The GSDNR Communicator

The Geomatics for the Sustainable Development of Natural Resources (GSDNR) Program's Newsletter

I am proud to present you with the latest version of the "GSDNR Communicator". As you will read, the program is making significant progress in achieving its goal of providing the required basic geospatial information to support industry leaders in natural resources management. It is my belief that the availability of better geospatial information will help natural resource managers to foster economic, social and environmental benefits for Canadians.

Among the significant achievements highlighted in this issue of the Communicator is the adoption of a National Hydro Network (NHN) standard. The NHN project team, in collaboration with its provincial partners, can now fully commit to the creation of an "intelligent" dataset to provide strong modeling and analysis functionality to its end users. Such an "intelligent", or GIS-ready, dataset is essential to meet the needs of today's decision-makers.

Another important program milestone highlighted in this issue is the collection of the last Landsat-7 satellite image needed to complete a set of cloud-free orthoimages covering the entire Canadian landmass. In addition to providing quality, accurate, and valuable data products, this project exemplifies interdepartmental and federal-provincial collaboration. By involving 10 federal departments and all of the provinces and territories, this successful project paved the way for other major collaborative efforts such as the GeoBase initiative, in which various players in the field of geomatics agreed to assemble their data and expertise in order the create a single authoritative quality dataset shared and maintained by all. Collaboration such as this is not only cost effective, but also favours data integration and exchange amongst partners.

Enjoy your reading!

Éric Loubier
Program Manager, GSDNR

National Road Network Receives Award of Excellence from ESRI Canada

The National Road Network (NRN), in combination with Statistics Canada and Elections Canada received a joint Award of Excellence at ESRI Canada's annual Regional User Conference in Ottawa. Alex Miller, President of ESRI Canada, the leading geographic information systems (GIS) provider in Canada, presented the award in recognition of the joint GeoBase initiative undertaken by these three groups in building a standardized addressed national road network. More than 350 GIS professionals were on hand for the presentation, which was one of the highlights of the conference.

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Natural Resources Canada   Ressources naturelles Canada

Canada

National Hydro Network Standard Adopted

Canada's National Hydro Network (NHN) Standard is now official. In August, the Canadian Council on Geomatics (CCOG) approved the "National Hydro Network, Canada, Level 1, Edition 1.0" Standard, in accordance with CCOG resolution F03-05 on GeoBase Data Standard Maintenance.

The NHN is a digital geospatial data set describing Canada's surface waters. The NHN standard includes a data model, specifications, and a catalogue that describes the entities to be included and their attributes. It synthesizes elements of hydrography and hydrology so as to be compatible with several different types of applications including both cartographic representations and the spatial analysis of data. Both are important for sustainable water management.

Adoption of the NHN standard comes after many years work and following extensive consultations, including meetings with data producers and users as well as two national consultations that brought together federal, provincial, and territorial stakeholders.

The adoption of the NHN standard is an important step for sustainable water management in Canada. Many experts capture digital geospatial data relating to water in our country, but the integration of this data is difficult since the data geometry and models used are different. In addition, this water-related geospatial data must be manipulated and incorporated into modern decision-making systems such as GIS in order to be most useful. This process is costly and time-consuming and risks the integrity of the data itself. The NHN will resolve these difficulties by establishing a common standard so that specialists and decision-makers can use the same water-related data.

The NHN will:
- Prevent the duplication of work
- Allow information sharing, analysis and decision-making among groups, as these groups will all be working from the same set of data
- Improve the reliability and accuracy of data, as updates will be available to all via the Internet
- Provide for the integration of water-related data into decision-making tools and systems, as the NHN data will be GIS-ready, standardized against a national model, using a common vocabulary, in a single data base

The NHN standard was developed in alignment with the GeoBase objective of making quality geospatial data available to Canadians. In addition, the NHN will be developed according to GeoBase principles and best practices. Thus, NHN data will be captured only once, as close to the source as possible, and from the best available data. It will also be distributed without user restrictions to the Canadian community. The NHN is a flexible model that allows partners and end-users to integrate their own data into the NHN's common model and vocabulary.

