B068680 SeRAC-CC

Sensitivity of the Runoff Characteristics of Small Alpine Catchments to Climate Change

Synopsis: The SeRAC-CC project aims at estimating the impacts of climate change on the behaviour of hydrological systems using the example of three small Eastern Alpine catchments differing in altitude, natural environment and precipitation regime.

Abstract: Runoff reaction of small Alpine catchments (< 10 km²) primarily depend on three influencing components: (a) precipitation characteristics (rainfall duration and intensity, spatial coverage by the rainfall cell, snow line), (b) properties of the subcatchments (geology, relief – especially connection to the channel network, soil, vegetation, land use) and (c) their system states (e.g. existence of hydrophobic layers, bulk density, antecedent soil moisture content, soil frost, snow layer) whereby the third component is controlled by individually contributing factors taking effect in differing time scales (episodically, seasonally, in the long term). SeRAC-CC aims at evaluating the influence of changes of temperature and precipitation conditions on the system state and thus on the resulting runoff reaction of small Alpine catchments. The methodical core is based on the utilization of hydrological models, supported by field measurements (especially sprinkling experiments simulating torrential rainfall carried out at different system states for characteristic soil/vegetation units) and fed by bias-corrected climate change scenarios. The model outputs will give information on the future seasonal patterns of system state conditions. In a next step critical combinations of system states and meteorological conditions will be identified and their future occurrence probabilities will be assessed from regional climate model scenario ensembles. The occurrence probability serves as direct indicator for expected changes of the magnitude-frequency-relationship of floods. The methodology will be tested and evaluated in three small catchments characterised by differing elevation levels, natural environment and precipitation regimes. Beside the estimation of occurrence probabilities, project results will cover the identification of different runoff patterns depending on altitude, natural environment and precipitation regime; climate projections for the regions of the three test catchments and the evaluation of the ability of regional climate models to reproduce heavy precipitation events in small scale Alpine catchments. By these results SeRAC-CC will provide useful information for practitioners (Torrent and Avalanche Control Service, civil engineers, electricity industry, operators of skiing regions etc.) for future oriented flood risk estimation in small Alpine catchments.

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