

Dissolved and particulate organic carbon in the melt water of Icelandic glaciers

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Recently, glaciers have been recognized as unique ecosystems with potential effects on the global carbon cycle. Among other transport processes organic carbon stored in glacier ecosystems is released from the glaciers through melt at the glaciers surface that discharges into proglacial streams and finally into the ocean. Nevertheless, the potential role of glaciers in the carbon cycle remains poorly understood (Hood et al. 2015). One particular problem in this respect is that there is a lack in regional and global analysis of the total amount of organic carbon released from glaciers. Although, the release of organic carbon has been investigated in proglacial streams in Alaska, the European Alps and Greenland, to our knowledge, there is no information available for Icelandic proglacial streams. Thus, the aims of this study are: 1) to develop a first base information about the concentration of dissolved and particulate organic carbon (DOC and POC) in several Icelandic proglacial streams and 2) to detect the variability of DOC and POC along a proglacial stream from the glacier source to the mouth into the Atlantic Ocean.

Therefore, a field trip was conducted between 23 and 31 July 2016, whereby, 25 water samples were taken. The sampling points cover melt water from the following Icelandic glaciers Vatnajökull, Langjökull, Hofsjökull, Myrdalsjökull and Tungnafellsjökull. Further water samples were taken along the river Hvitá starting at the glacier Langjökull and ending at the mouth into the Atlantic ocean in the southwest of Iceland. At every sample point electrical conductivity, water temperate and the pH-value were measured in situ using a calibrated portable water quality meter (Hanna Combo HI98129). The water samples (130 ml) were filtered using pre-combusted GF/F filters (Whatman, pore sizes 0.7 μm) and stored in a cooling box until the shipment to the laboratory of the Department for Geography, Philipps-University of Marburg. The DOC concentrations in the filtered water samples were measured using a TOC analyzer using high-temperature combustion of organic matter (OM) followed by thermal detection of CO_2 (TOC-L, Shimadzu, Japan). POC was measured by determining mass lost upon combustion of the samples. Therefore all glass fiber membranes were dried after sampling at 65°C to a constant weight, reweighed to calculate the total suspended solids (TSS), combusted via heating the filter to 550° C and finally reweighed to calculate the amount of particulate organic matter. Spectroscopic characteristics were detected by using a spectrophotometer (ThermoFisher, Genesys 10S) for UV-VIS analysis and a fluorescence spectrometer (Shimadzu RF-6000) for fluorescence analysis. Spectroscopic indices will be calculated based on these UV-VIS and fluorescence data.

First results show that the DOC-concentrations are very low and range from 0.113 mg/l to 0.937 mg/l. These concentrations are comparable with values measured in the melt water in other regions (Alaska, Greenland and European Alps) (Hood et al. 2015). POC concentrations range from 0.667 mg/l to 173.333 mg/l and exceed the DOC-concentration at every sampling location. This differences can be compared with results of the Greenland Ice Sheet, but not with some small glaciers in the European Alps, where the concentrations of DOC and POC more or less equal (Hood et al. 2015). Nevertheless, the export of POC plays a very important factor within the organic carbon export budget of glaciers in Iceland and further measurements are required.

Hood, E., Battin, T. J., Fellman, J., O'Neel, S., & Spencer, R. G. (2015). Storage and release of organic carbon from glaciers and ice sheets. *Nature Geoscience*, 8(2), 91-96.