

Section Sciences et Ingénierie de l'environnement Design Project 2016 (semestre de printemps)

Proposition n°29

Modelled precipitation time series at snow-depth measurement stations as data source for spatialization of precipitation

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Description

Automatic snow-measurement stations from the IMIS network, run by the SLF, supply information about snow depth, air and snow temperature as well as radiation. However, due to non-heated rain-gauges, solid precipitations are not measured. Furthermore, in spring, the melt-water from the melting snow in the equipment is erroneously recorder as precipitation. For these reasons, raw precipitation time series from the IMIS stations cannot be considered without post-treatment.

More coherent precipitation time series can be computed thanks to modelling and use of fresh snow measures. The energy-balance model SNOWPACK, developed by the SLF, will be used for this purpose and applied to some IMIS stations. Consistency of these reconstructed time series will then be analyzed and their possible use for precipitation spatialization discussed.

Objective

The objective is to evaluate the quality of reconstructed precipitation time series based on modelling and define if they can be used as additional data source for spatialization of precipitations.

Tasks description

The project is divided in two phases. First, the students will establish a SNOWPACK model for some IMIS stations in the Canton of Valais. Once the model calibrated, precipitation time series at the selected stations will be computed. These precipitation time series will account for liquid and solid precipitations.

In the second phase, reconstructed time series will be combined with data from stations with heated rain-gauges, in particular the SwissMetNet network (MeteoSwiss). Spatialization methods and cross-validation will then be used to evaluate the positive or negative impact of integrating the simulated data to observed data for spatialization of precipitation.

Diverse (prerequisite)

At least one student in the group must have followed the course *Snow physics and hydrology*.

Bibliography

Goovaerts, P. (1997). *Geostatistics for natural resources evaluation*, Applied geostatistics series, Oxford University Press, New York, 483p.

Bavay, M. and Fierz, C. (2015). *Snowpack*. [online] Available from: <https://models.slf.ch/p/snowpack/> (Accessed 20 November 2015)

SLF (2015a). *Snowpack manual*. [online] Available from: <https://models.slf.ch/docserver/snowpack/html/index.html> (Accessed 18 November 2015)