

SPACE IN MY DAILY LIFE

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What do seabirds, forests and satellites in space have in common?

More than you might imagine.

In fact, our planet and the environment surrounding us benefit from space research and development.

Be it to improve soil use, reduce pollution or guarantee better access to drinking water, space technologies and satellite data play an essential role in the daily lives of Canadians here on Earth.

At the Canadian Space Agency, we encourage and support the development of innovative applications and solutions that help to improve the quality of life of Canadians and of all humanity



1. WATER MANAGEMENT AND PROTECTION

OVER ONE BILLION PEOPLE WORLDWIDE DO NOT HAVE ACCESS TO SAFE DRINKING WATER.

Sources: Global Health and Education Foundation and Oxfam.

Did you know that applications developed for the Canadian RADARSAT satellite enables hydrologists to locate and better manage water resources around the world?

In Africa, for example, it is difficult to locate groundwater sources using traditional methods, and drilling many dry wells quickly becomes costly. The Canadian Space Agency and the Canada Centre for Remote Sensing have developed a method for locating these bodies of water using images obtained from RADARSAT.

EACH YEAR, OVER 300,000 SEABIRDS DIE OFF THE EAST COAST OF CANADA.

Source: Canadian Space Agency

Canada has taken action to protect wildlife and the coastlines and oceans they inhabit. Through data gathered by the RADARSAT satellite, we are able to monitor Canadian territorial waters. As part of the I-STOP project, the RADARSAT satellite scans the surface of the water looking for signs of oil spills. Using this data from space, Canadian authorities are alerted so that they may take action quickly, in just a few hours. With such a short response time, the polluting vessel may be quickly located and intercepted.





2. AGRICULTURE

CANADA'S TOTAL FARM ACREAGE IS ESTIMATED AT OVER 675,867 SQUARE KILOMETRES, WHICH IS MORE THAN THE AREA OF THE PROVINCE OF ALBERTA.

Source: Canada, Censuses of Agriculture

In addition to guiding us on the ground, the global positioning system (GPS), combined with Canadian engineering, is helping Canadian producers save time, money and effort, while increasing safety. A Canadian company used GPS technology to develop an agricultural guidance system that greatly improves the distribution of fertiliser on fields both on the ground or from the air, a system that increases the cost-effectiveness of the whole process.

CANADA REPORTS A 10 PER CENT PESTICIDE RESIDUE ON FRESH FRUIT AND VEGETABLES PRODUCED IN THIS COUNTRY.

Source: Canadian Federation of Agriculture

Farmers can use data acquired through satellites and other remote-sensing methods to assess soil water content and irrigation needs. In addition to enabling farmers to better predict precipitation or pest infestations, this technology can improve yields, save more crops or help farmers decide to grow varieties that are more resistant to drought and pests.

This technology has enormous commercial potential throughout Canada and in the United States, where crop losses could be significantly reduced.

Observation of the Earth from space can make it possible to develop better farming practices. This is revolutionary for the agricultural community, which, through the use of this technology, hopes to generate large savings, while at the same time limiting the spread of chemicals that are harmful to our ecosystem.

MARTIAN LETTUCE HELPS MAXIMIZE THE POTENTIAL OF GREENHOUSES.

Source: Canadian Space Agency

Where better than the Canadian Arctic to simulate the environment on the planet Mars? Efforts are now being made to develop technology that will make it possible to survive on the Red Planet one day. The Canadian Space Agency operates a remotely controlled greenhouse on Devon Island to gain a better understanding of the design, operational and energy-saving requirements for northern facilities.

The technology used will have a direct impact on the Canadian greenhouse industry, which will benefit from improved greenhouse yield and autonomy. Other biology research and experiments also being conducted in the hostile environment of the Canadian Arctic will benefit this industry, as well as northern communities that want to develop their own agricultural potential.



3. POLLUTION

CANADIANS RELEASED EMISSIONS INTO THE ATMOSPHERE EQUIVALENT TO THOSE OF 747 MILLION MID-SIZE CARS DRIVEN FOR 5,000 KM.

