CONFÉRENCE

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Advancing Hyperspectral Remote Sensing for Peatland Research

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Abstract:

Northern peatlands cover more than 2 million km^2 in Canada, Europe and Russia, with also large extents in tropical regions. These carbon-rich ecosystems play a key role in terms of carbon accumulation and storage (e.g., potential stock: 875±125 Pg C before the end of the present interglacial), in addition to providing several ecosystem services. However, climate change and other anthropogenic factors – e.g., wildfires, Nitrogen deposition, and harvesting may result in these ecosystems becoming strong sources of greenhouse gases (GHGs). Therefore, because of their important ecosystem role, and the need to monitor the biogeochemical functioning of peatlands (whether they remain a sink or become a net source of GHGs), there has been increasing efforts related to peatland mapping from local to regional and global scales. However, their structural complexity with vegetation microtopographic elements – e.g., hollows and hummocks, hydrology and phenology, present challenges for developing accurate peatland maps using coarse spatial and spectral resolution optical satellites. Here I introduce the Mer Bleue Peatland Observatory (MBPO), which is the only peatland site in the world use for calibration and validation of satellite products – e.g., Sentinel-2, EnMAP. Then, I show the development of new remote sensing technologies for peatland research at the NRC during the last 10 years. I will demonstrate the utility a of novel drone based hyperspectral system for peatland vegetation physiognomy mapping e.g., hummocks dominated by vascular plants. At local scales this system provides the fine spatial (e.g., 5-10cm) and spectral resolutions (e.g., 400 bands in the VNIR and SWIR regions) necessary for mapping this ecosystem. Finally, I will provide an example of a recent drone hyperspectral campaign carried out at the St. Etienne peatland site.

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