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INTERNATIONAL POLAR FOUNDATION

Princess Elisabeth Antarctica Research Station

Location

Region: Dronning Maud Land, East Antarctica

Area: Sør Rondane Mountains

Geographical coordinates: 71°57'S 23°20'E.

The station is built on the Utsteinen Ridge at an altitude of 1382 metres.

Transport

The Gateway to Antarctica is Cape Town, South Africa. From there, researchers and cargo fly by Ilyushin 76 to the Novozalarevskaya Air Base operated by DROMLAN (Dronning Maud Land Air Network). To reach Utsteinen and Princess Elisabeth Antarctica (PEA), another flight is required aboard a ski-equipped Basler DC3 plane or a De Havilland Twin Otter, which lands on a snow airstrip near the station.

Station Operations

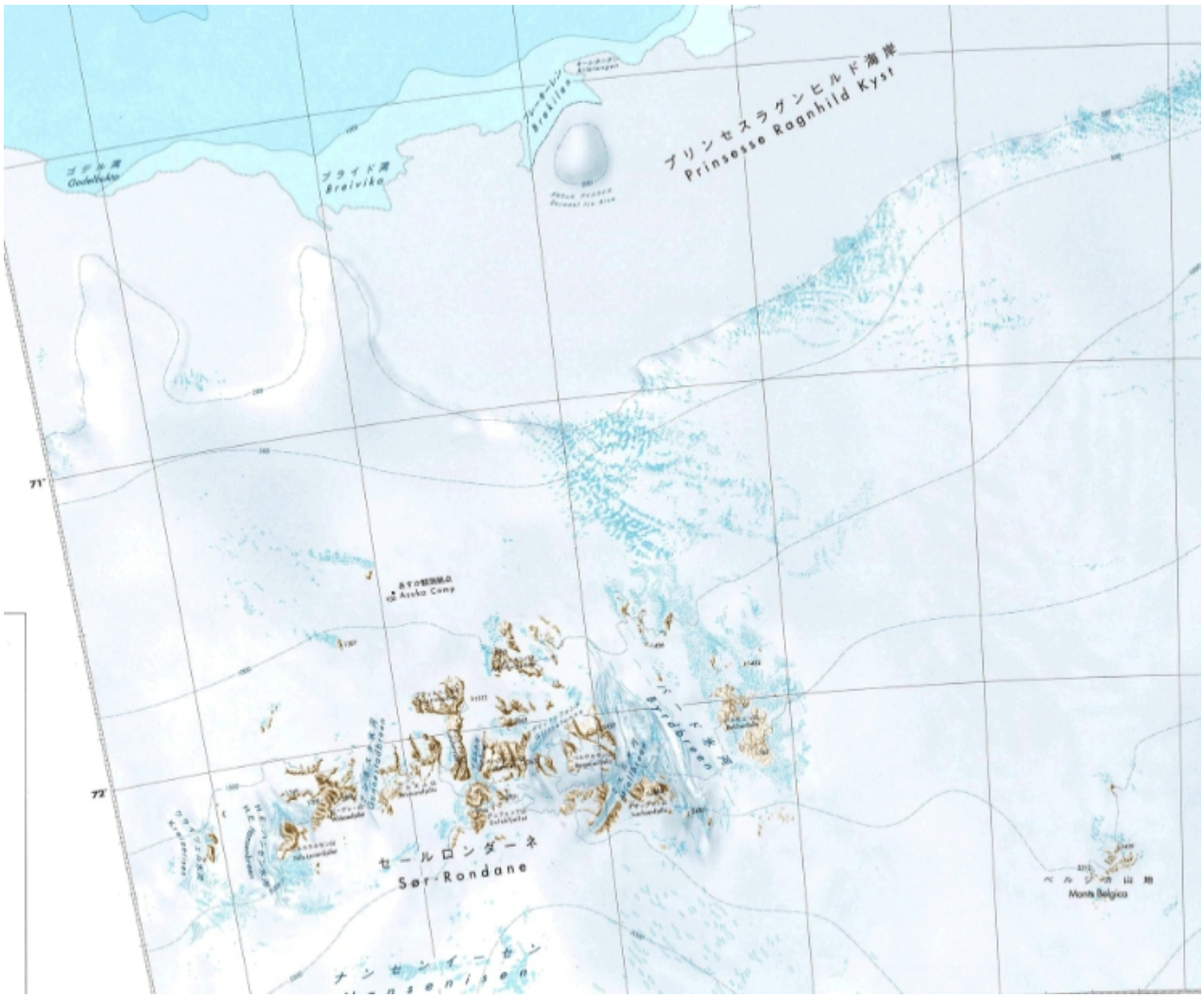
Station operation times: Beginning of November to the end of February (austral summer)

Station capacity: The station has 48 beds. All rooms are shared, but depending on the number of people present, rooms can be occupied by 2-4 people.

