Geophysical Research Abstracts
Vol. 15, EGU2013-7262, 2013
EGU General Assembly 2013

Comparison of wetland evapotranspiration estimates using diurnal groundwater fluctuations and measurements of a groundwater lysimeter

Marcus Fahle (1,2), Ottfried Dietrich (1), Gunnar Lischeid (1,2)

(1) Leibniz Centre for Agricultural Landscape Research (ZALF), Institute of Landscape Hydrology, Müncheberg, Germany (Marcus.Fahle@zalf.de), (2) University of Potsdam, Institute of Earth and Environmental Science, Potsdam, Germany

Sound water management in wetlands requires knowledge of on-going processes and estimates of the water balance components. Specifically evapotranspiration is of crucial importance, as it is often the main water extracting quantity. To avoid elaborate and expensive equipment, which is often required for estimating actual values, potential evapotranspiration is frequently used, which can be easily derived from standard meteorological measurements. However, the potential values may under- or overestimate actual evapotranspiration significantly.
A cheap and easy-to-use method for estimating actual values in shallow groundwater environments relies on diurnal groundwater fluctuation. Basically the 24 hours groundwater level decline, considering in some way the prevalent groundwater recovery, is multiplied by the readily available specific yield. Various varieties of this approach have been employed for that purpose, above all differing in their assumptions on groundwater recovery, i.e. lateral or vertical in- or outflow. The objective of our study is therefore to compare these different methods.
For this purpose we use data of a weighable groundwater lysimeter situated at a ditch drained grassland site in the Spreewald wetland in Northeastern Germany. The groundwater level in the lysimeter was adjusted to a reference gauge and simulated the conditions of the surrounding area. Hence the lysimeter reflected near natural conditions and provided measurements of all water balance components with high temporal resolution (up to 10 minute intervals). Suitable days, i.e. with a pronounced diurnal fluctuation, of the vegetation periods 2011 and 2012 are chosen and used to prove common assumptions about groundwater recharge, e.g. if the values remain constant during the day or if diurnal variations resulting from gradient changes exist. Finally, based on the lysimeter measurements, the evapotranspiration estimates gained from different approaches that employ diurnal groundwater fluctuation are evaluated.