European Mineralogical Conference
Vol. 1, EMC2012-554, 2012
European Mineralogical Conference 2012
© Author(s) 2012

Earthquakes and fluid-induced high grade metamorphism

H. Austrheim
Physics of Geological Processes (PGP), University of Oslo, Norway (h.o.austrheim@geo.uio.no)

The Grenville (c.930Ma) granulite facies complex of the Lindås Nappe in the Bergen Arcs, W-Norway underwent a fluid-induced partial eclogite and amphibolite facies metamorphism during the Caledonian (c.400-430Ma) continent collision. Pseudotachylyte fault and injection veins formed in the dry granulites at or close to the reaction fronts both in the eclogitized(western parts) and the amphibolitized(eastern parts) of the Nappe. The veins can be followed from the granulites into the Caledonized parts. They are locally recrystalized with the development of amphibolite and eclogite facies assemblages demonstrating that they formed pre or syn the Caledonian metamorphism. The pseudotachylytes transect lithologies ranging from peridotite to anorthosite and consequently the influence of the seismic energy release on a range of granulite facies minerals including garnet, pyroxenes, olivine, plagioclase, hornblende and scapolite can be observed. The seismic energy released promotes the Caledonian metamorphism of the metastable crust in the following ways: The melting and the ultracommunition of the granulite facies minerals increasing the reactive surface area and produce local pathways for fluid. The pseudotachylyte veins impose inhomogeneities in the massive rocks through grain size reduction and lead to strain localization with development of amphibolite and eclogite facies shear zones. Formation of eclogite facies breccias where meter size blocks of rotated granulites are enclosed in eclogite may have initiated by the seismic events. The seismic events may have been important in large scale transport of fluid required to bring about the metamorphism of the dry granulite facies complex.