

American Alpine Club Progress Report for AAC Research Grant
(\$900 to Kristin Schild)

Field work: 5/1-5/31/2015, Final Presentation 12/15/2015
Fieldwork Location: Kronebreen glacier, Svalbard, Norway

Dear American Alpine Club,

As the last of my American Alpine Club funding was used to attend the American Geophysical Union (AGU) conference in San Francisco (held 14-18 December 2015), it is now time to write up everything I was able to accomplish because of your financial support. My goal for this project was to collect water samples (conductivity, temperature, salinity, turbidity) in front of Kronebreen glacier (Svalbard, Norway) to fill a key gap in scientific knowledge, specifically the magnitude and variation of glacier-driven fjord circulation. Presently, this is hindering accurate prediction of the influence of a warming climate on ice discharge and its influence on physical and biological dynamics within the fjord.

Our prime study location was Kronebreen glacier. We had 2 very successful days out in the motorized Zodiac (Figure 1), and had surprisingly clear skies enabling usable satellite imagery. Because we were able to get this imagery, the collected water samples and calculated the suspended sediment concentration (SSC) I am presently using to establish a method for determining the SSC based entirely off of satellite data. Due to the weather in these regions, such a feat (ground-truthing satellite imagery) is somewhat of a mythical beast, so we are very hopeful that this is the data set to move this type of remote sensing analysis forward! We also installed and serviced the time-lapse cameras (3 in total), which will enable analysis of surface currents in the fjord. Those cameras are presumably still collecting imagery and those data will be collected in February. The conductivity, temperature, and turbidity measurements were also very successful, and we were able to get a better handle on the fjord water stratification with depth. Additionally, because this field season went so well, the team with which I was working invited me back for another season in August, on their dime. So now we will be able to compare fjord characteristics early in the melt season and at the peak of the melt season, again something that logistically is challenging.

I've included some pictures below of my field season at Kronebreen (Figure 1), the second field season at Tunabreen (Figure 2), my poster I presented at AGU about this work (Figure 3), and the location maps for all of the water, turbidity and conductivity samples I was able to collect. Additionally, I also put together a movie about my fieldwork for the middle school students I taught as part of the National Science Foundation's GK-12 program during the 2014-2015 school year. You all are acknowledged and thanked at the end of the movie, but unfortunately it is just too large to send as an attachment. Thank you very much again for all of your support. Without your support, this field season would not have been possible, and this gap in our understanding of fjords would still remain a mystery.



Figure 1. Kristin Schild in her survival suit and field gear collecting samples out of a Rigid Inflatable Boat (RIB) in Kongsfjorden, Svalbard, Norway. She is looking at the sediment coming out of Kronebreen glacier, which is moved by meltwater under the glacier. Kronebreen is seen in the background (Photo: K. Lindbäck).

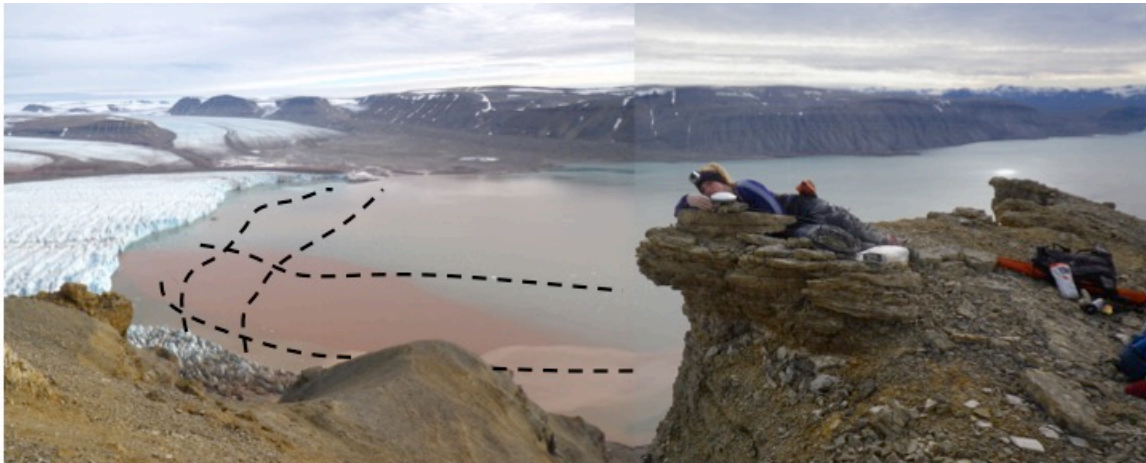


Figure 2. Sediment plumes exiting Tunabreen glacier with *in situ* boat sampling profiles indicated by the black dashed lines. In the foreground is scientist Penny How (UEdinburgh) repairing a time-lapse camera, which overlooks Tunabreen glacier and captures sediment plume evolution and tracks iceberg movement (Photo: K. Schild).

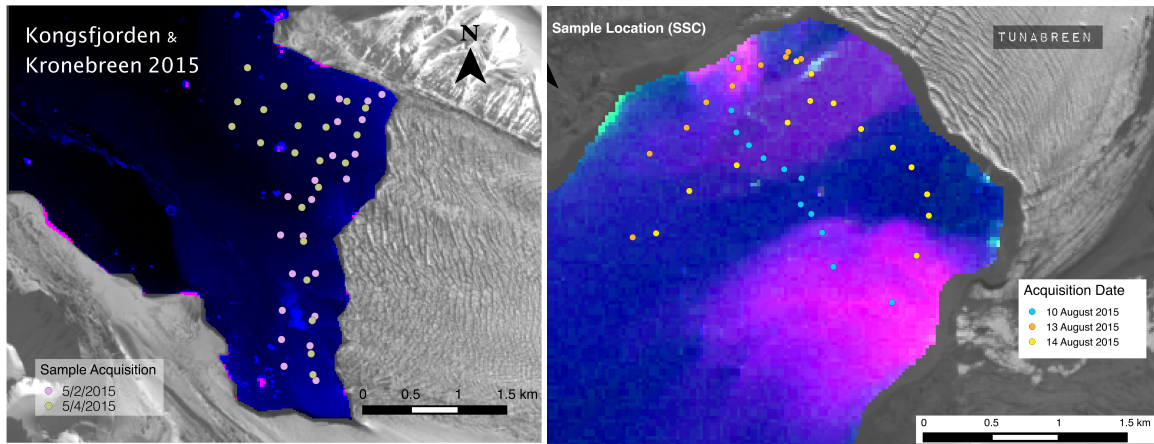


Figure 4: Sample locations in front of Kronebreen glacier (left) in May 2015 and in front of Tunabreen glacier (right) collected in August 2015. The bright blue (left) and bright magenta (right) are sediment plumes exiting from under the glacier.