



Origin of silicic island-arc volcanic rocks from the Lower Köli Nappe, north-central Swedish Caledonides

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Oceanic terranes build up an important part of the internal nappes of the Scandinavian Caledonides (Köli Nappe Complex). They consist of ophiolite and island-arc fragments, and related volcanic and sedimentary sequences. Beside numerous ultramafic bodies, island-arc volcanic sequences with pre-dominant intermediate and felsic volcanic rocks are distinctive features of the Lower and Middle Köli Nappes. The volcanic sequences represent the Ankarede Volcanite Formation (AVF) of late Cambrian to early Ordovician age in the Lower Köli Nappe of greenschist metamorphic grade. Geochemical analyses from the AVF in N Jämtland and SW Västerbotten counties identified these meta-volcanic rocks as low-K island-arc basalts, andesites, dacites, and rhyodacites. Sub-chondritic Zr/Hf, Nb/Yb, Nb/Ta, low HFSE content and flat REE+Y patterns indicate a depleted mantle source and high degrees of partial melting. Low Mg#, Cr, Ni contents as well as compositional evolution imply at least two stages of fractionation for the origin of relatively large proportions of silicic volcanic rocks. Variation diagrams and negative Eu-anomalies of REE+Y patterns indicate the beginning of plagioclase fractionation at SiO₂ > 59% accompanied by apatite fractionation. Massive and detrital serpentinite bodies in the over- and underlying sedimentary sequences point to a forearc setting. It is thus suggested that these primitive island-arc volcanic rocks were emplaced in forearc sediments as submarine lava flows and shallow intrusions. The volcanic rocks pinch out towards east. Therefore, the easternmost occurrences could define the volcanic front of a largely submerged late Cambrian to early Ordovician intra oceanic island arc above a westerly dipping subduction zone.