Source: Human Activity and the Environment, Statistics Canada. Numbers for the year 2005.

MOPITT, a Canadian space instrument designed to measure pollution in the troposphere, that part of the atmosphere where most of our weather originates, was launched in December 1999, and was one of the first instruments to clearly show the large-scale transport of pollutants from one continent to another.

In measuring the planet-wide distribution of carbon monoxide and methane in the troposphere, MOPITT became the first major Canadian instrument used to measure pollution in Earth's atmosphere from space. MOPITT is Canadian Space Agency's biggest contribution to the NASA's Earth Observation System.

The data obtained through MOPITT, combined with those from other instruments, made it possible to monitor the planet-wide distribution of carbon monoxide over a long period, making it possible, through time simulation, to paint a picture of the concentrations around the planet over an 18-month period.

Through its high-resolution 3D maps of global concentrations of carbon monoxide, MOPITT enables us to distinguish between natural pollution sources and those related to human activity. In the long term, it will help us assess whether it is necessary to tighten pollution control measures. The 3D maps produced by MOPITT have also contributed to worldwide monitoring of the movement of pollution originating from burning croplands in Brazil and Africa or in the industrial centres of North America, Europe and, increasingly, China.

Canada also contributed to the development of ORACLE, a space-based remote-sensing instrument that provides information essential for understanding greenhouse gases, global warming, ozone layer depletion and air pollutants. ORACLE measures and monitors constituents of the Earth's troposphere and stratosphere, the stable layer that is nearly free of turbulence and weather.

THE GLOBAL OZONE LAYER IS SHRINKING ABOUT 4% EVERY TEN YEARS.

Source: NASA

Launched in 2003, the all Canadian SCISAT satellite is helping us gain further insight into the atmospheric chemistry and dynamics that affect the ozone layer. SCISAT data is helping scientists improve their understanding of ozone layer depletion, especially important for Canadians living in the Arctic. This new research is allowing Canada to make informed assessments and decisions on international environmental policies.

BETTER FLIGHT PATTERNS FOR REDUCED FUEL CONSUMPTION.

Source: Canadian Space Agency

Canada's contribution to the European Galileo satellite navigation system is helping airlines to better plan their flights and air controllers as they direct the flow of air traffic, resulting in major fuel savings. In addition to reducing pollution, Canada will have supported efforts aimed at increasing air traffic capacity and effectiveness, as well as improving the safety of passengers travelling on the various airlines.

4. CLIMATE CHANGE

EVERY YEAR, ROUGHLY 40,000 ICEBERGS MIGRATE THROUGH CANADA'S EASTERN WATERS.

Source: Environment Canada, Canadian Ice Service

One of the most alarming effects of global climate change is the melting of the ice caps, which threatens to flood many coastal areas all over the world. Using RADARSAT data, experts are able to monitor the ice and its movement.

In an Antarctic mapping mission conducted for NASA, RADARSAT-1 greatly exceeded expectations, providing complete coverage and quality images. It made it possible to produce the first map of the continent, while providing for the first time an overview of the Eastern Antarctic ice streams.

Satellites also collect sea-level data. Variations in sea levels are one of the most visible signs of the occurrence of climate change and can affect many coastal communities.

Resupplying deep-sea exploration platforms and ocean research stations is no small feat. The Canadian RADARSAT satellite allows for regular monitoring of the entire Arctic region to map the distribution of sea ice and ensure that boats take safe and secure routes. The data obtained by RADARSAT have greatly contributed to the updating of Antarctic maps and the monitoring of ice fields in that region. In addition, RADARSAT has increased our knowledge of the various types of ice.

EACH YEAR IN CANADA, FIRES BURN AN AVERAGE OF 25,000 SQUARE KILOMETRES OF FOREST, THE EQUIVALENT OF OVER FOUR TIMES THE AREA OF PRINCE EDWARD ISLAND.

