Phase equilibria modelling constraints on the *P*–*T* conditions of eclogitised granulite in the Bergen Arcs, Norway

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PHASE EQUILIBRIA MODELLING CONSTRAINTS ON THE *P–T* CONDITIONS OF ECLOGISTISED GRANULITE IN THE BERGEN ARCS, NORWAY

RUNNING TITLE: *P–T* CONSTRAINTS OF ECLOGITISED GRANULITES

ABSTRACT

Exhumed deep crust is rare and exposures that preserve both protoliths and altered domains are limited around the world. Mesoproterozoic anorthositic granulites exposed on the island of Holsnøy, western Norway, preserve different stages of progressive deformation together with the corresponding metamorphism that record the conversion to Siluro-Ordovician eclogites during fluid infiltration. Five different stages of deformation can be identified: 1) brittle deformation resulting in the formation of fractures and generation of pseudotachylites in the granulite; 2) development of mesoscale shear zones associated with increased fluid–rock interaction; 3) large-scale replacement of granulite by hydrous eclogite with blocks of granulite sitting in an eclogitic 'matrix'; 4) complete conversion of granulite to eclogite within large-scale shear zones; and 5) break up of completely eclogitised granulite by continued fluid influx, resulting in the formation of potassium-rich mineral assemblages. *P–T* constraints derived from phase equilibria forward modelling document a burial and partial exhumation path with peak conditions around 21–22 kbar and 640–660 °C. Fluid infiltration began on the prograde path and continued throughout the recorded *P–T* evolution. However, in places limited fluid availability on the prograde path resulted in an excellent preservation of prograde mineral assemblage, allowing the burial path to be well constrained.

KEYWORDS

Eclogite; fluid assisted metamorphism; *P–T* pseudosections; Caledonian Orogeny; Bergen Arcs; *P–T* path

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