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チェコ共和国ボヘミア山塊のザクロ石橄欖岩が経験した多重上昇履歴について
Multiple exhumation episodes recorded in orogenic garnet peridotites from the Bohemian Massif (Czech Republic)

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Presence of garnet peridotites in *HP/UHP* metamorphic terranes is taken as evidence for interaction between crust and mantle during orogeny. In order to constrain the timing of interaction, *P-T* paths for both peridotites and crustal rocks have been constrained, which demonstrated that there are significant gaps between peak pressure of peridotites and host continental crust. In this contribution, we will show an evidence for multiple exhumations recorded by clinopyroxene (*Cpx*) megacryst discovered in the garnet peridotite from the Bohemian Massif, and will constrain the timing of crust-mantle interaction in the light of the new data.

The Gföhl Unit experienced the highest metamorphic grade in the Moldanubian zone of the Bohemian Massif, and it mainly consists of quartz-feldspathic garnet-kyanite granulite with peak condition at 2.2-2.3 GPa and 1000 ℃ (Vrana et al., 2013, *J. Geosci.* **58**, 347-378), although Kotková et al. (2011, *Geology* **39**, 667-670) recently found diamond and coesite from the Saxony-type granulite. Gföhl granulite occurs as tens km-sized isolated blocks and contains garnet peridotites whose peak conditions were estimated as 2-6 GPa and 850-1350 ℃ (Medaris et al., 2005, *Lithos* **82**, 1-23). We studied *P-T* path for the garnet peridotite at Lom pod Libínem quarry in the Prachatice granulite massif in the south Bohemia. Lom pod Libínem (*LPL*) peridotite generally displays granoblastic texture consisting of mm-sized (0.1-5.0 mm in diameter) garnet, pyroxenes, olivine, and most garnet grains are transformed to kelyphite and are replaced by phlogopite. *LPL* peridotite includes a lot of cm-size Cpx megacrysts. Among them, the largest megacryst (3×5 cm) shows a strong chemical zoning consisting of three zones (Fig. 1), namely, core, mantle and rim: (1) the " pale-green core " is poor in Ca-Tschermak (CaTs.~6 mol.%) and rich in Enstatite (En.~9 mol.%) (components after Simakov, 2008, *Lithos* **106**, 125-136) and includes phlogopite and orthopyroxene, (2) the " mantle " is lower in CaTs. (4-5 mol.%) and En. (4 mol.%), and includes hornblende, chlorite, apatite, titanite, andradite, olivine, and celsian, and (3) the " rim ", rich in CaTs. (7-9 mol.%) and En. (9 mol.%), includes olivine, phlgopite, and hornblende, respectively. The mm-size Cpx has identical composition to the megacryst-rim, and (4) the smaller Cpx is richer in CaTs. (12 mol.%) and poorer in En. (7 mol.%). Four mineral stages can be identified: **Stage 1** is defined by megacryst-core coexisting with phlogopite, orthopyroxene. Assuming the co-existence with garnet, the equilibrium condition was estimated at ~4 GPa and 1000 ℃ by use of the single Cpx geothermobarometer (Nimis & Taylor, 2000, *Contrib. Mineral. Petrol.* **139**, 541-554), **Stage 2** is defined by the " mantle " coexisting with hornblende, chlorite, orthopyroxene, and andradite, which were equilibrated at ~700 ℃, $P<2.5$ GPa. **Stage 3** is defined by the core of mm-size pyroxenes, garnet and olivine that were equilibrated at ~3.0 GPa and 1000 ℃ in the garnet lherzolite facies. **Stage 4** is defined by the matrix spinel lherzolite assemblage equilibrated at T~800 ℃ at 1-2 GPa.

We envisaged the following juxtaposition mechanism: *LPL* peridotite originally came from the upper mantle (4 GPa) that exhumed to the depth of <2.5 GPa and was partially transformed to chlroite peridotite. Assuming that *LPL* peridotite was entrained in the crust at Stage 2, peridotite and host continental crust could have shared the Variscan *UHP* metamorphism at 3 GPa (Stage 3), followed by final exhumation. Although the peak *P-T* condition of Stage 3 is still higher than that of country granulite (<2.3 GPa), this could reflect different degree of retrogression during the final exhumation. Our study suggests some orogenic peridotites were exotically derived from the *UHP* mantle (>4 GPa), where continental crust have not subducted more than 3 GPa. This will give an another solution to the observed pressure gaps between orogenic peridotites and host continental crust.

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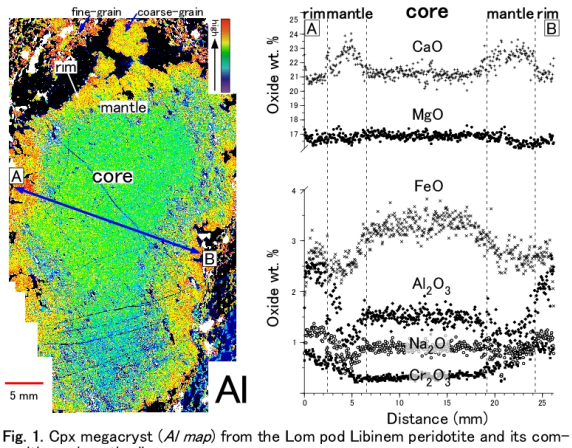

Fig. 1. Cpx megacryst (*Al map*) from the Lom pod Libinem peridotite and its compositions along the line.