

# Ny-Ålesund 20-meter Antenna

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## Abstract

In the year 2010, the 20-meter VLBI antenna at the Geodetic Observatory, Ny-Ålesund, participated in VLBI experiments, observing 91 of 91 scheduled 24-hour experiments and 116 of 118 scheduled Intensives. The reason for the lost experiments was the repair of the cooling system. Several experiments during November had to be run with a warm receiver due to a failure of the cold-head. In 2010, Ny-Ålesund was manned by four employees dividing three positions between them: Carl Petter Nielsen as base commander and Geir Mathiassen, Moritz Sieber, and Lars Karvonen as engineers, all working 75%. In connection with the application for two new antennas, the Norwegian Mapping Authority (NMA) carried out an extensive Environmental Impact Assessment (EIA) and will continue towards its completion in summer 2011. During spring some holes were drilled to establish the quality of the ground and to find the best location for the new antennas. In the autumn Geir Mathiassen and Carl Petter Nielsen visited Kokee Park to learn more about antenna maintenance.

## 1. General Information

The Geodetic Observatory of the NMA is situated at 78.9° N and 11.87° W in Ny-Ålesund, in Kings Bay, at the west side of the island of Spitsbergen. This is the biggest island in the Svalbard archipelago. In 2010, Ny-Ålesund was scheduled for 91 24-hour VLBI experiments, including R1, R4, EURO, RD, T2, and RDV sessions, and 118 Intensives within the Int1/Int3 program, making a total of 209 experiments. Two Intensives had to be cancelled because of station problems, in both cases, connected to the cooling system. Of the 207 completed experiments 71 1-hour and four 24-hour experiments were added during the year because of downtime/problems at other stations. This is an increase of 72.5% since 2009 (measured in number of experiments).

In addition to the 20-meter VLBI antenna, the Geodetic Observatory has two GPS antennas in the IGS system and a Superconducting Gravimeter in the Global Geodynamics Project (GGP) installed at the site. There is also a CHAMP GPS and a SATREF (dGPS) installation at the station. At the French research station in Ny-Ålesund, there is a DORIS station. In October 2004, a GISTM (GPS Ionospheric Scintillation and TEC Monitor) receiver was installed at the Mapping Authority structure in the frame of ISACCO, an Italian research project on ionospheric scintillation observations, led by Giordiana De Franceschi of the Italian Institute of Volcanology and Geophysics (INGV).

## 2. Component Description

The antenna is intended for geodetic use and is designed for receiving in S-band and X-band. Ny-Ålesund is a Mark 5A station. The station configuration file can be found on the IVS Web site: <ftp://ivscc.gsfc.nasa.gov/pub/config/ns/nyales.config>. Ny-Ålesund is located so far north that the sun is below the horizon from the 23rd of October until the 22nd of February, and the station has midnight sun from the 20th of April to the 27th of August. The station is situated under the auroral circle during daytime giving some extra disturbance in the ionosphere, but generally the polar atmosphere is calmer than the atmosphere closer to the equator.

### 3. Staff

Carl Petter Nielsen has a two year contract as base commander, ending 2011.12.31. Geir Mathiassen, Moritz Sieber, and Lars Karvonen all have two year contracts as engineers ending 2012.09.01, 2011.09.01, and 2012.02.01, respectively. Everybody works 75%, which means that three full-time positions are covered. When Carl Petter Nielsen is off, one of the others steps in as base commander.

Table 1. Staff related to VLBI operations at Ny-Ålesund.

Hønefoss:	Section manager:	Line Langkaas
	Station responsible at Hønefoss:	Line Langkaas
Ny-Ålesund:	Station commander:	Carl Petter Nielsen
	Engineer	Geir Mathiassen
	Engineer	Moritz Sieber
	Engineer	Lars Karvonen since 2010.02.01



Figure 1. Ny-Ålesund antenna.

## 4. Current Status and Activities

Ny-Ålesund participated in the scheduled VLBI experiments. During 2010 e-VLBI was extended to the transfer of R4 and Int1 sessions from Ny-Ålesund to the Washington Correlator in addition to transferring R1 and Int3 measurements to the Bonn Correlator. The Ministry of Education granted funding for a fiber cable between Longyearbyen and Ny-Ålesund. The new cable will enable us to take part in real time correlation as opposed to our present radiolink, which is 100 Mbit/s.

The Superconducting Gravimeter (SCG) placed on the same foundation as IGS-GPS NYA1 has been running without problems. The yearly service on the system was performed by the staff in September. There were some problems in transporting the liquid helium (LHe) to Ny-Ålesund. Due to the 2–3 weeks it takes to transport the LHe to Ny-Ålesund, most of it might turn into gas on the journey, especially if the ship experiences bad weather. Therefore we had to have an extra tank of LHe, but still we only had just enough LHe to last until the first boat in April 2011. National Astronomical Observatory of Japan, Mizusawa VERA Observatory, which owns the SCG, lent this equipment to NMA starting 2007.04.01, to continue the scientific measurement series.

NMA plans to take part in VLBI2010 and has applied to the Norwegian government for funding of two new VLBI antennas and an SLR system. In order to establish the optimal site, some ground drilling has been done, and on this background a site has been chosen. Ny-Ålesund is an Arctic research village, and the scientific community (organized in Ny-SMAC) would like to keep Ny-Ålesund and the surroundings as pristine and unaffected by human activity as possible. Therefore NMA has initiated an extensive Environmental Impact Assessment (EIA) involving the different interested parties.

In the autumn Geir Mathiassen and Carl Petter Nielsen visited Kokee Park to learn more about antenna maintenance. This was a very useful exercise for the staff at Ny-Ålesund, who all are fairly new to VLBI.

## 5. Future Plans

Ny-Ålesund will continue to participate in the 119 regular and 43 Intensive experiments as well as the CONT11 in September. The station is currently trying to replace the Mark IV with a Mark 5 formatter. Hopefully we will succeed despite some problems at the moment. In order to save energy, three heat pumps will be installed, and the plan to insulate the ceiling will finally be carried out. Rüdiger Haas and Sten Bergstrand will measure the movement of the surrounding terrain in late February before the solar heating starts.

If our application for funding is successful, building of the roads and the foundations of the new antennas will start in 2011.

The SCG has to be refilled with liquid helium each year, and the lift has to be re-certified every year. A new car will be bought. Depending on the availability of cable ships, the new fiber cable between Longyearbyen and Ny-Ålesund will be laid down during summer 2011 or 2012.