Total surface of main building: 500 m^2

Total surface of technical areas: 1500 m^2

Princess Elisabeth station is a 'zero emission station'. Electricity is produced by photovoltaic panels and wind turbines. Solar thermal technology is used to produce water from snow and to heat it for showers and kitchen use. A smart grid has been developed to optimize energy management at the station.



PEA Area of Operations ; *NIPR Map 103, 1980*

Research possibilities in the vicinity of the Princess Elisabeth Antarctica station

Given its location, the station provides opportunities for research in a wide diversity of environments within a 2000 km^2 area, from the Princess Ragnhilde Coast (at a distance of 220 km) to the Antarctic Plateau, 50 km from the station.

Several countries benefit from the support of the Princess Elisabeth Station in order to carry out research activities in the area. Apart from the Belgian programmes, the Japanese and the German research Institutes, and the University of Luxembourg are regular visitors. In the past seasons, researchers from Switzerland have also been present. Researchers of all nationalities are welcome and the station has hosted researchers from more than ten different countries.

The Sør Rondane Mountains is a paradise for geology, geophysics, geomorphology and related disciplines, providing high interest areas for research all within relatively easy reach of the station. The station also hosts reference GPS station, a borehole seismometer, a magnetometer station, and a geomagnetic observatory.

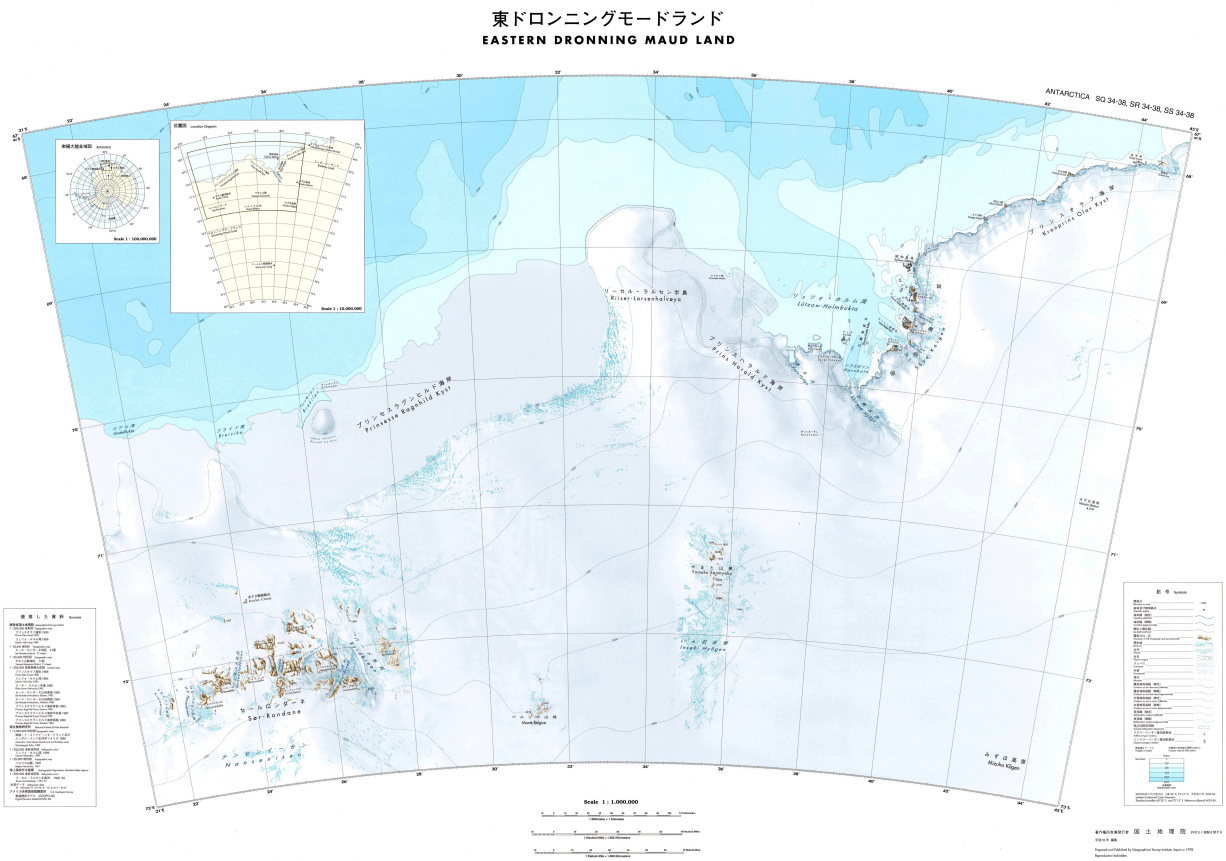
There are plans from the Japanese National Institute of Polar Research to build an observatory for the study of aurorae. Another project is planning to study solar electromagnetic plumes using VLF antennae.

