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First report on pigeonite exsolution in clinopyroxene in UHP mafic rocks from the North Dabie Complex (China) and its significance

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Pigeonite exsolution texture in clinopyroxene is normally recognized in some Precambrian metaironstone (BIF), indicating UHT ($\sim$1000 $^{\circ}$C) metamorphic conditions (Fonarev et al., 2006). However, the Ca-Eskola-bearing (CaEs, $Ca_{0.5}{}_{0.5}AlSi_2O_6$) clinopyroxene indicating UHP conditions is mainly reported from some UHP terrane (Katayama et al., 2000). Here we firstly report that both UHT pigeonite and UHP Ca-Eskola-bearing clinopyroxene occur as exsolution products in peak clinopyroxenes in UHP garnet pyroxenites from the North Dabie Complex (NDC) in China, with further implications for understanding UHP metamorphic P-T history.

UHP eclogite relics have recently been reported from the NDC, with overprinting granulite assemblages (Tsai and Liou, 2000; Liu et al., 2001; Xu et al., 2002; Faure et al., 2003; Malaspina et al., 2006). However, the suggested peak P-T conditions are quite different. For instance, a peak UHP condition of $\geq$25 kbar at $\geq$800 $^{\circ}$C was suggested by Tsai and Liou (2000), whereas a higher peak P condition of $\sim$35 kbar with T $\geq$750-800 $^{\circ}$C was proposed by Malaspina et al. (2006). However, Xu et al. (2002) suggested that the peak P condition could have reached 50-70 kbar, and granulite assemblage overprinting occurred at P = 11-14 kbar and T = 820-910 $^{\circ}$C. Thus, distinctly different P-T paths have been inferred for the eclogite relics from the NDC (Liu et al., 2001; Xu et al., 2002; Faure et al., 2003).

Our investigation for the garnet pyroxenites from the NDC suggests that: (1) the peak UHP stage (I) is of an assemblage of Grt-Cpx-Rt, with P-T conditions of $\geq$40 kbar and $\geq$750 $^{\circ}$C, while exsolved Rt-Cpx-Ilm rods in garnet may imply a higher P condi-

tion of >50 kbar; (2) the post-peak HP stage (II) is of an assemblage of Grt-Opx-Cpx-Pl-Ilm-Amp, but Ca-Eskola-bearing (CaEs 26.2% and Jd 19.4%) omphacitic clinopyroxene exsolution in matrix clinopyroxene might have formed during the initial decompression-heating stage (IIa) at ∼25 kbar and ∼900 ˚C, whereas pigeonite exsolution (CaO 3.50-5.98 wt%) in matrix clinopyroxene might have formed during the second decompression-heating stage (IIb) under a UHT condition of ∼1000 ˚C at 10-12 kbar; (3) the late retrograde decompression-cooling stage (III) occurred under the amphibolite facies condition of 6-7 kbar at ∼700 ˚C which was related to the formation of fine symplectite assemblage Amp-Pl.

The above suggestions yielded a new P-T path, indicating that postdating the UHP metamorphism, the NDC suffered an overprinting UHT metamorphism at lower crustal level probably as a result of thinning of lithospheric mantle. The UHP evidence further supports that the NDC likewise has experienced deep continental subduction during the Triassic collision between the North China and Yangtze blocks. This may be compatible with a recent finding of micro-diamonds in UHP eclogite relics from the NDC (Xu et al., 2005).

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References

Faure et al., 2003, Lithos, 70, 213-241.

Fonarev et al., 2006, Journal of Metamorphic Geology, 2, 13-31.

Katayama et al., 2000, American Mineralogist, 85, 1368-1374.

Liu et al., 2001, Acta Geologica Sinica, 6, 417-423. (in Chinese)

Malaspina et al., 2006, Lithos, 90, 19-42.

Tsai and Liou, 2000, American Mineralogist, 85, 1-8.

Xu et al., 2002, Architecture and kinematics of the Dabie Moutains Orogen, University of Science and Technology of China Press, Hefei, pp. 1-133. (in Chinese)

Xu et al., 2005, Mineralogical Magazine, 69, 509-520.