

Ny-Ålesund Geodetic Observatory 2013 Annual Report

Moritz Sieber

Abstract In 2013, the 20-m telescope at Ny-Ålesund, Svalbard, operated by the Norwegian Mapping Authority (NMA), took part in 209 out of 211 scheduled sessions of the IVS program.

1 General Information

The Geodetic Observatory of the Norwegian Mapping Authority (NMA) is situated at 78.9° N and 11.9° E in Ny-Ålesund, in Kings Bay, at the west side of the island Spitsbergen. This is the biggest island in the Svalbard archipelago. In 2013, Ny-Ålesund was scheduled for 125 24-hour VLBI sessions, including R1, R4, EURO, RD, T2, and RDV sessions, and 86 one-hour sessions within the Intensives-program.

In addition to the 20-meter VLBI antenna, the Geodetic Observatory has two GNSS antennas in the IGS system and a Super Conducting Gravimeter in the Global Geodynamics Project (GGP) installed at the site. A second gravimeter (a GWR “iGrav”) got set up in September and will replace the former system after a period of parallel measurements. The French-German AWIPEV research base in Ny-Ålesund operates a DORIS station. In October 2004, a GISTM (GPS Ionospheric Scintillation and TEC Monitor) receiver was installed at the Mapping Authority’s structure in the frame of ISACCO, an Italian research project on ionospheric scintillation observations, led by Giordiana De Franceschi of the Italian Institute

Norwegian Mapping Authority, Geodetic Institute

NYALES20 Network Station

IVS 2013 Annual Report



Fig. 1 Telescope seen from east.

of Volcanology and Geophysics (INGV). Another Real-Time Ionospheric Scintillation (RTIS) Monitor was set up by the NMA in November 2012.

1.1 Component Description

The antenna with 20-m diameter is intended for geodetic use and receives in S- and X-band. Its design and construction are similar to those at Green Bank and Kokee Park. A rack with 14 video-converters, Mark IV decoder, and Mark 5 sampler streams the data to a Mark 5B+ recorder. A Mark 5A-unit is used to transfer data via network to the correlators. Timing and frequency is provided by a NASA NR maser, which is monitored by a CNS system.

1.2 Staff

The staff at Ny-Ålesund consists of four people employed at 75 %, which means that three full-time positions are covered (see Table 1 for an overview). Each position goes with a three-year contract that can be extended up to 12 years, but in average people stay 3–4 years. The observatory is part of the Geodetic Division of the Norwegian Mapping Authority with its main office at Hønefoss (near Oslo).

During 2013, Åsmund Skjæveland moved back to the mainland to the love he found—all the best wishes for the two of you. He is still within reach however, working at the NMA's control center for the SATREF-network. His open position was covered by Susana García-Espada, who was previously working at the station in Yebes, and she brought some sun and Spanish air to Ny-Ålesund. Welcome to the Arctic!

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

Hønefoss	Section Manager Technical Manager	Reidun Kittelsrud Leif Morten Tangen
Ny-Ålesund	Station Manager Engineer Engineer Engineer Engineer	Moritz Sieber Susana García-Espada (≥ Sept.) Geir Mathiassen Kent Roskifte Åsmund Skjæveland (≤ May)

2 Current Status and Activities

2.1 Maintenance

The main bearings in one of the Az-gearboxes showed wear; as well, the top radial shaft seal was broken, leading to both oil leakage and water contamination of the lubrication system. So the whole gearbox was replaced during the maintenance period in summer, which had to be extended by one week. Everything worked well, and the gearbox that was taken down will be overhauled to provide a working spare one again.

