Geophysical Research Abstracts
Vol. 21, EGU2019-12507-1, 2019
EGU General Assembly 2019

Geochemical subsurface controls on seepage groundwater quality and consequences for peatland functioning

Jelmer Nijp (1), Pierre Huyghe (2), Edu Dorland (2), Rudy van Diggelen (2), and Camiel Aggenbach (1)

(1) KWR Watercycle Research Institute, Ecohydrology, Wageningen, Netherlands (jelmer.nijp@kwrwater.nl), (2) University of Antwerp, Antwerp, Belgium

In many fen peatland ecosystems in e.g. brook valleys, natural vegetation is adapted to wet conditions and a large input of buffering cations. In these systems, upward seeping groundwater is a major control on water quality in the root zone and contributes to the soil's buffering capacity. The quality of groundwater entering the root zone of seepage-dependent ecosystems is controlled by many factors, including land use in the infiltration area and geohydrochemical conditions that groundwater encounters along its way from through the subsoil infiltration to exfiltration (seepage). While seepage water quality is often considered static, changes in land-use and climate may lead to considerable modifications. Specifically ecosystems reliant on groundwater that infiltrates in areas with intensified agriculture and short groundwater residence times may be at risk due to forthcoming increased nutrient inputs. However, reactive subsoil compounds may interact with dissolved nutrients and reduce, temporarily buffer, or increase pressure on vegetation of seepage-dependent peatland ecosystems. To date, however, a generic framework to identify conditions under which seepage dependent peatlands are at risk is absent. Here, we present a novel framework that (1) designates geochemical subsoil properties to any geographic position in the Pleistocene part of The Netherlands (2) quantifies the subsoil buffering potential with given input water quality and (3) provides solutions for local management to counteract negative impact (e.g. reduced carbon uptake) on peatlands. The framework allows rapid identification of how environmental changes may modify seepage water quality and under which conditions such changes put peatlands at risk.