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Spatial variability of soil moisture in Switzerland during summer 2010

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Soil moisture impacts the partitioning of energy and water fluxes at the land surface and therefore plays a central role in land surface-atmosphere interactions. Knowledge about the spatial variability of soil moisture, which is constrained by different characteristics, such as soil properties, topography, vegetation and meteorological conditions, is critical for a better understanding of land surface-climate interactions and the validation of models and remote sensing data. However, regional scale soil moisture networks are still scarce. Within the Swiss Soil Moisture EXperiment (SwissSMEX) and SwissSMEX/-Veg project (www.iac.ethz.ch/url/SwissSMEX) a network of in-situ soil moisture measurements was recently established in Switzerland. This network mainly covers the Swiss Plateau and consists of 19 sites at 17 locations (14 grassland, 1 arable, and 4 forest sites). Profile measurements with up to seven levels of soil moisture and soil temperature down to 120 cm have been established. Furthermore, information about soil characteristics, vegetation cover and meteorological parameters are available for each site.

In the present study soil moisture observations from the SwissSMEX/-Veg network are used to evaluate the spatial variability of soil moisture in Switzerland during the summer 2010. By focusing on this time period we include dry conditions with above average air temperature in the last third of June and first half of July 2010. Furthermore, the first half of July was characterized by locally heavy storm events, while the second half of July resulted in a regionally wet period. Geostatistical approaches are used to analyze the spatial variability of soil moisture for these different moisture conditions. The resulting semi-variograms of dry and wet conditions are compared. Furthermore, the study provides an overview of the possible applications of the involved geostatistical approaches at the considered spatial scale.