

Arctic Coastal Dynamics (ACD)—Status Report

Volker Rachold Alfred Wegener
Institute for Polar and Marine Research

Coastal dynamics directly reflecting the complicated land-ocean interactions play an important role in the balance of sediments, organic carbon, and nutrients in the Arctic Basin. Recent studies indicate that sediment input to the arctic shelves resulting from erosion of ice-rich, permafrost-dominated coasts may be equal to or greater than input from rivers. Thus, the understanding and quantification of coastal processes is critical for interpreting the geological history of the arctic shelves. The predictions of future behavior of these coasts in response to climatic and sea level changes is an important issue because most of the human activity that occurs at high latitudes concentrates on the arctic coastlines.

Arctic Coastal Dynamics (ACD) is a multi-disciplinary, multi-national project of the International Arctic Science Committee (IASC) and the International Permafrost Association (IPA). Its overall objective is to improve our understanding of circum-arctic coastal dynamics as a function of environmental forcing, coastal geology and cryology, and morphodynamic behavior. In particular, ACD aims to:

- establish the rates and magnitudes of erosion and accumulation of arctic coasts;
- develop a network of long-term monitoring sites;
- identify and undertake focused research on critical processes;
- estimate the amount of sediments and organic carbon derived from coastal erosion;
- refine and apply an arctic coastal classification (includes ground ice, permafrost, geology etc.) in digital form (GIS format);
- extract and utilize existing information on relevant environmental forcing parameters (e.g. wind speed, sea level, fetch, sea ice etc.);
- produce a series of thematic and derived maps (e.g., coastal classification, ground ice, sensitivity etc.);
- develop empirical models to assess the sensitivity of arctic coasts to environmental variability and human impacts.

At the present state, emphasis is on developing a reliable circum-arctic estimate of sediment and organic carbon input from coastal erosion to the inner shelf, which involves classifying and segmenting the entire circum-arctic coastline into common elements based primarily on morphology, ground-ice composition, and erosion rates. During the third IASC-sponsored ACD workshop, held in Oslo, Norway, on 2–5 Dec. 2002, regional working groups continued previous efforts for their sectors, and the final version of the segmentation and classification will be available at the next ACD workshop to be organized in St. Petersburg, Russia, in November 2003. Additionally, representative photographs of coastal sites for each sector for inclusion in a coastal photo library available at the ACD web site (<http://www.awi-potsdam.de/www-pot/geo/acd.html>) were selected during the Oslo meeting. Finally, two circum-arctic working groups focused on GIS development and extraction and presentation of environmental data, respectively.

Alfred Wegener Institute for Polar and Marine Research,
Research Unit Potsdam, Telegrafenberg A43, Potsdam,
D-14473, Germany, Phone +49-331-288-2174, Fax +49-
331-288-2137, vrachold@awi-potsdam.de