Partners are already producing data according to the newly accepted NHN standard. In fact, the provinces of Nova Scotia and British Columbia are already producing data using their provincial topographic data bases. Both provinces foresee the completion of data production for the whole province by the spring of 2005. NRCan has also begun data production for parts of Manitoba and Saskat-chewan using data from the National Topo-graphic Data Base that have already been geometrically corrected according to GeoBase Landsat-7 ortho-images.

Who will use the NHN and what will they use it for?

Resource managers and industry leaders including decision-makers from federal, provincial, territorial, and regional governments and the private sector will use the NHN for water management. The NHN will also be available to non-governmental organizations, environmental groups, and to the public for monitoring and information purposes and for individual decision-making.

The network will be used for water flow analysis, watershed monitoring and management, and data querying and manipulation.

For example, in the case of a chemical spill, the NHN can be used in combination with GIS to track the flow of contaminants in surface water to find out where these contaminants will go and whom they will affect. Similarly, the NHN can be used to monitor water levels in the case of drought or flood to help decision-makers evaluate the need for agricultural relief measures or evacuation.

The NHN is GIS ready, meaning that it can be incorporated into broader information systems to help show the relationship of surface water with other geographical features. This preserves data integrity that may otherwise be lost in the manipulation of data when incorporating into various GIS systems. It also facilitates the sharing of water-related information, making the NHN a useful tool to a wide range of water management applications.

Why Does Canada Need a National Hydro Network?

Water is a priceless resource. It is essential to support human, plant and animal life and it shapes the Earth as we know it. In addition to supporting our basic needs, we use water for hydro-electricity, maritime transport, fire control, agriculture, industry, tourism and recreation, and to support plant and animal biodiversity. Canada's water supply is abundant, but not unlimited, and there is no substitute for water.

With so many different uses for this limited resource, questions are raised about over consumption and the criteria and priorities for resource allocation.

The National Hydro Network is a water resource management tool that provides decision-makers with the accurate, reliable and current information they need about Canada's water resources. The national Hydro Network will enable natural resource managers to make wise choices regarding the ways in which we use this irreplaceable resource. The NHN is contributing to Canada's commitment to sustainable development.

Release of the first National Road Network updates

The GSDNR program's National Transportation Network (NTN) project recently released the first ever updates to the National Road Network (NRN) for the Northwest Territories, Prince Edward Island, and the Yukon. These updates can be found on the GeoBase web site, and are available for download free of charge.

These first updates mark a major milestone for the NTN project as well as for the GeoBase initiative. In addition to highlighting the continued cooperation with the provinces and territories that the NTN project has undertaken, these updates underline one of the key benefits of the NRN project, which is the accessibility of the most recent, accurate, and standardized road network data.

More updates to the NRN are forthcoming, with the next set expected to be for the province of Nova Scotia, which should be available in late fall. Subsequent provincial and territorial updates will follow regularly.

In addition, the NTN project is now developing and validating a process that will produce files that contain NRN changes (deltas) for each updated NRN dataset. Users will now have a choice of starting with the latest NRN version or integrating changes (deltas) from their previous NRN version to create the latest version of the NRN dataset.

PEI Department of Transportation uses the NRN

"The Prince Edward Island Department of Transportation (PEIDOT) and Public Works was an early partner in the National Road Network project. Being a small jurisdiction, the Department saw the benefit of participating in a nation wide initiative where we could share our experiences and gain from a wide range of technical and administrative expertise.

The Department has adopted the NRN as its GIS road centreline since January 2003. Asset and network data residing on a previous centreline are being transferred and new mapping projects are now under way. Winter maintenance mapping is one project that has been completed with much of the Department's snow removal and sanding information now mapped using the NRN.

The National Road Network is becoming an integral part of the Department's GIS mapping. The structure of the data combined with its accuracy and currency make it an ideal base on which we can manage and model our Department's assets and activities."

