Strategy document for the Zeppelin Observatory Ny-Ålesund Research Station 2020-2025

The Zeppelin Observatory is located 472 m.a.s.l. on the Zeppelin Mountain and is part of the Ny-Ålesund Research Station in Svalbard, Norway. The Observatory was established to cover a need for atmospheric monitoring in the clean Arctic in Svalbard. It is owned by the Norwegian Polar Institute, while NILU - Norwegian Institute for Air Research is responsible for scientific coordination. The Observatory is one of the key shared facilities for atmospheric research and monitoring in Ny-Ålesund, together with Gruvebadet Atmosphere Laboratory, the AWIPEV Atmosphere Observatory and the CNR Climate Change Tower. Data from the Observatory contribute to research in all four Ny-Ålesund Research Flagships.

Photo: Helge T. Markussen, NPI

The Zeppelin Observatory

The Observatory is located at 79° N in an untouched, Arctic environment, far away from substantial contamination sources. The Observatory's unique location makes it an ideal place for monitoring of global atmospheric gases and long-range transported atmospheric pollutants to the Arctic. The influence from local contamination sources on the measurements is minimal as the Observatory is above the mixing layer most of the time.

The Zeppelin Observatory, which was officially opened in 1990, is the northernmost Norwegian observatory of its kind. It is part of the Norwegian national infrastructure for atmospheric research and monitoring and is made available to the international research community working in Ny-Ålesund. NILU's long term monitoring program running at the Observatory is part of the Norwegian monitoring program defined by the Norwegian Environment Agency.

The primary users of the Zeppelin Observatory are NILU – the Norwegian Institute for Air Research, Stockholm University (SU) and the Norwegian Polar Institute (NPI), constituting the partner institutions. Both the Zeppelin Observatory building, and the cableway used to access it, are owned by NPI. NPI is responsible for the observatory development, maintenance, daily management and safety, while NILU is responsible for the scientific coordination. NILU and NPI have been assigned their respective tasks by the Ministry of Climate and Environment (KLD).

In addition to NILU, SU and NPI, several other institutions have instruments and measurement programmes at the Observatory, run permanently or on a campaign basis.

Research and monitoring

The most important research and monitoring activities at the Zeppelin Observatory are:

- Monitoring of long-range transported atmospheric pollutants and research on their source and impacts. This includes greenhouse gases, carbon monoxide, ozone, persistent organic pollutants, aerosols, environmental toxins and heavy metals.
- Studies of the characteristics of the Arctic atmosphere and atmospheric processes and changes.
- Measurements aimed at increasing the understanding of feedback mechanisms between aerosols, clouds and radiation, and how these affect the Arctic climate.

The Zeppelin Observatory belongs to a group of very important global observatories for atmospheric measurements, and the observatory is part of several regional and global monitoring networks, such as WMO – GAW (the Worlds Meteorological Organization's Global Atmosphere Watch), EMEP (The European Monitoring and Evaluation Programme), AMAP (Arctic Monitoring and Assessment Programme), AGAGE (Advanced Global Atmospheric Gases Experiment), ICOS (Integrated Carbon Observation System) and ACTRIS (The Aerosol, Clouds and Trace Gases Research Infrastructure).

The national long term monitoring programmes are to be given top priority if conflicts arise between such programmes and other measurements or instrumentation.

The measurements at the Zeppelin Observatory shall be utilized to generate new knowledge, and this knowledge is to be made accessible through publications of results and data.

Goals

NILU, SU and NPI will operate and develop the Observatory as a leading platform for atmospheric research and monitoring. This will ensure that the Zeppelin Observatory maintains its status as an important global atmospheric observatory and be a leading observatory for monitoring Arctic, regional and global atmospheric conditions and changes.

The users shall conduct high quality measurements which meet all requirements in international conventions related to the measurements of long-range transported pollutants and climate processes and deliver these to the relevant national and international networks and authorities for research and monitoring programmes. Users shall also utilize the Observatory platform and network as a tool to promote professional cooperation between institutions and nations within Ny-Ålesund Research Station, in a circumpolar setting and globally.

How to maintain and strengthen this position

All users of the Observatory shall

- deliver measurements of high quality which have passed quality assurance routines in accordance with international programmes.
- have traceable references on all monitoring parameters where it is relevant.
- aim at having state-of-the-art instrumentation for all measurement parameters.

The partner institutions shall ensure that

- variables that are important for understanding the human influence on the natural system are monitored.
- the contamination at the Observatory is minimal, seeking to reduce the local emissions in Ny-Ålesund, and logging potential local emissions.
- ongoing measurements at the Zeppelin Observatory are not disturbed by limiting access to the Observatory for non-professional or non-relevant personnel to a minimum.

Data sharing and communication of results

The Research Strategy for Ny-Ålesund Research Station outlines expectations for data policy and data sharing. These expectations will be guiding the data policy for the Zeppelin Observatory and are repeated below.

Open access to data makes it easier to validate and assess findings as well as to use data in new ways. Combining data facilitates more interdisciplinary research. Open access to research data reduces duplication of effort, increases efficiency and reduces environmental impacts. Broader access to research data will strengthen the quality of research in Svalbard.

Users of the Zeppelin Observatory need to adhere to Norwegian and international data policies emphasising that research data should be made openly accessible when no legitimate considerations prevent its accessibility, or "as open as possible, as closed as necessary".

Strong metadata, i.e. information about collection, delineation, definition, and other factors relevant for further use, is a prerequisite for being able to find and interpret data. It is therefore important that data producers are meticulous about standardising the methods and that they share metadata in a way that make data easier to use, ideally in line with the FAIR principles. The SIOS consortium has developed a data policy that is consistent with international principles including requirements for the availability and quality of metadata.

