*American Mineralogist, Volume 100, pages 1848–1855, 2015*

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

**Lei Han[1], Lifei Zhang[1,*] and Guibin Zhang[1]**

[1]MOE Key Laboratory of Orogenic Belts and Crustal Evolution, School of Earth and Space Sciences, Peking University, Beijing 100871, China

## 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% $K_2O$ and ~10 000 ppm $H_2O$. 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 $H_2O$ 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