

Sveconorwegian albitites, Bamble Sector, S-Norway – new U/Pb geochronological and stable O-isotopic data

A.K. ENGVIK^{1*}, F. CORFU², H. TAUBALD³ AND H. AUSTRHEIM²

¹*Geological Survey of Norway, P.O.Box 6315 Sluppen, N-7491 Trondheim NORWAY
(*correspondence: ane.engvik@ngu.no)*

²*Department of Geosciences, University of Oslo, P.O.Box 1047 Blindern, N-0316 Oslo, NORWAY*

³*Department of Geosciences, University of Tübingen, Wilhelmstr. 56, D-72074 Tübingen, GERMANY*

Na-metasomatism causing albitisation was regionally extensive in the Precambrian crust of southern Norway, particularly in the Bamble Sector. The albitites have been studied in detail in the region around the city of Kragerø. The occurrences have been described as megascale Cpx-Ttn-bearing albitite, albitisation along veins, breccias, albitic felsites and albite-carbonate deposits.

U-Pb geochronology of Cpx-Ttn-bearing albitite shows zircon data partly reset but pointing to upper intercept ages reflecting an origin of the rocks in the period 1250-1300 Ma. The minerals titanite, monazite and rutile reflect transformation stages: Titanite ages are in the range 1102 ± 2 to 1093 ± 2 Ma. The oldest monazite age is 1101 ± 3, while a younger age shows 1079 ± 4 Ma. Rutile is moderately discordant and reflects ages in the range 1094-1085 Ma. The whole alteration mineralogy seems to have developed in pulses over a period of about 20 m.y.

Stable O-isotopic analyses, on a variety of albitic rocks, give $\delta^{18}_{\text{SMOW}} = 5.1\text{-}8.4$ for albite originating from mafic protoliths, and $\delta^{18}_{\text{SMOW}} = 8.5\text{-}11.1$ for albite in albitite of tonalitic origin. The results exclude a meteoric fluid, and overlap with primary values indicated by the protoliths. A large amount of fluids is necessary to change O-isotopic values, the spread in reported values could be explained by influx of seawater.

The spread in both the U-Pb geochronological data and the O-isotopic data supports earlier interpretation of fluid control on the formation of albitite in the Kragerø area. The mineral replacement reactions illustrate fluid transport by a H₂O-CO₂ fluid rich in Na. We document that the albitisation as reflected in the Cpx-Ttn-bearing albitite occurred in the final stages of the tectonometamorphic Arendal phase of the Sveconorwegian event in the Bamble Sector, although overprints by younger lower-grade replacement processes are not excluded.