On the Antarctic plateau there are also several confirmed sites for meteorites. While these may have been depleted by recent expeditions, the area is vast enough to retain some surprises.

There are several ice sheets in the operational area, which are of interest to glaciologists running from the plateau, over the grounding line to the ice shelves. Some of the ice streams are currently being studied by glaciologists and seismologists.

For biologists there are a surprisingly large number of possible areas of study, for such an “arid” part of the World. Hidden lakes harbour large communities of cyanobacteria, and hardy mosses, lichens and algae are present in the most unexpected places, and form communities of species which are completely endemic to the area. High on the plateau, evidence can be seen of the trace of extremophiles living under the ice next to moraines where air temperatures remain extreme. There are small colonies of petrels inland, and large colonies of penguins early in the summer season at the Princess Ragnhilde Coast.

The area is also ripe in opportunity for cartographers using modern techniques. The existing maps, where these exist, date back to the US/Norwegian maps of the 1940s and the more recent Japanese maps. However, to improve safety of operations, more detailed maps would be welcome.



Map of Eastern Dronning Maud land ; *NIPR, 1980*

Research at the station

Atmospheric scientists and climate researchers have a clean palette on which to work. There are hardly any stations in this area and the installation of Automatic Weather Stations (there are now four in the area) has provided much needed data for weather and climate models.

Princess Elisabeth Antarctica has also begun an upper air sounding programme (a collaboration between the Royal Meteorological Institute, the ETH Zurich and the IPF) using radiosonde balloons to provide data for weather and climate models. This data is the only measure available in this 2000 km^2.

For atmospheric chemistry the air is so pure that the signature of distant events can be monitored with ease. An atmospheric chemistry platform, boasting a complete instrumentation has been installed and operated over several seasons, and the data is of great interest.

An automatic weather station operated by the AEROCLOUD project provides real time raw meteorological data. The data is available at:
http://www.projects.science.uu.nl/iceclimate/aws/files_oper/oper_23670

The AEROCLOUD project also boasts several other instruments, including micro-rain radar and ceilometer. The AEROCLOUD project was preceded by the HYDRANT project.

The BELATMOS project has a vast array of instruments for measuring particles in the air (long range transport), UV radiation, a sun spectrophotometer, etc.

An unmanned magnetometer at Utsteinen was installed in February 2009 as a collaboration between Belgium and Japan. The observed data is transferred to Japan daily via Iridium satellite data link during the summer seasons.

For further information see:
http://www.antarcticstation.org/science_projects/detail/jare_japanese_antarctic_research_expedition/

As mentioned above, the Royal Observatory in Brussels has a bore hole seismometer now installed in the North Science Platform, and has recorded earthquakes in far off locations like Chile, New Zealand and, recently, South Georgia. The seismometer is the sole one of its kind to be installed in this area and provides valuable information to seismic monitoring stations around the World.

