

Temperature dependence of water content in wadsleyite and ringwoodite

*Toru INOUE^{1,2}, Yuji HAMADA², Hanae KAYA², Yusuke EGI¹, Daichi MAEDA¹, Kazutaka YAMAGUCHI¹, Konosuke YAMADA¹, Takaaki KAWAZOE^{1,2}

1. Hiroshima Univ. Adv. Sci. Eng., 2. Hiroshima Univ. Sci.

Many researchers agree that the main constituent minerals of the mantle transition zone (MTZ: corresponding to 410-660 km depth) are wadsleyite (Wd) and ringwoodite (Rw), which are high-pressure polymorph of olivine. Although these phases are nominally anhydrous minerals (NAM), it has been shown that water can be present in the crystal structure at several wt% levels (e.g. Inoue et al., 1995; Kohlstedt et al., 1996) and that the MTZ can act as a water reservoir in the Earth interiors. In this context, Pearson et al. (2014) found ~1.4 wt% hydrous Rw in diamond inclusions, indicating that the MTZ is at least locally hydrous. Since the water content of minerals has a great influence on their physical properties, it is important to clarify the temperature dependence of water content in Wd and Rw in order to discuss the dynamics of the Earth's deep interior. Although previous studies have already shown the temperature dependence (Ohtani et al., 2001; Litasov and Ohtani, 2003), the results are inconsistent, and it is difficult to conclude that the temperature dependence has been clearly determined. Therefore, this experimental study was conducted to reexamine the temperature dependence of water content in Wd and Rw.

Keywords: wadsleyite, ringwoodite, maximum water solubility, mantle transition zone

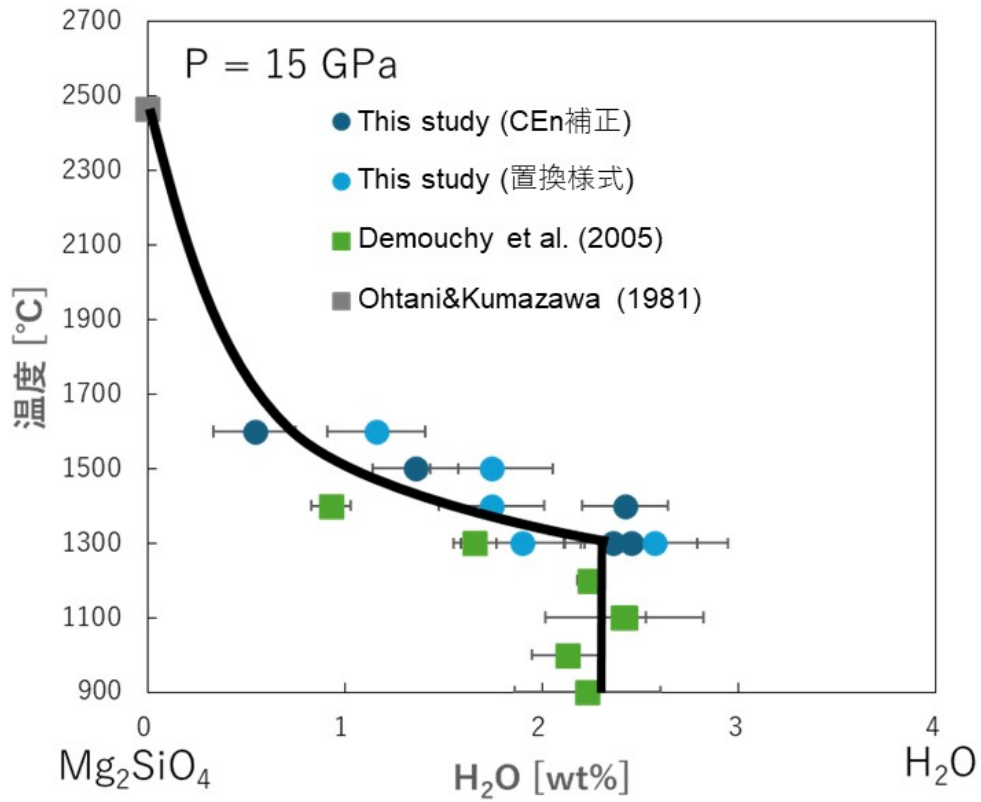


図1. Mg_2SiO_4 wadsleyite の最大含水量の温度依存性