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**STSM title:** Measurement of soil water balance with fast track Isotope field methods along a desertification gradient in the SE of Portugal

**STSM Host scientist:** Christoph Külls, Institut für Hydrologie, University of Freiburg (DE)

**Five Keywords:** desertification and land degradation; plant community; soil water percolation rate; soil-plant relationships; stable isotope soil profile

**Topic summary:** The STSM was focused the application of a method based on the measurement of stable isotope profiles of soil water, to determine soil percolation rate from approximately the last 1 – 5 years, along a desertification gradient in SE Portugal.

**Methods summary:** Soil samples were previously collected in SE Portugal at different soil depths in 4 sites (in collaboration with Nadia Bianconi), transferred to aluminum zip-bags and shipped to Freiburg. There, they were prepared and analyzed for the isotopic composition of the vapor in the bags, later converted to isotopic content of pore water, and soil water content was also determined.

**Results and implications for restoration:** Based on the soil water profiles, we estimated soil percolation rate at each site. Soil retrospective information about water percolation, along with climatic information, helped to explain and interpret plant community patterns along the desertification gradient. By providing a better understanding of soil-climate-plant relationships, the results are an important contribution to the study of land degradation and desertification processes which increasingly affect drylands, contributing also to improve restoration strategies to mitigate them.



Detail of field sample collection, sealing of the inflated bags with a hot bag sealer, and measurement of the isotopic composition of the vapor in the bags with the Picarro Wavelength-Scanned Cavity Ring Down Spectroscopy (WS-CRDS) analyzer