QUESTIONNAIRE

SCIENTIFIC ACTIVITIES

ADVANCED NOTICE FOR SCIENTIFIC ACTIVITIES IN ANTARCTICA

Finnish Antarctic Research Program / Finnish Meteorological Institute

Questionnaire

Advanced Notice for Antarctic scientific activities

In order to facilitate the advanced notification process Finnish Antarctic Research Program (FINNARP) has developed a questionnaire which is an attachment of the Initial Environmental Evaluation of the FINNARP expedition.

Completed questionnaires should be forwarded to the following address:

FINNARP/Sari Matilainen
Finnish Meteorological Institute
P.O. Box 503
00101 Helsinki

[redacted]

1 Introduction

Activities in the Antarctic shall be planned and conducted so as to have the least possible effect on the environment in Antarctica; in particular the activities should avoid leading to:

- adverse effects on air or weather patterns
- significant adverse effects on air or water quality
- significant changes in the atmospheric, terrestrial, glacial, limnetic or marine environments
- detrimental changes in the distribution, occurrence or productivity of species or populations of animals or plants
- risks to endangered or threatened species or population of such species
- risk of damage to areas of biological, scientific, historical or aesthetical importance, or of significance to the region's characteristic as a wilderness
- other significantly harmful effect on the Antarctic environment and Antarctic related ecosystems

Antarctica is designated as a natural reserve, devoted to peace and science. The fundamental framework for protection in Antarctica is the Protocol on Environmental Protection to the Antarctic Treaty. The Environmental Protocol is in Finland implemented through the Act to Protection of the Environment in Antarctica 18.10.1996/28 v. 1998.

2 General information

2.1 Project

Project title: **DynEAnt, Research Council of Finland funded consortium project between the National Land Survey of Finland and Aalto University**

Scientific area (quaternary geology, verte-brate zoology etc.): **geodesy, geophysics**

2.2 Project leader

Name: **Hannu Koivula (consortium project PI)**

Address: **Finnish Geospatial Research Institute FGI**
National Land Survey of Finland
Vuorimiehentie 5
FI-02150 Espoo
FINLAND

Telephone: [redacted]

E-mail address: [redacted]

2.3 Time period

Time period in Antarctica: **15.11.2026-15.2.2027 (estimate)**

2.4 Participants

List of participants in the project:

Name	Address and phone (home and work)	Position/Task
Jyri Näränen	**Finnish Geospatial Research Institute FGI** **National Land Survey of Finland** **Vuorimiehentie 5** **02150 Espoo, Finland** [redacted]	**research project manager/field researcher**
Niko Kareinen	**Finnish Geospatial Research Institute FGI** **National Land Survey of Finland** **Vuorimiehentie 5**	**field researcher**

	02150 Espoo, Finland [redacted]	
Maaria Nordman	**Aalto University** **Otakaari 4** **02150 Espoo, Finland** [redacted]	**field researcher**
Aino Schultz	**Aalto University** **Otakaari 4** **02150 Espoo, Finland** [redacted]	**field researcher**

3 Description of the project

Give a short description of the project and its scientific purpose

Aim of this research project is to deepen the knowledge of the cryosphere-lithosphere interaction in Antarctica. Specifically, how the crust of the Earth in Western Dronning Maud Land responds to various tidal and non-tidal loadings (e.g. ocean tides, atmospheric pressure, wind-driven sea level). Crustal movement due to loading is present in all Antarctic geodetic measurements (Global Navigation Satellite Systems; GNSS, gravity,…) and is usually taken into account using global loading models. However, these models are less-than-optimal in Antarctica due to lack of in-situ data and satellite coverage in high latitudes. This project will gather in-situ data of the response of the crust due to loading by continuous GNSS and gravity measurements at the geophysics laboratory at Aboa Station and in the nearby ice sheet. This data will be used to evaluate the performance of the global loading models at Western Dronning Maud Land, help select the best performing models, and ultimately to create a semi-empirical dedicated model for the region. This will improve the quality of all geospatial information in the region and also provides new insights into the geophysical characteristics of the crust and upper mantle in the region.

Within this particular field campaign, the absolute gravity time series measurements at Aboa will be continued. In addition, continuous gravity recordings with a relative gravimeter will be taken alongside high-spatial-resolution GNSS data with the permanent GNSS station at Aboa. These measurements will be carried out in the gravity lab of Aboa Station. Additionally, supporting geodetic measurements such as RTK-GPS

measurements of ice sheet elevation are carried out in the area surrounding the Basen nunatak. The measurements are done up to 10-15 km distance from the gravity lab at least in some directions. These measurements are used to correct for gravity effects that changes in the mass distribution of local ice and snow introduce into the AG time series. Two GNSS receivers, powered by solar panels, will be deployed in the field. One on the grounding line of the Riiser-Larsen ice shelf and one on the ice shelf itself. The measurements are collected during the expedition and the receivers retrieved at the end of the expedition. Installation, check-up (once or twice during the expedition), and removal of the receivers can be done within a working day due to the relatively short distance from Aboa. No field camps are expected within this research. No equipment will be left on the ice. The research staff will be exchanged mid-season, around the New Year, meaning that there will be two persons from this project at Aboa at any given time.

3.1 Field work area

List the areas where the scientific activities are done. Give name, coordinates and time period for each area.

