Ny-Ålesund Geodetic Observatory 2014 Annual Report

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Abstract In 2014, the 20-m telescope at Ny-Ålesund, Svalbard, operated by the Norwegian Mapping Authority (NMA), took part in 136 out of the 138 IVS 24-hour sessions for which Ny-Ålesund was scheduled, including the 15 sessions of CONT14.

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 of Spitsbergen. This is the biggest island in the Svalbard archipelago. In 2014, Ny-Ålesund was scheduled for 138 24-hour VLBI sessions, including R1, R4, EURO, RD, T2, and RDV sessions and CONT14, and 47 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.

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 Giorgiana De Franceschi of the Italian Institute 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 a 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, a Mark IV decoder, and a Mark 5 sampler streams the data to a Mark 5B+ recorder. Another Mark 5 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 people stay an average of three to four years. The observatory is part of the Geodetic Division of the Norwegian Mapping Authority with a main office at Hønefoss (near Oslo).

During 2014, Susana got the unique opportunity to start working at the new observatory in the Azores — together with her boyfriend, so there was no point in even trying to convince her to stay. Geir took half a year of leave to swap Svalbard for living on the small, remote island of Jan Mayen in the Arctic Ocean. To cover the temporary low manning until his return in April

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Fig. 1 Station staff in October (image: Bjørn-Owe Holmberg).

2015 and until a new employee is found, Alex Burns (MIT Haystack Observatory, Westford) and Anita Titmarsh (University of Tasmania, AuScope) agreed to help out for some months, so our team became even more international.

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

Hønefoss	Section Manager	Reidun Kittelsrud
	Assisting Section Manager	Frode Koppang
	Technical Manager	Leif Morten Tangen
Ny-Ålesund	Station Manager	Moritz Sieber
	Engineer	Alex Burns ($\geq$ Sept.)
	Engineer	Susana García Espada ($\leq$ Sept.)
	Engineer	Geir Mathiassen ($\leq$ Aug.)
	Engineer	Kent Roskifte
	Engineer	Anita Titmarsh ($\geq$ Oct.)

2 Current Status and Activities

2.1 Maintenance

The antenna structure and gears show clear signs of wear, so regular maintenance is becoming more crucial. In March, the receiver dewar had to be replaced, one of the O-ring seals became defective, and the vacuum couldn't be held. The work took longer than expected, and the maintenance period had to be extended a bit. As a consequence, some Int3 and R1 sessions could not be observed.

2.2 Monitoring

The monitoring system was extended and now checks the main receiver parameters regularly, even when there is no observation. Data is collected from several logfiles throughout the last 24 hours and various plots (see Figure 2) are generated and displayed online on the station's documentation-wiki. This way a good overview over receiver- and recorder-performance, and environment-parameters can be maintained.

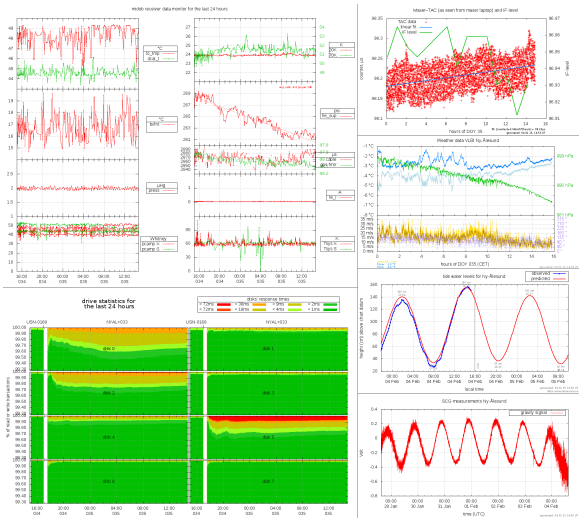

Fig. 2 Monitor-plots: receiver parameters with phase-cal/Tsys-data, drive statistics, maser-timing, meteorological data, and tide-water and gravity-measurements.

2.3 Session Performance

By end of 2013, Ny-Ålesund was scheduled for 15 CONT14, 119 24-hour, and 44 one-hour sessions. At the end of the year (2014), all of the CONT, 121 of 123 24-hour, and 45 one-hour sessions had been observed. One R1-session had to be cancelled due to extended maintenance work, and another session could not be observed due to high windspeeds throughout the scheduled period. Until mid-March there were several shorter outages during observations, mainly due to a poor receiver dewar that got replaced in the end. After that there were only four sessions with a completion of

98% or less; a more extensive summary can be found in Table 2.

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

Session	Comments
R4621, R4623, R1624, RV103, R4624, R1625, R1626, R4627, R4628	Receiver dewar pressure increased, interrupted the schedule, and evacuated the dewar to prevent further warmup; lost roughly one hour of observations each time.
R1628	Decoder timeout caused delays in schedule.
R1630	Not observed due to extended maintenance (replacing receiver dewar).
R1631	Decoder timeout caused delays in schedule.
R4631	Azimuth motor outage.
R1637	Tested emergency power supply during session (bad idea; lost half an hour).
R1662	Late start due to pointing problems.
R1664	Not observed due to high windspeed during the entire schedule.

2.4 New Observatory

The road construction to the new observatory site was completed during summer 2014, and the work on the foundations began with an official inauguration in October. During winter and most of the next year, the station building and all infrastructure will be established. MT Mechatronics is the contractor for the two new telescopes. They will be pre-assembled and tested during 2015 and arrive in Ny-Ålesund the year after.

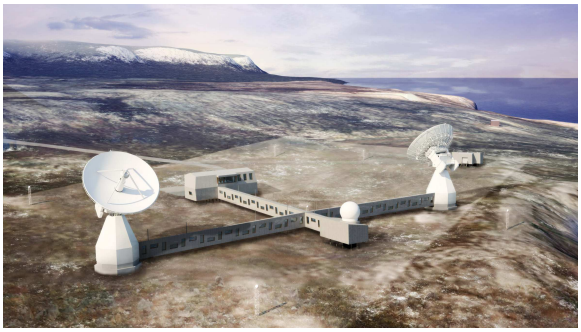

Fig. 3 Sketch of the new observatory site (image: LPO arkitekter)

2.5 New Instrumentation

The station is in the transition towards a DBBC digital backend. To be able to perform parallel observations with the existing Mark IV rack, the second Mark 5 recorder had to be upgraded from Mark 5A to Mark 5B+. Thanks go to David Hall and WACO, who provided us with some of the necessary parts. The DBBC itself proved to be not really plug-and-play, but with help from Gino Tuccari, Michael Wunderlich, Jamie McCallum, Ed Himwich, and others, we managed to record some data by November. There is still some calibration and tuning missing, so we looked through AuScope's wiki and all other documentation we could find and hope to be operative by mid-2015. The demand for storage capacity during CONT14 enabled us to justify a purchase of ten 8-TB modules. All of Ny-Ålesund's data is transferred via network, and with this extended buffer we are able to keep all data until it is correlated (in case of bad transfers). We still have a little backup in case of bad connectivity. The last hundred-or-so miles between Ny-Ålesund and Longyearbyen were connected by fiber cable in September. But the line will not be operational before April 2015.

3 Future Plans

Getting the DBBC operational is just a first step to try out and get training for the new equipment. There is no intention to increase the manning even during the period of parallel observations (estimated to be 2018–2020), so good routines need to be developed.

Fig. 4 20 years of the Geodetic Observatory in Ny-Ålesund!