Ny-Ålesund 20-meter Antenna

Carl Petter Nielsen

Abstract

In 2011, the 20-meter VLBI antenna at the Geodetic Observatory, Ny-Ålesund, has participated in VLBI experiments, observing 115 of 115 scheduled 24-hour experiments, 35 of 41 scheduled Intensives and the CONT in September. Reasons for the lost Intensive experiments were cancellations due to the disabling of the Tsukuba antenna by the earthquake in Japan. In 2011, 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 November Lars Karvonen was replaced by Åsmund Skjæveland. In connection with our VLBI2010 application, the Norwegian Mapping Authority (NMA) was granted 219 million NOK from the Norwegian Government.

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 2011, Ny-Ålesund was scheduled for 115 24-hour VLBI experiments, including R1, R4, EURO, RD, T2, and RDV sessions, and 41 1-hour Intensives within the Int1/Int3 program. Five Intensive experiments were cancelled due to the earthquake in Japan that disabled the Tsukuba antenna. One Intensive had to be cancelled because of station problems. The rest of the 150 experiments were run as planned. Ny-Ålesund also participated successfully in the CONT in September.

In addition to the 20-meter VLBI antenna, the Geodetic Observatory has two GPS antennas in the IGS system and a Super Conducting Gravimeter in the Global Geodynamics Project (GGP) installed at the site. There is also 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 Giorgiana De Franceschi of the Italian Institute of Geophysics and Volcanology (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 located so far north that the sun is below the horizon from the 23rd of October until the 22nd of February and has midnight sun from the 20th of April to the 27th of August. The station is situated under the auroral circle during the daytime, giving some extra disturbance in the ionosphere, but generally the polar atmosphere is calmer than the atmosphere closer to the equator.

