Spatial interpolation of Automatic Weather Station (AWS) data

Description

The WSL Institute for Snow and Avalanche Research SLF in Davos (Switzerland) has a mix of research and operational duties. For its duties, it manages an automatic weather station network (~180 stations for Switzerland), collects manual snow measurements and develops both snow cover and snow hydrology models. These models are developed based on new insights gained from research that also benefit from the collected data and the modeling efforts themselves.

As the environmental parameters are collected by the AWS, some erroneous values will be recorded (either because of some local physical phenomena or because of sensor failure). A typical kind of error is represented by spikes, ie brief jumps in the data to significantly different values. Although there are already many algorithms available to filter out such spikes, these methods struggle to handle several common meteorological parameters such as snow height. Many despiking algorithm rely on a sudden change in the signal's variance to detect spikes, but snow height naturally experiences such sudden changes of variance (for example a new snow fall occurring after a long period of slow settling of the snow pack). To make matter worst, snow height measurements typically exhibit lots of spikes during periods of heavy snowfall (when half of the measured values might be erroneous).

This internship consists in finding and implementing new strategies to detect spikes in AWS data for snow height and relative humidity. Currently available methods (rate of change, median absolute deviation and phase-space despiking) will be fine tuned and used as benchmark. Based on the temporal characteristics of spikes in environmental data, new methods will be investigated. The internship is based in Davos.

Goals

Develop new algorithms to remove spikes from environmental data

Benefits

- Getting familiar with environmental research;
- Practical experience of working with AWS data;
- Applying statistics to filter out erroneous data.

Required

- Working autonomously with help from the supervisor;

Contact

Dr. Mathias Bavay
bavay@slf.ch
081 4170 265