Bed-parallel disc fractures started at bit level, within the core, at bedding irregularities. Hackle plumes indicate that spreading velocity of disc fractures was greatest toward core centers and decreased toward core margins in response to changes in tensile stress intensity.

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Radiolarian Preservation in Present and Past Oceans

Three methods were used to collect living and recently dead radiolarians and fecal pellets containing radiolarians—plankton tows for those in the water column, and gravity cores and box cores for recovery from surficial sediments. Deep Sea Drilling Project cores were used to study radiolarians from fossil sediments. Our techniques differ from previous studies by the investigation of individual skeletons and suggest that radiolarian skeletons are removed from the water column primarily by dissolution and, secondarily, by settling as individuals or via fecal pellets. Laboratory experiments suggest that metallic coatings help to protect the skeletons from dissolution in the water column and in sediments. Other factors of extreme importance are differential rates of settling, thickness of the "radiolarian dissolution zone," productivity of overlying waters, amounts and ratios of terrigenous and authigenic sediment, presence of different water masses in the water column and at the sediment-water interface, degree of bioturbation, and chemical conditions at and below the sediment-water interface.

Paleobiologic developments such as the evolution of diatoms appear to be related to radiolarian conservation. The use of silica by diatoms may be partly responsible for the preferential dissolution of some Neogene radiolarians. Major changes in oceanic circulation appear to be related to such changes as the cessation of radiolarian preservation in the middle and tropical Atlantic during the middle Miocene.

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Sedimentologic Facies in Modern Glacial-Marine Environment

Studies of recent Antarctic glacial-marine sediments have enabled us to delineate facies associations that reflect the influence of fundamental glaciologic and glacio-isostatic processes on continental-margin deposition. Glacial-marine deposits can be broadly categorized as representing three sedimentary provinces. These are (1) the grounded shelf province—that portion of the continental shelf where sediments have been deposited by grounded ice at some time during glaciation; (2) the nongrounded shelf–upper-slope province; and (3) the middle to lower slope–rise province.

Sediments in the grounded shelf province consist predominantly of orthotills deposited by grounded ice, related till-flow deposits, and paratills deposited from floating ice. Glacial erosion and deposition by subglacial streams are also important processes. Seaward of the maximum grounding line, on the nongrounded shelf and upper slope, deposition is primarily by floating ice. However, substantial sediment reworking occurs, forming coarse residual deposits and sediments enriched in fine-grained material. From a sedimentologic standpoint, distinction between the outer shelf and upper slope is problematic. The middle to lower slope and continental rise may be dissected by submarine canyons or may be nonchannelized. Gravity-flow deposits are commonplace. Laminated muds, perhaps deposited by contour currents, are also widespread. The boundary separating the two slope provinces is related to a zone of glacio-isostatically induced slumping where sediment gravity flows are generated, and perhaps to the shallowest depth at which contour currents occur.

These facies associations are useful in characterizing older sequences; they have been used to interpret several ancient glacial-marine sequences.

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Organic Geochemistry of Sediments Recovered by DSDP/IPOD

Since the beginning of the Deep Sea Drilling Project more than 10 years ago, organic geochemical studies have been undertaken on almost 2,000 sediment samples from beneath the ocean floor. These studies have provided fundamental information regarding the distribution of carbon in oceanic sediments and have yielded a better understanding of the processes that alter and transform organic matter in the marine environment. Of particular practical importance have been those investigations directed toward the occurrence of liquid and gaseous hydrocarbons in sediment of the continental margins and ocean basins; however, work has not been specifically directed to finding oil and gas. Instead, such discoveries have been purposely avoided, and information about possible occurrences of petroleum has been extrapolated from studies of anoxic basins, such as the Carioca Trench and the Black Sea, and from continental-margin sediments such as those off Norway, northern Africa, and southwest Africa. It is evident that significant concentrations of organic matter are sequestered in certain marine sediments, and it appears that much of this organic matter has come initially from the continents. Studies of the continental rise off Morocco show that organic material is undergoing diagenetic processes leading to petroleum. The organic geochemical conditions for petroleum formation, therefore, are present in the outer continental margins, but it remains to be determined if the geologic settings there are favorable for petroleum accumulations.

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Silica Dissolution from Montmorillonite; Effect of Solution Chemistry

The rate of silica removal from two montmorillonites (Chambers and Polkville) has been measured as a func-