

Field-based measurement of coastal erosion in the Southeast Chukchi Sea, Alaska

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Twenty-seven monitoring stations established between 1987 and 1993 in Bering Land Bridge National Preserve (BELA) and Cape Krusenstern National Monument (CAKR), Alaska, were reoccupied during August 2006 to investigate shoreline change in the southeast Chukchi Sea. The irregularly spaced stations span 200km of coastline in BELA and 70km in CAKR, and provide point estimates of shoreline retreat along undeveloped reaches. Retreat rates are highly variable in both areas (0.06m/yr to 2.02m/yr in BELA; 0.09m/yr to 1.29m/yr in CAKR, with net progradation occurring at two sites and no net change at one site in CAKR).

The highest rates of erosion occur along the Shishmaref barrier island chain in BELA and along ice-rich bluffs and the pronounced east-west to north-south shoreline reorientation in CAKR. The spatial variability in erosion rates reflects differences in the geomorphology, dominant processes, and exposure of reaches. This variability suggests that storm climatology and thermokarst degradation play greater roles in retreat than long-term regional sea-level rise. Preliminary analyses indicate decadal-scale cyclicity in storm intensity in the northern Bering – southeast Chukchi seas and a temperature rise of about 1.5°C since 1950 at Kotzebue, which is located between the two parks. Results from monitoring stations alone are insufficient to determine regional coastal sediment flux, but they are important for 1) placing rates of erosion observed on developed shorelines in the context of rates occurring along non-modified reaches, 2) for documenting the inherent along-shore variability in retreat rates, and 3) for providing field-based data for calibrating GIS analyses of long-term change.

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