SUPPORT FOR INTERNATIONAL POLAR YEAR RESEARCH

SPOT 5 HRS IMAGERY HELPS ASSESS THE STATE OF THE POLAR ICE SHEETS

The French space agency CNES and Spot Image are contributing to a number of research programmes now underway for International Polar Year (IPY), for which they have built up a significant archive of imagery of the polar regions from SPOT 5's HRS instrument (High Resolution Stereoscopic). With global warming today a chief concern, these data are giving scientists around the globe an opportunity to gain a closer insight into the world's changing ice cover.

Satellite imagery is a vital tool for tracking temperate and polar ice cover. In this respect, SPOT 5's HRS instrument has the key ability to acquire stereopair imagery at a spatial resolution of 5 metres, covering an area of 120 km x 600 km.

CNES and Spot Image have launched the SPIRIT project (SPOT 5 stereoscopic survey of Polar Ice: Reference Images and Topographies) in partnership with French survey and mapping agency IGN, responsible for generating digital elevation model (DEM) products, and the LEGOS space geophysics and oceanography research laboratory, principal investigator. The chief aims of this project are to:

Image 2.5 million sq.km. of the Arctic and Antarctic regions, covering glaciers, small ice caps and the coasts of Antarctica and Greenland.

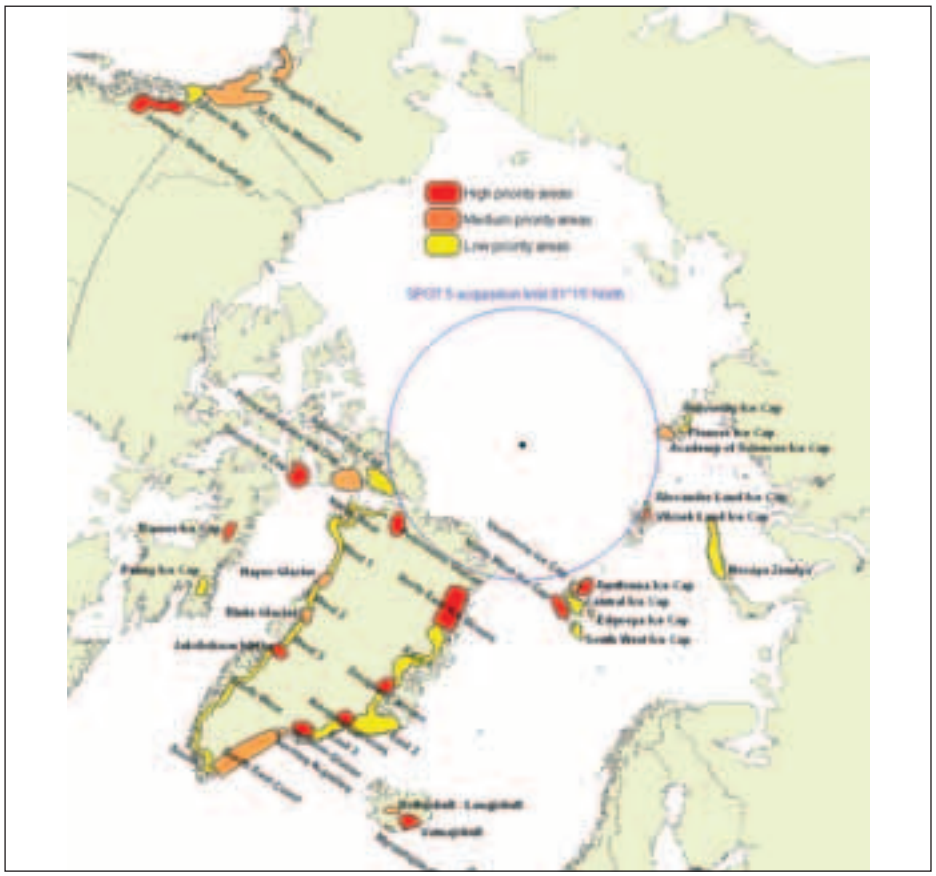
Allow scientists around the world working on themes in line with IPY to access the SPOT 5 HRS archive through a dedicated Web interface.

Distribute DEM products free of charge to research laboratories approved by CNES, to give them a baseline topography that until now has been lacking for studies of polar ice, so they can map change in these regions.

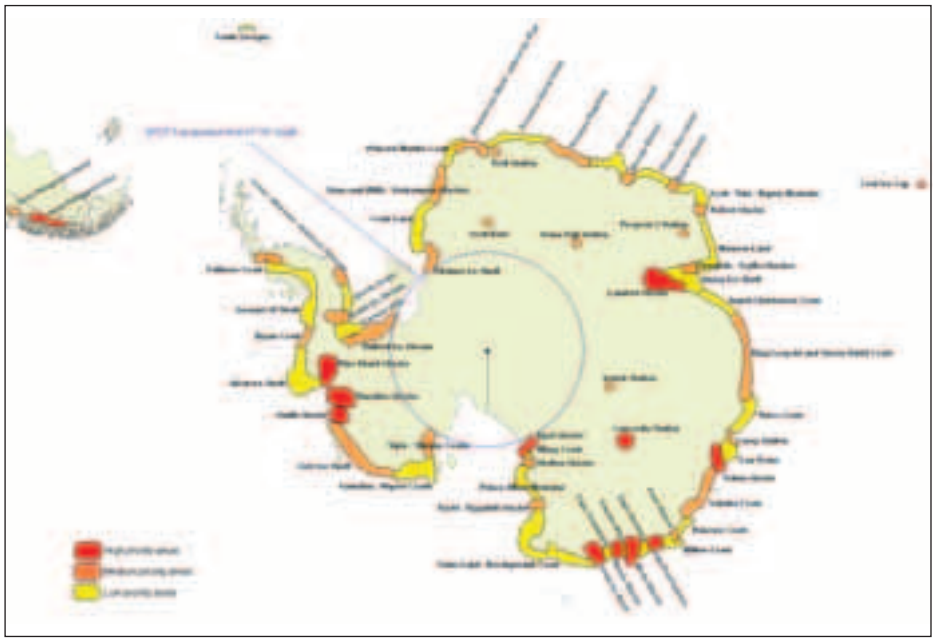
An initial imaging campaign in the Northern Hemisphere has already covered 830,000 sq.km of Arctic regions. The ongoing Antarctic campaign has set out with the ambitious aim of covering 2 million sq.km of the ice sheet.