Goals

- The main outlets for communicating the measurements and knowledge from the Zeppelin Observatory should be publishing the datasets in open databases and scientific publications.
- All measurements and associated metadata from the Zeppelin Observatory should be easily accessible in open databases.
- The results should be actively communicated both nationally and internationally.

How to get there

- The users of the Observatory are obliged to comply with the SIOS data policy principles.
- The measurements from the national measurement programmes and those connected to international reporting obligations should be available in open databases immediately after reporting.
- All data collected at the Zeppelin Observatory are considered public. All who collect data as part of their research activities at the Observatory have an obligation to make processed data available and known as soon as possible. A delay of up to one year is considered reasonable in order to prepare publications before the data are made public. In some projects where PhD students are involved, a delay of up to three years can be considered.
- All data owners are encouraged to make metadata available through the SIOS metadata systems.
- Data owners are actively encouraged to meet the requirements of the data policy for measurement programmes such as EMEP, GAW, AGAGE and EU's research infrastructure programmes.
- All scientists using public measurements from the Zeppelin Observatory shall contact the measurement programme's PI and offer co-authorship. In all instances, the Zeppelin Observatory and the measurement programme's owners are to be acknowledged, at a minimum in the acknowledgements section in publications.
- NILU, SU and NPI are responsible for keeping webpages describing their respective Zeppelin Observatory contribution up to date. NPI is keeping a webpage with information about programmes where measurements from the Observatory are included. Any updated information regarding such programmes should be conveyed to NPI.
- All users shall actively promote and make the Zeppelin Observatory visible.

Financing

The Norwegian Ministry of Climate and the Environment (KLD) finances the management of the Observatory and the daily operation of the measurement programmes run by NILU, NPI and SU. In addition, the Norwegian Environment Agency finances NILU's national monitoring programmes, and the Swedish Environmental Protection Agency finances SU's measurement programme. Other campaign activities are financed through research grants.

All users of the Observatory cover the costs for their own activity.

Goals

- Secure steady financing in order to be able to develop and staff the Observatory
- Develop a viable economic plan for the management of the Observatory.
- Secure funding from relevant funding agencies to extract added value from the measurements being conducted.

How to get there

- NILU, SU and NPI should ensure good cooperation between the institutions and the funding agencies (KLD, the Norwegian Environment Agency, and the Swedish Environmental Protection Agency).
- All users of the Observatory should promote and make visible the value and potential of the measurements to prospective funding agencies.

Management and development

The "House meeting" is the topmost forum for the Zeppelin Observatory. The House meeting consists of representatives from the three partner institutions NILU, NPI and SU. The House meeting convenes twice a year. All proposed new activities at the Zeppelin Observatory will be assessed by the House meeting. The House meeting will ensure that all new research and monitoring activity on the Observatory will complement the existing activity, that is does not have a large negative effect on already ongoing activity, and that is does not duplicate existing activity. In addition, there must be capacity (i.e. suitable area and engineer time) for the new activity.

Some tasks require certification of personnel or equipment. In such cases the institution responsible for the project or instrument is responsible for any eventual extra costs related to the certifications.

Goals

The partner institutions shall establish good routines for managing the Observatory. NPI shall establish and maintain good routines for operating instruments at the Observatory for both existing and new projects and campaigns.

How to get there

- Keep up the meeting frequency with two meetings annually
- Maintain the good procedures for accepting new activities at the Observatory by utilizing the Registration form.
- NPI shall require a written description for the work preformed for all users

Staff

The Observatory is staffed by a leader and engineers from the NPI Sverdrup who perform daily inspection and management of the routine measurements and operate the cableway.

Good and stable operations are dependent on a stable and competent staff. The observatory has a staffing such that the routine measurements can be conducted Monday through Friday. For some of the measurements the quality would increase if the measurements could be conducted also on the weekends.

Goals

- Secure adequate training to the staff to be able to handle all the instruments.
- Maintain continuity in the staff's competence.

How to get there

- The institution responsible for individual measurements is also responsible for ensuring adequate training of the staff, supported by adequate procedures for operation the instruments.
- The partner institutions (especially NPI) shall arrange for good working conditions that encourage the staff to complete the full 2+2 years contract.
- NPI shall ensure that internal qualifications and competence are maintained when staff change.

Technical Infrastructure (buildings and cableway)

The Zeppelin Observatory is defined as the atmospheric observatory on the top of the Zeppelin Mountain, as well as the cableway to the Observatory. The Observatory is a wooden building, connected to power and high capacity internet from Ny-Ålesund. The building has an integrated cooling and ventilation system. The Observatory is connected to the cableway upper station via a tunnel.

Goals

- In all building maintenance work, emphasis shall be on minimising any impact on the measurements.
- NPI is responsible for ensuring that the building is adequate for its purpose, and flexible regarding future developments. The building is to be energy efficient, and safe regarding EHS.
- All partner institutions and users are responsible for reliable and safe operation, without unwanted incidents.

How to get there

- Establish safety instruction for Observatory staff maintaining instrumentation for users, including safe use of necessary chemicals, electrical risks etc.
- Be critical regarding which materials are chosen for maintenance of the Observatory. The House meeting must be consulted regarding the choice of materials.
- The partner institutions shall work actively to reduce energy consumption to a minimum.
- The partner institutions shall carry out measurements in the building to identify any local contamination whenever relevant.
- The partner institutions shall follow the same standards for management and certification as on the mainland.
- Always refer to and follow the House rules for the Zeppelin Observatory for safe operation and maintenance of the Observatory.

Tromsø, Kjeller and Stockholm, 19. January 2021

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