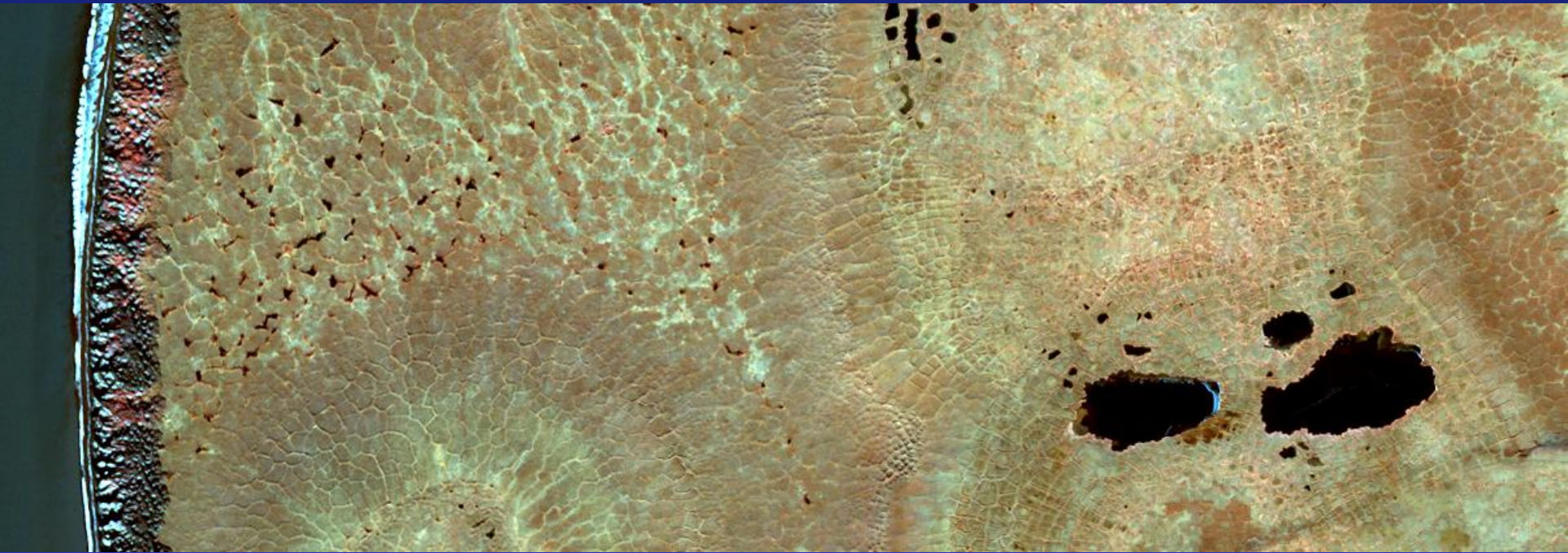


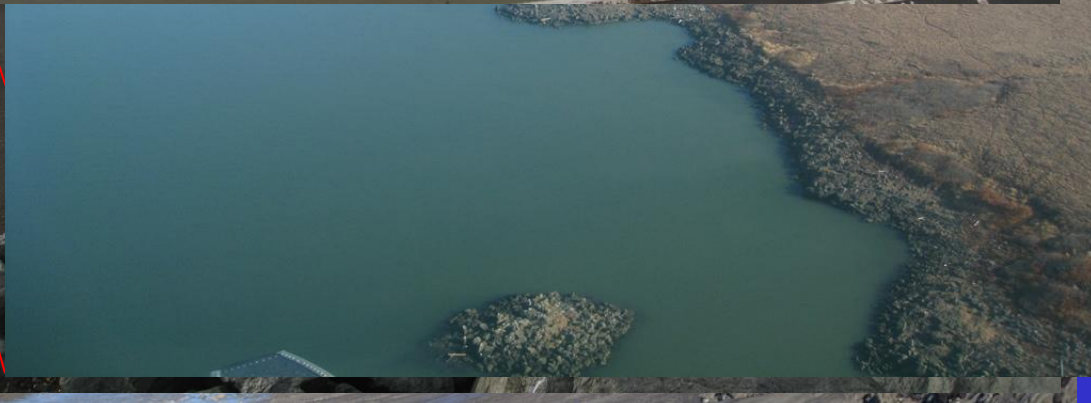
# Alaska Coastal Hazards Workshop – 30 May 2012

