

Ultra-deep subduction of Yematan eclogite in the North Qaidam UHP belt, NW China: Evidence from phengite exsolution in omphacite

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ABSTRACT

Phengite exsolution in omphacite from the Yematan eclogite, North Qaidam UHP belt, NW China, is described. Mineralogical investigations show that the precursor omphacite in the Yematan eclogite contains up to 1.16 wt% K₂O and ~10 000 ppm H₂O. Experimental studies document this omphacite to be formed at pressures higher than 6 GPa (at 900 °C). The pressure-temperature conditions of 3.68 GPa and 892 °C for phengite exsolution in omphacite associated with garnet during the exhumation were obtained by using Grt-Omp-Ph geothermobarometer. We conclude that omphacitic-clinopyroxene in subducted eclogites may act as a robust medium to transport H₂O and potassium deep into the interior of the Earth. This study suggests that the Yematan eclogite in North Qaidam UHP metamorphic belt, NW China, may have been subducted and exhumed from depths of more than 200 km.

Keywords: Phengite exsolution, eclogite, ultra-deep subduction, North Qaidam, China