THE GEODYNAMICS SEMINAR №537

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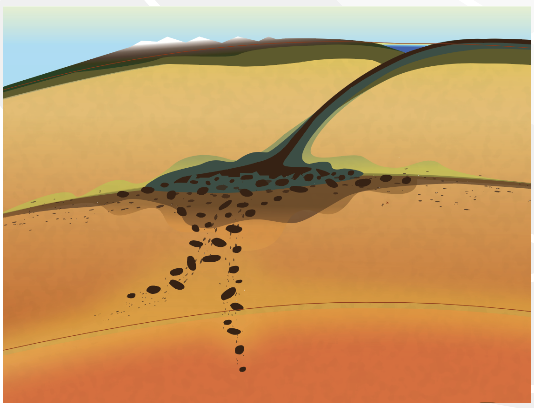
2020.11.06 (Fri.) 16:30 ~

Venue: Zoom

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



Sound velocities of the subducted basaltic crust in the deep mantle

P- and S-wave velocities are the unique tool we have to explore the bulk chemical composition and structures of the inaccessible deep Earth. Laboratory measurements of sound velocities of high-pressure minerals therefore provide crucial information on the deep mantle via comparisons with observed seismic velocities. Nonetheless, our current understanding of mantle velocities is mainly based on averaging velocities of single minerals, assuming an isotropic mantle and a global phase equilibrium. Recent studies however suggest that mantle rocks may not behave that simply, furthermore chemical and thermal disequilibrium may be introduced in the mantle by slabs subduction or upwelling plumes.

To investigate these issues, we conducted direct ultrasonic measurements on MORB aggregates, in-situ, at high pressure and high temperature. Simultaneous ultrasonic travel times, X-ray radiography imaging, and X-ray diffraction measurement enables to precisely assess V_P and V_S at absolute pressure and temperature. The obtained velocities on a given MORB mineralogical assemblages allows for a direct comparison with seismic velocity profiles, independently from single mineral elasticity data or mineralogical models from different studies. Our results will be discussed with regards to the emerging mantle "extended transition zone" (ETZ), in between depths of 400 km to 1000 km, which structure and composition may be critical for understanding mechanisms of mass transport by convective systems and the fate of the subducting slabs.

Keywords: 1. Ultrasonic measurement
2. High pressure
3. Mantle composition

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