



Case study of a hillside lysimeter with realistic boundary conditions on slope and hillside in an inner alpine area, Switzerland

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The MontanAqua project aims to study the water resources management in the region Sierre-Montana (Valais, Switzerland). Thus, it is of importance to have a precise idea of the water resources. As most of the measuring systems are usually installed at lower altitudes (less than 1500 m asl), water inputs and outputs were monitored through a dense measuring network from the bottom of the Rhone valley to the Plaine Morte glacier (from 550 m asl to 2800 m asl). Weather and discharge stations, but also soil moisture sensors were installed in the key areas of our study region (Sierre-Crans-Motana region, Valais, Switzerland).

But Evapotranspiration is a crucial data for water resources management. A hillside lysimeter was built in a typical unirrigated dry meadow to get the actual evapotranspiration on the driest place of the study area. This case study allows us to compare the usual evapotranspiration measurements using soil moisture data (Seneviratna et al. 2010). We will calibrate our soil moisture measurements using the lysimeter data to compute actual evapotranspiration on the whole region.

To our knowledge this is the first time a lysimeter is built on slope on a hillside. It was built in September 2010 and the first month was used to set up the lysimeter and all the sensors. Measurements began in 2011 and still occur.

The results of the measuring network bring out a north-south and a west-east important rainfall gradient in the region. This mainly means for the region, that the water remains on the upper areas, as higher from Montana, 2000 mm/a of water is coming as rainfall, and less than 800 mm/a fall on the lower area. The lysimeter measured an actual evapotranspiration of 400-440 mm/a on 2011-2012, which leaves less than 200 mm/a of water for the grassland/pasture system. As most of the grassland are irrigated, our soil moisture and lysimeter measurements bring out the amount of water necessary for the agriculture in the region for the next year. Climate change data will be applied to our data and future water resources for agriculture will be modeled.

This brings important knowledge for our comprehension of the sensitivity of the agricultural land use systems in an extremely dry inner alpine area. Without an important and integrated water management system, the region might encounter some important droughts, which will be of importance for the farmers.

Sonia I. Seneviratna, Thierry Corti, Edouard L. Davin, Martin Hirschi, Eric B. Jaeger, Irene Lehner, Boris Orlowsky, Adriaan J. Teuling. 2010. Investigating soil moisture-climate interactions in a changing climate: A review. *Earth-Science Reviews* 99: 125-161