Spot Image, the commercial operator of the SPOT satellites, is headquartered in Toulouse, France, with subsidiaries and offices in Australia, Brazil, China, Japan, Mexico, Peru, Singapore and the United States. It leverages a global network of partners, distributors and ground receiving stations to serve public and private-sector decision-makers worldwide. Spot Image is a leading supplier of geospatial information with an extensive portfolio of multisensor, multiresolution products.

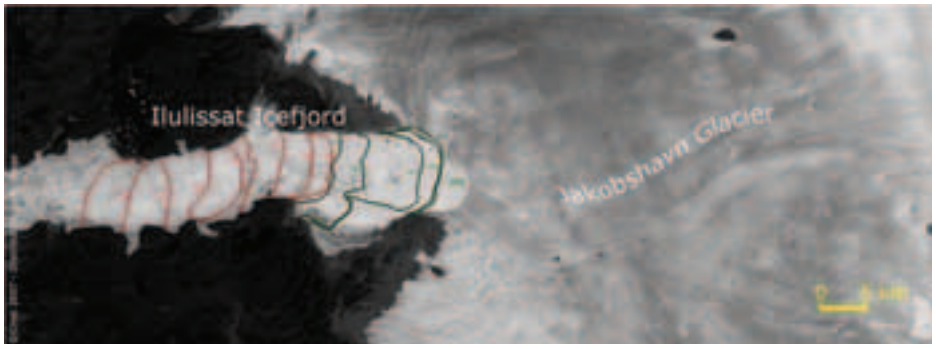
France affirmed its space ambitions from a very early stage. As a result of its efforts, it has achieved independent access to space and is a prime mover behind Europe's space policy and international cooperation. Over the years, CNES has built up end-to-end expertise in implementing space systems, working with expert contractors and research laboratories. Through its ability to innovate and its foresight, it is helping to expand knowledge, foster the emergence of new technologies for the benefit of society and develop space applications.



SPOT 5 acquisition areas in the Arctic



SPT 5 acquisition priorities in the Antarctic



Retreat of the Jakobshavn Isbrae glacier

Outlet glacier in Greenland

The ice tongue of the Jakobshavn Isbrae glacier on Greenland's west coast has retreated significantly in the last five years. At the same time, it has thinned and started to flow faster. These changes have been confirmed in processed SPOT 5 HRS imagery.

The town of Jakobshavn (Ilulíssat in Greenlandic) lies near the mouth of the eponymous fjord from where icebergs calve off the Jakobshavn Isbrae glacier into Disko Bay. A UNESCO world heritage site, this glacier is one of the largest on the Arctic ice sheet, discharging some 35 billion tonnes of ice into the sea every year, that is, 6 to 10 percent of the total mass of ice discharged into the Northern Hemisphere oceans. Jakobshavn Isbrae is now the world's fastest-flowing glacier and is estimated to be responsible for 4 percent (0.06 mm) of the recent rise in sea level across the globe.

Since 2004, new ASTER and Landsat satellite data have revealed a clear break in the glacier's advance. Its northern and southern sections are exhibiting different behaviour, with the ice streams driving the flow of ice to the calving front moving at different speeds. The rate of ice flow doubled between 1985 and 2006, from 17 metres to 35 metres per day.

Details in the DEM

SPOT 5's HRS instrument has been used to map the Jakobshavn glacier precisely in three dimensions. Comparing a digital elevation model (DEM) generated by IGN, France's survey and mapping agency, from SPOT 5 HRS imagery acquired in 2007 with a DEM from April 2003, the LEGOS space geophysics and oceanography research laboratory found that the glacier had thinned rapidly. The glacier's speed was also measured by comparing two HRS orthoimages acquired 10 days apart. The main ice stream peaked at 42.5 metres per day (15.5 kilometres per year), making Jakobshavn Isbrae well and truly the world's fastest glacier.

Légende image

The main front, or ice tongue, where icebergs calve from the glacier has retreated 40 kilometres since 1850. But this process has not been constant. From 1850 to 1964, the tongue retreated about 0.3 km a year, speeding up slightly in 1929-1930. The front remained somewhat constant from 1964 to 2001 and then accelerated significantly, reaching a speed of 3 km per year from 2001 onwards.

Web sites:
www.spotimage.com/IPY
www.cnes.fr
www.legos.obs-mip.fr
www.ipy.org

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