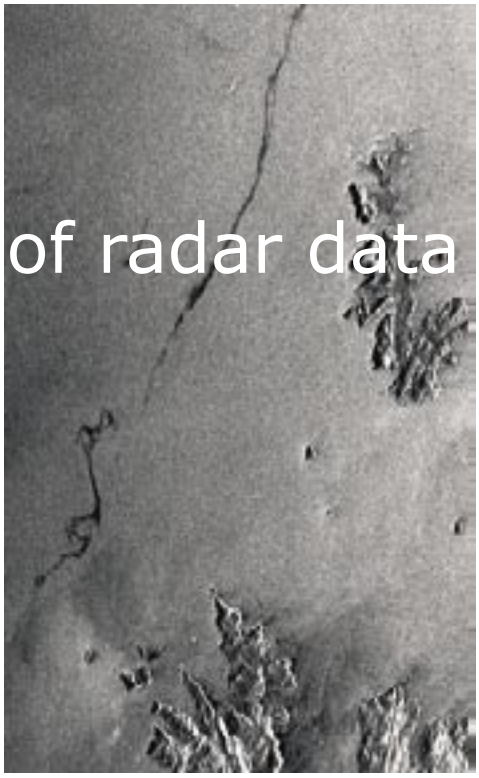
Radarsat-2

Secure a continuous flow of radar data

When RADARSAT-2 is launched in the near future the continuous flow of data from the SAR sensors on the satellites will be prolonged for several years. Continuous data flow is very important in order to pay attention to evolution in the nature, such as the climate, ice and snow covering etc. The Nordic countries, like all countries at high latitudes have greatly benefited from this type of satellites; thus we look forward to the operative phase with great expectations.



Oil spill detected by a Syntetic Aperture Radar placed in a polar orbiting satellite. Photo: RADARSAT

Mission

RADARSAT-2 is a collaboration between the government - the Canadian Space Agency (CSA), and the industry - MacDonald, Dettwiler and Associates Ltd. (MDA). MDA owns and operates the satellite and ground segments, while CSA is contributing funds for the construction and launch of the satellite. CSA will also cover its financial investment in the programme through the supply of RADARSAT-2 data to the Canadian government agencies during the lifetime of the mission.

RADARSAT-2 is Canada's next-generation commercial SAR satellite, the follow-up to RADARSAT-1, launched in 1995. The new satellite will be launched in the summer of 2007 to a 798 km high near-polar, sun-synchronous orbit. RADARSAT-2 has been designed with significant and powerful technical advancements which include 3 m high-resolution imaging, flexibility in selection of polarization, left and right-looking imaging options, superior data storage, and more precise measurements of spacecraft position and attitude.

Bard Kringen, NordicSpace

The Nordic countries and RADARSAT

The unique capacity the radar satellites have to detect land and ocean almost undisturbed by weather conditions and darkness has placed them at the top of platforms for detecting and monitoring. Its four fields' radar satellite is especially useful for the users at the high latitudes, in oil detection in oceans, ship detection, ice monitoring and snow covering detection.

The only thing that may disturb the observation for ship detection is very high waves, because it is the waves from the ship that are being detected. For oil detection it is the opposite. It is the oil's lowering effect in the waves that are being detected. When the ocean is calm, the difference between the clean water and the oil membrane is difficult to detect.

For the high latitudes the polar orbiting satellites are very vulnerable for a number of reasons. The time between the repetition orbits is short, given daily coverage for these areas. The whole day can be in darkness large parts of the year, and the weather conditions may cause it to go days between optical sensors can see the surface, but the monitoring with SAR can been carried out independently of that.

The Nordic countries use the data from the existing satellite through several programmes and look forward to a successful launch with great expectations. A new operative satellite in service before RADARSAT-1 goes down will ensure the continuity in the real dataflow from radar satellites. This data flow that starts with ERS-1, is now fifteen years, and it is very important for several reasons that they are completed. The users also have expectations about even better data from further developed sensors.

Among receiving stations around the world the Norwegian Kongsberg Satellite Services (KSAT) downloads data from the satellite to their ground stations at Svalbard. The data can be downloaded in near real time, for areas within the covering area for KSAT, or as stored data from other areas in the world. From this base they distribute data, mainly to international users, but also for several public administrations in Norway. This data can be either raw data, or processed data to different levels, dependent on what the users require. KSAT can, in the near future, also offer downloading of near real time data to the new ground station in Antarctic.

Norway pays for access to the satellite data as do several public administrations that need near real times satellite data, and Norway also participates in a Dutch treaty for this right. The main use of such data in Norway is reserved to oil spill detection,

The backside of the SAR antenna in the inegration hall. Photo: Canadian Space Agency.

ice monitoring, monitoring the fishing fleet, merchant traffic in the ocean areas, and for the search and rescue services.

RADARSAT -2 versus the predecessor

Like all types of satellites the second Radarsat will have several additional improved instrument and functions than the predecessor. That comes natural, given the further developed technique and more knowledge about wishes and needs from the users. For RADARSAT-2 that has become visible in almost all the fields the satellite sensors cover. All fields of applications, marine surveillance, ice detection, disaster management, hydrology, mapping, agriculture, forestry and geology will get better and more accurate resolution, and higher reliability etc.

RADARSAT 2 in the integration hall. Photo: Canadian Space Agency.

Mission information

Orbit:	ear pole, sun-synchronous
Altitude:	798 km
Inclination:	98.6 degrees
Period:	100.7 minutes
Repeat cycle:	24 days
Orbits per day:	14
SAR Antenna dimensions:	15 x 5 m
Lifetime:	7 years minimum

The history of Synthetic Aperture Radar (SAR)

The SAR system has shown the possibilities to detect the Earth's surface independent of weather conditions and darkness. These capacities are invaluable for continuous monitoring the surface, not least for the areas with high latitudes.

The first satellite to make use of the system was the American Seasat 1, in operation about three months in 1978. The pictures the satellite sent back paved the way for several projects based on this technique. For political reasons the first Soviet SAR test satellite was not launched until 1987, followed by the operative Almaz in 1991. Europe took an active part for the same system in 1982, with the ESA decision to go ahead with the European Remote Sensing (ERS) programme. ERS 1 was launched in 1992 and was in service until 2000, but was already then supplied by ERS 2 in 1995. Later these satellites were completed with the much larger Envisat in 2002.

Common for the European satellites was the multi mission research aspect, but already in 1995 Canada launched the first commercially SAR satellite. RADARSAT-1 carries only one sensor, the synthetic Aperture Radar, and for the first time the satellite delivered pictures to most of the world's earth observation community. RADARSAT-1 will now be followed by RADARSAT-2, simultaneously as plans for the third generation are being carried out.

Other countries such as Japan, Ukraine etc. has their own radar satellites in orbit, and especially Japan is active within this field.