Time monitoring of electrical resistivity in the vadose zone

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Abstract title: Time monitoring of electrical resistivity in the vadose zone

Abstract = maximum 1500 characters

Climate change modifies the precipitations and temperatures, changing the distribution of water supply in soil during the growing seasons of cultivated plants. To help farmers to optimize their irrigation, the description of water processes in agricultural soils is essential. In this context, we have evaluated a new geophysical device to characterise water exchanges in the vadose zone, both in the soil (area prospected by the roots), and at the soil / subsoil interface. We were especially interested in identifying ascending fluxes linked to capillary rise. About 50 meters from the O'ZNS area, the studied soil has been equipped with a drilling device the electrical resistivity on 21 levels up to 3.1 m several times a day: the "Subsurface Monitoring Device" (SMD). After a 2 years measurements period, we are optimistic about the whole quality of the measured data recorded by the SMD since April 2017, despite the low level quality of some surface measurements due to soil / electrode contact problems. Comparisons of SMD data with independent resistivity measurements demonstrated the good coherence of data. The device allows us to acquire data at a resolution in depth that would not be accessible by a surface geophysical device. The temporal analysis suggested that water transfers exist between the different soil and subsoil levels in depth. This hypothesis still needs to be validated by a comparison with complementary data over a longer observation period as well as by confronting the data that will be collected on the long-term observatory of the O'ZNS platform being installed on the study site.