Monitoring seasonal dynamic of surface hydrology in minerotrophic peatlands using high resolution satellite imagery

Yann Dribault, Karem Chokmani, and Monique Bernier

INRS Centre-Eau Terre Environnement, 490 rue de la Couronne, Quebec (Qc, Canada) G1K9A9 (yann.dribault@ete.inrs.ca)

The "La Grande river" watershed (N53°47';W77°27'), James Bay (Quebec, Canada) is a major contributor to the production of the hydropower electricity in the province. Peatlands, cover up to 20% of the terrestrial environnement in this region. Their hydrological behaviour is not well understood. The present study is a part of a multidisciplinary project, aiming at analysing the hydrological processes in the minerotrophic peatlands (fens), in order to provide effective monitoring tools to water managers. The objective of this study is to use remote sensing data to better understand the seasonal dynamic of the surface hydrology in minerotrophic peatlands. To do so, a sub-basin dominated by fens, located in the middle course of the "La Grande river" (Laforge sector), was selected. Using high-resolution multitemporal, multispectral and panchromatic imagery, the temporal and spatial variations dynamics of the sub-structure of minerotrophic peatlands are studied. A series of 12 pan-sharpened GeoEye-1 images (with a spatial resolution of 0,40m) were acquired over the site under study, during the summer season (May to October) of 2009 and 2010. In parallel, three representative fens were instrumented with leveloggers. For each GeoEye-1 image, the aquatic, semi-aquatic and terrestrial compartments were delineated using an object-oriented classification. The relationship between observed water levels and change in the extent of the delineated compartments, was studied. The impacts of variables, such as watershed topography and area, aquatic /terrestrial ratio, were evaluated.

Keywords : Peatlands ; Remote sensing ; Hydrology : Fen ; GeoEye ; High resolution ; Water level