Biostratigraphic approach to Holocene marsh development, Plum Island, Massachusetts, USA

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Studies of the origin and development of offshore marshes has been overshadowed by the debate over the origin of barrier islands, but knowledge of sequential marsh development should provide data for evaluating various barrier island models. To elaborate on this concept, we report our preliminary results from a 40-core study of the Plum Island marsh located 65 km northeast of Boston. This barrier island began forming about 6,000 years BP and the marsh behind it is typical of many barrier islands. More recent growth appears to be the result of high energy events, dune migration and complex spit development, rather than major sea-level rise.

Core samples were taken every 15 cm down to the contact with the underlying Eastern Coarse-Grained Facies (fine, aeolian and/or spit sands) and analyzed for sediment characteristics and foraminifera. Approximate (and tentative) dates were assigned to the core samples on the basis of depths corresponding to previously determined C-14 curves.

Significant marsh development did not occur in the study area until sometime after about 3,100 BP. The percentage of silt, clay and vegetative mass increased from about 3,400 BP and reached a high at about 2,700 to 2,900 BP when relative stabilization of eustatic sea level began. Since about 2,600 BP the ratio of silt and clay to sand (9:1) and the percentage of vegetative mass (about 25%) have essentially remained constant.

Preliminary analysis of the foraminiferal distribution at the base of 10 cores and throughout one core indicates: (1) Only **Trochammina inflata** occurs at the base, suggesting an early high marsh environment succeeding aeolian and/or spit sands. (2) **Miliammina fusca** only occurs just above the basal sample, suggesting a later low salt marsh in a more open back-barrier environment about 3,000 to 3,300 BP. (3) **T. macrescens** appears next, and with **T. inflata,** which occurs throughout, indicates a transition up into a high salt marsh environment sometime soon after about 2,900 BP.

These preliminary results suggest that the southern Plum Island marsh may have developed over a submerged spit.