nicolas basins were analyzed for palynomorph content. Dinoflagellate cysts, acritarchs (organic-walled phytoplankton), and spores and pollen of terrestrial plants are present in all samples. Dinoflagellate cysts and acritarchs are more common in samples from Santa Monica and San Pedro basins, and show a general decrease in abundance with increasing distance from shore. Cyst genera include *Leptodinium, Lingulodinium, Nematosphaeropsis,* and *Spiniferites* (referrable to the thecate genus *Gonyaulax*) and species of *Peridinium. Lingulodinium machaerophorum* Deflandre and Cookson (= *Gonyaulax polyedra* Stein) is the dominant species in all samples. Spores, pollen, and other plant tissue fragments provide an indication of the terrestrial component of these sediments.

Evidence of reworking of older material into recent sediments is suggested by differential stain uptake observed among individual specimens of phytoplankton and pollen.

DAVIS, THOM, Univ. California, Santa Barbara, CA

Basin-Edge Tectonics and Stratigraphic Development, Southern San Joaquin Valley, California

No abstract.

DUPRE, W. R., Univ. Houston, Houston, TX, and H. E. CLIFTON and R. E. HUNTER, U.S. Geol. Survey, Menlo Park, CA

Modern and Ancient Coastal Sedimentary Facies, Monterey Bay, California

Depositional processes and sedimentary structures in both barred and non-barred nearshore environments of the Pacific Coast vary systematically with water depth. These variations allow the construction of idealized progradational sequences of sediments deposited along a wave-dominated coastline. The idealized sequences are very similar to the vertical sequences of sedimentary structures preserved in Pleistocene marine terrace deposits exposed along the margin of Monterey Bay.

The central Monterey Bay coastal region has been a subsiding depocenter for marine, fluvial, and eolian sedimentation throughout the Quaternary. It provides an opportunity to study the role of climatic change (including fluctuating sea level) in controlling patterns of Quaternary sedimentation and terrace formation along the non-uplifted portions of the California coastline. Most of the fluvial sediment in these regions was deposited during intervals of rising sea level, hence is out of phase with marine and eolian sediments deposited mainly during intervals of lowering sea level. In combination, however, these deposits form suites of sediments by which glacio-eustatic cycles can be recognized. Evidence of at least 11 such cycles is present within the Quaternary deposits in the north-central Monterey Bay region.

ECHOLS, R. J., and JOHN M. ARMENTROUT, Mobil Oil Corp., Dallas, TX

Holocene Foraminiferal Distribution Patterns on Shelf and Slope, Yakataga–Yakutat Area, Northern Gulf of Alaska

Foraminiferal distribution patterns in the northern Gulf of Alaska are interpreted as representing seven faunal assemblages. Three sublittoral and three bathyal

assemblages define depth zones. A seventh faunal assemblage occurs within two sublittoral depth zones where it is restricted to shelly, gravelly mud on submarine banks of truncated Pleistocene rocks. The study is based on 112 stained samples from stations between 15 and 1,350 m depths along transect lines across the shelf and slope between Cape Yakataga and Yakutat, and from within Yakutat Sea Valley and Yakutat Bay. Where data are adequate for depth zonation on live populations, zones determined on live and live-plus-dead populations are approximately the same.

The Yakataga-Yakutat area shelf and slope foraminiferal depth-zonation assemblages correspond in depth to depth-zonation assemblages from other areas of the northeast Pacific margin; the only marked difference is the deeper limit of the inner and middle sublittoral zone transition at 40-50 m, approximating the limit of inner-shelf sandy substrates. This depth limit is the same as that off Washington-Oregon and is significantly deeper than off southern California, reflecting the deeper reach of winter storm waves in the higher latitudes in the northeast Pacific.

Yakutat Sea Valley, a glaciated trough with a floor 100 to 150 m below the shelf, arcs across the shelf toward the mouth of Yakutat Bay. Yakutat Sea Valley is inhabited by outer sublittoral and upper bathyal benthic assemblages associated with abundant planktons. The distribution pattern of the assemblages is related more importantly to factors that vary with depth than to factors that vary with distance from shore or substrate type.

