

Comparison of ablation modelling by three mass balance models of differing complexity

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In order to model the impact of climate change on glaciers it is important to understand the processes that control the mass budget of the ice bodies. Today a wide range of glacier mass balance models is applied, ranging from simple degree day models to complex energy balance models. Differences between the models do mainly concern the parameterizations for the calculation of the ablation. In this study we compare the output of three distributed mass balance models of differing complexity: a degree day model enhanced by calculated potential global and two energy balance models of differing complexity. Ice ablation on Haute Glacier d’Arolla, Switzerland, is simulated for the melt seasons 2005 and 2006. All three models are driven by identical input parameters from two automatic weather stations outside of the glacier boundary layer.

Calculated melt rates are compared to ablation measurements taken at 15 stake locations. The calculated energy fluxes are compared to measurements of a third automatic weather station, located directly on the glacier surface. We present the results of the model runs and analyze the reasons for the differences among the models.