Geophysical Research Abstracts
Vol. 12, EGU2010-3927, 2010
EGU General Assembly 2010

Function of peatland located on secondary transformed peat-moorsh soils on the purification processes of groundwater and the impact of pH on the rates of the elution of organic matter

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The investigation of peatland is used to show the water quality functioning with respect to different forms of nitrogen and carbon. The purification of ground water by the transect of 4.5 km long consisting organic soils (peat–moorsh soils) was estimated. This transect is located in the Agroecological Landscape Park in Turew, 40 km South-West of Poznan, West Polish Lowland. There is this transect along Wyskoć ditch. pH, the contents of total and dissolved organic carbon, total nitrogen, N-NO_3^-, N-NH_4^+ was measured. Additionally C/N factors of peats were estimated. The investigation has shown the impact of the peatland located on the secondary transformed peat - moorsh soils on the lowering of total nitrogen, ammonium, and nitrates as well as total and dissolved organic carbon in ground water.

Peat-moorsh soils were described and classified according to Polish hydrogenic soil classification and World Reference Base Soil Notation.

There are four investigated points along to Wyskoc ditch. Two times a month during entire vegetation season the following material was taken from this four chosen sites:

- samples of peat, from the depth of 0-20 cm,
- samples of water from the ditch,
- samples of ground water from wells established for this investigation.

Samples of peat-moorsh soils were collected at the depth 0-20 cm. Soils were sampled two times a month from 10 sites of each site. Samples were air dried and crushed to pass a 1 mm-mesh sieve. These 10 sub-samples were mixed for the reason of preparing a "mean sample", which used for the determination of pH (in 1M KCl), dissolved organic carbon (DOC), total organic carbon (TOC), total nitrogen (N_{total}), and N-NO_3^- as well as N-NH_4^+.

In water from Wyskoć ditch pH, N_{total}, N-NO_3^-, N-NH_4^+, DTC (dissolved total carbon) and DOC (dissolved organic carbon) was measured.

Ground water samples were collected from four wells established for this investigation. The water was filtered by the middle velocity separation and pH, N-total, N-NO_3^-, N-NH_4^+, DTC (dissolved total carbon) and DOC (dissolved organic carbon) ware measured.

Peatland located on the secondary transformed peat - moorsh soils has revealed the lowering in ground water: nitrates 38.5%, N-organic 10%, N-total 24.5%, ammonium 38.7%, dissolved total carbon 33.1%, dissolved total inorganic carbon 10%, and dissolved organic carbon 57.5%.

The elution of soil organic matter from peat-moorsh soils in broad range of pH and ionic strength was investigated. The rates of the reaction were calculated from the kinetics of first order reaction model. All experiments were repeated at different pH 6.0, 6.5, 7.0, 8.0, 8.5 of 0.5 M ammonium acetate buffer solution. The investigations have shown the impact of the properties of secondary transformed peat-moorsh soils on the rates of the dissolution of organic matter.

The rates of organic matter elution for all samples of peats were significant different at four used wavelengths λ=272 nm, λ=320 nm, λ=465 nm, and λ=665 nm. It was observed that the rates increased between λ=272 nm and λ=320 nm and decreased from λ=465 nm to λ=665 nm. Although, the lowest values of the pseudo first-order rate constants measured at λ=665 nm for all samples of peats from four places ranged from 1.9524 10^{-4} s^{-1} to 2.7361 10^{-4} s^{-1}. Therefore, the highest values of $t_{0.5}$ ranged from 42.2 to 59.2 min for all samples from Zbęchy, Shelterbelt, Mostek and Hirudo.

This work was supported by a grant No. N N305 3204 36 founded by Polish Ministry of Education.