## State of the Coast – Coastal Landforms



Benjamin Jones - USGS – Alaska Science Center

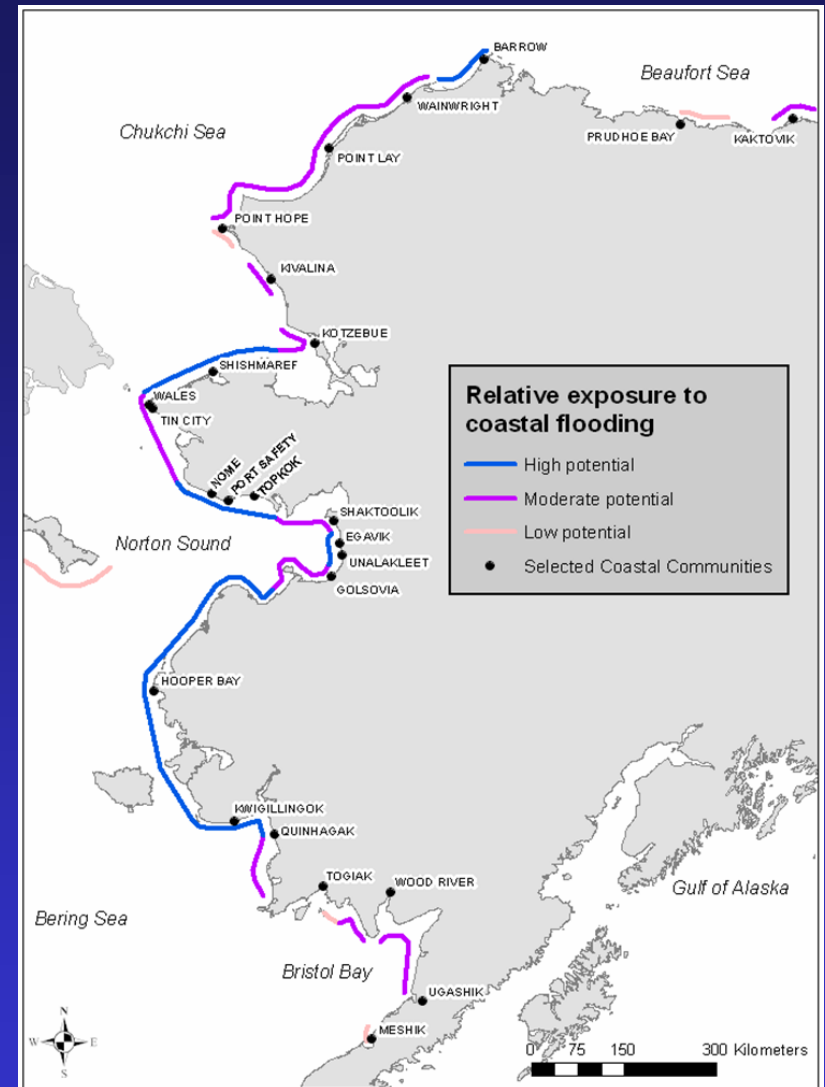
# Surficial Geology: Rocky vs. Non-Rocky



