



Spatial patterns of denitrification and its functional genes in peatlands

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This study is aimed to analyse relationships between the environmental factors and the spatial distribution of the main functional genes *nirS*, *nirK*, and *nosZ* regulating the denitrification process. Variations in hydrological regime, soil temperature and peat quality have been taken into the consideration at both local and global scale. Measurements of greenhouse gas (GHG) emissions using static chambers, groundwater analysis, gas and peat sampling for further laboratory analysis has been conducted in various peatlands in Iceland (two study areas, 2011), Transylvania/Romania (2012), Santa Catarina/Brazil (2012), Quebec/Canada (2012), Bashkortostan/Russian Federation (two study areas, 2012), Sichuan/China (2012), Estonia (two study areas, 2012), Florida/USA (2013, Sologne/France (2013), Jugra in West Siberia/Russia (2013), Uganda (2013), French Guyana (two study areas, 2013), Tasmania (two study areas, 2014) and New Zealand (two study areas, 2014). In each study area at least 2 transects along the groundwater depth gradient, one preferably in undisturbed, another one in drained area, and at least 3 rows of sampling sites (3-5 replicate chambers and 1 piezometer and soil sampling plot in each) in both has been established for studies. In each transect GHG emission was measured during 2-3 days in at least 5 sessions. In addition, organic sediments from the artificial riverine wetlands in Ohio/USA in 2009 and relevant gas emission studies have been used in the analyses. In the laboratories of Estonian University of Life Sciences and the University of Tartu, the peat chemical quality (pH, N, P, C, NH₄, NO₃) and N₂O, CO₂, and CH₄ concentration in gas samples (50mL glass bottles and exainers) were analysed. The peat samples for further pyrosequencing and qPCR analyses are stored in fridge by -22oC.

This presentation will consider the variation of GHG emissions and hydrological conditions in the study sites. In addition, several selected biophysical factors will be taken into account.

Further study will include peatland sites in Montana/USA, Columbia (Andes), Tierra del Fuego/Argentina, Pyrenees/Spain, Savo/Finland, the Netherlands, Okavango/Botswana, Heilongjiang/China, and Kamchatka/Russian Federation.

Also, additional analysis will be conducted on the relationships between the intensity of CH₄ emissions and methanogenesis regulating functional genes *mcrA*, *pmoA*, and *dsrAB*.