Scientists have developed project websites, blogs and publications where they provide information on their past and current research, including:

Atmospheric sciences

AEROCLOUD : http://ees.kuleuven.be/hydrant/aerocloud/index.html

HYDRANT : http://ees.kuleuven.be/hydrant/index.html

BELATMOS : http://belatmos.blogspot.be

BENEMELT : http://benemelt.blogspot.be/

Glaciology

ICECON : http://icecon2012.blogspot.be

BEWISE : http://benicetoice.eu/

BELISSIMA : http://ulbonice.blogspot.be

SAMBA-GLACIOCLIM : http://lgge.obs.ujf-grenoble.fr/~christo/glacioclim/samba/home.shtml

Biology

BELDIVA : http://antarcticabelgium.blogspot.be

AMBIO : http://www.ambio.ulg.ac.be/index.html
ANTAR-IMPACT : http://www.antar-impact.ulg.ac.be/antarc-impactEN.htm

Geology

GIANT : http://www.gnss.be/antarctica.php
GIANT-LISSA : http://seismologie.be/dir1700/pdf/Poster_Antarctique.pdf (in French and Dutch)
GEAII : http://www.gea2.uni-bremen.de/hauptseite/index.html

Station facilities

In addition to the science platforms and the mobile laboratories, desks are available for working at the station where researchers can prepare reports and stay in close contact with their home base, colleagues and relatives using the broadband internet satellite connection of the station. Many instruments are also able to communicate data in Real Time from the station to the home Institute or University. The data use is not charged for the time being, but this service may become paying in the future.

Medical Assistance

During the season there is medical supervision at Princess Elisabeth Antarctica, but medical evacuation procedure is in place for serious cases. Basic medical services are available, but these do not extend to surgery, except for minor interventions. For additional information, pictures and videos, please refer to: http://www.antarcticstation.org/science/logistics_support/

Scientific Instruments

Because Antarctic logistics are costly and shipping instruments to Antarctica can be complicated, the Princess Elisabeth Station can offer some scientific equipment for use. It is best to check with the station what is available, to avoid having to procure and transport costly materials which may be available on site. For additional information, pictures and videos, please refer to:

http://www.antarcticstation.org/science/facilities/

Science Support @PEA

A number of mobile labs are available at the station, as well as the North and South Instrument platforms. These however, are quite full for the time being and plans are afoot to enlarge the platforms to improve the accessibility and management of the instrumentation. A fibre-optic cable provides a fast and efficient link with the station, and data is then transmitted to home institutes via satellite.

Field Support

The Princess Elisabeth Antarctica Vehicle Park can furnish ground transport for mobile camps, and laboratories as well as skidoos for field activities. The cost of these services depend on the distance at which the field activities take place as fuel has to be provided for the snow tractors, and generators as well as the skidoos. The mobile accommodation units have satellite communication capabilities. High plateau activities can benefit from this now, as the units will have iridium data communication facilities installed shortly.

Workshops and Technical Areas

The workshops at Princess Elisabeth Antarctica are well-equipped to repair station and field equipment. The station crew is sometimes requested to design and build specific pieces of equipment, which they will do if possible, on site.

Field Equipment

The International Polar Foundation provides cold weather clothing and boots for working in Antarctica.

Field living equipment such as sleeping bags, tents, camping equipment and sledges may also be provided on request.

Pre-Expedition Procedures

Registration

All expedition participants have to carry out the registration procedure, as well as registering their cargo. Most researchers also provide a detailed planning for their field activities so that the station staff can recruit additional staff if necessary (field guides, mechanics, and vehicle operators).

Physical exam before departure

As medical facilities at Antarctic stations are limited, all participants are required to be in good health prior to their departure. Certain medical conditions exclude travel to the Antarctic. There is no way around this and the doctor carrying out the examination will be engaging his/her personal. All expedition participants must undergo a thorough physical examination prior to departure.

Field Training

Field training is provided before departure (as well as on arrival at the station), under the supervision of certified field guides. These team members have undergone extensive training and are experienced with working and taking care of others in harsh polar conditions.

Additional information

The website www.antarcticstation.org provides general information on the station and logistic operations as well as information on past and current science projects. During the research season, it is regularly updated with news, picture galleries and videos of activities at the station.

A brochure of the station can be downloaded at: .

http://www.antarcticstation.org/assets/uploads/documents_files/brochure_pea_19_04_2013_web.pdf