Arctic Ocean storm surges: origin, simulation and prediction

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The shore of the arctic seas are generally of low relief and the combination of waves and high water levels during late summer and fall storms before the development of significant sea-ice cover can be particularly damaging to shorelines. Gravel barrier beaches can be overwashed and eroded while bluffs consisting of unlithified ice-bonded sediment and segregated ice can fail and retreat. Storm surges of the Arctic Ocean are investigated, simulated and predicted using observational data and employing a 2-D coupled ice-ocean barotropic model. Meteorological forcing is calculated based on NCAR/NCEP reanalysis data for 1948-present period. The spatial resolution of the model is 13.89 km. The sea ice conditions (concentration and thickness) are prescribed on the mean monthly basis. The model was calibrated based on the strongest storm surges observed in the Kara, Laptev, East-Siberian, Chukchi and Beaufort Seas. Simulation results are in relatively good agreement with observations of sea level heights and ice drift. Detailed studies showed that the spatial and temporal resolutions of the NCEP/NCAR sea level pressure data (2.5x2.5 degree, 6 hours) are too low and can not reproduce well extreme conditions typical for the relatively small polar cyclones but storm surge event frequency is reproduce very well.