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Distributed Modelling of Regional Equilibrium Line Altitude in the European Alps: First Results and Discussion Report

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Within the framework of the EU-funded Project ALP-IMP (dealing with climate change within the greater Alpine region over the past 1000 years) GIS-techniques are used for a distributed modelling of the regional mean Equilibrium Line Altitude (ELA0) in the European Alps.

An empirical relationship between mean summer temperature and annual precipitation at the ELA0 of 14 Alpine glaciers has been obtained, derived from high altitude temperature time series, gridded precipitation data (2 km resolution) and mass balance measurements over the period 1971-1990. Using GIS-techniques and a Digital Elevation Model (DEM; derived from SRTM3 and GTOPO30 data) the Alpine ELA0s for this period are modelled. Unlike other studies on Alpine ELAs or distributed mass balance models, this approach allows for computation of the regional ELA0s over the entire Alps at high horizontal resolution (100 m), using a minimum of data input (DEM, temperature and precipitation data).

The results of a this pilot study are compared to results from distributed mass balance models and glacier inventory data. In addition, extended models including potential solar radiation are tested. We conclude that temperature and precipitation information from climate reconstructions and scenarios can be used to model past and future Alpine ELA0s. Current problems and first promising results of this ongoing study are presented and have to be discussed.