Thin chert-rich conglomerates and sandstones and the absence of much of the Lower Triassic in eastern Nevada indicate a positive area in that region. Evidence of Lower Triassic volcanism is present in western Utah and eastern Nevada.

KRAFT, JOHN C., and GLENN K. ELLIOTT, Dept. Geol., Univ. Delaware, Newark, DE 19711

SEDIMENT FACIES PATTERNS AND GEOLOGIC HISTORY OF COASTAL MARSH

Preliminary facies studies in the Great Marsh, on the southwestern shore of Delaware Bay, show a complex history of marsh-lagoonal facies forming the leading edge of the late Holocene marine transgression. A molluscan fauna (*Crassostrea virginica, Macoma balthica,* and *Nassarius obsoletus*) found in a dark-gray sand-mud, indicates a tidal creek–shallow coastal lagoon environment surrounded below, landward, and above by medium-dark-gray organic mud with variable amounts of *Spartina* grass and peat. Shallow cores, supplemented by deeper auger borings and reflection seismic surveys, indicate that the morphology of the Holocene transgression wedge and the present drainage patterns are a reflection of topography on a deeply eroded pre-transgression unconformity incised into Pleistocene sediments.

Late Holocene geologic history and the resulting sediment facies patterns therefore are associated closely with fluvial drainage patterns on the pretransgression surface. A relative sea-level-rise curve has been used to place facies patterns and vertical sequences into a time-space perspective showing the migration of environments landward and upward over this dendritic erosion surface. The initial transgression of the fringing marsh and tidal creeks, and their widening into lagoons were followed by an increased sedimentation rate. This increase led to infilling of lagoons and formation of the present tidal creek-marsh system.

The transgressive sequence, because of continuing sea-level rise, is being partly obliterated and buried by a rapidly advancing washover barrier and shallow marine-estuary complex (Delaware Bay).

LAFON, G. MICHEL, Dept. Geol., SUNY at Binghamton, Binghamton, NY 13901, and FRED T. MACKENZIE, Dept. Geol., Northwestern Univ., Evanston, IL 60201

EARLY EVOLUTION OF OCEANS—A WEATHERING MODEL

The long-term chemical composition of seawater is controlled by the generalized reaction: primary igneous rocks + water + acid volatiles = sediments + oceans + atmosphere. Unstable crustal minerals are weathered by water and acid volatiles, and local equilibrium between the products of the reaction—oceanic sediments, seawater and the atmosphere—is attained.

To obtain a better picture of the evolution of the oceans as this reaction proceeds (minerals formed, mass transfers involved, changes in seawater composition), we simulated with a model calculation on a high speed computer the irreversible attack of "average igneous rock"—represented by an idealized mineral assemblage—by water and acid volatiles. We assumed a single-stage degassing process under reducing conditions at 25°C and 1 atm. The predicted final solid products at equilibrium, ranked according to decreasing mass, are amorphous silica (chert), clay minerals, carbonates, and K-feldspar. The predicted composition of the early ocean resembles that of present seawater except that (1) the dissolved sulfur is in reduced form, (2) the solution is saturated with amorphous silica, and (3) the salinity is about twice that of today because of nonremoval of NaCl as evaporites.

Extension of these results to more realistic systems can at best be semiquantitative because of lack of sufficient thermochemical data. Furthermore, the recycling of sediments makes it very difficult to estimate early environmental conditions from present remnants of Precambrian sediments. Some generalizations can nevertheless be made with confidence. A more basic initial crustal material such as oceanic basalt would lead to larger amounts of clays and carbonates in the sediments at the expense of chert, and to a large concentration of dissolved ferrous iron in the ocean. Degassing of water preferentially to other volatiles would not affect the outcome of the weathering process unless the escape rates of the volatiles differed by several orders of magnitude. Although our model clearly represents one extreme, rapid degassing, the available geologic evidence does not preclude its having taken place. It is encouraging that the results of the calculation are in general accord with what has been reported previously.

LAURY, ROBERT L., Dept. Geol. Sci., Southern Methodist Univ., Dallas, TX 75222

DEEP-SEA CHERT IN GULF OF MEXICO

Chert from at least 9 different stratigraphic zones, ranging in age from Cenomanian (Late Cretaceous) through late Oligocene, was recovered at 4 sites in the southeastern Gulf of Mexico during Leg 10 of the Deep Sea Drilling Project. The sites are on the northern and eastern edges of the Campeche Scarp, in the Catoche Tongue area of the Yucatan Channel, and on the western approach to the Straits of Florida.

Chert formation in all locations took place by late postdepositional replacement of deep-water, calcareous, foraminiferal nannoplankton oozes. At each site the degree of silicification of the carbonates increases with increasing age. Depth of burial and/or thickness of the overlying water mass appears to be independent of the degree of silicification.

Preliminary petrographic analyses of the cherts reveal the presence of amorphous (opaline) silica; fibrous quartz (variety chalcedony); fibrous cristobalite; and anhedral, subequant, microcrystalline quartz. The type of silica present is dependent upon the stage of silicification and on the composition and texture of the components being replaced. Finely comminuted plant material and other forms of organic detritus are locally common but are unaltered by silicification.

The exact source of silica for these cherts is not presently established. Radiolaria and other siliceous organisms are generally common in overlying sediments and may be important silica sources. Although drill-core data in the Gulf of Mexico are incomplete and far from conclusive, there is a suggested increase in the amount of silica both in the form of siliceous organisms and in chert—in the southeastern Gulf of Mexico.

LIPPS, JERE H., Dept. Geol. and Inst. Ecol., Univ. California, Davis, CA 95616

HISTORY OF CIRCULATION IN PACIFIC OCEAN

Present evidence indicates that the Pacific Ocean is the remnant of a larger, pre-Mesozoic ocean basin, since restricted by drifting continents. Similar Paleo-