Characterizing Large-scale Bathymetry and Bathymetric Change Patterns of Ebb-tidal Delta At Shinnecock Inlet, Long Island, New York

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The present study characterizes the large-scale bathymetry and bathymetric change patterns of Shinnecock Inlet and ebb-tidal delta during the period from 2000 to 2002 by analyzing four high-resolution bathymetry data. This kind of information is critical to understand the sediment bypassing and the behavior of adjacent shoreline. The ebb-tidal delta traps portions of the sediments that would otherwise have bypassed and causes downdrift erosions. And the sediment bypassing at Shinnecock Inlet is probably achieved by wave-induced transport along the periphery of the ebb shoal. The high-resolution bathymetry data collected by a shallow-water multibeam echosounder (Simrad EM 3000) were processed with MATLAB to analyze. Our results indicate that Shinnecock Inlet was experiencing an overall period of growth accreting 686,900 m^3 on the ebb shoal from 2000 to 2002. There is also net deposition on the ebb shoal indicating steady growth of ebb shoal. Rate of net deposition was almost 400,000 m^3/d, which is much greater than the earlier estimates. Difference maps also show clear and coherent patterns of depth change on the ebb-tidal delta and little depth change on the adjacent sea floor. Large depth variations are observed on the ebb-tidal shoal in part due to the migration of sand bars and the deposition of littoral bypassing. Sand bars migration patterns are consistent with the current fields simulated by hydrodynamic model and the net sediment transport patterns indicated by grain size trend analysis.