

Gold in the Nuuk region of West Greenland

The mineral potential of the Nuuk region is promising, especially for gold, although the region is in an early stage of exploration.

Presently, gold is the most prospective of the metals with potential for future exploitation within the Nuuk region. The high crustal level of the terrane, the occurrence of greenstone belts and the long geological history with recurrent events of granite magmatism, shearing and faulting renders a NNE-trending zone from Nuuk to Isukasia favourable for gold mineralisation. There are several generations of Archaean greenstone belts, some of which have close similarities with world class gold-producing greenstone belts in Western Australia and in Canada.

Geological setting

The gold showings in the Nuuk region seem to follow a terrane boundary which can be traced for more than 150 km from Nuuk to Isukasia. Two gold occurrences are found on Storø and at Isukasia together with gold anomalies located through stream sediment surveys. Other gold showings and anomalies at Ivisaartoq are located on the south-eastern side of the terrane boundary. Distribution patterns of lithophile and radioactive elements demonstrate that high-level granite magma-

tism follow the same boundary. Although gold showings are presently known at three sites only, there is good chance that there are manifestations of a large gold mineralising system affecting the entire zone.

Where observed, the terrane boundary is identified as a narrow mylonitic zone, the Ivnguit fault, formed during continent-continent collision. The collision may have happened as early as about 3.0 Ga or as late as 2.8-2.7 Ga, as granite veining at c. 2.7 Ga clearly post-dates the mylonitic zone. The last major intrusion of granite, the Qôrqt granite, took place at c. 2.5 Ga, and it is likely that the intrusion was accompanied by rejuvenation of the shear zones and additional faulting. Interpretation of the geological history is strengthened by information from the Survey's geochemical database, as well as from modelling results based on airborne geophysical data, likewise stored in the Survey archives.

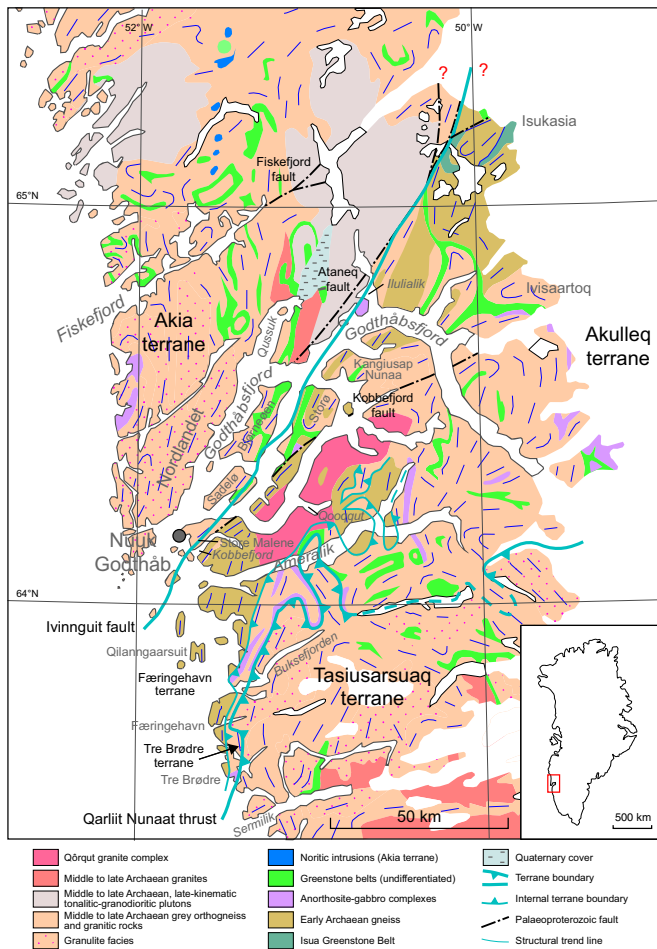
Gold occurrences

On Storø high grade gold mineralisation is found over mineable widths in mid- to late Archaean greenstones along the Nuuk-Isukasia zone.

The discovery is a result of two drilling campaigns in 1995 by NunaOil A/S. The obtained results are up to 6



Rusty Archaean greenstones with gold mineralisation, located adjacent to a major terrane boundary, Storø, Godthåbsfjord.



ppm Au over 18 m, 20 ppm Au over 2 m and 37 ppm Au over 1.8 m.