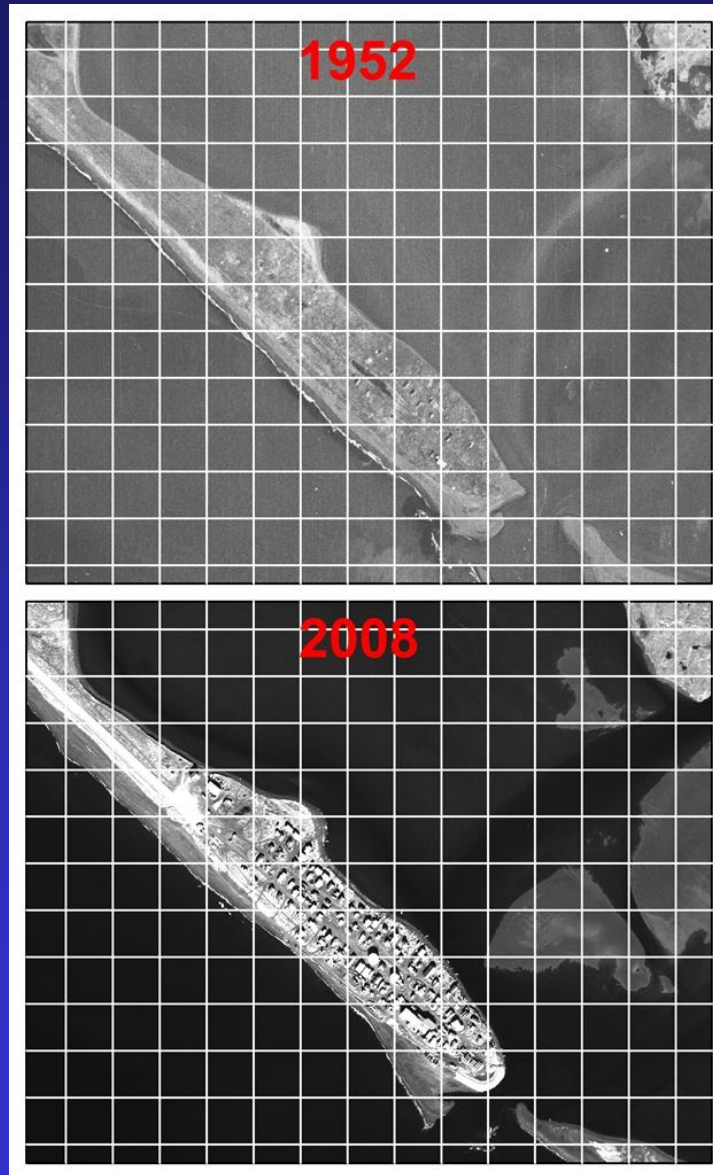
# Living with the Coast of Alaska

Owen Mason, William J. Neal, and Orrin H. Pilkey,  
with Jane Bullock, Ted Fathauer, Deborah Pilkey,  
and Douglas Swanston

- Mason et al. (1998) identified coastal communities in which bluff erosion and coastal flooding were major hazards and all of the communities occurred in the Arctic, Bering, or Cook Inlet region



# Increase in the Coastal Hazard Potential, 1952-2008



# Databases and Tools for Characterizing Coastal Landforms and Geomorphology



# Arctic Coastal Dynamics Geospatial Database

Estuaries and Coasts  
DOI 10.1007/s12237-010-9362-6

## The Arctic Coastal Dynamics Database: A New Classification Scheme and Statistics on Arctic Permafrost Coastlines

Hugues Lantuit · Pier Paul Overduin · Nicole Couture · Sebastian Wetterich · Felix Aré · David Atkinson · Jerry Brown · Georgy Cherkashov · Dmitry Drozdov · Donald Lawrence Forbes · Allison Graves-Gaylord · Mikhail Grigoriev · Hans-Wolfgang Hubberten · James Jordan · Torre Jorgenson · Rune Strand Odegård · Stanislav Ogorodov · Wayne H. Pollard · Volker Rachold · Sergey Sedenko · Steve Solomon · Frits Steenhuisen · Irina Streletskaia · Alexander Vasiliev

Received: 10 March 2010 / Revised: 6 December 2010 / Accepted: 7 December 2010  
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**Abstract** Arctic permafrost coasts are sensitive to changing climate. The lengthening open water season and the increasing open water area are likely to induce greater erosion and threaten community and industry infrastructure as well as dramatically change nutrient pathways in the near-shore zone. The shallow, mediterranean Arctic Ocean is likely to be strongly affected by changes in currently poorly observed arctic coastal dynamics. We present a geomorphological classification scheme for the arctic coast, with 101,447 km of coastline in 1,315 segments. The average rate of erosion for the arctic coast is  $0.5 \text{ m year}^{-1}$  with high local and regional variability. Highest rates are observed in the Laptev, East Siberian, and Beaufort Seas. Strong spatial variability in associated database bluff height, ground carbon and ice content, and coastline movement highlights the need to estimate the relative

