LCLUC ABSTRACT

Satellite observation of boreal land cover: methods, data sets and applications.
(http://www.ccrs.nrcan.gc.ca/ccrs/tekrd/rd/apps/em/indexe.html)
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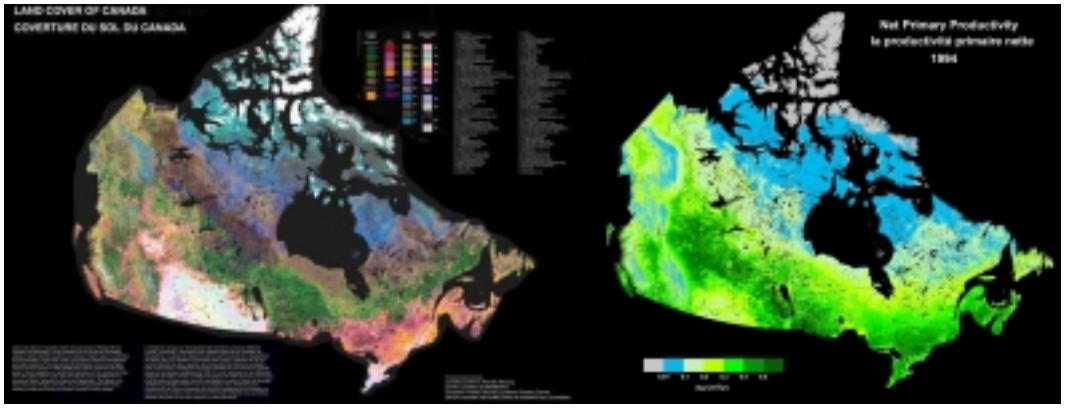
The circumpolar boreal ecosystem represents the most extensive forest region in the Northern Hemisphere and contains the largest portion of soil carbon among all biomes. There are unresolved questions regarding the role of the boreal ecosystem in global and regional carbon, water and energy budgets. The effect of recent and future disturbances and potential climate change feedbacks on biogeochemical cycles needs to be characterized to determine the sink/source potential of Boreal carbon pools. Land cover, and its spatial and temporal characteristics, plays a significant role in monitoring ecosystem changes. Land cover is also an important parameter for ecosystem flux models at both regional and global (or national) scales.



AVHRR 1995 Canadian Land Cover Modeled 1994 Canadian NPP

The aim of our project is to address the following **basic scientific questions** (the questions are framed in the Canadian context but also apply to the global boreal ecosystem):

1. What are the spatial and temporal patterns of land cover over the Canadian boreal ecosystem over the last decade?
2. Where are the wetlands in Canada and what are their characteristics in terms of attributes known to control carbon and water fluxes?
3. What is the role of land cover in carbon and hydrological cycles?

The first question will be addressed by developing an operational method of regional land cover mapping. Fine resolution land cover classifications will be developed over sub regions using spectral clustering and reflectance modeling with Landsat data. Coarse resolution classifications will then be generated from AVHRR and MODIS images after appropriate geometric and radiometric corrections. Approaches such as neural networks and mixture decomposition will be evaluated for dealing with the problem of mixed pixels when classifying coarse resolution imagery. We intend to apply the classification procedures to produce land cover maps of the Canadian landmass (and the boreal ecosystem in specific) over the last decade. These maps will include specific methods for timely mapping burned areas.

The second question deals with the integration of satellite data sources with existing coarse scale wetland databases to produce up-to-date 1:1,000,000 scale national wetland maps. We focus on wetlands as they are typically fragmented into small regions that collectively play an important role in carbon, methane and water fluxes. We will investigate the synergistic use optical and radar satellite data to improve and up-date existing wetland databases.

The third question will be addressed using two approaches. The first approach focuses on compiling statistics for land cover distributions over national and regional extents using a combination of medium and high resolution satellite data. These statistics are useful for quantifying land cover changes and relating the changes to social and natural factors. The second approach involves using the land cover information for deriving higher level products and to study surface-atmosphere interactions and the role of land cover in carbon and hydrological cycles. We will work in collaboration with ongoing research activities dealing with boreal ecosystem modeling.