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Soil moisture during midlatitude continental summers: an experimental and modeling analysis

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Soil moisture is a fundamental variable for the comprehension of ecohydrological systems, in particular when vegetation dynamics can be assumed to be water limited. Here we present soil water data at hourly temporal resolution collected during the summers 2005-2007 in the monitoring station located in Grugliasco, Torino (campus of the Agricultural Faculty of University of Torino, Italy). The station is located in the northwestern part of the Po Valley, characterized by dry summers. The site is equipped with an automatic meteorological station, an automatic TDR station with 160 vertical probes ranging from 150 mm to 2000 mm length, and 80 mercury column tensiometers. The vegetation at the site is mainly composed of grasses that can be considered water limited during summer. We discuss the comparison of these temporal series with the output of a simple punctual model for soil moisture in a soil layer, as introduced e.g. by Laio et al., 2001. The necessary soil-vegetation parameters, related to the evapotranspiration process, are evaluated from the measured soil retention curve. Rainfall at the site is used as external input of the model. The model allows a detailed temporal description of soil moisture dynamics, with resolution of a few hours, comparable with the temporal resolution of the data.