KLOVAN, J. EDWARD, and ASHTON F. EMBRY, III, Dept. Geol., Univ. Calgary, Calgary, Alta.

Upper Devonian Stratigraphy and Structure, Western Canadian Arctic Islands

Upper Devonian strata (Melville Island Group) in the western Arctic Islands are part of a clastic wedge at least 10,000 ft thick. The strata represent the uppermost part of the Lower to Middle Paleozoic sequence of the Franklinian miogeosyncline.

Three major depositional facies are recognized. (1) Marine shelf facies—interbedded green, very fine-grained, argillaceous quartz sandstone, siltstone, and shale with a few marine fossils. Organic limestones are rare. (2) High energy shoreline facies—white, fine to coarse-grained, well-sorted quartz sandstone with plant and fish remains. (3) Low energy shoreline facies—interbedded, very fine-grained, argillaceous quartz sandstone, siltstone, shale, and coal.

On Bathurst and Melville Islands, the Group is divided into the Hecla Bay Formation (early to middle Frasnian) consisting mainly of high-energy shoreline facies, and the overlying Griper Bay Formation consisting of 2 informal members. The lower member (mid to late Frasnian) consists of marine shelf facies, and the upper member (early to middle Famennian) consists of high- and low-energy shoreline facies. On Prince Patrick and Banks Islands only the Griper Bay Formation is developed. Two informal members are recognized, the lower comprising the entire Frasnian stage, and the upper a part of the Famennian.

The source area for the sediments is interpreted to have been a tectonic highland situated along the present western continental margin.

Mississippian (Ellesmerian) deformation resulted in the development of open anticline-syncline couples and normal faults. On Bathurst and Melville Islands these structures trend east-west. In contrast, the structures trend north-south on Banks Island. This sharp bend in the Ellesmerian fold belt may be interpreted to be an orocline superimposed on the Franklinian geosyncline during the Ellesmerian orogeny. Restoration of the orocline clarifies otherwise irreconcilable facies relations in the Upper Devonian strata of the Western Arctic Islands.

KNEBEL, HARLEY J., and JOE S. CREAGER, Dept. Oceanography, Univ. Washington, Seattle, Wash.

Holocene Sedimentary Framework of East-Central Bering Shelf: Preliminary Results

The floor of the east-central Bering Sea between St. Matthew and St. Lawrence Islands and the Alaska mainland during the late Pleistocene–early Holocene was a lowland scored with numerous broad depressions. High resolution profiles obtained with a precision depth recorder coupled with a transceiver operated at 12 kc and a pulse length of 0.4–2.0 msec show that these undulations have been smoothed by Holocene sedimentary fill and that some now lack bathymetric expression. Contorted, discontinuous reflectors within an 88-km NE-SW-trending trough that bisects the area, indicate that at one time the drainage pattern was dominated by the floodplain of a major meandering waterway. An isolated basin within this trough just northeast of St. Matthew Island has been filled with pre-Holocene varves and is capped by a transgressive sedimentary sequence that was deposited more than 12,000 years ago.

Spatial and temporal variations in rates of sediment accumulation indicate that the influence of fluvial and oceanographic processes changed considerably during the post-Wisconsin transgression of sea level across this part of the shelf. Radiocarbon dates from a core in the northwestern part of the area show a depositional rate of 33 mg/cu cm/year, whereas a contemporary annual rate measured over the same depth interval in a core taken from the southwestern sector is 186 mg/cu cm. Sediments in both areas are dominantly silt and clayey silt. The rates of accumulation are more variable farther offshore. A core from near the western perimeter of the area (water depth = 140 m) contains more than 10 m of homogeneous clayey silt that has been deposited since 12,000 years B.P. The causes of these differences will be resolved after precise isopach data have been compiled and specific paleo-shelf surfaces have been delineated.

KOSYGIN, YU. A., and L. M. PARFENOV, USSR

Precambrian Tectonics of Northern Asia

The North Asian craton may be isolated from other Precambrian structural units of northern Asia. These include the Precambrian Siberian platform pericratonal geosynclinal systems of the western and southern margins of the Siberian platform and the Verkhoyansk-Chukchi epicratonal geosynclinal region. A common feature of these regions is the presence of continuous and gently dislocated crystalline basement formed by the oldest Precambrian complexes (older than 3.3–3.5 b.y.), by gneiss complexes 2.5–2.6 b.y. old, and by volcanogenic-schist complexes 1.6 b.y. old. The Upper Precambrian beds of the Siberian platform are thin (less than 2 km) terrigenous-carbonate complexes, whose formation began north and east of the platform about 1.6 b.y. ago, south and west of the platform about 1.0 b.y. ago, and in the central areas about 0.7–0.65 b.y. ago. The upper Precambrian rocks of pericratonic and epicratonic geosynclinal systems are represented also by the nonmagmatic carbonate-terrigenous complexes of greater thickness than the platform rock sequences.

Analyses of the Precambrian sections of Severnaya Zemlya and Wrangel Island and geophysical data confirm that the North Asian craton extends from the adjacent shelf region of the Arctic Ocean to the continental slope.

On the west, south, and southeast the North Asian craton is separated from the central Asian fold belt by deep fault zones with Precambrian intrusions of hyperbasites and gabbroids. The central Asian fold belt is characterized by complex structure. Within its boundaries volcanogenic, terrigenous, and carbonate successions of upper Precambrian formations can be identified. Separation of the craton and the fold belt had occurred in early Precambrian time, 2.5–3.0 b.y. ago. The granitoid belt of Precambrian and Paleozoic ages and the zones of pronounced metamorphism (up to granulite and amphibolite facies) are confined to the boundary between the craton and fold belt.

KRASNY, L. I., All-Union Scientific Research Geol. Inst., Vsegei, Leningrad, USSR

Geologic Structure and History of Geologic Development of Eastern USSR

Three geochrons are distinguished: (1) Protogey (before 1,600 m.y.), (2) Mesogey (1,600–600 m.y.), and (3) Neogey (younger than 600–550 m.y.).