Geophysical Research Abstracts
Vol. 13, EGU2011-10606, 2011
EGU General Assembly 2011
© Author(s) 2011

Validation of gridded precipitation maps using mass balance measurements from glaciers in Norway

Markus Engelhardt (1), Thomas V. Schuler (1), and Bjarne Kjøllmoen (2)

(1) Department of Geosciences, University of Oslo, Norway (markus.engelhardt@geo.uio.no), (2) Norwegian Water Resources and Energy Directorate (NVE), Oslo, Norway

The accurate assessment of spatially distributed precipitation is a crucial component in any attempt to quantify snow storage, glacier mass balance or catchment runoff. Operationally gridded precipitation maps from SeNorge (http://senorge.no) are based on applying geostatistical methods on observations made at meteorological stations to derive continuous precipitation fields. The gridded products are a result of collaboration between the Norwegian Meteorological Institute, the Norwegian Water Resources and Energy Directorate (NVE) and the Norwegian Mapping Authority. The platform provides daily meteorological and hydrological fields at a 1 km resolution for mainland Norway since 1957.

Problematically, stations are predominantly located in low-elevation populated areas and thus high elevations are undersampled. Consequently, uncertainty is large concerning the precipitation in mountainous regions, both due to sparsity of observations as well as the large spatial variability of precipitation. We exploit the fact that winter mass balance of glaciers represents a seasonally aggregated measure of precipitation, if corrected for potential occurrence of melt within the considered period. We use gridded temperature and precipitation to simulate glacier mass balance that are compared to mass balance measurements made at various locations and glaciers in Norway.

First results from different Norwegian glaciers show a good correlation between simulated mass balance and stake measurements obtained over an altitudinal range of 600 m to 2000 m a.s.l. To account for melting of snow and ice, a simple degree-day model is employed. For Nigardsbreen, an outlet glacier from the Jostedalsbreen ice cap in Western Norway, it is found that an appropriate account of melt requires degree-day factors (DDF) between 4 and 5 mm/ day/ °C for snow and around 7 mm/ day/ °C for ice. These values are consistent with those reported elsewhere in the literature. Using this approach, the simulated mass balances agree well to summer observations suggesting that spatial distributions of both gridded precipitation and temperature are adequate.