Geophysical Research Abstracts
Vol. 20, EGU2018-15369, 2018
EGU General Assembly 2018

Impact of groundwater regimes on water balance components of a site with a shallow water table

Ottfried Dietrich, Thomas Kaiser, and Jörg Steidl
Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany (odietrich@zalf.de)

Large areas of the northern German Lowlands are characterized by shallow water tables. The water levels of the ditches and the groundwater levels of the most agricultural used areas can often be regulated by drainage, also with pumping stations and sub-irrigation with the help of weirs. Their water management is often the subject of discussions between different interest groups, the most controversial topic being the different target groundwater levels. A good level of knowledge about the expected effects of the different water levels on the water budget components is a precondition for the development of compromises in well-balanced water resource management.
We used groundwater lysimeters to investigate the impact of different water level regimes on the water balance. The lysimeters were installed directly within a typical shallow water table site and had a specially designed system to control the lower boundary condition. This enabled us to simulate different management options in a realistic way.
Our results indicate that rising water tables caused increasing evapotranspiration if the vegetation is adapted to these conditions. This adaptation may take place within a few years in which water tables were higher than before. High water tables in spring are linked to increased water storage in the area. This can help to compensate for the higher evapotranspiration for some weeks but not for the entire season. The meteorological conditions have a large short-term impact on the water budget, which is difficult to compensate for using long-term water management strategies or slow-responding vegetation development.
The results underline the suitability of groundwater lysimeters for the investigation of complex eco-hydrological processes of shallow water table sites. They show the necessity to involve ecological processes in hydrological investigations under these site conditions and the need for long-term studies. The insights gained can help to find compromises for water management options and can be an important basis for the development or improvement of eco-hydrological models.