CALEDONIAN KYANITE-ZOISITE ECLOGITES OF THE SERBO-MACEDONIAN UNIT: PHASE RELATIONS, REACTION TEXTURES OF EXHUMATION STAGE AND U-Pb ZIRCON AGE

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Eclogites were found in the eastern part of the Serbo-Macedonian unit as lenses of 50 x 30 m among Bt-Ms gneisses. The primary assemblage corresponding to the metamorphic peak was omphacite (50-64 % *Jd*) + progradely zoned garnet + zoisite + kyanite + hornblende + muscovite + quartz + rutile. These minerals are in equilibrium but are often surrounded by various rims that developed during later decompression. During the initial stage of decompression, ***Omp*** was overgrown by *Na-Aug*^{2} - *Ab(Olg)* ± *Hbl*^{2} symplectites, which are always surrounded by an outer monomineralic *Na-Aug*^{2}-rim at contacts with *Qtz* (*Omp*^{1} → *Na-Aug* + *Olg* → *Na-Aug*^{2} → *Qtz*). ***Grt*** grains acquire retrograde rims and are armored by either *Hbl*$^2_{Al\text{-}rich}$ or bimineral *Hbl*^{2} - *Pl* rims at contacts with *Omp*. The next decompression stage was responsible for formation of *Chl*-bearing rims around Grt (*Grt* → *Labr-Btw* → *Chl* ± *Hbl*^{3}) or *Hbl*^{3} - *Ep*^{2} ± *Chl* kelyphite. Garnet grains are corroded by *Pl* (*An* 30-50) - *Hbl*^{3} - *Chl* veinlets. *Ky* prisms are surrounded by concentric margarite-zoisite-oligoclase-hornblende kelyphite in the succession *Ky* → *Mrg* → *Zs*^{2} → *Pl* → *Hbl*^{3} → *Omp*^{1}. These textures mean decomposition of omphacite in assemblages with Ky and Grt, and a diminish in stability of Grt: Omp1 + Qtz → *Na-Aug*^{2} + *Pl*, *Omp*^{1} + *Ky* + H_2O → *Mrg* + *Zs*^{2} + *Pl* + *Hbl*^{3} + H_2O, *Omp*^{1} + *Grt* + H_2O → *Hbl*$^2_{Al\text{-}rich}$ + *Pl* (20 - 50 % *An*) and *Omp*^{1} + *Grt* + H_2O → *Hbl*^{3} + *Ep*^{2} + *Chl* + *Pl*. Thus, the *Omp-Grt-Zs-Hbl-Ky-Ms-Qtz* eclogites recrystallized during exhumation and were replaced first by symplectitic eclogites (an early exhumation stage) and then by *Hbl-Grt-Chl-Ep-Mrg-Ms-Pl* (20 - 40 % *An*)-*Qtz* amphibolites (final decompression stage). The maximum eclogite temperatures (*Grt-Omp* thermometry) is 530 - 570 °C (KROGH RAVNA, 2000), the minimum pressure (*Jd* isopleths in *Cpx* - HOLLAND, 1980) 15 kbar. Temperature of the development of *Cpx-Hbl-Pl* symplectites after omphacite and *Hbl-Pl* kelyphite between *Grt* and *Omp* was determined using the Grt_{retrog} - Hbl_{rim} pair (PERCHUK, 1989) to be 580 - 620 °C at P = 7 10 kbar (*Grt-Hbl-Pl-Qtz* barometer, KOHN & SPEAR, 1990). Thus, initial prograde decompression changes into retrograde one (*Chl*-, *Ep*- and *Hbl*^{3}-bearing rims – 540 - 580 °C according to Grt_{retrog} - *Hbl*^{3} thermometry). Zircons from eclogites have been studied by U-Pb method. They are concordant and the mean ^{206}Pb / ^{238}U age of 455 ± 6 Ma is interpreted as the time of eclogite metamorphism.

References

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