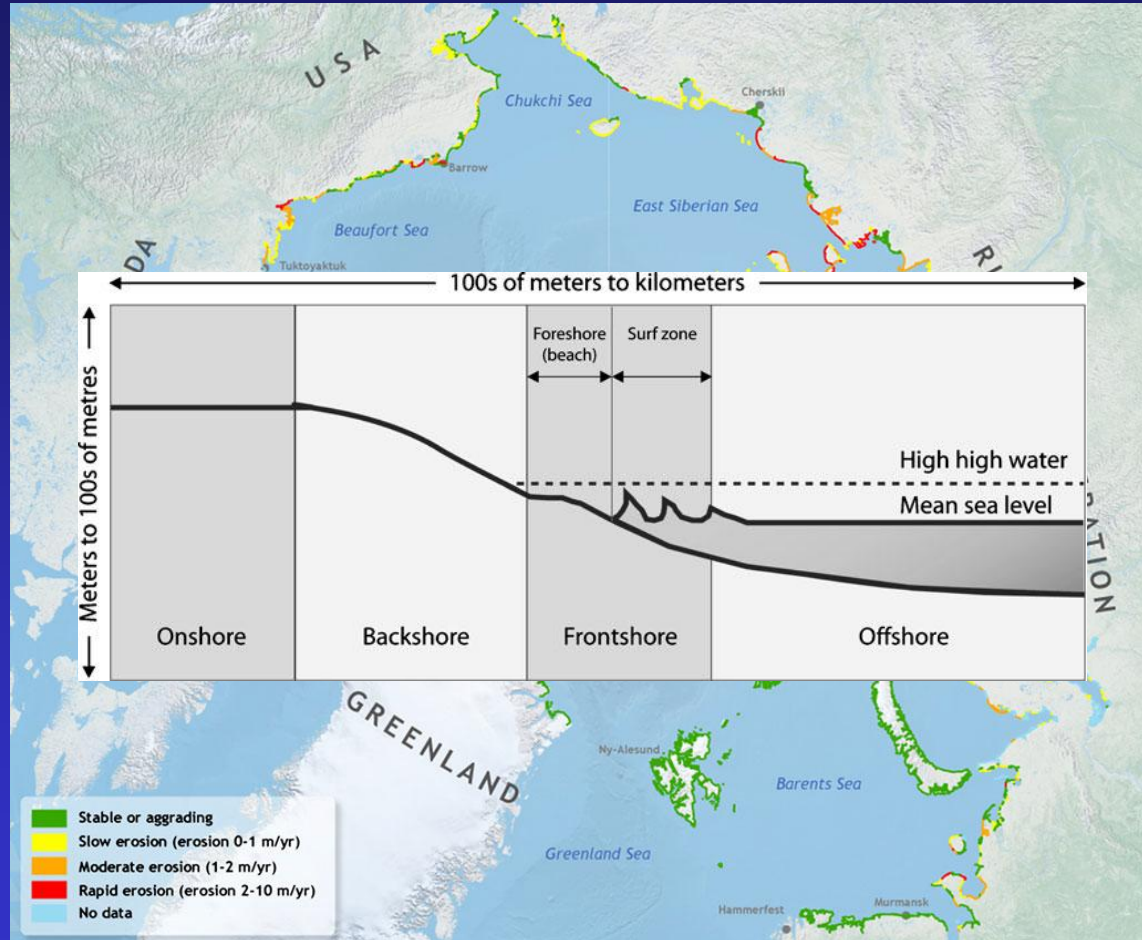
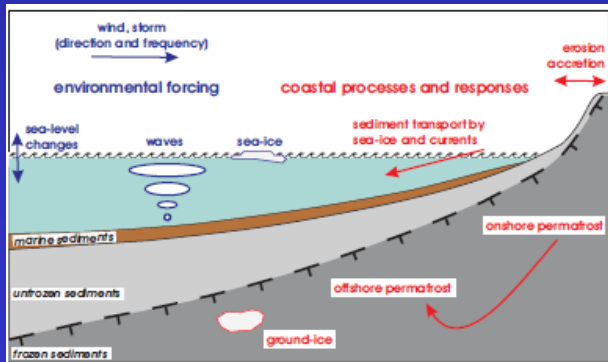
importance of shifting coastal fluxes to the Arctic Ocean at multiple spatial scales.

