

Status of the Establishment of a new core site in Ny-Ålesund

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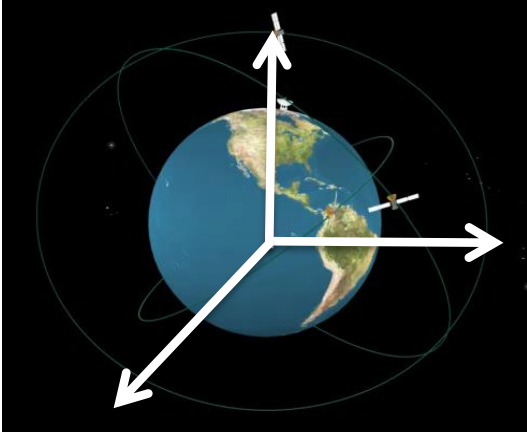
Abstract

Back in December 2011, the Norwegian Government decided to turn the Geodetic Observatory in Ny-Ålesund into a GGOS core site, equipped with 2 VLBI telescopes, SLR, GNSS, Doris, gravimeter and a tide gauge. Accordant to current planning the VLBI telescopes will be in operation from 2018, but when it comes to SLR, we still do not know how to go forward. The fund is in place, but there is currently a lack of SLR-instruments available, that could make the station in Ny-Ålesund to one of the pillars of the future global geodetic reference frame. How to handle such a situation?



Photo: Bjorn Owe Holmberg

1. Motivation: The Norwegian Mapping Authority aims to contribute to a global geodetic reference frame that supports the future needs for monitoring effects of climate change.



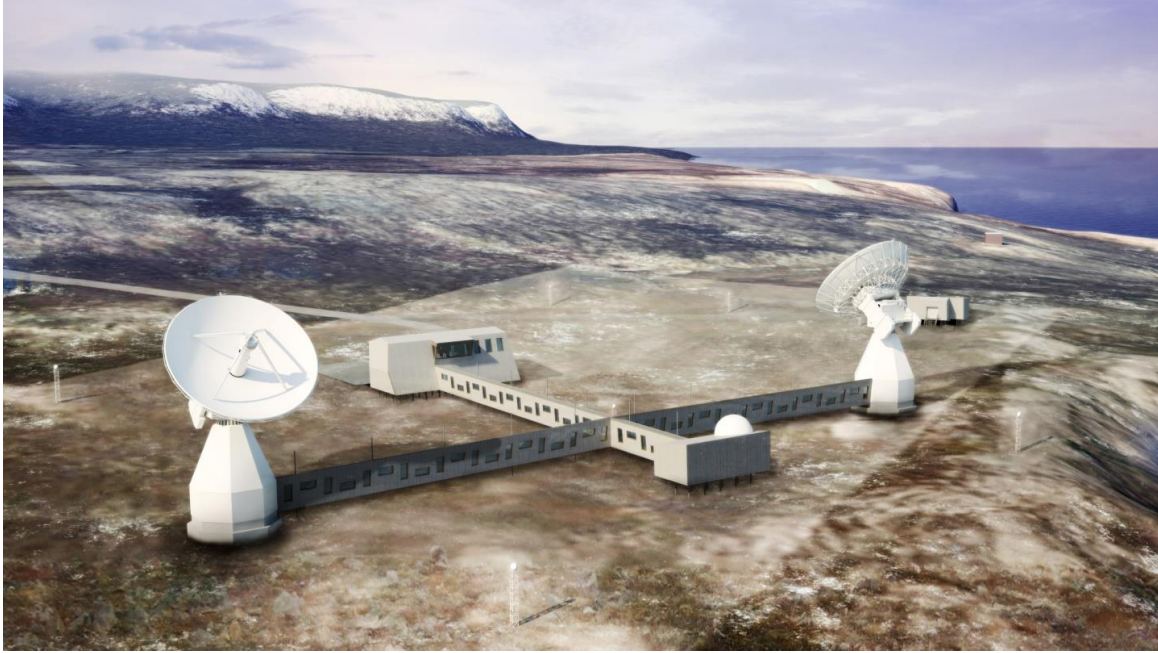
The goal

- Obtain a long-term stable reference frame with an accuracy of 1 mm and a stability of 0.1mm/year.
- Improved precision and consistency in the orbit determination of earth observation satellites.

Improvements in the global geodetic reference frame requires a broad global cooperation, since no country can maintain the reference frame alone. To reach the goal, we need improvements in the space-, ground- and analysis- segments.

The Norwegian contribution will be a modernized core site in Ny-Ålesund, and the development of a software package that combines VLBI, SLR and GNSS in one single computation at the observation level.

2. The new station in Ny-Ålesund is planned to be a GGOS core site equipped with VLBI, SLR, GNSS, DORIS, tide gauge, absolute- and super conducting gravity.



