



PASTERZE GLACIER - Surface Mass Balance, Ice Thickness & Dynamics

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The Pasterze Glacier is the largest glacier of the Eastern Alps (17.7 km², 2003). In the period of 1980 to 1997 mass balance measurements were carried out by the Verbund-Austrian Hydro Power (AHP) Company. Due to the project 'Zukunftsprognose Pasterze', the Climate Change Impacts-Section of the Central Institute for Meteorology and Geodynamics (ZAMG, Vienna) reinstalled mass balance measurements on the biggest Austrian glacier. Since the hydrological budget year of 2004/05 mass balance is determined using the glaciological method. The mean specific surface mass balance over the current project corresponds to a surface ice loss of 1.4m per balance year. Between the years 1920-1998 several geophysical investigation campaigns (seismics and Ground Penetrating Radar (GPR)) were realized by ZAMG and University of Innsbruck to gather ice thickness data of the Pasterze Glacier. Since the recent mass loss of the last decades the ice thickness data had to be corrected using linear surface lowering trends ascertained by digital terrain models (DTM) of 1969 and 1998. In the summer of 2009 the last field campaign was initiated to gather ice thickness data by means of reflexion seismics. The seismic profiles were designed to reveal expected maximum ice thicknesses. Gathered seismic data were of high quality and showed reflectors in depths of $\sim 200 \pm 20$ m. Based on all obtainable and actualized ice thickness data an ice thickness map was calculated using a spatial minimum variance approach of the basal shear stress. Still existent data gaps were filled using a constant basal shear stress of 100kPa. Based on the calculated ice thickness map and the accumulation data, balance velocities were calculated. Calculated balance velocities were compared with actual flow velocities yielded by Differential Global Positioning System (DGPS) measurements.