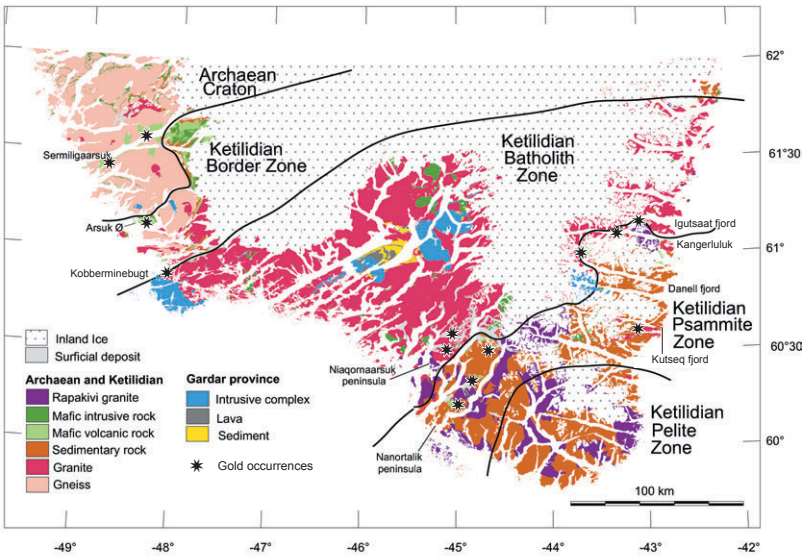
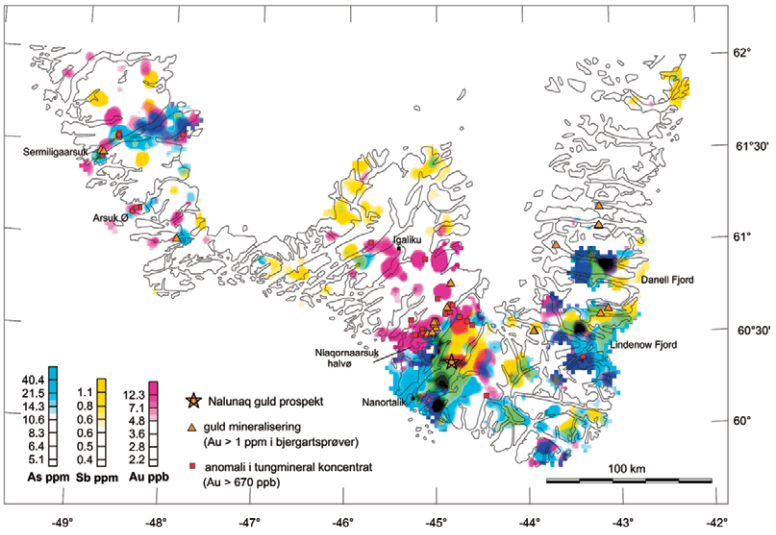
Gold mineralisation and gold potential in South Greenland



Gold and pathfinder elements

The gold potential of South Greenland is indicated in the geochemical mapping by the distribution of high values for gold (Au) and pathfinder elements like arsenic (As) and antimony (Sb) in the fine fractions (<0,1 mm) of stream sediments. Using this information together with gold anomalies in bedrock and in heavy mineral concentrates of stream sediments, the presently recognised potential for gold mineralisations is focused on specific regions and smaller areas.

The most prospective areas are around the Sermiligaarsuk fjord, at the southern margin of the Julianehåb Batholith domain, and within large parts of the Psammite Zone.



