Glaciers and ice caps cover around 34,000 Km2 or 57 per cent of the land area of the Svalbard archipelago. Roughly 60 per cent of the glaciated area drains to the ocean through tidewater glacier fronts. Runoff from tidewater glaciers is posited to have a significant impact on fjord circulation and thereby on fjord ecosystems. Ocean circulation modelling underway in the Kongsfjord system requires specification of the freshwater amounts contributed by both tidewater and land-terminating glaciers in its basin.

We use a coupled surface energy-balance and fern model (Van Pelt and Kohler, 2015) to simulate mass balance and runoff from the glaciers of Kongsfjord basin over the period 1980-2016. Meteorological data from the nearby station at Ny-Ålesund is used for climate forcing in the model domain, with mass balance data at four glaciers in the Kongsfjord watershed used to calibrate model parameters. The model is forced with downscaled ERA-Interim precipitation. Spatial and temporal evolution of melt, refreezing and runoff are analysed, along with the vertical evolution of subsurface conditions.

There is substantial delay involved between melt water production and runoff to the fjord. We analyse steady state subglacial hydrology of tide water glaciers to access subglacial water routing. We further use simple routing model to calculate discharge hydrograph at the major outlets of glaciers. We evaluate the discharge hydrograph of a tide water glacier and a land terminating glacier with observational plume data and long term proglacial discharge data respectively.