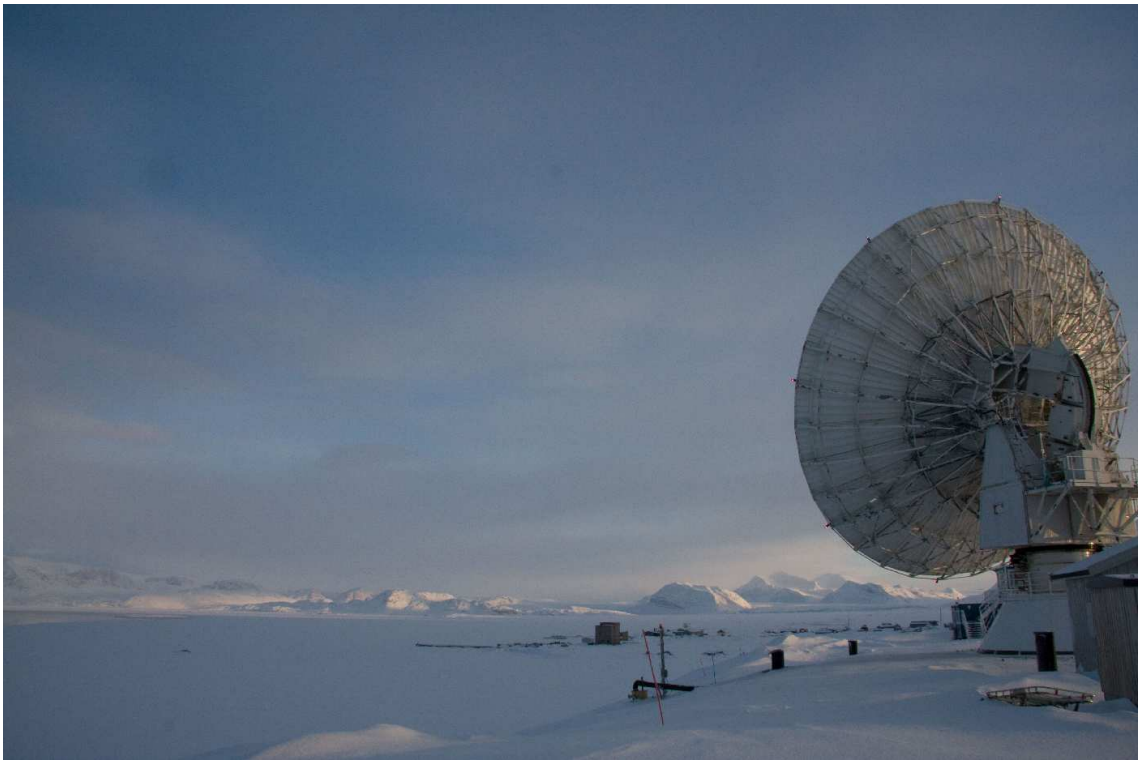

Figure 1. Ny-Ålesund antenna.

3. Staff

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 until 2011.10.01
	Engineer	Åsmund Skjæveland since 2011.11.15

Carl Petter Nielsen has a three-year contract as base commander, ending 2012.12.31. Geir Mathiassen and Moritz Sieber have two-year contracts as engineers ending 2012.09.01 and 2013.07.31, respectively. Lars Karvonen terminated his contract on 2011.10.01 and was replaced by Asmund Skjæveland on 2011.11.15. When Carl Petter Nielsen is off, one of the others step in as base commander.

4. Current Status and Activities

Ny-Ålesund participated in the scheduled VLBI experiments. During 2011 e-transfer was extended to transfer all experiments from Ny-Ålesund to the different correlators. The fiber-cable between Longyearbyen and Ny-Ålesund was postponed until 2013/2014. 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 Super Conducting 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. We also experienced increasing problems transferring LHe from the transport container to the gravimeter. As a result we had three shipments of LHe in 2011. To reduce the running cost of the gravimeter the NMA is applying for a new gravimeter with a built-in regenerating LHe system. 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 was granted 219 million NOK from the Norwegian Government for two new antennas and SLR. Ny-Ålesund is an Arctic research village, and the scientific community (organized in NySMAC) would like to keep the surroundings as pristine and unaffected by human activity as possible. Therefore NMA has initiated an extensive Enviromental Impact Assessment (EIA) involving the different interested parties. This work is soon to be finished enabling us to complete the planning of the project. Our hope is that everybody involved will find that the VLBI2010 project is acceptable for the ongoing research in Ny-Ålesund.

The Mark IV formatter was replaced with a Mark 5 sampler. Mark 5B is now used as the recorder, and Mark 5A is used for transferring data to correlators. In early May the receiver-monitorsystem broke down, and we are in the process of replacing it with an alternative PLC-system.

In order to improve the skills of the staff some measures were taken. In March, Geir Mathiassen and Lars Karvonen visited Wettzell. Lars Karvonen and Moritz Sieber attended the Technical Operations Workshop (TOW) in early May, and Moritz Sieber attended the ILRS workshop in Wettzell in the middle of May. Carl Petter Nielsen and Moritz Sieber visited Wettzell in June. A climbing and safety course was held in November. In November Moritz Sieber studied the SLR at Wettzell, and during that period Kent Roskifte substituted for him in Ny-Ålesund.

During August the roof was insulated against the arctic cold, and two heat-pumps were installed to improve our energy budget. The lift was treated for rust and repainted. A new car was bought in October, and the oldest car was sold.

Our present antenna is scheduled to observe until 2022, when it will be taken down due to airport safety. A representative for Vertex inspected the antenna in August and produced a list of measures that need to be carried out in order to keep our old lady alive.

5. Future Plans

Ny-Ålesund will continue to participate in the 123 regular and 46 Intensive experiments. Our aim is to use e-transfer for all transfers of data. A new system for monitoring the receiver will be

implemented.

During 2012 competitive tendering for the different parts of the VLBI2010 project will be carried out. Hopefully work on the infrastructure can start in late 2012. The new fiber-cable between Longyearbyen and Ny-Ålesund has been delayed. Depending on the availability and price of cable-ships the fiber-cable will be laid during the summer of 2012 or 2013.