Area	Longitude	Latitude	Time period
Aboa geophysics lab (plus surroundings, see the map)	**13.41°W**	**73.03°S**	**November 2026-February 2027**
GNSS receiver installation/retrieval on the grounding line of the Riiser-Larsen ice shelf.	**13.96°W**	**72.96°S**	**December 2026-February 2027 (3-4 day visits in total)**
GNSS receiver installation/retrieval on the Riiser-Larsen ice shelf	**14.53°W**	**72.86°S**	**December 2026-February 2027 (3-4 day visits in total)**

4 Environmental impacts

4.1 General evaluation

What kind of impact on the environment is anticipated (e.g. emission to the atmosphere from generators/engines, impact on snow free areas from walking, disposal of chemicals, etc.)?

Little impact on environment. The main experiment at the geophysics laboratory requires a few hundreds of watts of electricity, the auxilliary instrumentation on the field much less. The electricity at the geophysics laboratory is assumed to be obtained from the station infrastructure and the field equipment are either

battery or solar powered or both. Also the geophysics lab needs to be heated to room temperature during measurements. Driving with the RTK-GPS equipment out into the surrounding ice sheet with snow mobile will produce some exhaust emissions. The same applies to the installation, check-up, and retrieval of the GNSS equipment on the ice shelf. The experiments themselves are nondestructive and don't produce any kinds of emissions, wastes or chemicals.

4.2 Chemicals and radioisotopes

Will the following be brought to Antarctica?

Harmful chemicals ☐ Yes **X** No

Radioisotopes ☐ Yes **X** No

If yes, specify the chemicals.

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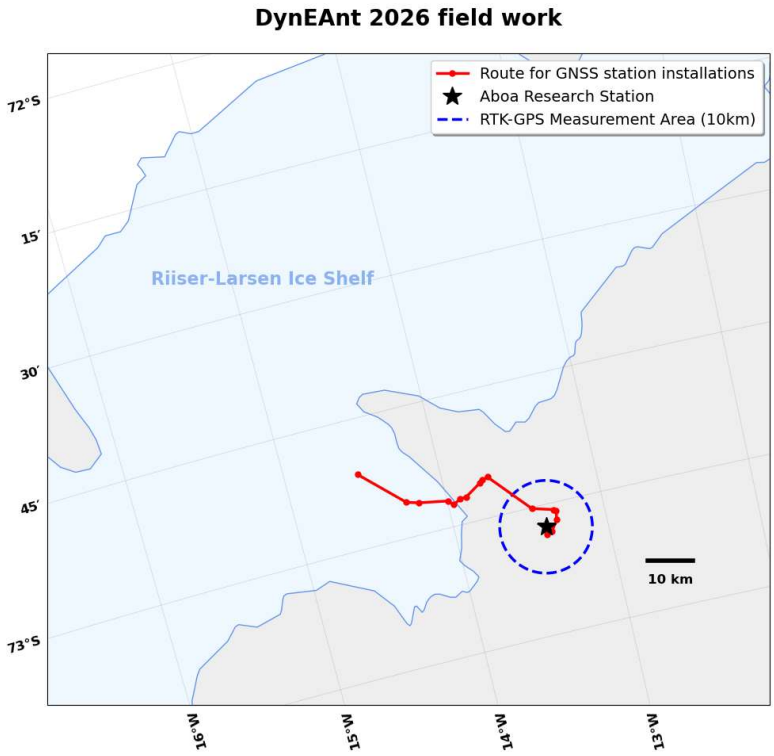
Will the project involve disposal of chemicals to ice, soil, water or air? If yes, specify!

no

If the scientific activities are done in the station area; area between geodetic container and aerosol container, you may leave the questions in 4.3, 4.4, 4.5 ja 4.6 open.

4.3 Field work

Attach a map where planned areas/routes for field work are indicated.



Most of the work is concentrated around Aboa station area (in the Geophysics laboratory). The ring approximates the area where we will do some RTK-GPS measurement work, most of the work is done within 5 km distance of Aboa with a snow mobile, the total driving distance being less than 100 km. The red line is the driving route for the temporary GNSS station placement at the ice shelf grounding line and on the shelf. The route is based on safe route established by SWEDARP in 2025 on the way to Rampen. Distance to the installation site of the receiver on the ice shelf is about 40 km one way and the driving and installations will be done within a working day (no field camps needed). We expect 3-4 times of driving the route (installation, check up(s) after a storm etc., and retrieval of the equipment at the end of the season). The final tracks to be driven are to be finalized later, together with FINNARP logistics.

How many will participate in the field work?

Two persons plus some help from FINNARP logistics.

Will the party establish separate field camps? If yes, indicate the expected maximum amount of days spent in one and the same field camp.

no

4.4 Environment

Will the project involve contact with especially sensitive environments or an environment with aesthetic values? If yes, specify!

no

Will the project involve contact with animals, plants or minerals (e.g. walking on snow free areas, water sampling, catching a bird, mineral sampling)? If yes, specify!

No. (some walking on snow-free areas, but in the main station area described above)

4.5 Alternatives

Are there any alternatives to planned procedures in the project, in order to avoid or minimize environmental impact? Specify with regards to geographic area, methods, time, extent and length of period.

no

4.6 Prevention of environmental impact

How will environmental impacts be avoided or minimized?

We will attempt to optimize the routes that need to be driven for the RTK-GPS measurements and GNSS equipment deployment to be as short as possible. We will avoid unnecessarily walking on exposed rocks. We will carefully clean all the transport boxes of the equipment to avoid contaminating Antractica with alien species. We will attempt to produce zero waste from the experiments, i.e., we will transport all the materials out of Antarctica that we will bring with us.

Be aware that if there have been changes to the activity, you must report it to the Finnish Antarctic Research Program.

Digitally signed by Hannu Koivula (consortium project PI) 22.4.2026

HKOIVULA

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