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Mapping evapotranspiration of a mountain area using a model without calibration

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The mountains are known as the water towers of the World and they are also climate hot spots. Therefore, water availability studies are extremely useful. To this purpose, Evapotranspiration analyses are important because it plays an essential role in water balance. Its estimation is an important challenge in complex terrains because of few measurement sites and of models' resolution. Research on both meteorological and hydrological models is still ongoing and there are multiple aims: better catch the physical processes in the atmosphere and in the soil and simulate the reaction of ecosystems to temperature changes, droughts and vegetation shifts towards higher altitudes.

It is therefore important to elaborate new tools for the monitoring of mountain environments and ecosystems from a meteo-hydrological and also climatological point of view.

We elaborated and used a high-resolution model to compute the evapotranspiration field of an Alpine domain located in Italy. The model includes a meteorological module and a hydrological module, which is based on a soil bucket approach. The model allowed us to estimate the local water balance and was validated using three eddy covariance quality-controlled data sets. Furthermore, it was also compared to satellite products. The first results indicate a rather good agreement between simulations of our model, observations, and satellite evapotranspiration estimates.

These are first, encouraging results and the model will be hopefully used in a climate change perspective by means of climate models' outputs, to simulate future scenarios in the Alps.