



Long-term lysimeter experiment to analyze the influence of the climate change on matter fluxes

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Based on the TERENO SoilCan infrastructure, a long-term large-scale experiment was designed to study the effects of climate change on terrestrial systems. The water and matter fluxes in soil are the main focuses of SoilCan.

In the frame of SoilCan, fully automated lysimeter systems were installed on several highly equipped experimental field sites of the TERENO-observatories and the relevant status variables of each ecosystem were monitored (e.g. climate, hydrology, biosphere-atmosphere exchange, biodiversity, etc.).

In total, 90 lysimeters (1.5 m depth, 1m² surface) were filled with soil monoliths at the four TERENO-observatories and were instrumented with TDRs, tensiometers, temperature sensors, soil heat flux plates, and CO₂ sensors. For the controlling of the lower boundary condition, suction candle rakes were installed into the lysimeter bottoms. In combination with bi-directional pumps and tanks, the water content of the lysimeters was adjusted to the surrounded original field sites. To simulate the expected climate change, 48 lysimeters were transferred along temperature and rainfall gradients within the respective observatories and between the observatories, based on the principle 'Space for Time'. In case of the "Rur" observatory, three intensively instrumented field sites ("Wüstebach", "Rollesbroich" und "Selhausen") were equipped with lysimeter stations. These three field sites include different land uses, "Wüstebach" as a forest site, "Rollesbroich" as a grassland and "Selhausen" as an arable site. In order to standardize the agronomic management, the crop rotation at the arable lysimeters comprised winter wheat - winter rye - winter barley - oats. For investigation of the matter flux, soil solutions and leachates were regularly sampled. The water balances and the dynamics of the carbon and nitrogen fluxes in the first two years of the experiment will be presented.