Project acronym: 2GEIL

Project title: CH4 & CO2 Gas Emissions under Ice of Land-terminating Glaciers

Project leader: Sarah Elise Sapper, University of Copenhagen, Denmark

Discipline: Earth Sciences & Environment: Other - Earth Sciences

Station(s): Finse Alpine Research Centre (Norway), Kluane Lake Research Station (Canada)

The subglacial environments of three land-terminating glaciers on Greenland and Iceland are a newly discovered source of the greenhouse gases methane (CH4) and carbon dioxide (CO2), which are emitted to the atmosphere via degassing from glacial meltwater. No studies exist on direct emissions of these gases from other glaciated areas of the world. Therefore, the spatial distribution of this phenomenon and its local and global importance for the atmospheric carbon budget is unknown.

The 2GEIL project proposes to conduct first field investigations of subglacial CH4 and CO2 emissions from under ice of the land-terminating glaciers Hardangerjøkulen, Norway (adjacent to Finse Alpine Research Centre) and the icefield of Kluane National Park, Canada (accessed through Kluane Lake Research Station). 2GEIL aims to investigate if emissions of CH4 and CO2 occur from these glaciers and if concentration levels in glacial meltwater and air are linked to the size of the glacier and the bed substrate. We will use a new approach to measure dissolved concentrations of CH4 in meltwater at the glacier portal continuously with a custom-built low-cost, low-power instrument. These continuous measurements will be accompanied by laser-based headspace analyses of CH4 and CO2 concentrations of glacial meltwater as well as discrete water and suspended sediment samples for analyses of the elemental composition and isotopes.