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A European vision for hydrological observations and experimentation

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An observatory to monitor long-term eco-hydrological changes in Alpine environments: the LTER Matschertal/Val di Mazia.

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The Long Term (Socio-) Ecological Research LT(S)ER site IT25 - Val Mazia/Matschertal is a catchment covering an elevation range between 900 and 3700m a.s.l., in South Tyrol (Italian Alps). While nivo-glacial processes dominate runoff production, lower sideslopes have a relatively dry climate, (ca. 500 mm at 1500m a.s.l.), mainly as summer convective precipitation, and therefore the site is appropriate for space-to-time substitution experiments for understanding mountain eco-hydrologic processes along climatic gradients.

For a better understand of the ecological, hydrological, and climatic processes in the catchment, a spatially distributed micro-meteorological network has been installed since 2009. The measurement infrastructure consists of about 20 stations among all dominant land-use types (grassland, forest, river, proglacial area) covering an elevation range from 1000 to 2700 m a.s.l.. The parameters monitored are mainly related to the 1) Microclimate (air temperature, humidity, wind) 2) Hydrological cycle (soil moisture, soil water potential, runoff, evapotranspiration, solid/liquid precipitation) 3) Energy balance (short/longwave/net radiation, surface heat fluxes) 4) Optical reflectance (Phenocam, NDVI/PRI Sensors). 5) Vegetation (sap-flow. O-H stable isotope monitoring).

The talk will focus on the capability of the collected observations to clarify if the water used by vegetation is coming from snowmelt or mainly from summer precipitation, which is one of the key open research questions in the perspective of a future elevational increase of the rain-snowfall transition zone.

In this contribution, we would like to highlight the potential of the site in a network of hydrological observatories in Europe that allows the testing of hydrologic hypotheses for different environments and climatic regions.