Institut für Geologie: Kolloquium

UNIVERSITÄT BERN

The darkening of the Greenland Ice Sheet or how dust, bugs and black carbon melt our ice caps

Liane Benning

Geoforschung Zentrum, Potsdam, Germany

Monday, 19 April 2021

Liane Benning
Abstract

Anthropogenically enhanced melting of snow and ice masses in Greenland and the associated sea level rise is controlled by changes in albedo, which is primarily a consequence of increased amounts of light absorbing particulates (LAP) on snow and ice surfaces. Among LAPs, well-known and included in climate models, is fossil fuel or wild fire derived black carbon – soot – which, when deposited on snow, reduces is reflectivity. However, other LAPs so far not included in climate models because their role is rather poorly-quantified, are mineral dust and pigmented glacier algae. We know that pigmented algae can reduce albedo by 9 to 15 %, but what initiates algal blooms or what the contribution of mineral dust in albedo reduction is are still not well established. Our data shows the necessary interplay between geochemical, mineralogical and microbiological parameters, yet, the mechanisms for the mineral-nutrient fueled glacial algal blooms during the ever-lengthening melt seasons are unknown. With our work, we aim to ground truth and link surface, airborne and satellite data and determine the role and consequences of water-mineral-microbe interface reactions in shaping large-scale processes across the Greenland Ice Sheet.