



P-T-X conditions of symplectite formation in the eclogites from the Western Gneiss Region (Norway).

Nils Bigge (1,2), Céline Martin (2), and George Harlow (2)

(1) Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, D-44801, Germany (Nils.Bigge@rub.de),

(2) Department of Earth and Planetary Sciences, American Museum of Natural History, New York, NY 10024-5129, USA (cmartin@amnh.org)

Symplectitic intergrowths of sodic plagioclase + diopside \pm amphibole that replace omphacite are commonly found in eclogites. The role of an aqueous fluid as a catalyst of the symplectite formation process has now been demonstrated, but the origin of that fluid is still debated. In the Western Gneiss Region (Norway), basaltic eclogites are found as meter- to kilometer-size lenses embedded within the surrounding gneiss, and many of these display symplectite replacements. X-ray maps of the major elements were acquired by EMPA on six eclogites samples from four locations in the Western Gneiss Region. These maps were processed with XMapTools software to (i) calculate mass balance based on local equilibrium and (ii) estimate the P-T conditions of symplectite formation. One sample shows symplectite with only plagioclase and diopside, whereas the five other samples also contain amphibole lamellae. Kelyphite (intergrowths of amphibole and plagioclase around garnet) is also present in those five samples. Mass balance calculations derived from the standardized X-ray maps reveal that symplectite can form either in a closed (i.e. no influx of an external fluid) or open (i.e. influx of an external fluid) system, but open system behavior is dominant (five samples). The only sample showing symplectite formation in a closed system likely depended on the OH component of the phengite to catalyze the reaction. The estimated P-T paths for the four locations are similar: Symplectite formation is initiated in eclogite facies (20-15 kbar and 650-750 °C), and continues toward amphibolite facies which is indicated by kelyphite formation (15-9 kbar and 500-700 °C). The combination of these data with existing P-T estimates from the same areas, for both peak eclogite and amphibolite, shows that symplectites record the path between eclogite- and amphibolite-facies conditions, when plagioclase becomes stable.