Peatland hydrology: a global comparison using the PeatDataHub monitoring network

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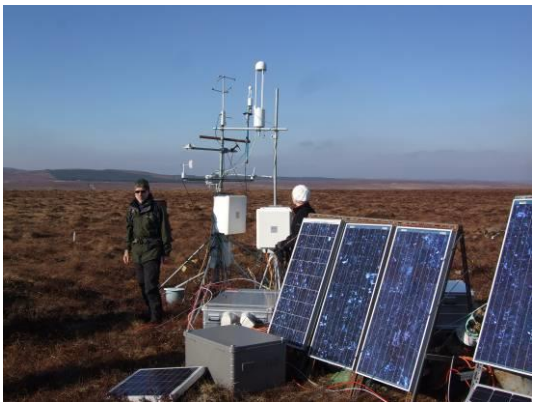
Peatlands are important carbon stores holding an equivalent to two thirds of the atmospheric store (Yu *et al.*, 2010; Yu, 2011). Peatlands occur in tropical, temperate and high latitude locations (Xu *et al.*, 2018). Sometimes they form over large land areas (e.g. James Bay Lowlands, Canada) while in other locations they form in smaller, more isolated pockets (e.g. valley bottoms in mountainous regions). Peatlands accumulate carbon by preserving dead plant material in a wet state which reduces oxidation so that net carbon loss is smaller than net accumulation (Charman, 2002). Therefore, the condition of a peatland is strongly controlled by its hydrological processes.

While there are different types of peatland, ranging from fens (mainly groundwater fed) to bogs (mainly rainwater fed), the basic properties of extensive saturation are thought to be the same (University of Leeds Peat Club *et al.*, 2017). Typically saturation state is measured by determining the depth of the water table, and water table is one of the most commonly measured parameters when scientists and practitioners want to monitor a peatland. However, water tables fluctuate throughout the year (Holden *et al.*, 2011) and can be spatially variable depending on the location within the peatland (at a micro or macro topographic scale) and also whether management is impacting the site (Holden, 2005; Holden *et al.*, 2006; Moore *et al.*, 2015). The availability of a large amount of data on peatland water-table dynamics means that if it were carefully pooled together from different sites, using clear data comparison protocols, we might be able to undertake some global assessments of the variation of water-table depth (spatially and temporally) for different types of peatland under different topographic, climatic or management influences.



Objectives

This PhD project seeks to use the new PeatDataHub platform (https://peatdatahub.net/) to compile data from sites around the world in order to enable the successful student to interrogate datasets on water table and other hydrological properties to understand more about global peatland water-table dynamics.

You will work with peatland scientists from around the world to help curate the datasets and lead the analysis of these datasets. PeatDataHub workshops have already brought together scientists from around the world who have agreed to be part of PeatDataHub and protocols for data sharing and co-authorship of papers are already in place (Young *et al.*, 2016). The project would have flexibility in terms of the types of approaches and questions that could be addressed. For example, the successful student may wish to examine peat properties, permeability, evapotranspiration or surface water discharge or to link hydrological data to carbon data, and perhaps to use the data to inform or develop models or examine recent climate change impacts. However, we envisage hydrological datasets being central to the project. The work will have a global focus and will be of relevance for understanding global carbon dynamics and peatland restoration targets.

Potential for high impact outcome

The project will have a global focus and as such be likely to lead to papers submitted to top international journals. The supervisors of the project, in line with the spirit of the PeatDataHub network, would encourage the student to produce a thesis by publications (the research papers published in journals forming the main thesis chapters), which is an exciting route for PhD students at the University of Leeds. The work will connect the student to lots of peatland scientists and study sites around the world, thereby creating a network of contacts which will enhance the future career prospects of the student. The project should also be of interest to major peatland conservation organisations such as IUCN and Wetlands International.

Training

The student will work under the supervision of Prof Joseph Holden and Dr Paul Morris within the River Basins Processes and Management research cluster in the School of Geography, and Dr Gaby Lopez-Gonzalez who is the water@leeds co-ordinator and has expertise developing international data centres. Holden and Morris will provide training on peatland hydrological processes and, depending on the direction of the project, modelling. Lopez-Gonzalez will provide training on data protocols, curation, database systems and working with and developing international data networks. The student would also be part of the Leeds PeatClub, a large group of peatland researchers working across different research groups, sharing and providing feedback on research ideas, methods and experiences in an informal training environment. The student would join water@leeds which is the largest interdisciplinary water-related doctoral research and training centre in the world. The student would therefore have access to a wide network of contacts and water@leeds training opportunities. The University of Leeds also hosts the Leeds Institute for Data Analytics (LIDA), a centre that deals with 'big' datasets, and LIDA staff and training courses may assist the student in dealing with large datasets in the project. Training needs will be assessed at the beginning of the project and at key stages throughout the project and the student will be encouraged to participate in the numerous training and development course that are run within the university to support PGR students, including statistics training (e.g. R, SPSS), academic writing skills, grant writing etc (http://www.emeskillstraining.leeds.ac.uk/). Supervision will involve regular meetings between all supervisors and further support of a research support group.

Student profile

The student should have a background in a related subject such as physical geography, environmental science, earth science, hydrology / water management or ecology. The student should have excellent communication skills in order to work scientists around the world in compiling and curating data. They should be happy to work on a PhD project that will be largely desk-based. Good analytical, data presentation and GIS skills are desirable but suitable training will be provided during the PhD.

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