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The Key Influence of Fluid in the Preserves, Mineral Assemblages, Compositionsand Structures: Study from High-Pressure Eclogite and Its Amphibolization in the Western Dabie Mountains，Central China

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Pseudosection modeling for the garnet amphibolite samples from the Western Dabie Mountains show they have experienced similar HP metamorphic evolution with that of the adjected eclogites. The common assemblage of the garnet amphibolite stage involves garnet, hornblende, epidote, plagioclase (albite) and quartz, with or without biotite and muscovite. The different size of the mineral grains and the compositions show that garnet amphibolite has not reached equilibria conditions. Like the grains that grew prior to omphacite and barroisite in the matrix they have been transformed into symplectite, composed of hornblende and albite. The pargasite corona or hornblende+plagioclase±epidote reaction rim grows around garnet. The garnet preserves the growth zonation like that in eclogite, and the embayed rim composition like the rim of garnet in eclogite, but has lower pyrope-contents, representing stronger modified metamorphism. On the pseudosections, the garnet rim compositions, wthin garnet amphibolite, plots in the H_2O-undersatured fields indicate the P-T range of 0.5-0.8 GPa at 500-580℃. With the developmet of the retrograde path, the garnet within the rocks is finally consumed (< 0.5 GPa), while the size of mineral grains of the rock becomes equal and turns into epidote amphibolite.

Phase calculation shows that fluid plays an important role during the preservation of the HP eclogites and its retrogradation to amphibolites. All pyrope containing garnet rims in garnet amphibolite reflect the H_2O-undersatured conditions, but the compositional change reflects even higher water-contents than that in eclogites. The lowest pyrope-content garnet rim, in garnet amphibolite, may have reached or come near equilibrium conditions with the minerals in matrix.

Thus, we can conclude that within the low and middle crust the preservation of eclogite, which still preserves the HP/UHP mineral assemblages, compositions and structures, is controlled by H_2O-undersatured conditions. The transformation from eclogite to amphibolite in many HP/UHP terranes of the world, implies H_2O-undersatured conditions and hydration by the external fluid influx. Under H_2O-undersaturated conditions, metamorphic reactions hardly reach equilibrium condition. Therefore, the mineral assemblages and compositions of eclogite and garnet amphibolite can often reflect multistage metamorphism and disequilibria structures.

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