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Numerical simulations of the Hinlopen-Yermak landslide and possible tsunami, Arctic Ocean

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The Hinlopen-Yermak Slide (located north of Svalbard) is characterized by headwalls that are up to 1400 m high at the shelf edge. Slide blocks that are up to 450 m high tens of km downslope from their source attest to the magnitude of the slide event(s). The mechanism of the failure is not yet understood, but run-out simulations show that the slide more than likely generated a tsunami that influenced the Polar Ocean. Steep waves implying dispersive and non-linear effects probably were more pronounced than for most other tsunamis induced by submarine landslides due to the combination of high speed and the substantial thickness of the mass transport. Propagation and coastal impact of the tsunami is simulated by a weakly non-linear and dispersive Boussinesq model. Close to the landslide area, the simulations return sea-surface elevations exceeding 130 m, whereas sea-surface elevations along the coasts of Svalbard and Greenland are in the order of tens of meters. However, the Svalbard archipelago - and the 80 m lower sea-level at the time of slope failure which lead to part of the northwestern Barents margin to be subaerial - protects northern European and Scandinavian coastlines from the tsunami impact.