

## P 11.7

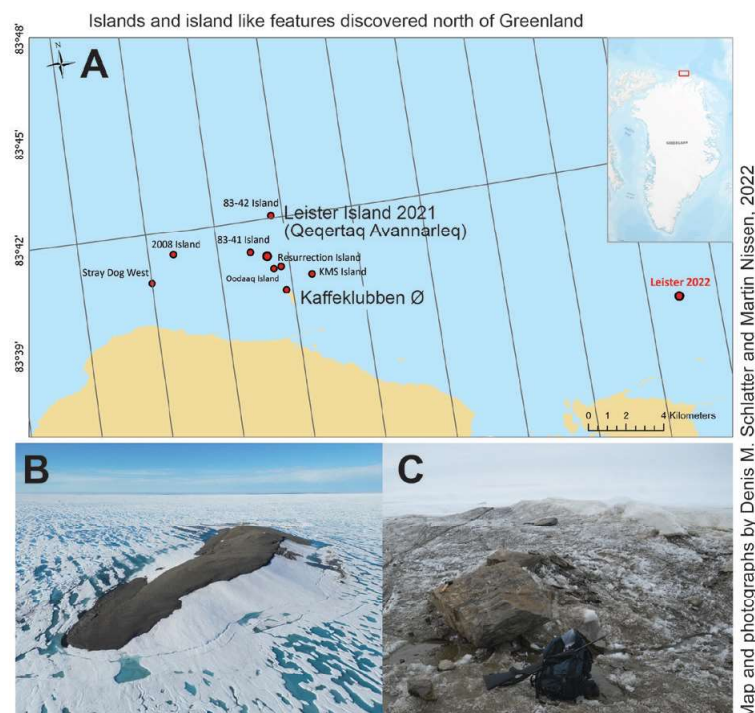
# The northernmost sampled rocks (83.68407° N) and preliminary geological and geomorphological data from recently discovered “islands” located between North Greenland and the North Pole

Denis M. Schlatter<sup>1</sup>, Martin Nissen<sup>2</sup>

<sup>1</sup> *Helvetica Exploration Services GmbH, Carl-Spitteler-Strasse 100, CH-8053 Zürich*  
(\* [denis.schlatter@helvetica-exploration.ch](mailto:denis.schlatter@helvetica-exploration.ch); <http://www.helvetica-exploration.ch>)

<sup>2</sup> *Office for Earth Observation, Agency for Data Supply and Infrastructure Ministry of Climate, Energy and Utilities, Rentemestervej 8 2400 Copenhagen NV*

In North Greenland at 83.66249° N, Inuit Qeqertaat (Kaffeklubben Ø) is located in the Arctic Ocean, just north of Cape Morris Jesup (83.644699° N) which is the northernmost point of mainland Greenland and consequently the northernmost point on Earth. In proximity of Kaffeklubben Ø and located even further north, several islands have been reported, however it has been debated since a long time, which of them are real islands, which of them are apparently ephemeral “islands”, and which of them represents the northernmost “real” island on Earth (Bennike & Shea, 2019).



Map and photographs by Denis M. Schlatter and Martin Nissen, 2022

Figure 1. **A:** Map showing the location of Kaffeklubben Ø, Leister Island 2021 and other island-like features discovered in the area. Cape Morris Jesup is located about 40 km to the West of Kaffeklubben Ø and outside the map. The inset map shows the location of these “islands” with respect to Greenland. **B:** Kaffeklubben Ø is considered the northernmost island in the world. **C:** Sample 190893 collected on the Leister Island 2021 is an erratic glacial boulder of a metamorphic rock comprising mica schist and abundant quartz.

In this paper we discuss how to distinguish real islands from short-lived islets and we shed light into the formation of these features and finally we discuss results of the geochemical analyses of rocks that have been sampled from Kaffeklubben Ø (Fig. 1A and 1B) and from a recently discovered “island” informally named Leister Island 2021 (Qeqertaq Avannarleq) which is located just north of Kaffeklubben Ø at latitude 83.684070° N (Fig. 1A and 1C). During 2021 and 2022 extensive research was carried out by the Swiss Danish initiated research expeditions (Leister et al., 2023). During 2021 the “Around North Greenland” expedition resulted in the discovery of the northernmost “island”, whereas in the summer of 2022 the follow-up expedition “Go North” confirmed that this and previously discovered “islands” did not qualify as islands because of their non-permanent feature, and therefore demonstrated that the northernmost island of the world is Kaffeklubben Ø. Field work comprised airborne LIDAR surveys, geodetic measurements of previously reported islets, sea ice measurements, gravimetric measurements and measurement of the depth of the Arctic Ocean with an echosounder. The field work also comprised

collecting of five rocks that were analysed for geochemistry. These surveys showed that the Leister 2021 Island and smaller "islands" in vicinity lack a rock basement, and are therefore debris-covered ice island fragments. By contrast, the Kaffeklubben Ø which is also of larger size shows continuity with a rock basement and is therefore classified as an island. The geological survey revealed that the surface of Kaffeklubben Ø is covered by large amount of glacial boulders comprising red andesite porphyry thus supporting a glacial push in west-east direction, likely from the Cape Washington area located about 100 km to the west where the same andesitic rocks occur. The four rocks from glacial boulders sampled from the Leister Island 2021 show a large variety of rock types which supports that these are glacial debris. The surface of the "island" also comprises sandy areas with mud cracks, and some patches of about 10x10 m of glacial moraine material. The erratic blocks have various sizes and are up to 1.2x1x1 m. The sampled rocks comprise boulders of (1) dark-greenish mica schist rich metamorphic rock, (2) blocks with a quartz vein hosted in mica schist with few specs of sulphide and 5 cm thick quartz veinlet in mica schist, (3) mica schist from large erratic blocks, (4) mica schist from large erratic block with abundant quartz. The geochemical analyses also show a large variety with different contents of e.g. Fe and Al. By contrast one rock sampled from Kaffeklubben Ø shows distinct differences in the geochemical contents compared to the four samples from the Leister Island 2021 by having elevated REE (up to 272 ppm Ce, and 124 ppm La) and interestingly also by a slight anomalous gold content of 16 ppb. The five rocks sampled from the extreme north of Greenland are now integrated in the more than 100 years old Greenland rock collection at the Geological Museum in Lausanne, together with many specimens from the "de Quervain expedition" of 1912. This outcome of these two Leister expeditions potentially have territorial consequences, because the Kaffeklubben Ø island was confirmed to be a real island, and consequently defines the northernmost boarder of Greenland and thus the extent of the realm of Denmark.

## REFERENCES

- Bennike, O. & Shea, J. 2019: Oodaaq Ø and other short-lived islets north of Greenland. *Polar Record* 55: 14–24
- Leister Foundation (ed.) Leister, C., Lassen, H., Breum, M., Nissen, M., Thor, S., Rasch, M., Forsberg, R., Elberling, B., Primé, A., Schneider, T., Schlatter, D.M., Biersma, E., Rixen, C. & Charrière, J. 2023: *Leister Expeditions 2021 and 2022, Discoveries and Explorations in North Greenland* 268 pages, in print.