Dan MacDonald
GIS-T Manager
PEIDOT
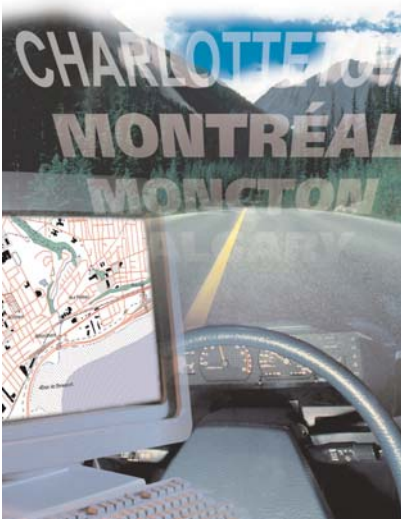
GeoNames Applications Releases GNApp for CGNS

GSDNR's GeoNames Applications project officially released the GNApp component of the Canadian Geographical Names Service (CGNS), in September 2004. The GNApp component allows the GNBC members to directly maintain the CGNS data warehouse using a web application. The release of this latest component completes the CGNS, making it a comprehensive web based system for collecting, storing, maintaining, and distributing current and reliable information about Canada's geographical names.

Partners may already begin uploading names into the GNApp application. In fact, the provinces of Newfoundland, Manitoba and Saskatchewan have already begun uploading names using the web-based interface.

Records of official geographical names have been maintained for over 100 years as part of the Geographical Names Board of Canada (GNBC)'s mandate to provide official toponymic information and advice to individuals and groups in and out of Canada. The upkeep and distribution of these records has evolved, however, to accommodate technological change and to increase the accessibility and utility of these records to groups and organizations.

In its earlier form, the Canadian Geographical Names Data Base (CGNDB) was distributed using file-based exchange mechanisms and database links. In this system, data was delivered as a file and had to be loaded into a local database in order to be used - a costly proposition for large organizations and virtually impossible for smaller ones or individuals. Additionally, in the previous system, data updates could only be made to a central file from which other files were duplicated for distribution. Organizations that obtained an initial set of data had to acquire update packages to maintain accurate information. These update packages were available on a quarterly basis, but were often not applied consistently since it was easier for users to update their own data sets directly on an as-required basis.

As a next generation technonogical aid in the collection and distribution of reliable and accurate geographical names information, the CGNS overcomes these distribution challenges. First, the CGNS is web-based, meaning that it is accessible from anywhere that has an Internet connection. Also, because it is web based, a local database is not needed. By contrast, the CGNS conforms to an international standard making this distributed database accessible from a single web page. This means that Canada's geographical names are accessible to a greater number of countries, organizations and individuals. Secondly, data updates in

Toponymy in Canada

In Canada, Toponymy, or the discipline of recording place and feature names (for example, names of rivers, lakes, mountains etc.), is the responsibility of the Geographical Names Board of Canada (GNBC). Established in 1897, the GNBC is the federal, provincial, and territorial body that coordinates the approval and documentation of geographical names and compiles them into a central catalogue known as the Canadian Geographical Names Data Base (CGNDB).

Advantages of the CGNS

- The CGNS is a free on-demand service that provides an immediate response to the user.
- Data provided through the CGNS is always complete and accurate.
- The need for independent updates that can be inconsistently applied is eliminated.
- Data is now available to smaller organizations and to individuals that could not previously access this information because of the prohibitive costs of independent databases that were required to interpret the information.
- The CGNS allows national geographical names systems to run on data that is more complete and accurate at a lower cost.
- The CGNS permits better sharing of Canada's geographical names - a publicly-owned resource.

this new system are made to the database through a web browser so that information that is distributed is always complete and accurate at the time of publication. In this way, updates are consistently applied.

