Chapter 2 The Outer Banks of North Carolina

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Summary

The 320 km long Outer Banks of North Carolina comprise two cuspatel forelands with morphologically and stratigraphically contrasting barrier limbs in a microtidal (0.9 m tidal range) high wave energy (1.7 m average wave height) hydrographic setting. Holocene sedimentation and coastal evolution have been a function of five major depositional processes: (1) eustatic sea-level rise and barrier-shoreline transgression; (2) lateral tidal inlet migration and reworking of barrier island deposits; (3) shoreface sedimentation and local barrier progradation; (4) storm washover deposition with infilling of shallow lagoons; and (5) flood-tidal delta sedimentation in backbarrier environments.

Twenty-five radiocarbon dates of subsurface peat and shell material from the Cape Lookout area are the basis for a late Holocene sea-level curve. Eustatic sea level rose rapidly from 9000 to 4000 B.P., resulting in landward migration of both barrier limbs of the cuspatel foreland. A decline in the rate of sea-level rise since 4000 B.P. resulted in relative shoreline stabilization and deposition of contrasting coastal sedimentary sequences. The higher-energy, north and northeast barrier limbs (Core-Portsmouth Banks and North Hatteras Island-Currituck Banks) have migrated landward, producing a transgressive sequence of coarse-grained, horizontally bedded washover sands overlying burrowed to laminated backbarrier and lagoonal silty sands. Locally, ephemeral tidal inlets have reworked the transgressive barrier sequence, depositing fining-upward spit platform and channel-fill sequences of cross-bedded, bioclastic, and lithic pebble-gravel to fine-grained sand and shell. Shoreface sedimentation along portions of the lower-energy, southwest barrier limb of Cape Lookout (Bogue Banks) has resulted in shoreline progradation and deposition of a coarsening-upward sequence of burrowed to cross-bedded and laminated, fine-grained shoreface and foreshore sands. In contrast, other barrier islands such as Shackleford Banks, and probably Ocracoke and South Hatteras Islands, consist almost totally of inlet-fill sediments deposited by lateral tidal inlet migration. Holocene sediments in the shallow bays and estuaries behind the barriers consist of 5–8 m thick fining-upward sequences of interbedded burrowed, rooted and laminated flood-tidal delta, salt marsh, and washover sands, silts, and clays.

Whereas barrier island sequences are 10 m in thickness, inlet-fill sequences may be up to 25 m thick and comprise on average 35% of all Holocene barrier deposits. Tidal inlet-fill, backbarrier (including flood-tidal delta) and shoreface deposits are the most preservable facies in this wave-dominated barrier-shoreline setting.

Introduction

The barrier islands of North Carolina have traditionally been referred to as the “Outer Banks.” The term “Bank” is a colloquial one that dates back to the 17th and 18th centuries, the colonial era, in the United States. It refers to “sand banks,” or barrier islands, and is used today only in North Carolina (Dunbar 1958).

The North Carolina Outer Banks are 320 km in length and extend south from the Virginia-North Carolina state line to Bogue Inlet, at the west end of Bogue Banks (Fig. 2.1). These islands are relatively long, linear, and narrow, as is typical of barrier islands in a wave-dominated environment.

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Fig. 2.1. Map showing location and names of the Holocene barrier islands (solid black) that form the "limbs" of the Cape Lookout and Cape Hatteras cuspat e forelands. Stipple indicates Pleistocene coastal plain.