Mr. Yuta Ishikawa
Master Student (M1)
Geodynamics Research Center

2021.11.25 (Fri.) 16:30 ~

Venue: Zoom

A link will be sent @grc-all within 30 minutes before the beginning of the seminar.

Keywords:

1. Hydrous mineral
2. Basalt
3. Lower mantle

Phase relation in a natural hydrous basalt under the lower mantle condition

It has been believed that basaltic crusts completely dehydrate at relatively low pressures and would not play any important roles in delivering water into deep mantle (Litasov and Ohtani, 2005). Recently, however, the formation of new some hydrous phases, i.e., Fe-Ti oxyhydroxide, Al-rich phase D, and Al-rich phase H (Al-PhH, hereafter), in basaltic compositions was reported under the low temperature and at pressures to 26GPa (Liu et al., 2019), which shed light on the possibility of water transport to the mantle transition region and uppermost lower mantle. In this study, attempts were made to reveal phase relations in a hydrous basalt composition at pressures of 27 and 30GPa and at temperatures 1000, 1200, and 1400 for up to 36hours, using natural hydrous basalt (JB-1b with a water content of 2.59wt%). As a result, depending on pressure and temperature conditions, Al-PhH is confirmed at 1200°C at 27GPa and at 1200 and 1400°C at 30GPa. Based on the obtained compositional data sets and mineral proportions evaluated by mass-balance calculations, it is shown that the hydrous basalt may retain 1.5-3.0wt% water as Al-PhH under the pressure and temperature conditions, close to those expected in cold slab subducted into the uppermost lower mantle. This indicates that the hydrous mineral may exist in cold subducting slabs under the lower mantle conditions, and when water is retained by hydrous minerals at low pressures, Al- PhH transports some amount of water into even deeper regions of the Earth's mantle.