Some carbonate muds deposited in intraplatform basins of the Bahamas contain sufficient organic matter to be considered potential source rocks. The sediments are Holocene to late Pliocene and immature.

Total organic carbon (TOC) values range between 0.1 and 2.58% for the basinal sediments of Tongue of the Ocean and Exuma Sound, though averaging 1.0% in the Tongue versus 0.33% for Exuma Sound. The difference appears to be related to the sedimentation rates of the basins, estimated to be 10 to 200 mm/10^3 years for Tongue of the Ocean and 4 to 50 mm/10^3 years for Exuma Sound.

In Tongue of the Ocean we have correlated cyclic variations in TOC with fluctuations of sea level. High sea levels are recorded by aragonite-rich basinal muds (peri-platform ooze) with an average TOC of 0.7% and an abundance of organic-rich turbidite muds with TOC averaging 1.21%. Peri-platform ooze deposited during low sea levels is calcitic, contains few turbidites, and generally is organic lean—0.1 to 0.3% TOC. Of the organic matter, δC^{13} suggests different sources for the organics deposited in the turbidite muds (−13.9 to −16.4‰ PDB) and the peri-platform ooze (−17.4 to −26.13‰ PDB). Cyclic variation in organic content in the Tongue is portrayed in the color of the muds: green muds have high TOC, while brown and white muds are leaner. Cyclic variation in sediment color also occurs in Exuma Sound and Columbus Basin. Basin depth does not seem to influence the TOC: Columbus Basin, the deepest, appears to be as rich in organics as the Tongue (shallowest). No clearcut correlation with kerogen types is seen at present.

Gas chromatographic analysis of organic matter evolved from samples heated only to 350°C demonstrated that the material evolved was not simply vaporized, but represented the thermal cracking of relatively heat-sensitive material. Mass spectral pyrolysis experiments on some samples suggests the presence of amino acids or proteins.

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Continental Borderland off Northern Baja California, Mexico: Rifted Segment of Pacific Margin

The California continental borderland consists of two geomorphic provinces: the northern borderland which forms the Pacific margin off southern California and the southern borderland which forms the margin off the northern Baja California peninsula. Although these two provinces are longitudinally continuous, bathymetric, geophysical, and bottom sample data suggest that their structure, lithology, and tectonic evolution differ markedly. Relative to the northern borderland, the southern borderland is on the average much deeper (0.5 to 1 km), ubiquitously volcanic (basaltic), and from heat flow and isostatic considerations, underlain by much thinner crust. Seimsic reflection profiles across the southern borderland show a thin veneer (generally <300 m) of relatively undeformed strata overlying an irregular nonstratified acoustic basement. Dredge hauls from exposed basement highs along these profiles have yielded chiefly basaltic rocks.

Major northwest-southeast-trending synclinoria bound the northwestern and southeastern limits of the southern borderland (Valero Basin and Vizcaino Bay, respectively), and the synclinal axes of these basins strike directly into the southern borderland. Seismic refraction data across these synclinoria indicate that they contain more than 3 km of sedimentary strata (above 6.6 km/sec basement) or at least 10 times the thickness of sedimentary strata recognized on seismic reflection profiles that cross the southern borderland.

The available data suggest that the southern borderland is a rifted segment of the Pacific margin. The extent of rifting is estimated to be about 260 km on the basis of basalt outcrops and seismic reflection profiles. Rifting had probably begun by 17 m.y. ago, and is inferred to be related to the southward migration of the Rivera triple junction.

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Distribution of Recent Benthic Foraminifera from Newfoundland to Yucatan

Benthic foraminifera are important environmental and paleoenvironmental indicators. In 1978, we commenced a project to produce a syntheses of the depth and geographic distributions of all species of recent benthic foraminifera recorded on the continental margins of North America using all published data (800 papers published over the past 150 years). To date, this project has resulted in computerized compilations for the Atlantic continental margin, the Gulf of Mexico, and the Caribbean region. Data manipulation has produced maps dealing with individual species distributions, genus distributions, and foraminiferal zoogeographic provinces. Geographic and depth distributions for over 300 commonly recorded species are tabulated for the eastern continental margin and the Gulf of Mexico. Four depth-related groups of species are noted for the east coast and 14 for the Gulf of Mexico. Species distributions can be used as paleoenvironmental (including paleobathymetric) indicators back at least to the Miocene and genus distributions back to the late Cretaceous.

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Mixing-Zone Origin of "Primary" Dolomite Grains from Cretaceous Marine Sandstones of Western Interior Basin

In a series of papers in the early 1960s, the occurrence of "primary" dolomite grains in Cretaceous sandstones of the Western Interior basin was documented. These grains are usually single crystals, with a rhombic outline that has been modified to varying degrees of roundness by abrasion. The grain size of the dolomite mimics that of other grains in the sandstone. Because these dolomite grains are confined to marine facies, it is unlikely that they are extrabasinal. Also, there is no evidence that the dolomite formed by replacement of other grains. The remaining possibility is that dolomite formed within the basin before significant burial.

Petrographic and stratigraphic evidence from the San Juan basin suggests that primary dolomite was formed in a mixing zone of meteoric water that discharged into shoreface environments. Thick coastal-plain coal sequences and paleoclimatic reconstructions support the existence of a large meteoric flow system in the western part of the Western Interior basin during the Cretaceous. As meteoric water discharged into shoreface sediment, dolomite rhombs were precipitated in the interstices of uncompacted sands. Some of the dolomite thus formed was close enough to the ocean bottom to be later eroded, abraded, and redeposited during storms or transgressions. Dolomite rhombs that were not eroded are similar in appearance to resedimented grains, but show no evidence of abrasion.

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Origin and Geochemical Correlation of Near-Surface Oil and