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An approach to evaluate the balance of fluxes of ice, water and sediments through the tongue of Gepatschferner (Ötztal Alps, Austria)

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On the basis of different methods and glaciological investigations at the tongue of Gepatschferner (Ötztal Alps, Austria, 46°52'N, 10°46'E), within the project "Glaciology and Geomorphology", which is part of the DFG/FWF joint project PROSA (Proglacial Systems of the Alps), the balances of water, ice and sediments of the glacier tongue can be closed.
Direct glaciological methods including ablation stakes and measurements with differential GPS as well as multi temporal high resolution airborne laser scans (ALS) are conducted and provide information about surface ablation, total mass loss of the glacier tongue and surface velocities. In order to increase the temporal and spatial resolution of the volume changes and the surface velocities, especially within the icefall zone of the glacier tongue, time lapse photography and photogrammetric analysis come into operation. The bedrock topography is determined out of radar and vibroseismic soundings. In addition, the vibroseismic investigations can resolve the thickness and change of the subglacial sediment layer which is an important parameter within the sediment balance. The mass gain due to rockfalls and landslides from the surrounding slopes to the glacier is calculated out of terrestrial laser scans and the ALS data. Directly at the snout, hydrological investigations such as runoff, bedload transport and the transport of suspended solids are important parameters to quantify the mass losses and to close the balances of water ice and sediments together with precipitation data.