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Kommission I: Bodenphysik und Bodenhydrologie

Wasser-, Stoff- und Energietransport im Boden und zum Grundwasser

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Titel
Long-term water mass and redox potential dynamics in large weighable fen lysimeter

Abstract
The water mass and redox potentials dynamics were intensively studied in peat soils. However, most of these studies were conducted either in the laboratory or in situ for the short-term period that does not reflect the actual long-term field conditions. Although sustainable management of peat soils needs to understand long-term water and redox potentials dynamics, there is little information on undisturbed peat soils. To address this problem, a large weighable fen lysimeter (LWFL) was installed at Lysimeter Station Falkenberg in 2003. The LWFL was filled with undisturbed 6 m3 (4 m length, 1 m width and 1.5 m depth) fen monolith. The lysimeter vessel had four electronic load cells at the four supporting points which are sensitive to detect and measure mass changes because of rain and evapotranspiration. Platinum redox electrodes were also horizontally installed in 20, 50 and 120 cm soil depth in three replications. The mass changes and redox potentials were automatically measured every hour interval for 13 years. The preliminary evaluation of the 13 years' data showed that the mass change was strongly and positively associated with the rainfall distribution pattern. The lowest and highest annual masses were 7092 and 9768 kg that was recorded in 2009 and 2016, respectively. Both the average and individual years of monthly and daily mass changes were also the reflection of seasonal changes that affect the rainfall amount and distribution. However, the hourly mass change was not significant within a year, but among the most years. The change in redox potentials showed similar trends to that of the mass change but in the opposite directions. The redox potentials increased as mass decreased and vice versa. The results indicate that the lysimeter can be used to study long-term water and redox potentials dynamics to understand the biogeochemistry of peat soils.