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Comparison of alnöites of the Alnö complex (Sweden) and Klunst (Germany)

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Alnöites are ultramafic lamprophyres (UML) defined by the presence of melilite and minor primary carbonate as felsic constituents, and phlogopite, clinopyroxene, olivine, amphibole as mafic constituents [1]. The importance of melilite in the definition of alnöites was first challenged by Kresten et al. (1981) pointing out the absence of melilite even in alnöite dykes at Alnö island [2]. Thus, most of alnöites from the type locality do not fit the original classification of Rosenbusch (1887).

Our study outlines distinct features of alnöites, sampled from the type locality of Alnö island (Sweden) and in the quarry Klunst (Germany), that could help refine the current classification of similar and related rock types.

Ediacaran (~584 Ma [3]) Alnö UML are evolved rocks (e.g., the presence of amphibole) and associated with a variety of carbonatite-alkaline rocks within Alnö volcanic complex [3]. Less evolved Cretaceous (~129 Ma [4]) Klunst UML have been attributed to an isolated magmatic pulse [4]. Melilite has not been commonly, or consistently observed in any of the samples. Main mafic mineral assemblage at both sites is phlogopite–clinopyroxene–olivine ± amphibole. Major element variations revealed low SiO_2 (30–35 wt. %), moderate Al_2O_3 (5–10 wt. %), FeO^{tot} (8–16 wt. %), Na_2O+K_2O (2–6 wt. %), and high MgO (16–24 wt. %) and CaO (11–20 wt. %). Chondrite-normalized REE trends are nearly identical for both localities, with Alnö being more enriched in LREE. Primitive mantle-normalized trace elements show negative Pb and positive Nb anomalies comparable to HIMU-type rocks. Radiogenic isotope systems obtained from both locations have Sr-Nd composition plotting in a strikingly similar field relative to mantle end members, specifically, close to the HIMU field.

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[1] Rosenbusch (1887), *E. Schweizerbart.*
[2] Kresten et al. (1981), *Geol. Rundsch.,* **70***,* 1215-1231
[3] Kresten & Troll (2018), *Springer International Publishing*.
[4] Mať o et al. (2024), *Geol. Carpath.,* **75**, 6, 405–414.