DEFORMATION OF THE UHP METAMORPHIC ROCKS IN THE SULU UHP METAMORPHIC BELT, CHINA: FROM MICRON TO CRUST SCALE STRUCTURES

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Sulu UHP metamorphic belt extending over 500 km in eastern China is part of the Qinling-Dabie-Sulu collisional orogenic belt resulted from the collision between the North China plate and the Yangtze plate during the Late Triassic. Coesite-bearing eclogite, gneisses and marbles are exposed along entire length of the Sulu UHP belt. Seismic reflection profiling revealed three main features of the crust structure across the UHP belt: stacked thrust sheets dipping to the south, a major detachment at the base of the thrust sheets and a normal fault cross-cutting the thrust sheets. Deep continental drilling (CCSD) and surface geology reveal that the stacked thrust sheets consist of over 10 km of UHP metamorphic rocks. The UHP rocks are interlayered granitic gneisses and paragneisses with minor amount of layers or lenses of ultramafic rocks and eclogites. On a mesoscopic scale the UHP rocks show isoclinal folding with various orientation. The major detaclunent crops out in the north of the UHP stacked thrust sheets as a 10 km wide high pressure (HP) mylonite zone that can be traced 200 km to the east, and is exposed at Yangkou as an UHP ductile shear complex. The UHP shear complex consists of interlayered granitic and eclogitic mylonites with well developed foliation and lineation. The UHP phase minerals, such as omphacite, kyanite, phengite and K-feldspar, show irregular undulatory extinction, kinks, subgrains and dynamic recrystallization indicative to dislocation creep being a major deformation mechanism. TEM study reveals dense dislocations, tilt walls, dislocation network and recrystallized grains with low dislocation density. The UHP deformation is estimated to take place at 624 °C and 3.3 GPa. Timing of the deformation is constrained by zircon age of 225 ± 3.2 Ma from an eclogite dike that crosscuts the mylonite. The normal faulting is observed in the region to relate to the Late Jurassic to Cretaceous extension and basin development. We suggest that the exhumation of the UHP rocks is due to back thrusting of the detached UHP slab in a compression regime but not normal faulting in an extension regime.