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Soil moisture monitoring in the Toce valley (Italy)

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Abstract. In the framework of the Mesoscale Alpine Programme (MAP), soil water content profiles were collected at a point station in the Toce Valley (Lago Maggiore MAP Target Area). The data are for the first 70 cm depth of soil for the period April–November, 1999. All measurements were made by a Time Domain Reflectometry device. The time variation of the water stored in a column of soil was estimated by a mass balance method. Evaporation was estimated from the data collected in the summer period. Likewise, by applying the mass balance method to the data collected during and after heavy precipitation events, the water infiltrated into the soil was also estimated. A qualitative evaluation of ponding and/or runoff as the difference between the precipitated and the drained water was obtained under suitable assumptions. Furthermore, the time evolution of the soil water content profile was studied by solving the Richards equation both analytically and numerically for two particular cases: the driest period and a period following a heavy precipitation event. Finally, during the MAP Special Observing Period, two intensive campaigns were performed, together with measurements using an airborne passive microwave radiometer, to assess the spatial distribution of the surface (0–30 cm depth) soil water content in fields with different physical and agricultural characteristics.

Keywords: soil water content, Time Domain Reflectometry, TDR temperature-dependence, evaporation, infiltration, runoff, linearised Richards equation.

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