The CGNS provides a names layer for digital maps and associates geographical names to places in digital format, making it useful for several applications including:

- Navigation in web-mapping applications, so that navigation can occur based on place names. For example, "Halifax" could become a target location that is found either manually or using a search operation based on geographical names;

- Resource tracking and business geographics geared towards sustainable development, so that the use and occurrence of natural resources can be traced according to geographical patterns through structured data that is linked to maps via place names. For example, city, forest clearcut, and success of revegetation could be compared and represented geographically;

- Spatial searching, sorting, and reporting, so that web content can be searched based on a geographical area or by feature type (rivers, lakes, mountains, etc.). For example, a bioinformatics application could trace the incidence of SARS across the country or within a specific area using an Internet search engine.
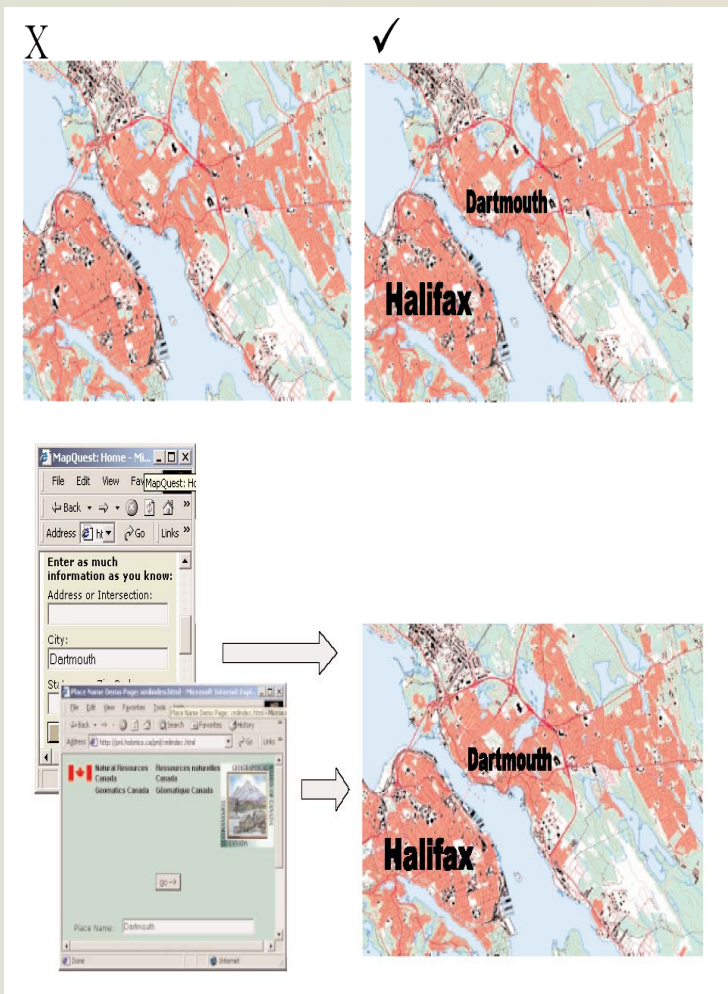
For Developers

The CGNS is built on open architecture. Developers worldwide are encouraged to use the system when building their applications. The CGNS is compliant with the Open GIS Consortium standards for improved information sharing.

The system has an Application Programmatic Interface (API) to access the GNSS without using forms.

The GNSS User Interface can also respond to a referrer application.

More information regarding API parameters, code definitions, and information on how to use the refer functionality can be found in the GNSS on-line help file at: **http://gnss.nrcan.gc.ca/gnss-srt/help_api.jsp**

Standard fittings allow a connection to be made with common software tools. E-mail the CGNS (cgns@nrcan.gc.ca) for information on how to make this connection directly for a mapped view of the names, or for source data.

Geographical Names and Sustainable Development

Geographical names describe the features of a land as well as the culture and heritage of the people that live there. They provide a reference to place, and help us define not only where we are, but also who we are.

With respect to sustainable development, spatial data is used to manage natural resources in the context of social, environmental, and economic concerns.

Geographical names are an essential information layer of any map used for this purpose, since they help us to orient ourselves and allow us to situate one place in relation to another. Geographical names provide the context from which work towards sustainable development can be achieved.

