



Ground Penetrating Radar Investigations in the North East of Greenland

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The scientific branch of the interdisciplinary Austrian IPY contribution FERMAP aims the North East of Greenland. Based at the Danish research station Zackenberg (74°28'N, 20°34'W) two adjacent glaciers were of main interest of the FERMAP expedition in May 2008. The Freya Glacier (74°23'N, 20°50'W) is an alpine-type valley glacier, c. 6 km² in size, situated on Clavering Island. Ground penetrating radar (GPR) was performed to determine accumulation for mass balance calculation. Further GPR was used to gain ice thickness data to calculate ice thickness distribution and total ice volume.

The second glacier of interest was an outlet glacier of the A. P. Olsen Ice Cap (74°38' N, 21°26' W). Again GPR was performed to yield ice thickness distribution of the outlet glacier, whereas englacial and subglacial reflections drew attention on itself. Conspicuous englacial and subglacial reflections are all located downwards in flow direction of the remaining structures of a lake outburst, and are likely to be part of an englacial and subglacial drainage system. The glacial stream of the investigated outlet glacier drains into the Zackenberg River. In the period of 1997-2008 floods were documented qualitatively by photo and quantitatively by discharge data, showing obvious peaks. Several floods occurred in the end of July, hence high discharge caused by snowmelt can be precluded.

First assumptions about structures, mixtures and origin of conspicuous reflections were taken into consideration. Forward modelling revealed potential structures and mixtures of englacial and subglacial objects causing acquired GPR data. Further the theoretical structure of the subglacial drainage system was modelled using different assumptions about subglacial water pressure. Calculated drainage pathways were compared with location of conspicuous subglacial reflections to yield first estimation for the water pressure condition in the formation period of the subglacial drainage system.