**Keywords** Arctic · Coast · Permafrost · Erosion · Carbon cycle

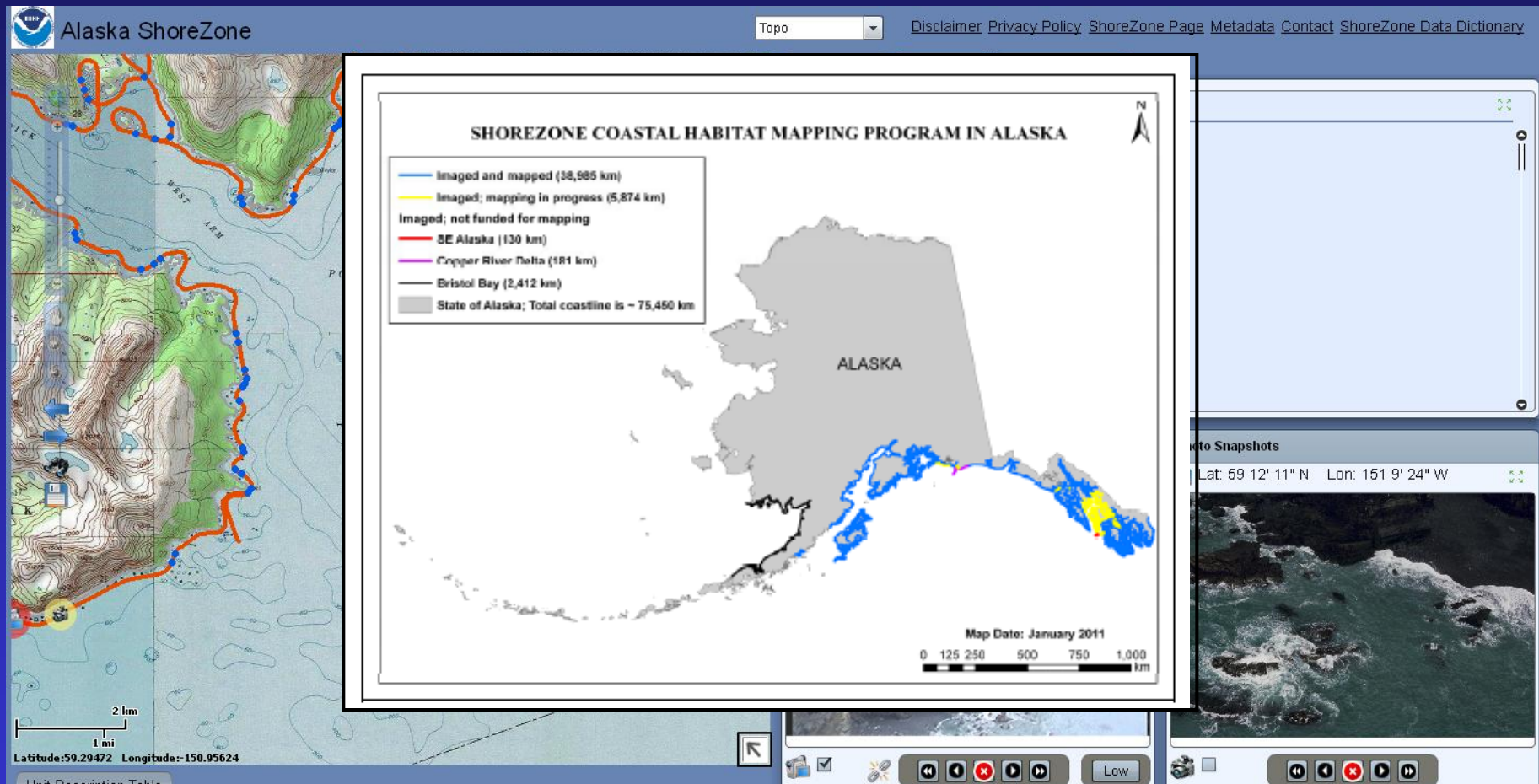
### Introduction

Arctic coasts are likely to become one of the most impacted environments on Earth under changing climate conditions. Under most scenarios, the Arctic is predicted to experience the strongest air and sea temperature increase at the Earth's surface (Kattsov and Källén 2005). As a result, the lengthening open water season and the increasing open water area, due to the decline of

