

Discovery of clinoenstatite in garnet pyroxenites from the Dabie-Sulu UHP terrane, east-central China

¹ZHANG, R. Y., ²SHAU, Y. H., and ¹LIU, J. G. ¹Department of Geological and Environmental Sciences, Stanford University, Stanford, CA, 94305 USA; ²Dept. of Marine Resource, National Sun Yat-sen University, Kaohsiung 80424, Taiwan, ROC

High-resolution transmission electron microscopy study reveals that some enstatites of $(\text{MgFe})_2\text{Si}_2\text{O}_6$ from several garnet-pyroxenites in the Dabie-Sulu UHP terrane, China consist of intimate intergrowths of orthoenstatite (OREN, *Pbca*) and clinoenstatite (CLEN, *P2₁/c*) and partially exhibit inclined extinction. These garnet pyroxenites are layered with coesite-bearing eclogite or omphacite and consist of garnet (Prp₅₄ to Prp₇₃), "enstatite" (En₈₅ to En₉₂), magnesite, and titanomagnetite (or clinohumite from Dabie) and have been subjected to UHP metamorphism at about $4.0\text{-}6.5 \pm 0.2$ GPa, $\sim 750 \pm 50^\circ\text{C}$. All CLEN lamellae in OREN have even numbers of 9 Å fringes without twins, and are oriented parallel to (100) of OREN. Both CLEN and OREN have identical compositions. The thickest CLEN lamellae (~ 0.5 micron) are from the Dabie sample. Cell parameters of the Sulu CLEN are $a = 9.54(7)$ Å, $b = 8.76(8)$ Å, $c = 5.15(4)$ Å, $\beta = 107.7(2)^\circ$, and volume = 410.04 Å³. The clinoenstatite from both areas is distorted low-P polymorph, may have formed either by the transformation from high-P clinoenstatite during decompression or by inversion of OREN due to shearing. If the first interpretation is correct, the protoliths of the garnet pyroxenites probably were subducted to mantle depths > 200 km prior to Triassic continent collision. The occurrence of pyropic garnet with high Na₂O (0.27 wt%) and Cr₂O₃ (up to 1.9-3.7 wt%) contents from the Dabie pyroxenite is consistent with this suggestion.