Yakutat Bay is a deep glacial bay with a sill depth of 75 m. The Yakutat Bay fauna developed between depths of 55 and 260 m resembles the open shelf fauna from between 50 and 75 m, suggesting that foraminiferal distribution in the bay is controlled by sill depth.

There are some notable differences in species distribution patterns between faunas in the Gulf of Alaska and those farther south in the northeast Pacific. For example, in the Gulf of Alaska, *Epistominella pacifica* is an outer sublittoral to bathyal species instead of being exclusively bathyal, and *Uvigerina peregrina* remains costate instead of changing to hispido-costate with increasing depth in the bathyal zone.

EDMONDSON, WILLIAM F., Mariposa Petroleum Co., Bakersfield, CA

Member Sands of Winters Formation

Six member sands are defined for the Winters Formation in the subsurface of the Sacramento Valley of California. Relations between these member sands and the S-5 member of the Starkey sands provide the basis for reconstruction of geologic events and basin geometry.

Two subbasins are recognized. Deposition of the Winters sands was concentrated in the northern subbasin where a more complete reconstruction of events is possible, though the largest gas field producing from the Winters sand is at Union Island in the southern subbasin.

The lower sands (Staten Island and Walnut Grove members) are inner bathyal deposits and part of an oblique tangential depositional pattern. These lower members are overlain unconformably by the S-5 member of the Starkey sands.

Due to partial filling of the basin, depositional conditions changed and subsequent sands (Putah Sink, Mound, and Unit members) are recognized as the deeper water facies of the S-5 member of the Starkey sands with an intervening area of shale representing deposition along the gentle prograding slope. For the uppermost part (McCune member), the basin filling had progressed to where there was no intervening shale between the Winters sand facies and the S-5 Starkey sand facies. The prograding slope can no longer be identified and the dividing line between the two sands is poorly defined.

Distributary channels served as conduits feeding sand into the central part of the basin where the Winters sands were deposited. For the lower members, stratigraphic trends associated with these distributary channels are favored areas for gas accumulation. For the higher members, gas accumulation is controlled primarily by faulting.

Discoveries to date total about 750 million Mcf recoverable reserves of which 400 million Mcf is estimated to be in the Union Island gas field. Future discoveries are anticipated in traps similar to those associated with existing discoveries.

EDWARDS, BRIAN D., U.S. Geol. Survey, Menlo Park, CA

Mass Movement Effects on a Bathyal Macrofaunal Population, California Borderland

The benthic macrofauna of Santa Cruz basin, a dysaerobic bathyal basin in the California borderland, is subject to frequent substrate disturbances that erode the muddy surficial deposits, bury more deeply burrowing infauna, and transport shallow-water fauna to deeper environments. The effects on infaunal distributions have been examined through trophic-group and life-habit analyses.

X-ray radiography and textural distributions of surficial sediments recovered at 211 box-core stations are complemented by acoustic profiling records. These data indicate that the basin is presently filling by both hemipelagic sedimentation and gravity-induced mass movements. Failures are frequent, and many dislocations involve the uppermost 1 cm of the sediment pile.

A single ridge-crest to basin-floor transect of 10 stations has been quantitatively analyzed for macrofauna (>0.5 mm). Species richness, density, and standing crop decrease from the ridge crest across the slope and fluctuate on the basin floor proper. Polychaetous annelids dominate the benthic macrofauna; crustaceans are second in abundance on the slopes, and mollusks are second on the basin floor.

The sand-and-gravel covered crest is equally partitioned by epifaunal suspension feeders and surface-deposit feeders. In comparison, the silty slope is dominated by infaunal, surface, and subsurface deposit feeders. Upper slope populations are evenly divided among sessile and motile species; motile species become more common toward the base of the slope. The basin floor is dominated by motile, infaunal surface-deposit feeders.

Substrate instability produces confused and patchy