

## Field- And GIS-Based Measurements of Coastal Change for the Southeast Chukchi Sea, Alaska

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Coastal environments at high latitudes are experiencing rapid change. Coastal erosion threatens a variety of nearshore marine, terrestrial, and freshwater habitats, and may be accelerating with Arctic warming. To better understand impacts for national parks in northwestern Alaska, a collaborative study has begun to document coastal change in the southeast Chukchi Sea. A comprehensive geospatial component includes: creation of a high-resolution (0.6 m) orthophoto mosaic for 2003; rectification of historic aerial photography from ca. 1950 and ca. 1980; and quantitative analysis of coastline and bluff erosion. For Bering Land Bridge NP and Cape Krusenstern NM, the GIS analyses quantify complex spatial and temporal variability tied to environmental forcing, as well as a dynamic range of coastal morphologies and processes. A field-based component includes: repeat photography; mapping and description of sediments and landforms; and periodic ground-truth measurements of shoreline change since 1987 at 27 sites. The study documents that most of the ca. 400-km-long coast from Wales to Kivalina has experienced erosion in the past five decades, with long-term average rates of 0-3 m/yr. Direct impacts include beach and bluff retreat, overwash deposition, migration or closure of inlets and lagoons, capture of thaw-lake basins, and release of sediment and organic carbon to nearshore waters. Observations of shrub expansion and thermokarst degradation are also consistent with rapid change. Coastal ecosystems in the region appear to be sensitive to the frequency and intensity of storm events, increasing temperatures, permafrost melting, sea-level rise, and increasing length of the summer ice-free season.

*Manley, W.F., Sanzone, D.M., Jordan, J.W., Mason, O.K., and Parrish, E.G., 2006, Field- and GIS-based measurement of coastal change in the southeast Chukchi Sea, Alaska: Eos Trans. AGU.*