THE CHINESE UNIVERSITY OF HONG KONG
DEPARTMENT OF GEOGRAPHY AND RESOURCE MANAGEMENT
SEMINAR

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Post-fire Carbon Dynamics in the Tropical Peat Swamp Forests of SE Asia

ABSTRACT

Tropical peatlands hold about 15%–19% of the global peat carbon (C) pool of which 77% is stored in the peat swamp forests (PSFs) of Southeast Asia. Nonetheless, these PSFs have been drained, exploited for timber and land for agriculture, leading to frequent fires in the region. The physico-chemical characteristics of peat, as well as the hydrology of PSFs are affected after a fire, during which the ecosystem can act as a C source for decades, as C emissions to the atmosphere exceed photosynthesis. In this work, we studied the longer-term impact of fires on C cycling in tropical PSFs, hence we quantified the magnitude and patterns of C loss (CO2, CH4 and dissolved organic carbon) and soil-water quality characteristics in an intact and a degraded burnt PSF in Brunei Darussalam affected by seven fires over the last 40 years. We used natural tracers such as 14C to investigate the age and sources of C contributing to ecosystem respiration (Reco) and CH4, while we continuously monitored soil temperature and water table (WT) level from June 2017 to January 2019. Our results showed a major difference in the physico-chemical parameters, which in turn affected C dynamics, especially CH4. Methane effluxes were higher in fire-affected areas (7.8 ± 2.2 mg CH4 m-2 hr-1) compared to the intact PSF (4.0 ± 2.0 mg CH4 m-2 hr-1) due to prolonged higher WT and more optimal methanogenesis conditions. On the other hand, we did not find significant differences in Reco between burnt (432 ± 83 mg CO2 m-2 hr-1) and intact PSF (359 ± 76 mg CO2 m-2 hr-1). Radiocarbon analysis showed overall no significant difference between intact and burnt PSF with a modern signature for both CO2 and CH4 fluxes implying a microbial preference for the more labile C fraction in the peat matrix.

LANGUAGE

English

DATE

3 Dec 2020 (Thu)

TIME

4:30 – 6:00 pm (GMT+8)

ZOOM MEETING

ID: 973 6037 5790
https://cuhk.zoom.us/j/97360375790
(no password required)

ABOUT THE SPEAKER

Dr. Massimo (Max) Lupascu has been an Assistant Professor in the Department of Geography at the National University of Singapore since August 2015. Max's research program focuses on understanding how climate change and land-use change affect the allocation, cycling, and residence time of carbon (C) in some of the richest C environments on our planet (peatlands and permafrost). His studies further the science of terrestrial ecosystem feedbacks to the climate system, e.g. by constraining future levels of greenhouse gases in the atmosphere. To monitor and predict changes in the cycling of C in terrestrial ecosystems, he applies field observations from natural soil and experiments using a variety of biogeochemical tools, including analysis of trace gases (CO2, CH4), their stable C isotopes and radiocarbon content (14C-AMS) and soil incubation. His research activities have been concentrated in ecosystems in the high latitudes (Lapland, Greenland, Svalbard and Alaska) and in the tropics (Brunei, Malaysia and Indonesia).

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