Mineral inclusions in garnets from granulites, eclogites and peridotites in the Kutná Hora Complex (Moldanubian zone, the Bohemian Massif)

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Felsic granulites go along with small boudins and lenses of garnet peridotites and high-pressure eclogites with size from decimetres to few houndred metres. Conditions of pressure and beginning of connection of the granulite´s pathway with peridotites and eclogites are subjekt to discuss.

For purpose of study of the oldest minerals and textures, thin-sections and mineral separates of these rocks from Kutná Hora complex were investigated. As all these rocks underwent granulite facies reequilibrium and subsequent cooling, most inclusions are transformed to secondary phases. In addition to olivine, orthopyroxene and clinopyroxene, garnet from garnet peridotites contains frequent chromium spinel. Host garnet around inclusions shows Cr-rich domains as result from diffusion from spinel to garnet. Rare ilmenite inclusions with high MgO content and pentlandite were also observed in garnet. Orthopyroxenes in matrix have low amounts of Al and clinopyroxenes have relatively high jadeite ratio component. Two varieties of eclogites are present in granulite: eclogite with pyroxenites and garnetites occur in the middle or in touch with garnet peridotites. Garnets of these eclogites contain oriented rutile needles. Apatite, often present in garnetite is typical for the monazite exsolution lamellae. Eclogites without peridotites has prograde zoning garnet contains inclusions of omphacite, kyanite, quartz and rutile. Inclusions of Ti-rich phengite were found in garnet from several samples of felsic granulites. It is mostly replaced by Ti-rich biotite with quartz and other Al-Si phase. In addition the inclusions of graphites with quartz, K-feldspar and kalcite in garnets were found. Several polyphase inclusions and radial cracks around these inclusions in garnets were discovered. The presence of spinel inclusions and the decrease of Al in orthopyroxene, associated with olivine, as well as increase of jadeite content in clinopyroxene in garnet peridotite from the Kutná Hora suggest increase of pressure and decrease of temperature during their metamorphic history. In addition to eclogite with prograde zoning garnet, a prograde PT path for the host granulite with phengite inclusions in garnet. Graphite inclusions in garnets will be subject of further study to decipher, if the graphite is of fossil organic origin or it was formed by precipitation from CO_2 fluid.