Source: Natural Resources Canada

Space technology has been used around the world for emergency response operations when calamities and natural disasters (floods, forest fires, volcanic eruptions, cyclones, earthquakes, hurricanes, etc.) have occurred.

Canadian satellites play a leading role in disaster and emergency preparedness management. In natural disasters, the data collected by the RADARSAT-1 and RADARSAT-2 satellites help us identify potentially dangerous sites, assess the extent of damage and facilitate rescue operations.

When it comes to saving lives, the observation speed of the Canadian satellites makes it possible to support humanitarian aid and victim assistance operations. As a founding member of the International Charter on Space and Major Disasters, Canada helps mitigate the effects of natural disasters on human life and natural resources. Images of devastated areas are supplied to international aid organizations, which are then able to send resources immediately to begin rescue and rebuilding efforts.

Established by Canada, the REMSAT (real-time emergency management via satellite) network uses telecommunication and Earth observation satellites to provide real-time digital mapping in emergency situations. The satellite data obtained make it possible not only to predict disasters (such as floods), in order to take the necessary preventive measures while there is still time, but also to deploy resources quickly. For example, by guiding firefighters through a blazing forest fire, the REMSAT network satellites can help save lives, protect real property and preserve natural resources.





5. USING THE EARTH'S RESOURCES

OUR SATELLITES ARE “GOLD MINES” OF INFORMATION FOR RESPONSIBLE USE OF LAND AND NATURAL AND GEOLOGICAL RESOURCES.

Source: Canadian Space Agency

Mapping of geological features makes it possible to improve safety and realize major savings. Using data obtained by satellites, experts are able to detect faults, folds and other information critical in the search and distribution of groundwater.

Information captured from space can be used to locate oil, gas and mineral deposits, in order to better direct the development of these resources.

The information improves the management of our geological resources, but also facilitates the detection of suitable below-ground sites for disposal of hazardous wastes.



6. FORESTS, OR GREEN HERITAGE

CANADA HAS THE LARGEST NATIONAL PARKS SYSTEM IN THE WORLD - 42 NATIONAL PARKS.

Source: Parks Canada

Space technologies developed for RADARSAT play a leading role in observing and managing Canada's natural resources.

Satellites provide data that can help protect and manage the ecological integrity and use of Canada's national parks. With this technology, Parks Canada can detect changes in the forest ecosystem and in the biodiversity - sometimes difficult to observe from the ground—and as a result, get an accurate picture of the health of the parks and take action quickly.

The information gathered is made available on the Parks Canada Web site to increase public awareness of climate change.

GLOBALLY, ABOUT 13 MILLION HECTARE OF FOREST ARE DEFORESTED EACH YEAR—THE EQUIVALENT OF NOVA SCOTIA AND NEW BRUNSWICK COMBINED.

Source: Natural Resources Canada

Canada's RADARSAT provides important data used to map and monitor forests around the world. These maps produced by specialists using satellite data, give us an accurate picture of forest activities.

The advanced technology used by the satellites makes it possible to detect clear-cut areas in forests at rates approaching 100%. Whether assessing the environmental impact of clear cutting in boreal and tropical forests or gauging the success of reforestation operations, specialists can count on Canadian technology and expertise.

A PARTNERSHIP FOR THE HABITATS OF WILD SPECIES

Source: Canadian Space Agency and Environment Canada

Environment Canada and the Canadian Space Agency are currently working on establishing a national satellite-assisted environmental monitoring program. By combining the knowledge and expertise of the government, universities, the private sector and environmental protection agencies, this co-operative pilot project would make it possible to improve management of wild species and the enforcement of legislation supporting environmental and species protection.

“Space for Habitat” would use RADARSAT technology to monitor wild species habitat. Data collected would make it possible to monitor developments and changes occurring in these ecosystems, even in the most remote locations. There are also plans to use the same techniques to monitor Canada's protected areas, in order to enforce environmental protection legislation.