EGU23-5460, updated on 24 Sep 2023
https://doi.org/10.5194/egusphere-egu23-5460
EGU General Assembly 2023

Deformation and fluid-infiltration influence in the evolution of the Krossøy dyke-swarm in the northern part of the Bergen Arcs, Norway

Lorena H. Filiberto[1], Håkon Austrheim[2], and Andrew Putnis[1,3]

[1]Institut für Mineralogie, University of Münster, 48149 Münster, Germany (lhernand@uni-muenster.de)
[2]The Njord Centre, University of Oslo, 0136 Oslo, Norway (h.o.austrheim@geo.uio.no)
[3]School of Earth and Planetary Sciences, Curtin University, Perth, 6845, Australia (putnis@uni-muenster.de)

The Bergen Arcs, in Norway, consist of several arcuate nappes formed during the Caledonian orogeny 440-420 Ma ago (Bingen et al., 2001; Glodny et al., 2008) when the western margin of Baltica was subducted below Laurentia. This Caledonian orogeny overprinted many of the anorthosites that formed the 930 Ma old (Bingen et al., 2001) granulitic basement. This overprint resulted in both amphibolites and eclogites and have been observed in shear zones within the rocks of the well-studied island of Holsnøy, located on the western margin of the Lindås Nappe. On the adjacent island of Radøy, the Caledonian overprint is associated with amphibolite facies shear zones (Mukai et al., 2014; Moore et al., 2020).

In the northern margin of the Bergen Arcs, near the Bergen Arcs Shear Zone, the much less-studied island of Krossøy also exposes the anorthosites from the old granulitic basement and here the Caledonian overprint also resulted only in amphibolite facies metamorphism. The anorthosites in Krossøy are intruded by a series of subparallel mafic granulitic dykes forming the Krossøy dyke swarm, that has never previously been described elsewhere in the Bergen Arcs. The style of deformation in the granulites and the textural evolution in the amphibolite facies overprint are also markedly different from the rocks on Holsnøy and Radøy. The development of ductile Caledonian shear zones may have been facilitated by initial brittle failure of the basement accompanied by fluid infiltration (Jamtveit et al., 2018). Here we investigate the influence of this deformation and fluid infiltration on different features observed on these rocks such as: the occurrence of plagioclase coronas around the garnets on the dykes; the presence of different types of symplectites; the variability of size, deformation and composition observed on the anorthositic feldspars; or the local changes of fluid composition along cm- long fractures. We will show our first analytical results on some of these key features and discuss their relevance in the context of the previous studies of the Bergen Arcs.

Bingen, B., David, W. J., & Austrheim, H. (2001). Zircon U-Pb geochronology in the Bergen Arc eclogites and their Protereyoic protoliths, and implications for the pre-Scandian evolution of the

Caledonides in western Norway. In *GSA Bulletin* (Issue 5). https://doi.org/10.1130/0016-7606(2001)113<0640:ZUPGIT>2.0.CO;2

Glodny, J., Ku□hn, A., & Austrheim, H. (2008). Geochronology of fluid-induced eclogite and amphibolite facies metamorphic reactions in a subduction-collision system, Bergen Arcs, Norway. *Contributions to Mineralogy and Petrology*, *156*(1), 27–48. https://doi.org/10.1007/s00410-007-0272-y

Jamtveit, B., Moulas, E., Andersen, T. B., Austrheim, H., Corfu, F., Petley-Ragan, A., & Schmalholz, S. M. (2018). High Pressure Metamorphism Caused by Fluid Induced Weakening of Deep Continental Crust. *Scientific Reports*, *8*(1). https://doi.org/10.1038/s41598-018-35200-1

Moore J., Beinlich A., Piazolo S., Austrheim H. & Putnis A. (2020). Metamorphic differentiation via enhanced dissolution along high permeability zones. *Journal of Petrology* 61, 10. https://doi.org/10.1093/petrology/egaa096

Mukai H., Austrheim H., Putnis CV. & Putnis A. (2014). Textural evolution of plagioclase feldspar across a shear zone: implications for deformation mechanism and rock strength. *Journal of Petrology*. 55, 1457-1477. https://doi.org/10.1093/petrology/egu030