

EGU2020-13491

<https://doi.org/10.5194/egusphere-egu2020-13491>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Nitrogen dynamics measurements in wetland soils

Kata Horváth-Szabó¹, Balázs Grosz², Marianna Ringer¹, and Zoltán Szalai¹

¹Research Centre for Astronomy and Earth Sciences, Geographical Institute, Hungary (katuszab@gmail.com)

²Johann Heinrich von Thünen Institute, Braunschweig, Germany

Wetlands are important sites for the biogeochemical cycles of macro and microelements, because the presence of the water induces faster chemical and transport processes in the soils which occur as intensive diurnal and seasonal fluctuations of the soil parameters and element-content. Vegetation is also varied basically because of the (often fluctuating) water level, which makes it possible to study these different ecotopes in a relatively small area.

We chose our long-term study site – a meadow formed by a local depression of the surface – near Ceglédbercel, Hungary in 2010. Three different vegetation patches were separated governed by the following species (in order of the influence of water): 1 – *Agrostis stolonifera*; 2 – *Carex acutiformis*, *Carex flacca*, *Carex vulpina*; 3 – *Phragmites australis*. Microclimatic and soil-representing parameters were measured in each patch: air temperature, evaporation, strength of wind and incident solar radiation; soil temperature, pH and redox potential of the soil solution. We also analyzed the main elements and element forms of the soil solution regularly: NO_3^- , NO_2^- , NH_4^+ , PO_4^{3-} , Mn, Fe, K, Na, Mg, Ca and emitted N_2O , CH_4 gas fluxes of the soil.

Our main hypothesis was that different plant species generate measurable differences and heterogeneities in the bulk soil. This is shown best by the run of the redox potential which often seemed to ignore the effect of water-gradient because of the regulating ability of plants in the rooting zone. The occurrence and concentration of nitrogen forms are very redox-sensitive; thus they are seemingly good indicators of the state of the soil. Somewhat surprisingly, diurnal cycles (caused by the plants' alternating photosynthetic activity) rarely occurred among the measured parameters and concentrations. One of those rare occurrences was the emission of gaseous N_2O , which reached its maximum in the afternoon and almost stopped before dawn. Our long-term experimentation also caught some interesting anomalies (e. g. accidental destruction of the vegetation) thus we managed to record the effect of these environmental changes on the soil and the most environment-sensitive elements of the soil proved to be the nitrogen-forms, with Fe and K.