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Overview of glacial and subglacial mass exchange measurements on Gepatschferner (Ötztal Alps, Austria)

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With the purpose to detect glacial and subglacial mass exchange including the erosion of the bedrock of the Gepatschferner, direct and indirect glaciological and geodetic methods are conducted. These measurements belong to the subproject “Glaciology and Geomorphology” which is part of the DFG/FWF joint project PROSA (Proglacial Systems of the Alps). Within this project all of the relief changes within the catchment of the river Fagge including Gepatschferner and Weißseeferner down to the beginning of the backwater of the Gepatsch reservoir (Ötztal Alps) are being investigated.
The mass balance at the surface is determined by using the direct glaciological method and the whole glacier mass balance by using the geodetic method including multiple high resolution airborne laser scans. Surface velocity is ascertained by DGPS and feature tracking with two digital cameras. In order to obtain the resolution and the periodic change of the sediment layer between rock and ice, which seems to play an important role as a sediment source to the forefield, the new method of vibroseismic comes into operation. Additionally the ice thickness is measured with ground penetrating radar and a comparison of the two methods shall be aspired.
A first analysis of the vibroseismic data shows that the spatial resolution exceeds the thickness of the subglacial sediments. At the upper part of the tongue were the ice is about 100 meters thick a sediment layer of more than ten meters of depth was detected. Due to the high surface velocity of the glacier of more than 50 meters per year at the root zone of the tongue, the erosion of the subglacial sediments is expected to be very high. With the effort to get these changes in thickness the vibroseismic measurements will be repeated.