

Hydrous phases in UHP metamorphic rocks from the Dabie-Sulu UHP terrane, east-central China

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Abundant hydrous phases occur as stable UHP phases in a variety of UHP metamorphic rocks from the Dabie-Sulu terrane, China. Ti-clinohumite, chlorite, phlogopite and pargasite occur in garnet peridotite; talc, phengite, zoisite/epidote are present in both coesite eclogite and metasediments in addition to topaz-OH in Ky-quartzite and nyböite in coesite eclogite. OH-Ti-clinohumite with high TiO₂ of 4 - 5 wt% and low F (0.05 - 0.20 wt%) coexists with garnet, pyroxene and olivine (Ol₁), and was replaced by ilmenite + olivine (Ol₂) at the margins. Talc is characterized by low Al (0.03 - 0.04 pfu). Topaz-bearing quartzites consist of quartz + kyanite + topaz (5-20 vol%) ± phengite + minor pyrite and rutile. Some topaz grains display compositional zoning with decreasing F content from core (12 - 16 wt%) to rim (<10 wt%). The maximum replacement of F by (OH) is up to 55%, much higher than previously reported 30% for natural topaz. OH-Ti clinohumite, low-Al talc and topaz-OH from the Dabie-Sulu UHP rocks were formed at P-T conditions within the stability fields of diamond and/or coesite based on P-T estimates (700-900 °C, >3-6.7 GPa) of these and associated rocks and experimental results. Parageneses and stabilities of hydrous UHP minerals suggest that H₂O is an important component in subducted slab and may be carried to deep mantle by these UHP hydrous phases; some H₂O may be released to the overlying mantle wedge through breakdown of hydrous phases.