dard Space Flight Center (GSFC) to adjust for the detector response of the Multispectral Scanner (MSS). Because illumination conditions and landscape characteristics vary considerably and detector response changes with time, the radiometric adjustments applied at GSFC are seldom perfect and detector striping remains in LANDSAT data. Therefore, adjustments are applied to minimize the effects of striping, and to adjust for bad data lines, line segments, and lost individual pixel data. Rotation of the earth under the satellite and movements of the satellite platform introduce geometric distortions in the data which must be compensated for if image data are to be correctly displayed to the data analyst. Adjustments to LANDSAT data are made to compensate for variable solar illumination and for atmospheric effects. Geometric registration of LANDSAT data involves determination of the spatial location of a pixel in the output image and determination of the new value of the pixel in the output image.

TEMPLES, TOMMY J., and BARUN K. SEN GUPTA, Univ. Georgia, Athens, Ga.

Late Quaternary Foraminiferal Record in Eastern Caribbean Cores—Paleo-Oceanographic Implications

Oxygen-isotope variations in planktonic Foraminifera (*Orbulina universa, Globorotalia menardii,* and *Globigerinoides sacculifer*) indicate that, in two Grenada Basin cores, paleontologic datum planes do not coincide with isotope boundaries. The time lag is greater when the boundaries are transitional from glacial to interglacial phases.

Recurrent-groups analysis of benthic foram assemblages led to the recognition of five groups. Only one of these, containing *Osangularia culter, Bulimina buchiana,* and *Chilostomella oolina,* appears to have any stratigraphic significance. The group shows its best development during interglacial times. In accordance with Weyl's paleo-oceanographic model, this group is associated with colder bottom waters and can be used to draw inferences about the influx of such waters. Periods of cold-water influx ranged from before 367,000 to 210,000 years B.P., from 139,000 to 81,000 years B.P., and from 22,000 to 8,600 years B.P. Cessation of influx 8,600 years B.P. is further substantiated by heat-flow calculations.

TERRY, GLENN A., U.S. Nuclear Regulatory Commission, Washington, D.C.

Environmental Assessment of In-Situ Leaching of Uranium

Maintenance of water quality during and following in-situ leaching of uranium is the fundamental problem which must be considered in an environmental assessment of such operations. Prior to any leaching activity, a realistic baseline by which to judge the groundwater quality must be established for any given operation. Monitoring programs will be required to evaluate subsurface restoration efforts and to assess the containment of the lixiviant and the solubilized ions essentially within the mining area of the ore-bearing aquifer of the leaching operation. Disposal of leach-mining wastes may prove a greater threat to the environment than the mining.

THIEDE, JORN, Univ. Oslo, Oslo, Norway

Oceans and Climate During Cenozoic

Ten years of deep-ocean drilling have helped to assemble an enormous body of new data about the evolution of the physiography and sedimentary processes of the Cenozoic ocean basins. The formation of the Southern Ocean isolated Antarctica and allowed the evolution of the circum-Antarctic oceanic current regime during mid-Tertiary time. The opening of the Norwegian-Greenland sea during the early Tertiary and the final subsidence of the Iceland-Faroe Ridge during the late Miocene connected the main North Atlantic with the Arctic basin. This seaway was the final step in the formation of an ocean basin connecting the cold, polar water bodies of both hemispheres. The construction of the middle American land bridge and the interruption of the Tethys into separated shallow and deep basins led to a segmentation of the old global, equatorial seaway into different current regimes in the Indian, Atlantic, and Pacific Oceans. This physiographic-tectonic evolution of the ocean basins and the deterioration of the earth's climate during the Cenozoic led to important changes of the depositional regime in the deep oceans because of the initiation of a vigorous polar bottom-water formation and because of the generation of steep zonal hydrographic gradients in the surface-water masses. The effects of these changes on pelagic sedimentation cannot be separated easily, but they have resulted in many deep ocean basins and in lithofacies distributions along their continental margins that are asymmetric along zonal profiles. The DSDP data from the North Atlantic are a prominent example of this Cenozoic evolution of the pelagic depositional environment.

THIEDE, JORN, Univ. Oslo, Norway; T. L. VALLIER, U.S. Geol. Survey; E. VINCENT, Scripps Inst. Oceanog.; R. R. SCHMIDT, Univ. Utrecht; A. SCHAAF, Univ. Louis Pasteur de Strasbourg; C. A. SANCETTA, Stanford Univ.; P. CEPEK, Bundesanstalt Geowissenschaften u. Rohstoffe; A. BOERSMA, Columbia Univ.; N. FUJII, Kobe Univ.; W. O. SAYRE, Univ. Southampton; K. E. WINDOM, Iowa State Univ.; K. E. SEIFERT, Iowa State Univ.; D. K. REA, Univ. Michigan; V. I. KOPORULIN, USSR Acad. Sciences; W. E. DEAN, U.S. Geol. Survey; and C. G. ADELSECK, Scripps Inst. Oceanog.

Middle Cretaceous Oxygen-Deficient Paleoenvironments in Mid-Pacific Mountains and on Hess Rise, Central North Pacific Ocean

Cores collected during Leg 62 of the Deep Sea Drilling Project recovered organic-rich rocks of early Aptian age in the Mid-Pacific Mountains and of late Albian age on the southern Hess Rise. Concentrations of organic carbon in these rocks range from a few tenths of 1% to more than 9%. The organic-rich strata in the Mid-Pacific Mountains are in a 45-m-thick sequence of carbonaceous and tuffaceous limestone that lies on inter-