## Driving and Resisting Forces

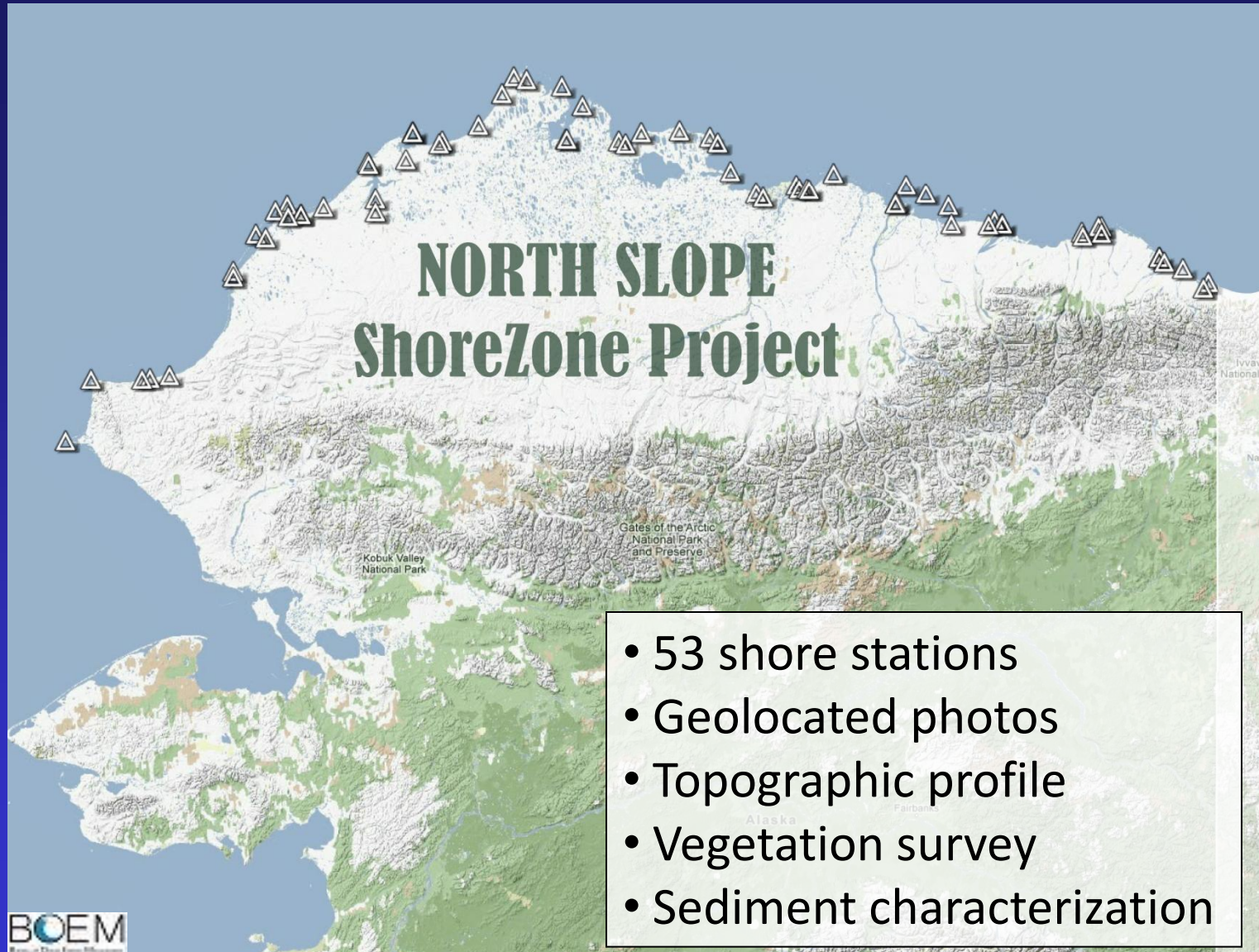


# Alaska ShoreZone Coastal Mapping and Imaging

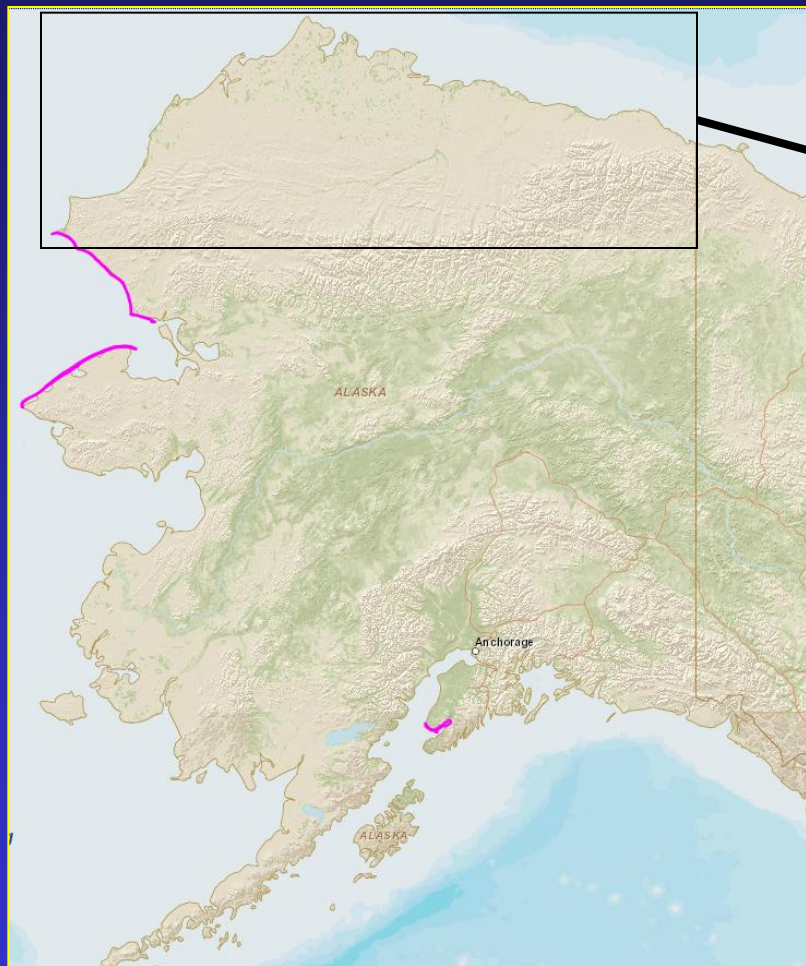


<http://alaskafisheries.noaa.gov/shorezone/>

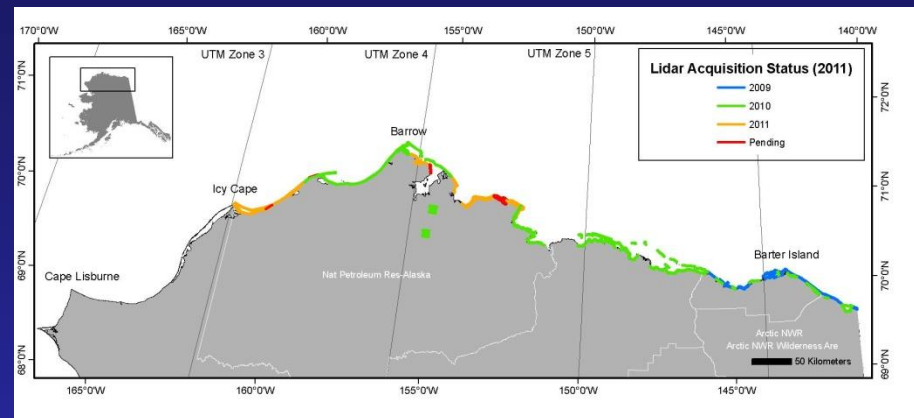
