



Satellite land cover mapping of Canada's forests

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Space-based techniques are being used to map Canada's forested ecozones in a multi-year project to help meet climate-change and sustainable forest management reporting requirements.

Canada is a large country, approaching a billion hectares in size. With over 400 million hectares (Mha) of forested land that contribute \$32.6 billion (Can\$37 billion) to the trade balance, Canada is determined to be a good steward of this renewable resource. Ensuring effective resource management requires current and reliable forest information. In support of national and international reporting requirements, the Canadian Forest Service (<http://www.cfs.nrcan.gc.ca>), in partnership with the Canadian Space Agency (<http://www.space.gc.ca/asc/index.html>), is using space-based technologies to monitor the country's forests through an initiative called Earth Observation for Sustainable Development of forests (EOSD) (<http://eosd.cfs.nrcan.gc.ca>).

EOSD is an important data source in the new plot-based National Forest Inventory (NFI) (<http://nfi.cfs.nrcan.gc.ca>) and the National Forest Carbon Accounting Framework (<http://carbon.cfs.nrcan.gc.ca>). The National Forest Information System (NFIS) (<http://nfis.org>) will be used to integrate and synthesize applicable data and products.

In this communication we summarize the EOSD Land Cover program and provide interested readers links to websites for additional detail. The initiative's overall goal is a land cover map of Canada's forested ecozones based on Landsat satellite data.¹ A goal for 2006 is to complete a land cover map representing *circa* 2000 forested area conditions.

Using single scenes of Landsat data to produce land cover information is not uncommon. However, combining several, or even hundreds, of scenes to develop a large-area land cover map is relatively uncommon. To encompass Canada's forested ecozones, approximately 800Mha must be mapped, requiring over 475 images.

The EOSD classification scheme² applied to the Landsat data merges the numerous spectral clusters found with a K-means hyperclustering algorithm into a smaller number of meaningful groupings labeled to conform with a closed 21-class legend. The EOSD legend was developed to fit with NFI's hierarchical classification. Additional information on the methods and legend are available online (http://eosd.cfs.nrcan.gc.ca/cover/legend_e.html).

EOSD land cover products—based on the National Topographic System (NTS) map sheet framework of the National Topographic Database—are available for download on a 1:250,000 NTS map sheet basis. Each map sheet represents an area of approximately 14,850km². The products are available in a Paletted GeoTiff format, with a disabled tiff world file, and Federal Geographic Data Committee-compliant metadata. Final products are resampled to a 25m spatial resolution. As a single tile may be composed of a number of images, ESRI shape files provide source image information and actual mosaic lines.

To date, approximately 225 of the 610 NTS sheets that cover Canada's forested ecozones are complete and available for download. While under final developments, data may be accessed through the NFIS website, and via the SAFORAH portal (System of Agents for Forest Observation Research with Automation Hierarchies) accessible from the Land Cover Implementation area of the EOSD website (http://eosd.cfs.nrcan.gc.ca/cover/index_e.html). A protocol for addressing the accuracy of the national EOSD product based upon a stratified random sample has been proposed and is being tested.³

By mapping the forested areas of Canada, EOSD will contribute toward meeting its national and international reporting requirements related to climate change and sustainable forest management. This task will require the support and concerted effort of many partners to complete.

Cooperation and communication both within and between various levels of government provides an opportunity to share resources and work towards common objectives. Products

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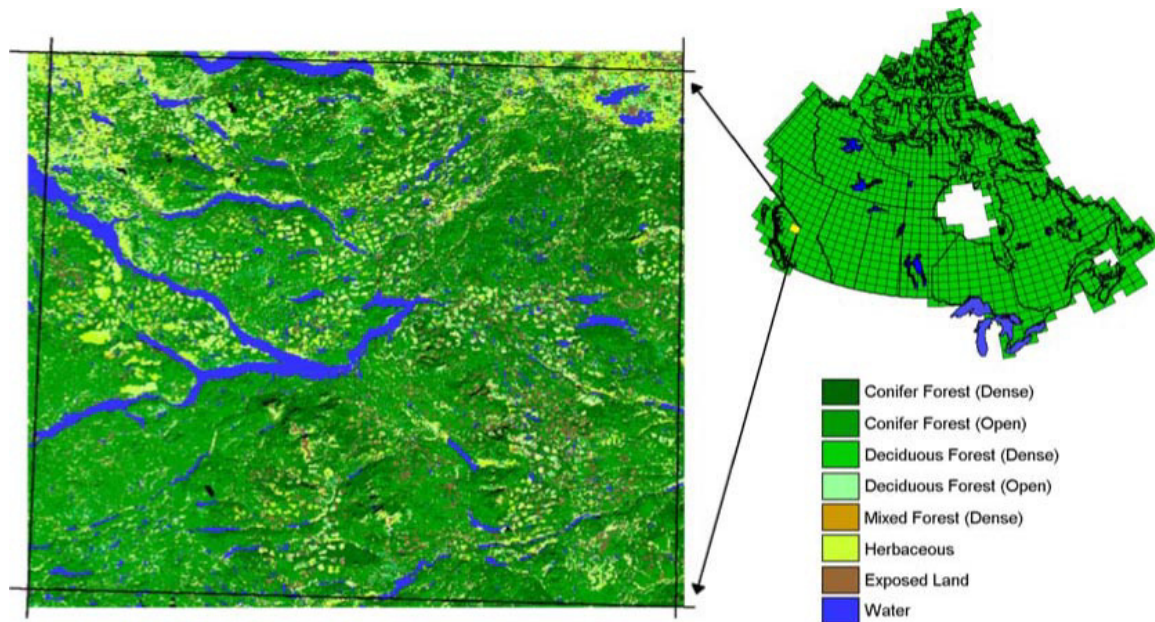


Figure 1. A sample Earth Observation for Sustainable Development land cover classification product is shown, representing the same area as the National Topographic System's 1:250,000 map sheet 93F, Nechako River, British Columbia, Canada.

stemming from this project will be integral parts of Canada's new forest measuring and monitoring system. They will assist the public and interested organizations in understanding the composition, distribution, and dynamics of Canada's forests.

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