Sensitivity studies of the global mass balance of mountain glaciers

B. Marzeion, A. H. Jarosch, and M. Hofer

University of Innsbruck, Institute of Meteorology and Geophysics, Innsbruck, Austria (ben.marzeion@uibk.ac.at)

We employ a minimal model of the area-mean mass balance of mountain glaciers, which is driven by temperature and precipitation data. It is the first model that has the demonstrated capability of hindcasting the observed evolution of unsampled, individual glaciers globally. The model construction is based on the identification of time periods when glaciers with existing mass balance measurements were in equilibrium with local climate. These periods of equilibrium are extrapolated to unsampled glaciers in order to determine the necessary model parameters. Length and area changes of the glaciers are accounted for by employing a parameterization based on linear relaxation to modeled volume changes. The model has been used to reconstruct the past global mass balance of mountain glaciers based on observations of temperature and precipitation, and to project the future changes based on CMIP5 scenarios.

Here, we will present sensitivity studies of the global mountain glacier mass balance in order to quantify the magnitude of the different feedbacks at play (e.g., caused by the response of terminus elevation and surface area to temperature changes).