# 2012 North Slope ShoreZone Shore Station Effort



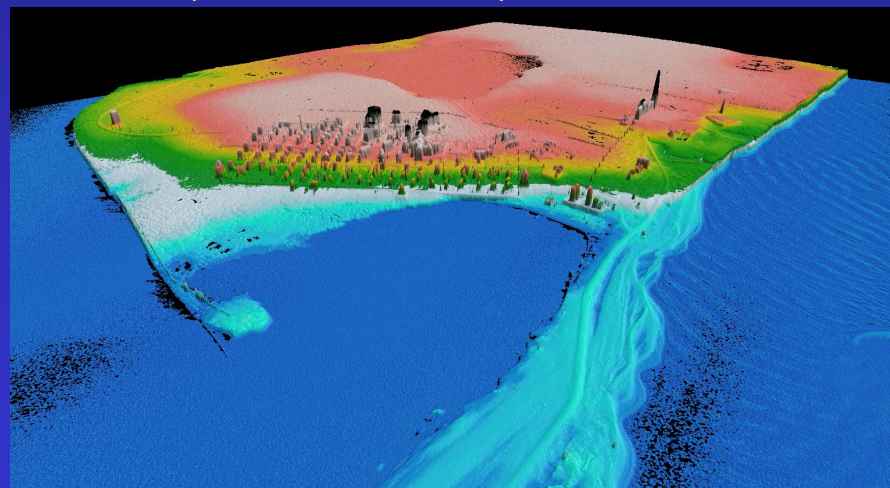
# Coastal Lidar Datasets Available for Alaska



<http://www.csc.noaa.gov/digitalcoast/data/coastallidar>



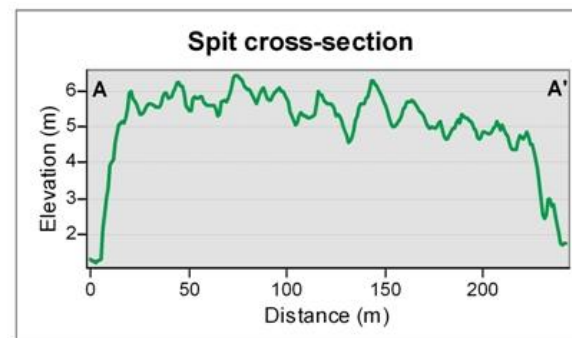
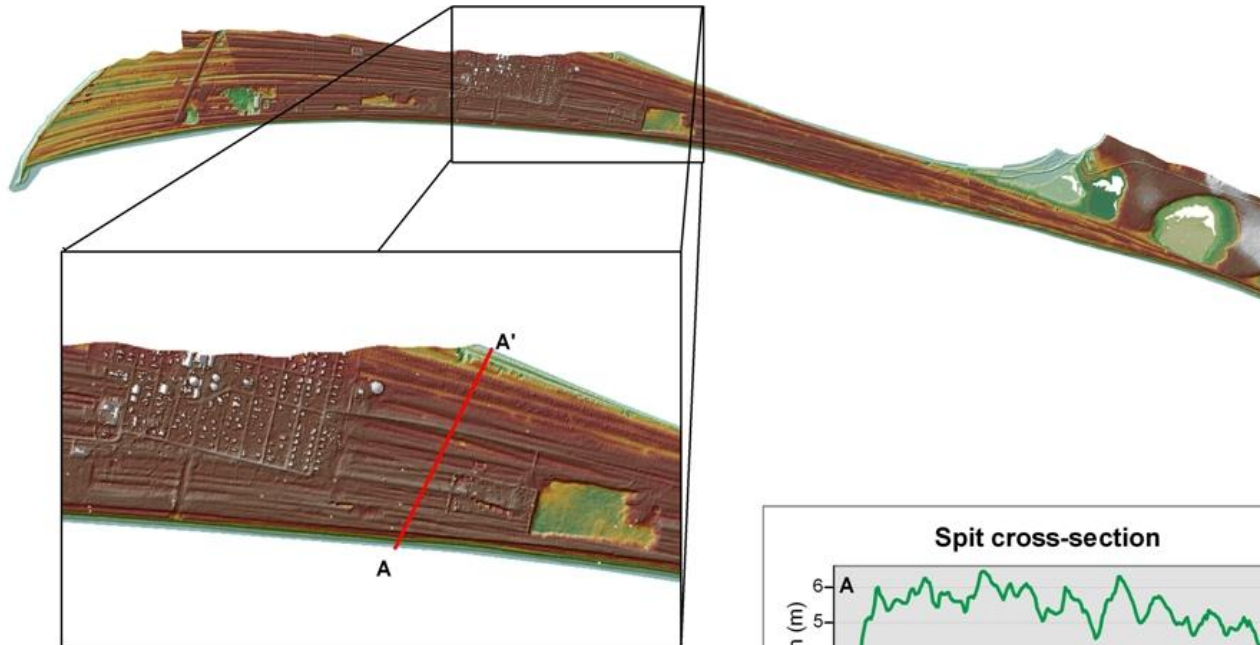
Example of LIDAR dataset acquired over Kaktovik



