

CORONITIC METAGABBRO FROM GRESSENBERG, KORALPE, AUSTRIA: TEXTURES AND REACTIONS OF AN ECLOGITE FACIES HYDRATION EVENT

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A boulder of metagabbro from Gressenberg, at display at the Geopark Glashütten (Koralpe, Austria), shows partial transformation to reddish-green eclogite. The first transformation step of the original clinopyroxene (cpx) - orthopyroxene (opx) – plagioclase (plag) assemblage is a domainal decomposition that mainly affects former plag and opx.

Plagioclase domain: The cores of these domains consist of more albitic plag₂, with little fibrous zoisite (zo) and kyanite (ky) or kyanite-quartz (qz) intergrowths. Towards the rims, the zo decreases drastically and cpx replaces plag₂ as the interstitial phase (ky-cpx-zone). Some former plag-plag grain boundaries, particularly if close to former opx, now consist of corundum (cor).

Orthopyroxene domain: The opx first develops a corona of cpx, cor and spinel (sp), within which corundum gets later replaced (rimmed) by kyanite, and the spinel also by kyanite, but more often and characteristically by garnet (grt) on a mycron to sub-mycron scale. The thin garnet rims around spinel can be BSE-brighter or –darker than spinel, depending on whether this texture is found close to the plag-domain or immediately adjacent to opx. The first more coarsely grained garnet appears at a later stage between the opx-corona and the plag-domain. At an even more advanced stage the corona can be dominated by grt and cpx, and garnet is also found further towards the core of opx. In other cases, cpx advances further towards the core of opx and garnet stays more or less restricted to the outer corona.

Even in an advanced stage of corona formation, when all spinel has been replaced by garnet, relatively coarse grained Al-phases are still visible at the inner and outer margin of the opx-corona, typically with kyanite at the outer (plag-)side and corundum at the inner (opx-) side of the corona, both rimmed by garnet. Garnet overgrowing the margins of former plag-domains typically contains the fine kyanite needles of that domain.

Clinopyroxene domain: Relict igneous cpx experiences little alteration in the first replacement stage and, except for the grain margins, still shows opx- and ilmenite (ilm) precipitates of the post-magmatic cooling stage. A gradual change towards a more omphacitic composition is observed from core to rim. Grain boundaries of former magmatic cpx and plag show minor development of sp, cor and ky in the outer part of the omphacitic cpx-rim. In some instances skeletal garnet growth is observed along former igneous cpx-plag grain boundaries. This was the only other instance where quartz (qz) was observed: either within grt or between grt and cpx.

The above textures can be explained by the hypothesis that Ca and Al advance towards and react more rapidly with opx than Si, which creates cpx, sp and cor before ky and grt can form in the opx corona. This is corroborated by the observation that zo and sometimes qz can be found only in the cores of plag domains, not in the rims.