Geophysical Research Abstracts
Vol. 13, EGU2011-2156, 2011
EGU General Assembly 2011

Modelling of snow- and icemelt contribution to Alpine streamflow at different scales in the Ötztal Alps (Tirol, Austria): the alpS MUSICALS project

Kay Helfricht (1,2), Bernd Seiser (1,3), Ulrich Strasser (3,1), Michael Kuhn (2,1), Rudolf Sailer (4,1), Johann Stötter (4,1), Eric Veulliet (1), and Helmut Schönlaub (5)

(1) alpS - Centre for Climate Change Adaption Technologies, Innsbruck, Austria, (2) Institute of Meteorology and Geophysics, Leopold-Franzens University, Innsbruck, Austria, (3) Institute for Geography and Regional Science, Karl-Franzens University, Graz, Austria, (4) Institute of Geography, Leopold-Franzens University, Innsbruck, Austria, (5) TIWAG-Tiroler Wasserkraft AG, Innsbruck, Austria

The spatial and temporal storage of water as snow and ice has a significant impact on streamflow of Alpine headwatersheds. The temporal flow retardation due to solid precipitation varies in the magnitude from hours to years, producing typical hydrographs of Alpine streamflow with increased discharge due to snowmelt in spring and glacier ablation in summer. Alike the spatial distribution of solid precipitation storage in terms of catchment glaciation and the heterogeneity of the seasonal snow cover affect the amount of melt water discharge. With respect to climate change, the expected modification of precipitation regimes, reduced snow cover duration and ongoing glacier retreat will have respective effects on the meltwater contribution to total runoff. The assessment and prediction of snow and ice water resources in high mountain regions are an issue of major importance for the operation of Alpine reservoirs. A new project was hence set up by the alpS Centre for climate change adaptation technologies to investigate the interaction of the driving processes for Alpine discharge generation. The research project MUSICALS (MUltiscale Snow/ICemelt Discharge Simulation into ALpine ReservoirS) aims to analyse the spatial and temporal variation of water storage as snow and ice and to investigate the spatial extent and redistribution of Alpine snow cover for the catchment of the Gepatsch reservoir (Ötztaler Alpen, Tirol/Austria). Further methods for multiscale applications of the glacio-hydrological models AMUNDSEN and OEZ will be developed to account for temporal variation in runoff. Therefor the spatial distributed discharge generation at the contributing catchments, covering an area of about 580 km^2, the discharge routing and the subsequent transition to the reservoir will be integrated in the simulations in timeframes of short term forecasts, of seasonal forecasts, and of long-term climate change scenarios. The snow-, icemelt and glacier fluctuation simulation in MUSICALS will both combine physical process representation with sophisticated data assimilation techniques to provide a robust, accurate and scenario-capable simulation tool, aiming for the development of an optimized management of reservoir inflow for both today's operation, as well as conditions of future climate change.