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# Example from 2004 NOAA Dataset

## Point Hope LIDAR 2004

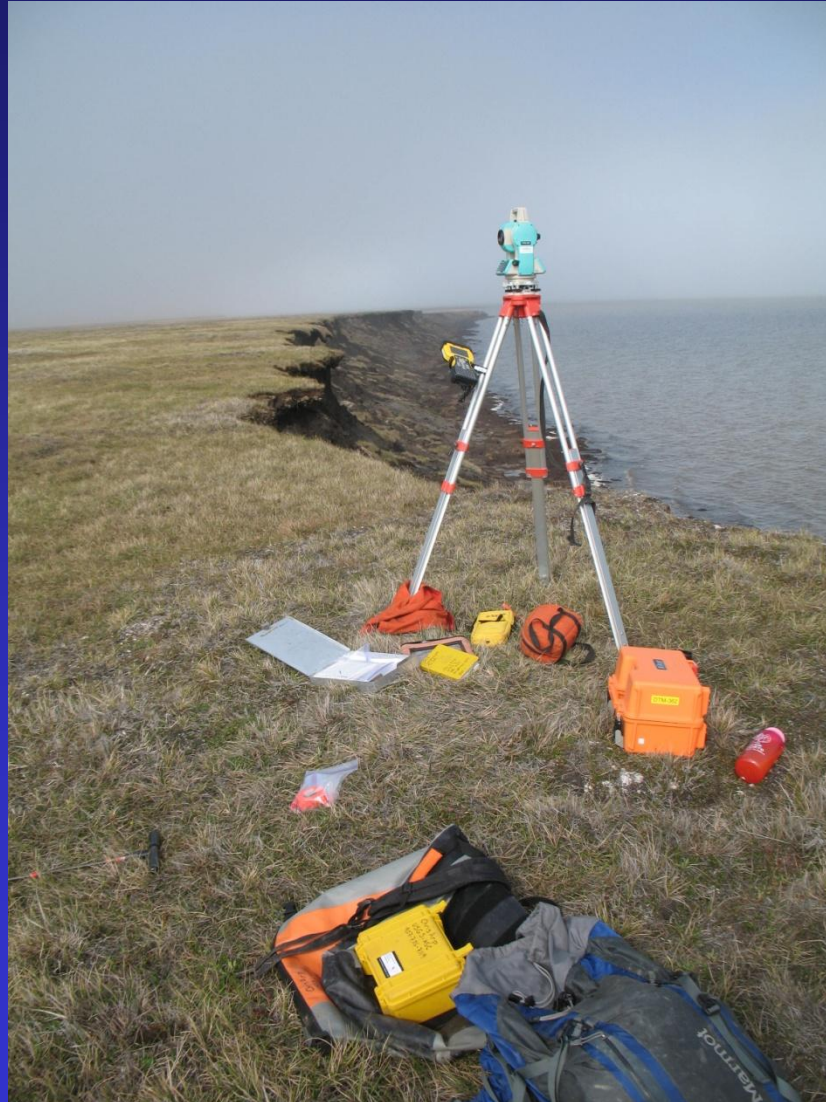


# Example 2009 USGS Dataset: simulating sea-level rise



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# Tools for Observing and Monitoring Coastal Landforms and Dynamics



# Time-Lapse Observations of Coastal Erosion

