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Spatial and Temporal dynamics of soil moisture in a Mediterranean mountain area

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Soil moisture plays a central role in hydrology affecting runoff, infiltration and evapotranspiration processes. The water content of soil layers is highly variable both in space and time, partly due to the variability of meteorological conditions, soil properties and vegetation. The knowledge of soil moisture dynamics at reasonable temporal and spatial resolutions, is therefore required to improve hydrological understanding and modeling in a global change context. In the Mediterranean area, defined as one of the most vulnerable areas to climate change, according to the last IPCC report (2007), there is however a severe lack of detailed soil moisture data sets. The objective of this work is to investigate the inter/intra-annual spatial and temporal distribution of soil moisture in a Mediterranean mountain area using the detailed hydrological data set gathered in the Vallcebre Research catchments (North Eastern Spain). Using "time domain reflectometry" (TDR), soil water content was measured weekly between 1998 and 2003, at four different depths (0–20, 20–40, 40–60 and 60–80 cm) at nine profiles representative of different geoecologic units. Results obtained revealed that inter-annual variability was greater in the profiles representative of humid conditions. Moreover the highest values of intra-annual variability were obtained during the most humid years (2002 and 2003). Finally, both topographic position and vegetal cover (forest or grassland) were the more important control factors of soil moisture patterns.