Last Landsat-7 Image for Complete Canadian Coverage Collected in September, 2004

GSDNR's Landsat-7 National Imagery Coverage project collected the last Landsat-7 satellite image needed for the complete coverage of the Canadian landmass in September, 2004. This last image covered a part of northern Canada that had not previously been imaged due to cloud cover. The project, co-financed by the GeoConnections program, is the result of an unequalled collaboration between provincial, territorial, and federal governments. More than 20 governmental organizations collaborated in the realization of this project.

Now that a preliminary national coverage of Canada exists, the Landsat-7 project is working towards improving about 60 orthoimages in order to deliver images that are both geometrically more precise and more cloud-free. This work is expected to be complete by January 2005.

The goal of the Landsat-7 National Imagery Coverage project is to produce a national data layer that is precise and up-to-date to serve as a framework for the integration of multiple geographical information sources. In addition to serving as a base layer to which other geospatial data layers are referenced, Landsat-7 orthoimages are used for a number of natural resource management applications. For example:

- The Canadian Forest Service uses geo-referenced Landsat-7 satellite images for the purposes of Kyoto reporting, which is done through the National Forest Carbon Accounting Program (NFCAP). The NFCAP will develop the new National Forestry Inventory (NFI), one of the six indicators identified by the National Round Table on the Environment and the Economy (NRTEE) to track the impact of economic practices on Canada's natural and human assets.
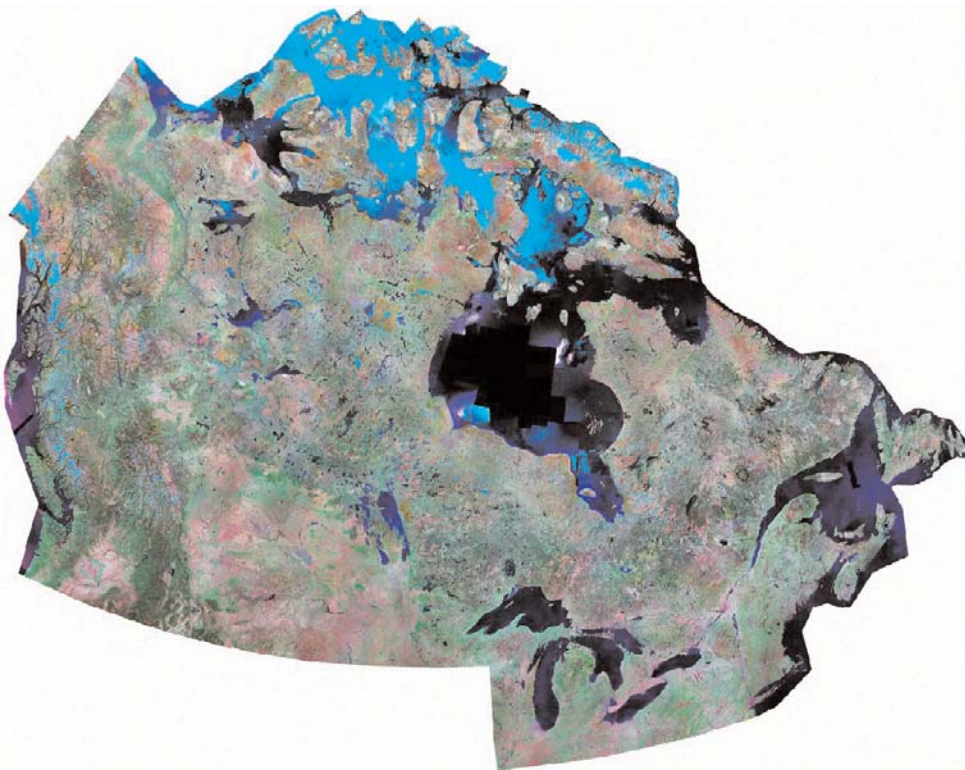
- Parks Canada uses GSDNR's Landsat-7 orthoimages to calculate land fragmentation and vegetation indexes, to detect change including slope movement, shoreline change, insect infestations, and vegetation changes, and to characterize specific ecosystems within national parks.