Progress:

- 2011 The Norwegian government decided to modernize the Geodetic Observatory in Ny-Ålesund in accordance to GGOS requirements.
- 2015 The concrete foundations for the VLBI telescopes, SLR and gravimeters to be completed as well as the operation center itself.
- 2016 Installation of the VLBI twin telescopes
- 2018 The first initial VLBI operations to start
- 2021 The old VLBI telescope to be demolished after three years of parallel operations to transfer the VLBI time series from the old to the new telescopes.
- ? SLR in operation

3. The new station area



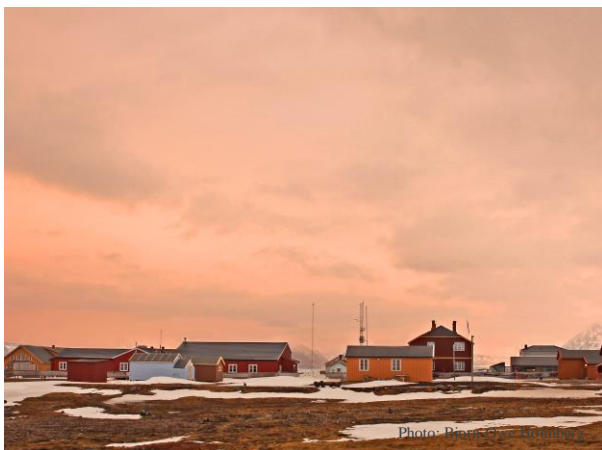
The construction work started by making an access road of 1.7 km in 2013. Due to rough winter conditions with almost no daylight at all and permafrost it is a challenge to build an observatory at such high northern latitude. The road was finished in 2014 and in due time to start the work on the foundations for the VLBI and SLR equipment's in October.

A high-speed fiber optic cable with a length of approximately 200 km will connect the operation center to Internet in 2015. The fiber optic cable is an extension to the cable between Longyearbyen and Harstad that connects the island to Internet on the mainland of Norway. Having access to the fiber optic cable is a necessity to run e-VLBI and real time communication for all instruments.

The construction work that includes concrete foundations for all the geodetic equipment's and the setup of the operation center itself will be finished in October 2015. The contract for the two VLBI telescopes was signed February 2014. According to schedule, both telescopes will arrive for assembly at site spring 2016 and handover will take place during fall 2016. The first initial VLBI operations will take place in 2018.

To a large extent the setup of a core station in Ny-Ålesund is according to schedule, but when it comes to SLR I must admit that there are some difficulties.

4. When it comes to SLR, we still don't know how to go forward



Status

- Ny-Ålesund is a remote place.
- A SLR fundament will be in place in fall 2015.
- The funds for the SLR equipment is currently available.
- The fully automated equipment that we need is not available, and we do not know when that will happen.

Setting up an SLR equipment in the arctic without having knowledge on SLR at all is obviously not an easy task to do. Ny-Ålesund is a remote place, with rough winter conditions. You can easily go there by plane twice a week, but the permanent staff are not allowed to bring their families. This means that the staff turnover is quite high which makes it difficult to build and maintain the competence needed to operate the equipment. Ny-Ålesund is definitely not the place to perform experimental SLR. The equipment should preferably be close to maintenance free, and it should be possible to operate it from elsewhere in the world. To my understanding, such an equipment does not currently exist. SLR is far away from being an on the shelf equipment. It is not meant to be either, but setting up SLR specifications that fits Ny-Ålesund requires a high level of knowledge that takes years to build. As it is by now, we do not know what would be the operational costs for the SLR equipment. It is totally dependent on the required number of staff and the level of knowledge they need – conceptual and or operational knowledge.

SLR equipment's with an even distribution all over the world is a necessary tool to obtain a global geodetic reference frame at the requested level. This means that we would need SLR equipment's located evenly regardless of local economics and politics. The way forward is most likely that the developed countries takes responsibility by providing capacity building, in kind deliveries and other kinds of assistance. What we probably need is a fully developed SLR concept that supports the reference frame, requires local assistance on just a minimum level and has the possibility to be fully remote operated. The world's knowledge about SLR is well organized in the ILRS community. The knowledge is in place and I am convinced that is possible to make such an SLR concept by putting the wise heads together. I do also believe it should be possible for the ILRS community to operate an evenly distributed SLR network remotely by sharing capacity among the leading countries.

5. Conclusion

There will be an SLR equipment available for service in Ny-Ålesund, but we do not know when that will happen. We do not currently have the needed competence. We have started to build it, but it will take some time. The challenge is that the equipment we need does not really exists.

With its location at high northern latitudes, the SLR equipment in Ny-Ålesund will play a significant role in strengthening the quality of the global geodetic reference frame, but to obtain a reliable geodetic reference frame as requested there is a need for an evenly distributed network of SLR stations. To do so, there is a need for a fully automated standardized equipment that the leading countries in the world could operate remotely.