Geophysical Research Abstracts
Vol. 20, EGU2018-7271-1, 2018
EGU General Assembly 2018

Global change experiments and high-resolution palaeoecological studies reveal response of peatlands to various disturbances - building a path to the new generation integrated research

Mariusz Lamentowicz (1,2), Vincent E. J. Jassey (5,6,8), Radosław Juszczak (7), Sandra Słowińska (3), Michał Słowiński (4), Katarzyna Kajukało (1,2), Dominika Łuców (1,2,3), Małgorzata Zielińska (1,2), Bogdan H. Chojnicki (7), Kamila Harenda (7), Monika K. Reczuga (1,2), Katarzyna Marcisz (1,2), Mateusz Samson (7), Piotr Kołaczek (2), Anna Basińska (1,2), Alexandre Buttler (5,6)

(1) Adam Mickiewicz University in Poznań, Laboratory of Wetland Ecology and Monitoring, Poznań, Poland (mariuszl@amu.edu.pl), (2) Department of Biogeography and Palaeoecology, Adam Mickiewicz University, Krygowskiego 10, 61-680 Poznań, Poland, (5) Swiss Federal Research Institute-WSL, Community Ecology Research Unit, Station 2, CH-1015 Lausanne, Switzerland, (6) ÉcolePolytechniqueFédérale de Lausanne (EPFL), School of Architecture, Civil and Environmental, Engineering (ENAC), Laboratory of Ecological Systems (ECOS), Station 2, CH-1015 Lausanne, Switzerland, (8) University of Toulouse, UPS CNRS INPT, UMR5245, Bâtiment 4R1, 118 route de Narbonne, F-31062 Toulouse cedex 09, (7) Department of Meteorology, University of Life Sciences, Piątkowska 94, 60-649 Poznań, Poland, (3) Polish Academy of Sciences, Institute of Geography and Spatial Organization, Department of Geoecology and Climatology, Twarda 51/55, 00-818 Warsaw, Poland, (4) Department of Environmental Resources and Geohazards, Institute of Geography and Spatial Organization, Polish Academy of Sciences, Kopernika 19, 87-100 Toruń, Poland

Peatlands are important terrestrial carbon stores. They are often last remnants of the pristine biodiversity in the fragmented landscape of Europe. Nevertheless, land-use changes, drainage, atmospheric pollution and climate change trigger the emission of carbon stored in peatlands for millennia to the atmosphere. Also, biodiversity loss is an important consequence of those disturbances. Therefore, it is crucial to recognize these processes in space and time. Global change experiments are often applied to understand the potential responses of peatland ecosystems to global change. Most of the experiments carried out in peatlands are concentrated on carbon balance and nitrogen deposition. However, it is still unclear how fast peatlands respond to warming and hydrological changes in the continental climate setting. This is especially important because continental regions account for a significant portion of all northern hemisphere peatlands. A combination of short- and long-term approaches in a single research project is particularly helpful to interpret experimental data. Here, we provide a concept of a Sphagnum-dominated peatland field manipulative experiments supported by a high-resolution multi-proxy palaeoecological studies. We present our activities within the framework of two COST actions CLIMMANI (ES1308) and INTIMATE (ES0907) that included several meetings and STSMs that supported us with the effective networking and competences that have not been present in the research team before. We present an outcome of our cooperation and discussions that surrounded our field experiments carried out in Poland with their novelty, methodology and ecological settings. We suggest it was beneficial to support field experiments with the palaeoecological studies, as human impact in the past providing perspective of the past dynamics of experimental sites that supported interpretation of the data. Our investigation across short and long temporal scales (projects CLIMPEAT and WETMAN with the support of the COST actions) revealed that peatlands can cross several ecological tipping points/thresholds in response to droughts, fires, and deforestations, which are mostly driven by shifts in plant-soil interactions. We quantified experimentally the hydrological tipping point, with ground water located at depth 23 cm. Inclusion of such values would improve C accumulation rate models in peatlands as once the different tipping points are crossed the peatland ecosystem abruptly loose carbon. A new generation of novel integrated research including modelling will connect networks of peatland research to build a novel look at those valuable ecosystems.