- The Ministère des Ressources naturelles, de la Faune et des Parcs uses Landsat-7 orthoimages to map forest fires and monitor regeneration activities, classify ecological districts, identify landslide prone areas, and to conduct municipal planning. The ministry also produces the Spatiocarte du Québec, a satellite image map of Quebec geometrically corrected and at a scale of 1:100 000, which is used by provincial park managers, Hydro-Quebec, the Ministère de la Sécurité publique, the Ministère de l'Environnement, forest companies, and academia.

- The Ontario Ministry of Natural Resources (OMNR) Inventory, Monitoring & Assessment Unit is using GSDNR's Landsat-7 orthoimages for the production of a new, on-line provincial land cover map for Ontario.

Between the 19th of November 2003, when the GeoBase portal was launched, and the 30 September 2004, more than 7 000 clients and partners downloaded a total of about 49 000 Landsat-7 orthoimages. This does not include images downloaded from the GeoGratis portal nor does it include the direct distribution of GSDNR's Landsat-7 images from the private sector to their own clients.

All of the GeoBase data layers, including Landsat-7 orthoimages and the control points used for their orthorectification are available free of charge on the GeoBase web site (geobase.ca) for the Canadian geomatics community and industry leaders in the field of land and resource management to take advantage of.

For more information see the GSDNR web site (gsdnr.nrcan.gc.ca) or contact:
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## GSDNR Landsat - 7 Orthoimage used in agriculture

In September, 2004, an agricultural magazine with a large readership published an in-depth review of agricultural development in the region of the Chaudière river valley in Quebec. The piece featured a perspective view of the area that was created using a Landsat-7 orthoimage and digital elevation models that were produced by GSDNR. The same magazine anticipates publishing a further article describing how these products are realized and how they can be used to support agriculturalists.

Landsat-7 orthoimages and digital elevation models required for the production of perspective views are produced by the GSDNR program and are available on the Geobase web site (geobase.ca).
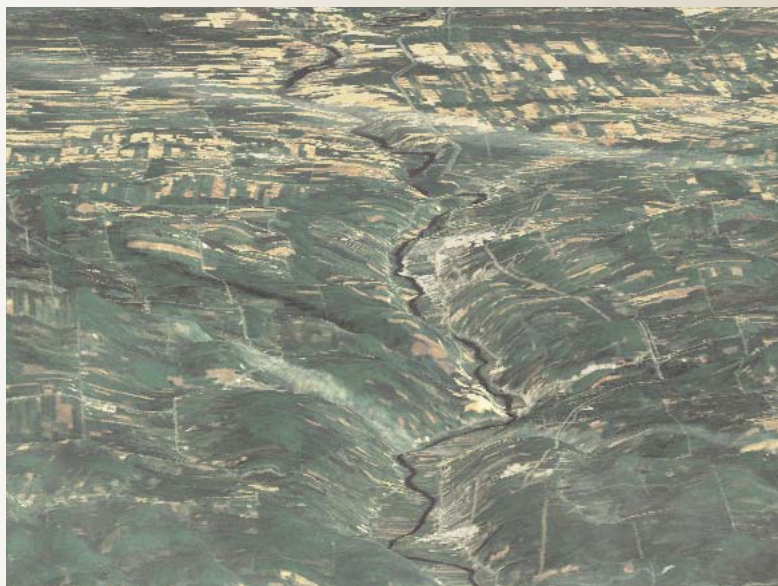
GSDNR receives letter of support from industry for its help in providing digital elevation datasets

