Comparisons of Paleoproterozoic orogenic gold deposits/occurrences of Nalunaq and Vagar in South Greenland and Svartliden in Northern Sweden

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Paleoproterozoic gold deposits/occurrences occur in different host rocks in Northern Sweden (e.g. Svartliden) and in South Greenland (e.g. Nalunaq and Vagar). The Svarliden gold deposit (2.967 Mt., 4.26g/t; Fig. 1A, Schlöglova et al. 2013) is located in the Lycksele-Storuman gold belt (LSGB), commonly referred to as the "Gold Line" and the Nalunaq gold deposit (0.713 Mt., 15g/t; Fig 1A, Bell et al. 2016) is located in the Nanortalik gold belt (NGB). The "Gold Line" trends in NW direction for 150 km within the Fennoscandian shield and is tentatively correlated with the NGB which can be followed for about 150 km from South-West to South-East Greenland (Fig. 1A, Lahtinen et al. 2008).

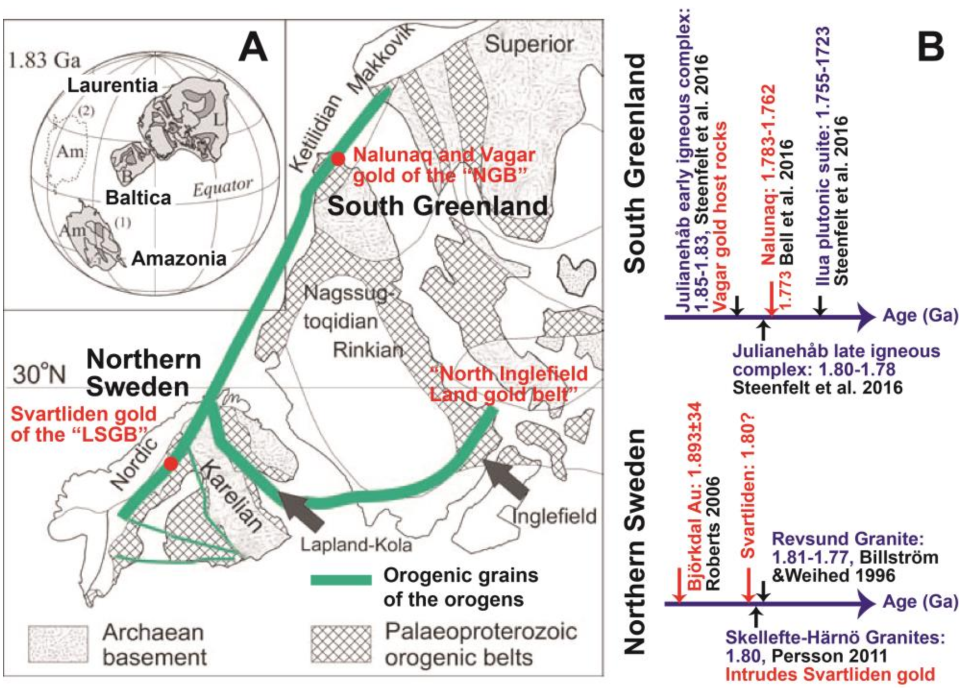

Figure 1. **A**: Plate reconstruction of Laurentia and Baltica at about 1.8 Ga and locations of Nalunaq and Vagar gold and Svartliden gold. Modified after Lahtinen et al. 2008. **B**: Sketch summarizing orogenic events and estimated timing of gold introduction in South Greenland and in Northern Sweden.

In this paper we discuss the similar geological environments of the LSGB and the NGB and depict the geological and geochemical characteristics of the gold deposits/occurrences of both gold belts. Gold mineralization occurs mainly in rocks of amphibolite metamorphic grade in all studied areas of the LSBG and the NGB. Gold of the NGB mainly occurs in quartz veins which are hosted in shear zones and a variety of rocks such as metabasalts (e.g. Nalunaq) and metagranitoids (e.g. Vagar) and the presence of auriferous quartz veins suggest an orogenic gold deposit. At Svartliden gold occurs in a shear zone at the contact between amphibolites and graphite-bearing schists and in boudinaged slivers of banded iron formation and is also considered to be an orogenic gold deposit (Schlöglova et al. 2013). The Svartliden gold deposit is dated indirectly by the intrusion ages of Skellefte-Härnö granites at 1.8 Ga (Fig. 1B) whereas the Nalunaq gold deposit has recently be dated to 1783 to 1762 Ma by Bell et al. (2016). Finally the Vagar gold occurrences of the NGB are suggested to be contemporaneous with the Ketilidian orogeny at about 1.85 to 1.83 Ga (Fig. 1B), hence the gold emplacement of the LSBG and NGB are roughly similar in ages. The most typical alteration minerals associated with the gold emplacement at the LSBG and the NGB are K-feldspar/biotite/sericite, arsenopyrite and pyrrhotite/löllingite reflecting addition of potassium, arsenic and sulphur at the time of the introduction of the gold. At Svartliden the gangue of the gold mineralization comprises diopside-quartz, whereas at Nalunaq a similar calc-silicate alteration style that also comprises diopside pre-dates the mineralization (Bell et al. 2016). Both gold belts are characterized by abundant regional calc-alkaline granitoids which are in places sericite altered (Schlatter et al. 2013); but it is unclear if the granites were genetically related to gold mineralization. In summary gold deposits of the LSGB and the NGB are interpreted to be of orogenic type and share intriguing similarities with respect to their ages, their variety of host rocks and the similar hydrothermal alteration type and tectonic settings in shear zones. Additional research including dating of the Svartliden deposit and the Vagar occurrences will add an argument in the discussion if there is a continuity of the LSGB and the NGB prior to the breakup of the Paleoproterozoic Columbia (Nuna) supercontinent. With respect to gold exploration a better understanding of the setting of the gold deposits of the “Gold Line” in Sweden will help the exploration efforts in remote South Greenland where much less data exist, and furthermore if the correlation of the proven prolific LSBG with the NGB can be demonstrated, such argument will favour investments for future exploration in South Greenland and elsewhere along the orogenic grains of the orogens, such as e.g. in Inglelfield (Fig. 1A).

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