2.2 Monitoring

The monitoring system has been extended by the ability to send alerts by VHF radio (see Figure 2 for a flowchart). Due to the situation in Ny-Ålesund (being in a small village without mobile phone coverage and living and working at the same place) this was preferred to sending e-mails or short-messages. The watchdog runs as a cron-job on the Field System computer. It checks if the Field System is running and asks for the current logfile-name. This is the only interaction between these two processes; once the logfile is known, the data since the last run is searched for keywords and figures such as:

- receiver 20K/70K temperature levels
- Dewar pressure
- Helium supply pressure
- wind speed
- Field System error codes <CC>, -<nnn>

If one of the values exceeds a threshold or an error code matches one on a predefined list, either a warning or alarm message is broadcast via VHF. Once received on the operators' radio it triggers an alarm.

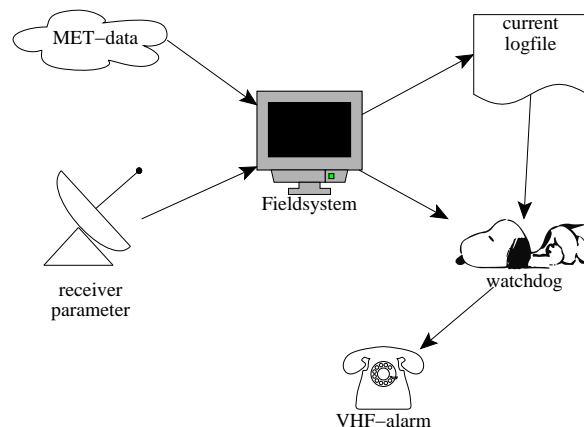


Fig. 2 VHF alerting system.

In combination with the e-control software by A. Neidhardt et al., this is an excellent tool to react quickly even at night, thus making night shifts unnecessary and enabling operators to work together during ordinary working hours (sharing knowledge) instead of going on separate shifts.

2.3 GPS Campaign

During late August, the triennial GPS campaign was carried out by Knut Gjerde from the Geodetic Institute, Hønefoss. 18 bolts of the reference network around Ny-Ålesund were measured over a period of five days each.

2.4 Session Performance

By the end of 2012, Ny-Ålesund was scheduled for 121 24h- and 46 1h-sessions. By the end of 2013, 123 of 125 24h- and 86 1h-sessions were observed. The increase in the number of 1h-Intensives is due to replacing Wettzell in the Int1 and Int2 series during their repair between July and September. For one R1- and one R4-session Ny-Ålesund had to be taken out of the schedule due to the extension of maintenance work; as a compensation, three sessions during December and one in May were added. Four of the remaining sessions were recorded with 98% or less. A summary can be found in Table 2.

Table 2 Sessions with trouble (that recorded 98% or less).

Session	Comments
R4576	not scheduled (announced maintenance period), but in performance matrix
RV100	interrupted observation for participation in Int1
T2091	interrupted observation for participation in Int1
RD1308	receiver warming up. stopped to cool down in time for succeeding R4
R4606	missed some scans by troubleshooting receiver monitoring issues
R1605	does not appear in schedule statistics, but observed as scheduled
R1606	not observed due to warm receiver
R4596	removed from schedule, extending maintenance period

2.5 New Observatory

Due to the proximity of the airfield to the current location, the new observatory has to be built further away. A road must be built first, and due to the Arctic and environmental conditions (removal and regrowth of top soil), this can only happen during the “summer”

months between June and October. More than the first half of it, including a bridge and a culvert section to cross a riverbed, was finished in 2013, and work will continue next year.

2.6 New Instrumentation

In September, a new GWR instrument iGrav 007 gravimeter was installed. It will replace the old superconducting gravimeter which needed a refill with liquid helium every now and then. The former system will be shipped to the mainland after some months of parallel measurements.

3 Future Plans

Ny-Ålesund will participate in CONT14. Related to that, the media pool has to be upgraded. The current Mark IV rack will be replaced by a digital backend system, both to replace the aged video converters and to gain experience with the new system that will be installed at the new site. The road construction will continue, and first preparations on the new observatory’s site will be performed. By end of the year the last remaining hundred miles between Ny-Ålesund and Longyearbyen will be covered by fiber cable, replacing the current radio link. The cable is supposed to be operational in early spring 2015.