



Discrimination of rewetted / renaturated habitats from natural moist habitat in a mire by means of DOM quality differences using fluorescence indices

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Mires can be a potential source of dissolved organic matter load (DOC) in fresh water catchment areas. Renaturation and rewetting of formerly drained mire sites is often debated in terms of nature protection aspects as well as in terms of climatic and adjacent water protection. Latter aspect is closely connected with the drinking water supply and thus of major human interest. In this case the Central German uplands play an important role. For estimation of potential leaching of humic substances the principal comparison of natural habitat with artificially rewetted habitats concerning dissolved organic matter quality can be of interest. In this regard a partly rewetted mire in the Harz Mountains, Germany was investigated. Seven locations, one oligotrophic natural, one mesotrophic natural, and together 5 rewetted locations were investigated. The soil water of all sites was sampled monthly and its quality was analysed by bulk parameters like DOC and bulk optical parameters like excitation emission matrix fluorescence (EEM) and UV spectra.

Water was pumped from piezometers and immediately filtered. Each site consisted of four parallel piezometers in the peat soil. Samples were stored at 4° C before analysis. All spectroscopic data, both UV spectra and EEM were recorded simultaneously. Fluorescence EEMs were collected using a spectrofluorometer (AQUALOG, HORIBA Jobin Yvon, USA). Fluorescence intensity was measured during emission scans (240 nm – 600 nm every 3.27 nm, 8 pixel) at set excitation wavelength in 3 nm increments from 240 nm to 600 nm. The fluorescence indices freshness (β/α), Fluorescence Index (FI), and Humification Index (HIX) were calculated [1] from the inner filter effect (IFE) corrected EEM spectra.

The natural habitat could be clearly discriminated from the rewetted sites. The DOC, UV absorption at 254 nm, and the humic like fluorescence intensity were relatively balanced in the natural habitat soil water whereas the rewetted habitats showed predominant maxima of DOC, fluorescence and UV intensity during summer months. The freshness index β/α was relatively balanced in soil water of the natural. In the rewetted sites soil water β/α had lower values in summer and larger values in winter compared to the natural soil water. The humification index was on average generally larger in the rewetted sites soil waters with a tendency to maximum values in summer months.

As one preliminary suggestion, leaching of humic substances takes place above average in summer months in the rewetted habitats, whereas the concentration of humic substances in soil water of the natural habitat seems to be balanced over the year.

Reference

- [1] Halbedel S, Büttner O, Weitere M (2013) Linkage between the temporal and spatial variability of dissolved organic matter and whole-stream metabolism. Biogeosciences 10:5555-5569