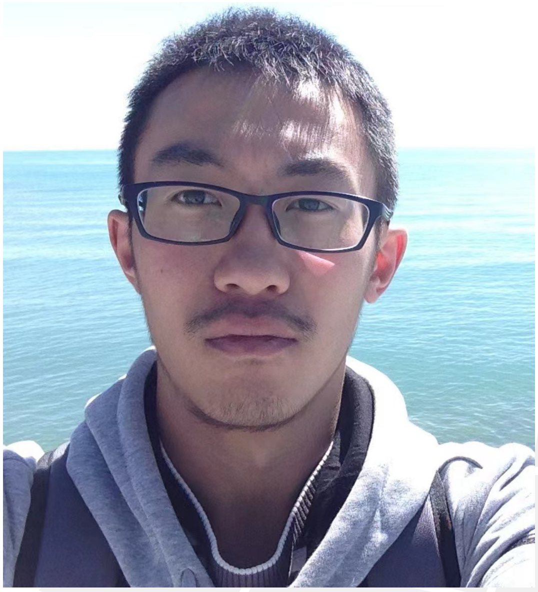

Strain-induced crystal preferred orientation of phase D and implications for seismic anisotropy in subduction zone at depth of mantle transition zone

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Venue: Zoom

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

Dense hydrous magnesium silicate (DHMS), play an important role in water transport into deep mantle and their rheological properties have profound influence on dynamic of subduction zones. Among these alphabet phases, phase D is somewhat special due to its layered crystal structure where Mg-O octahedron interlayered with Si-O octahedron, making it an anisotropic mineral both in rheology and seismic velocity. Growing evidence suggest that near subduction slabs, transition zone and uppermost lower mantle are seismically anisotropic (Vsh>Vsv) (Chen and Brudzinski, 2003; Ferreira et al., 2019; Lynner and Long, 2015; Nowacki et al., 2015), which is believed caused by deformation of the related minerals. Phase D, likewise, is expected to be a good candidate to shed some light on these phenomena owing to its relatively high shear wave anisotropy (Mainprice et al., 2007; Tsuchiya and Tsuchiya, 2008).

Rosa et al., (2013) reported that phase D can easily form crystal preferred orientation (CPO) where (0001) planes perpendicular with first principle stress direction under the condition up to 48GPa and room temperature. In our study, polycrystalline Mg-phase D were synthesized, and then uniaxially deformed using D111 deformation apparatus at 20GPa and 1000⊠, the consequent CPO were acquired and analyzed, showing (0001) maximum with various intensities which are proportional with strain (0.04~0.4), indicating basal slip is still dominant in the experimental conditions, which is consistent with the result of Rosa et al.(2013). In addition, the phase D with CPO can be a contributor to the observed radial anisotropy, and can generate delay time of 0.22s if 50km of phase D aggregate in thickness in slabs and surrounding hydrous peridotite was assumed.