



Sea level variability in the Arctic Ocean from observations and model results

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Monthly sea levels from five Arctic Ocean Model Intercomparison Project (AOMIP) models are analyzed and validated against observations in the Arctic Ocean. The AOMIP models are able to simulate variability of sea level reasonably well, but several improvements are needed to reduce model errors. It is suggested that the models will improve if their domains have a minimum depth less than 10 m. It is also recommended to take into account forcing associated with atmospheric loading, fast ice, and volume water fluxes representing Bering Strait inflow and river runoff. Several aspects of sea level variability in the Arctic Ocean are investigated based on updated observed sea level time series. The observed rate of sea level rise corrected for the glacial isostatic adjustment at 9 stations in the Kara, Laptev, and East Siberian seas for 1954-2007 is estimated as approximately 0.250 cm/yr. There is a well pronounced decadal variability in the observed sea level time series. The 5-year running mean sea level signal correlates well with the annual Arctic Oscillation (AO) index and the sea level atmospheric pressure (SLP) at coastal stations and the North Pole. For 1954-2000 all model results reflect this correlation very well, indicating that the long-term model forcing and model reaction to the forcing are correct. Consistent with the influences of AO-driven processes, the sea level in the Arctic Ocean dropped significantly after 1990 and increased after the circulation regime changed from cyclonic to anticyclonic in 1997. In contrast, from 2000 to 2007 the sea level rose despite the stabilization of

the AO index at its lowest values after 2000.