Other gold occurrences were observed in early Archaean greenstones at Isukasia, 100 km NE of Storø, along the same zone. Here, grab samples yielded up to 106 ppm gold in a shear zone-hosted, sheeted carbonate vein, and 3.1 ppm gold over 3 m in fuchsite-stained pyrite-rich chert.

Gold showings at Ivisartaq are located in mid-to late Archaean greenstones on the south-eastern side of the zone. As the result of a brief exploration campaign NunaOil A/S located rock samples with up to 3.2 ppm Au and scree sediment samples with up to 1.5 ppm Au.

The Nuuk region is in general terms the land area on the West Greenland coast between 64° and 65° northern latitude. The region has an excellent infrastructure and is easily accessible. Ocean-going vessels can operate in the large fjords all year round, and Greenland's largest town and capital, Nuuk, with its nearly 15,000 inhabitants provides excellent communication, supply and maintenance facilities. There are frequent international flight connections, and helicopters are locally available. In addition there is a large hydropower plant with sufficient capacity for new industrial customers. The distance from Nuuk to Storø is 40 km and to Isukasia about 150 km.

There are some indications that the gold in the Nuuk region was deposited from epigenetic, late Archaean mineralising fluids, and some of the showings contain very good intersections. However, the actual genesis of the individual gold showings is far from understood.

Exploration background

Exploration companies and researchers have been attracted to the Nuuk region since the 1960s. A prominent result from the beginning of the period was the discovery of the 2-billion tonne iron ore deposit at Isukasia by Kryolitselskabet Øresund A/S. Later exploration outlined a number of showings with a range of commodities, including the gold occurrences. Contributors to this exploration included Gemco Inc., Kidd Creek Mines Ltd., RTZ Ltd. and NunaOil A/S (NunaMinerals A/S).

Considering the favourable location and geological settings of the region, exploration activity cannot at all be said to be exhaustive. An outline of research and company exploration, including recommendations for forward-looking activities, are reviewed in Appel *et al.* (2003).

Key references

- Appel, P.W.U., Garde, A.A., Jørgensen, M.S., Moberg, E., Rasmussen, T.M., Schjødt, F. & Steenfelt, A. 2003: Preliminary evaluation of the economic potential of the greenstone belts in the Nuuk area. Danmarks og Grønlands Geologiske Undersøgelse Rapport **2003/94**, 147 pp. (DVD included).
- Appel, P.W.U., Bliss, I.C., Coller, D.W., Grahl-Madsen, L. & Petersen, J.S. 2000: Recent gold discoveries in Archaean rocks of central East Greenland. Transactions Institution of Mining and Metallurgy, **109**, B34-B41.
- Rasmussen, T.M., Thorning, L., Stemp, R.W., Jørgensen, M.S. & Schjøth, F. 2001: AEM Greenland 1994-1998 - summary report. Copenhagen: Danmarks og Grønlands Geologiske Undersøgelse Rapport **2001/58**, 46 pp. (CD-ROM included).
- Steenfelt, A. 2001: Geochemical atlas of Greenland - West and South Greenland, Danmarks og Grønlands Geologiske Undersøgelse Rapport **2001/46**, 40 pp. (CD-ROM included).
- Steenfelt, A., Thorning, L. & Tukiainen, T. 1990: Regional compilations of geoscience data from the Nuuk-Maniitsoq area, southern West Greenland. Thematic Map Series Grønlands Geologiske Undersøgelse, **90/1**, 9. 57 maps with legends.



Bureau of Minerals and Petroleum
(BMP)
Government of Greenland
P.O. Box 930
DK-3900 Nuuk
Greenland

Tel: (+299) 34 68 00
Fax: (+299) 32 43 02
E-mail: bmp@gh.gl
Internet: www.bmp.gl



GEUS

Geological Survey of Denmark
and Greenland (GEUS)
Øster Voldgade 10
DK-1350 Copenhagen K
Denmark

Tel: (+45) 38 14 20 00
Fax: (+45) 38 14 20 50
E-mail: geus@geus.dk
Internet: www.geus.dk

Author: P.W.U. Appel
Editor: K. Secher
Layout: GEUS, Grafisk
© GEUS 2004