



## **New parameterisations for the Greenland contribution to sea level rise**

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Ice2sea is an EU-funded project with 24 partners with the goal of constraining predictions of contributions of continental ice to sea level rise over the next 200 years. It provides an unprecedented opportunity to assess uncertainty in future sea level rise in a coordinated project. We present two new parameterisations produced by members of ice2sea for assessing the Greenland contribution to sea level rise over the next 200 years.

We present the first estimate of the effect of projected future Arctic warming on the dynamics of the Greenland ice sheet. During the summer, surface meltwater penetrates through crevasses to the bed, leading to a speed-up or slow down of the ice depending on whether the drainage is inefficient (cavity-based system) or efficient (channel-based). We present a new empirical parameterisation relating annual mean surface meltwater runoff to seasonal change in glacier speed, using simulations of runoff from the MAR regional climate model and observations of velocity from eleven field sites in western Greenland. Uncertainty in this parameterisation is assessed and propagated to a projection of Greenland surface runoff over the next 200 years under the A1B emissions scenario using the MAR regional climate model.

We also present a new empirical parameterisation relating surface mass balance (SMB) and surface elevation of the Greenland ice sheet, using simulations from the MAR and HIRHAM regional climate models. This is analogous to the temperature-elevation (lapse rate) feedback, and allows an ice sheet model to be forced with SMB from a regional climate model, while incorporating the feedback with elevation, without the computational challenges of a coupled climate-ice model. It also allows assessment and propagation of the contribution of uncertainty in this feedback to sea level rise projections without the use of additional climate simulations.