Geological setting

South Greenland is dominated by the Palaeoproterozic Ketilidian Orogen (2000–1750 Ma), which covers the southern tip of Greenland. The middle Proterozic Gardar province includes pronounced intrusive complexes (1300–1120 Ma) in the central part of the area. The environments for gold deposition can be grouped into several different geological scenarios:

1) Archaean foreland composed of highgrade gneisses serving as a basement to Palaeoproterozoic volcano-sedimentary successions
2) Archaean border zone affected by Ketilidian orogenesis
3) A magmatic arc represented by the 30,000 km^2, calcalkaline Julianehåb Batholith and large segments of volcano-sedimentary sequences located near the interface to
4) The Psammite Zone south of the batholith composed of metasediments and locally volcanic rocks that are deformed and sometimes migmatised and
5) The Pelite Zone located most southerly and composed of turbiditic sedimentary rocks, which are highly deformed and migmatised. The supracrustal successions are intruded by a rapakivi suite between 1755–1732 Ma.

Gold occurs in various settings

- Archaean Tartoq Group greenstone:
  Sermiligaarsuk
- Palaeoproterozoic border zone:
  Arsuk and Kobberminebugt
- Julianehåb Batholith:
  Qoormiut, Niaqornaarsuk, Igutsaat
- Border of Julianehåb Batholith and Psammite Zone:

Kangerluluk and Sorte Nunatak
- Psammite Zone: Nalunaq, Lake 410, Ippatit and Kutseq

A visit to these localities will reveal a variety of environments and mineral occurrences. They are briefly described here with emphasis on the geological setting and including some important analytical results.

Selected localities with primary gold accumulation

Sermiligaarsuk: The gold occurrences in the Taartoq supracrustals in Sermiligaarsuk are assumed to be deposited between 2500–3000 Ma, and are so far the only Archaean gold mineralisation in South Greenland.

In a quartz association gold occurs as discrete inclusions in pyrite. Other sulphides include arsenopyrite, chalcopyrite, tennantite, and chalcocite. The highest grade recorded for gold is 50 g/t, but typical values are 5–8 g/t .

Qoorormiut: The gold concentration varies significantly in this type of mesothermal gold mineralisation within batholith granite and reaches 380 ppm in narrow silicified shear zones. Chip samples from preliminary exploration activities resulted in assay results up to 114 ppm gold in quartz veins, and up to 14 ppm in zones with carbonated amphibolite.

Nalunaq: The Nalunaq gold deposit is hosted in metapelites and metabasic rocks of Ketilidian age (1850–1800 Ma). The supracrustal successions are intruded by postkinematic biotite granites and subsequently by anorogenic rapakivi granites around 1750 Ma.

The gold mineralisation is epigenetic and resides mainly in quartzveins. The 'Main Vein' of Nalunaq has so far been estimated to be 1700 m long and 0.1 to 2 m wide.

The gold is genetically related to metalliferous fluids associated with the emplacement of late intrusive stages of the Julianehåb Batholith granites (1800–1770 Ma) followed by local remobilisation.

Measured and indicated resources are 292,000 ounces of gold with an average grade of 25 g/t. As inferred resources 718,000 ounces of gold are considered in ore averaging 19 g/t Au. The Nalunaq deposit is expected to go into production during 2003.

Kangerluluk: A goldbearing sulphide mineralisation is hosted by a 200–300 m thick mafic volcanosedimentary supracrustal sequence exposed over an area of app. 4 km^2. The supracrustals rest unconformably on granites and granodiorites of the Julianehåb Batholith.

The ore minerals related to a 'quartz association' are dominated by pyrrhotite and pyrite. Locally massive pyrrhotite occurs at the contacts between sediments and more massive quartz veins. Narrow silicified alteration halos with very high gold concentrations are associated with the quartz veins. A grab sample from a halo contains 118 ppm gold.

Concluding remarks

Gold mineralised occurrences in South Greenland are located within two major geological environments, the Archaean and the Palaeoproterozoic. During exploration activity in the 1980s and the 1990s the knowledge about gold mineralisation has been increased and refined. Consequently the potential for locating viable gold deposits in the future has improved. As the result of recent exploration and research, a new mine is expected to be in operation soon (2003) at the Nalunaq deposit.

Key references

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