RECENT GEOLOGIC HISTORY OF THE WEST COAST OF FLORIDA; COASTAL MANGROVE SWAMPS, AND FLORIDA BAY

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ABSTRACT

The Recent (last 10,000-11,000 years) geologic history of the northeastern corner of the Gulf of Mexico, i.e., western and southern continental shelves of peninsular Florida, is recorded by the character and stratigraphy of outer-shelf and nearshore deposits. These deposits chiefly reflect the interplay of a generally rising sea level and the proximity of sources of terrigenous detritus, especially detrital quartz. For example, seaward of west-central Florida the outer shelf is essentially a bedrock surface overlain by a thin veneer of bioclastic sediment and biogenic reef growths that initially formed in a shallow nearshore environment. In contrast, the inner part of the shelf is flooded with shelly quartz sand or silt. Some of this detrital debris has been transferred to the shore to form prisms of quartzose beach sand, tracks of prograding beachridges, and high coastal dunes. The quartz is chiefly derived from reworking of residual shelf and terrace deposits and drowned coastal plain sediments of Pleistocene age. Sources of detrital quartz disappear to the south, consequently the inner belt of quartzose deposits narrows and becomes increasingly mixed with shell debris and finer calcilutaceous components in this direction. As an important constituent of shelf sediments, detrital quartz essentially vanishes by the latitude of Cape Sable (25°15′N). Attesting to this, the carbonate content of unconsolidated sediment in Florida Bay (immediately south of the Cape) averages close to 90 percent. This sediment is primarily composed of comminuted molluscan, foraminiferal, and algal debris, 80-85 percent of which consists of "metastable" aragonite and high-magnesian calcite.

The calcarenitic and calcilutaceous deposits of Florida Bay are as much as 4 meters thick and overlie a thin stratum of fresh-water peaty and calcareous sediment resting on a karsed bedrock surface of Pleistocene age. The basal fresh-water deposits have a radiocarbon age of approximately 4000 years, which implies that sea level at this time was about 4 meters lower than its present position. Also beginning about 4000 years ago marine water slowly inundated the western margin of the fresh-water swamps of the Everglades, thereby providing the necessary paralic environment for the growth of the magnificent coastal mangrove forest and swamps of southwestern Florida. Strata underlying submerged waterways, intra-forest bays and tidal channels of the swamps form a simple transgressive sequence consisting of a basal fresh-water unit of peat and calcitic mud, a middle unit of paralic and brackish-water peat, and an upper marine unit of organic-rich quartzose sediment or shell debris. Deposits underlying the floor of the mangrove forest, or associated salt-grass marshes, range from peaty and calcareous quartzose sand and silt to compact, fibrous autochthonous peat. These organic-rich units also attest to approximately 4 meters of marine submergence during the last 4000 years. Concomitant with this submergence a rather complicated sequence of peaty and calcareous sediments accumulated along the western margin of the Everglades.

If lithified, the modern shelf and coastal deposits of the northeastern corner of the Gulf of Mexico would be mapped as a somewhat discontinuous and slightly time-transgressive stratigraphic sequence consisting of a variety of shallow-water facies composed of mixtures of three lithologic end members: (1) calcarenite and calcilutite, (2) quartzose sandstone and siltstone, and (3) coal. These facies, and their stratigraphic relationships, duplicate some of the essential aspects of Paleozoic cyclothems.

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