



Exploiting Data on Canada's Forests to Enable Improved Monitoring and Management of Our Natural Resources

Forests play an essential role in Canada's ecosystem and economy. They support critical industries that employ hundreds of thousands of Canadians; reduce the carbon dioxide emissions that contribute to global warming; house many important plant and animal species; and contribute to the clean air we breathe. Rapid climate change is impacting many aspects of our environment, including forest canopy. These potential changes are prompting increased need for improved monitoring and management of these natural resources.

The world has come together to monitor the health of our planet through the Group on Earth Observations (GEO) and Canada is taking a leadership role in this area. Researchers are building sophisticated instruments to observe, map and study the world we live in. These sensors (devices that measure a physical quantity and convert it into a signal that can be read by an observer or by an instrument), produce very large volumes of complex data that are often challenging to manage and analyze. To address this problem, research teams are adopting 'grid computing techniques' which combine computer resources from multiple places and apply them to a common task, such as a science problem that needs to process large amounts of data.

The SAFORAH (System of Agents for Forest Observation Research with Advanced Hierarchies) project collects data from a variety of airborne and space-borne remote sensing instruments for the Canadian Forest Service, and academic and government partners. Remote-sensing images are made available on the SAFORAH data grid. The ability to provide processed images and other related information products would significantly enhance the value of SAFORAH to researchers.

Scientists from the University of Victoria, Pacific Forestry Centre of Natural Resources Canada, and National Research Council Canada (NRC) are addressing this challenge. Leveraging \$500 000 from CANARIE's Network-Enabled Platforms (NEP) program, the team is developing a new research platform that draws on grid computing techniques and enables a user to: search for geo-related data stored in SAFORAH; create a new data product by selecting a service in the portal; submit the order; and process the job.

"The platform allows us to manage a much broader array of data than ever before," says Dr. Randall Sobie, Project Leader and Research Scientist at the Institute of Particle Physics, University of Victoria. "This enables us to better understand the state of Canadian forests, where they are under stress, and how to better monitor them in future."

The platform exploits the advanced networking capabilities provided by CANARIE and its regional partner, BCNET, the not-for-profit organization that manages British Columbia's Optical Regional Advanced Network. These ultra high-speed, high bandwidth networks connect all project sites and enable researchers to easily manipulate and share large volumes of forest information. "SAFORAH currently provides access to a wealth of forest information, including more than 4,800 images," said Dr. David Goodenough, Senior Research Scientist with the Canadian Forest Service. "Using this platform, we can reap greater value from this data, and develop novel information products that would otherwise not be possible."

The platform can produce high quality images and products 'on-demand' that can be used by researchers, industry, governments and the public to monitor how the forests and above-ground carbon are changing over time. The ability to gather and analyze this data promises to help us better track changes to our planet, take action to preserve our environment, and increase the competitiveness of Canada's forestry sector.

¹ <http://en.wikipedia.org/wiki/Sensor>

² http://en.wikipedia.org/wiki/Grid_computing