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DATE OF DISPUTATION: 25th of January 2019

DISSERTATION TITLE: *Climatic Mass Balance and Meltwater Routing of Glacierized area of Kongsfjord basin, northwest Svalbard*

Kongsfjorden (Kings Bay) ligger på vestkysten av Spitsbergen, Svalbard. Fra isbreene rundt tilføres ferskvann med mye næringsstoffer. Avhandlingen undersøker massebalansen til isbreene, som varierer etter beliggenhet (sør, øst eller nord). For perioden 1980-16 er det en trend for økt ferskvann flux fra isbreene. Kronebreen er den største bidragsyteren av ferskvann til fjorden, og tilfører næringsstoffer som kan gi føde til ulike arter.

Kongsfjorden, in the Spitsbergen, is 26 km long and surrounded with glaciers with different dynamic behavior. Mass balance of the entire glacierized area of Kongsfjord basin is +0.23 m w.e. a⁻¹ over the period 1980-2016 with significant spatial variability among the south, east and north region of the fjord. The total runoff comprises 16% from seasonal snow of non-glacierized area and the rest from glacier discharge. No significant trend is observed in the mass balance time-series, however, runoff time-series shows a significant and increasing trend over the simulation period. Tidewater glaciers contribute most of the freshwater to the fjord, with maximum contribution coming from Kronebreen, on the east side of the fjord.

Freshwater from glaciers to the fjord modulates fjord circulation and play crucial role on biological activities. The study show that freshwater flux from the entire glacierized area of Kongsfjord basin has increased substantially over the period 1980-2016. Main reason is the increasing temperature in the last few decades. Mean regional temperature has increased by 0.09 oC per year with maximum increase in winter. Precipitation shows a little increasing trend, which marginally compensates the surface mass loss. Climatic mass balance of the entire glacierized area is +0.23 m w.e. a⁻¹ over the period with significant spatial variability among the south, east and north region of the fjord. Glaciers in south show strong negative mass balance, in east show weak negative mass balance and in north show positive mass balance with no significant trend in all three regions. Net mass balance is highly negative for all glaciers considering mass loss due to calving. Tidewater glaciers of the east region contributes most of freshwater to fjord. These tidewater glacier fronts are ecological hotspots which are severely influenced by the glacier freshwater flux, which helps to bring nutrients to the fjord surface providing food for wide range of species.