characteristic of shallower environments represent a displaced fauna.

Recognition of the Eocene *Ophiomorpha nodosa* Lundgren in the subsea fan deposits of the northeastern Olympic Peninsula documents an upper bathyal occurrence for this trace fossil.

ARMENTROUT, JOHN M., Mobil Oil Corp., Dallas, TX

Late Neogene Depositional and Climatic Cycles in Yakataga Formation, Gulf of Alaska

Lithofacies and chronostratigraphic analyses indicate three relatively warm and three relatively cool paleoclimatic intervals within the 5,000-m-thick strata of the lower Miocene through Holocene Yakataga Formation of the Robinson Mountains, eastern Gulf of Alaska. The cycle identified correlates with the widely recognized paleoclimatic cycle of warm middle Miocene, fluctuating late Miocene, cool terminal Miocene, warm early Pliocene, and cool to cold late Pliocene and Pleistocene. Glacial periods, recognized by the predominance of glacial lithofacies associated with populations of *Neoglobigerina pachyderma* s.l., are interpreted for the cool intervals. In the sections studied, the interglacial intervals have little or no glacial deposits.

ARMENTROUT, JOHN M., and GEORGE A. ANDERSON, Mobil Oil Corp., Dallas, TX

Hydrocarbon Potential of Sitkalidak Formation, Eocene Submarine Fan Complex, Kodiak Island Archipelago, Alaska

The middle upper Eocene Sitkalidak Formation is a 4,000-m thick sequence of interbedded sandstone, shale, and conglomerate. The formation crops out along the southeast side of the Kodiak Island archipelago and is believed to underlie the continental shelf for several hundred kilometers along a northeast structural grain. The Sitkalidak Formation, as used here, includes marine sandy flysch previously mapped as Sitkinak Formation.

The Sitkalidak Formation is a complex of submarine fans deposited at mid- to upper-bathyal depths in a northeast-trending structural trough. This trough was probably an accretionary basin located on an oceanic trench inner slope. The submarine fan deposits were subsequently faulted and uplifted during late Eocene subduction along an ancestral Aleutian trench. Emplacement was complete by early Oligocene time as the Sitkalidak Formation is overlain with angular discordance by the nonmarine Sitkinak Formation of Oligocene age.

Sitkalidak Formation sandstones were deposited as quartz-poor and mineralogically unstable feldspathic lithic arenites. Diagenesis has greatly reduced primary porosity and permeability to an average 2.5% ϕ and 0.01 md k (101 samples – ϕ = 1.0 to 7.5%; k = 0.0 to 1.3 md).

Sitkalidak Formation shales are gray to black silty claystones which contain dominantly terrestrially derived organic matter. Total organic content averages 0.44% (217 samples – TOC = 0.01 to 2.38%), suggesting lean source-rock potential for liquid hydrocarbons. Vitrinite reflectance values average 0.80% (53 samples – R_o = 0.54 to 0.92%), suggesting thermal maturity levels sufficient for oil generation.

Despite the presence of thick sandstone sequences and potential structural and stratigraphic traps, the Sitkalidak Formation has a low potential for hydrocarbon production because of the poor reservoir character of the sandstones and poor source potential of the shales.

ARMSTRONG, AUGUSTUS K., U.S. Geol. Survey, Menlo Park, CA, BERNARD L. MAMET, Univ. Montreal, Montreal, Quebec, and JOHN E. REPETSKI, U.S. Geol. Survey, Washington, D.C.

The Mississippian System of New Mexico and Southern Arizona

Lower Mississippian rocks of New Mexico and southern Arizona (pre-zone 7 Tournaisian age) are unconformable on rocks of Late Devonian to Precambrian age. Mississippian rocks were deposited during transgression on a surface of low relief. Tournaisian transgression began in southern Arizona, depositing the Escabrosa Limestone and, in southwestern New Mexico, the Keating (207 m), Caballero (18 m), and Lake Valley (180 m) Formations. At the end of Tournaisian time, epicontinental seas flooded southern and central Arizona, depositing the younger parts of the Escabrosa and Redwall Limestones. Osagean seaways extended to central and northern New Mexico depositing Kelly (35 m) and Espiritu Santo (35 m) Formations. The Espiritu Santo consists of subtidal to supratidal quartz sandstone and carbonate rocks. Zuni Highlands and Pedernal Highlands formed two low islands. The end of the Tournaisian is marked by marine regression, regional uplift, and erosion. Major regional marine transgression in early Visean is represented by parts of Escabrosa Limestone of southern Arizona, massive encrinites of the Hachita Formation (107 m) in southwestern New Mexico, basin carbonate rocks of the lower part of the Rancheria Formation (46 m) in south-central New Mexico, and the subtidal Tererro Formation (18 m) in north-central New Mexico. The Cowles Member (10 m) of the Tererro Formation indicates that sedimentation ceased in northern and central New Mexico in late Visean time. In southwestern New Mexico, the Paradise Formation (134 m) represents shallow-marine sediments and ranges from zone 15 into zone 19 (late Visean and Namurian). The Rancheria Formation (69 m) and the Helms Formation (50 m) of south-central New Mexico are deep-water facies of the Paradise Formation.

Pennsylvanian sedimentary rocks in southern Arizona and in New Mexico truncate Mississippian sedimentary rocks of Namurian, Visean, and Tournaisian age.

ARTHUR, MICHAEL A., WALTER E. DEAN, and RICHARD POLLASTRO, U.S. Geol. Survey, Denver, CO

Oxic-Anoxic and Carbonate Cycles in Cretaceous Organic Carbon-Rich Marine Strata

Sedimentary sequences of Early to middle Cretaceous