Integrating Seafloor Mapping Data with Sediment Transport and Coastal Change Studies: Preliminary Results from the Southern Gulf of Maine, USA

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Coastal erosion, intense storm events and sea-level rise pose threats to coastal communities and infrastructure. Managers and scientists often lack the high-resolution data needed to improve estimates of sediment abundance and movement, shoreline change, substrate heterogeneity and other seabed characteristics that influence coastal vulnerability. To address these and other needs the U.S. Geological Survey is conducting a multi-tiered research initiative consisting of shoreline change characterization, sediment transport numerical modeling and seafloor mapping in Cape Cod Bay, Massachusetts, USA. Here we present the seafloor mapping findings and their applications to an integrated coastal change analysis. Our comprehensive seafloor mapping technique includes the collection of multibeam and phase-discriminating data, seismic-reflection profile data, sediment samples, seabed imagery, as well as the synthesis of regional legacy datasets. A first-order comparison of the interdisciplinary results indicates that the presence of seafloor bedforms and the thickness of Late Holocene sediments correspond to patterns of modeled seabed elevation change and observed relative coastline stability. Analyses of these data are ongoing and may further resolve the relationships among shoreline change, nearshore processes and antecedent geology.