A private sector power company recently sent the National Elevation Data Project within GSDNR a letter of thanks for providing digital 1:50,000 national elevation datasets of regions in the NWT. The timely delivery of the datasets enabled the power company to finalize their preliminary project engineering presentations to the NWT government and local communities regarding their proposed project, to be located in the southeastern part of the territory. The project is a green hydro development proposal and will involve local First Nations communities as well as other levels of governments.
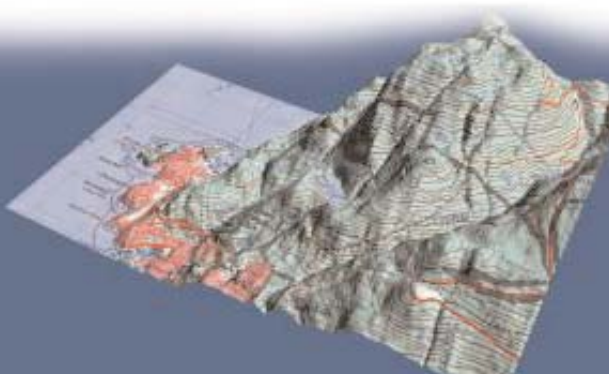
GSDNR Products in the Private Sector

Landsat-7 imagery control points, produced by the GSDNR program, were instrumental to Geomat-International, as described by the following testimonial:

"In the context of projects aimed at updating maps in the North, the control points for Landsat-7 imagery files produced by the Centre for Topographic Information, Sherbrooke (CTIS) and accessible via the GeoBase web site, were useful to us in producing RADARSAT-1 orthoimages for the Simpson Strait region in Nunavut.

Geomat International Inc. and Procean Environment have undertaken a project targeting the development of shoreline extraction methods from Earth observation data in various regions of the world, including northern Canada. In these regions, the availability of control points is generally limited to maps at the scale of 1:250 000 and we can rarely accommodate on-site data collection.

Even though the spatial distribution of control points is optimal for use with Landsat-7 scenes, many of these control points can also be used for other image sources such as RADARSAT-1, and even Landsat-5 archival images.

Used in conjunction with Landsat-7 orthoimages, this base data, which is available for the whole of Canada, represents an information source that is unique and indispensable for industry in the realization of their mandates in Northern Canada."

Sylvain Deslandes
Director, Remote sensing
Geomat-International
Montreal

GSDNR Activities at National Science and Technology Week

Many school groups enjoyed GSDNR-based activities at National Science and Technology Week, October 17 to 22. At the S&T week kick-off on Sunday at the Booth street complex in Ottawa, young people and the young at heart flocked to the remote sensing (GSDNR) booth that featured Landsat-7 images and puzzles, a swath browser showing recent Landsat image acquisitions, and the National Hydro Network's new poster. Throughout the week about 400 school children visited the complex for one-hour workshops related to remote sensing and its applications and featuring GSDNR products.

Are you using GSDNR information?

Tell us how! If you are using GSDNR information including data layers available from the GeoBase web site, we want to know about it! Send a brief description of your project or application to: **becky.mes@nrcan.gc.ca.**

You could be featured on our web site or in the next version of the Communicator.

Natural Resources Canada | **Ressources naturelles Canada**

2003-2004 Citation of Recognition for Two Canadian Geomatics Companies from Natural Resources Canada

Natural Resources Canada, through the Centre for Topographic Information in Sherbrooke (CTIS), would like to acknowledge the performance of two Canadian companies in producing geospatial data. We thank **Groupe Trifide Inc.** (Quebec, Quebec) for producing vector data for the National Topographic Data Base (NTDB) at the 1: 50 000 scale and also for the planimetric correction of NTDB data sets, and **Groupe Info Consult** (Sainte-Foy, Quebec) for producing vector data for the NTDB at the 1: 50 000 scale and also for updating digital topographic data. These firms have demonstrated, in the production year 2003-2004, their ability to produce digital data that surpass strict technical requirements. They also met deadlines as stipulated in the contracts and established strong communication links with CTIS technical representatives.

The digital geospatial data thus produced contribute to the achievement of the objectives of the "Geomatics for Sustainable Development of Natural Resources" and "Geomatics for Northern Development" programs of the Earth Sciences Sector.

Congratulations and thank you for a job well done!

Canada