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Climate contributions to Arctic coastal sea level change

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The Arctic Ocean is at the frontier of the fast changing climate in the northern latitudes. As the first study, we assessthe different mass and steric components of the observed sea level trend from both absolute sea level (ASL) from altimetryand tide gauges, without using gravimetric observations from GRACE. This approach permits a longer time series and avoidsproblems with errors from leakage effects in GRACE-products. ASL is equal to mass-driven sea level added with steric sealevel, while tide gauge based sea level are also corrected with novel estimates of vertical land movement. Calculations of the5mass component from present-day deglaciation, shows that deglaciation rises Arctic sea level with more than 1 mm y−1, whilethe steric contribution is between -5 and 15 mm y−1 with large spatial variability, with the halosteric signal dominating thepattern. A dynamic mass contribution is derived from the Estimating Circulation and Climate of the Oceans (ECCO)-model(version 4 release 4), which varies between -1 and 2 mm y−1. The combined mass and steric product agrees (within uncertainty)with ASL-trends observed from altimetry in 99% of the Arctic, although large uncertainties originate from poor data coverage in the steric data and large variability in the dynamic product. A comparison with ASL trends observed at tide gauges agreeswith mass+steric at 11 of 12 tide gauge sites.