

Slab dehydration and mantle melting in the transition zone and lower mantle

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Water released from slab dehydration reactions eventually percolate into the overlying (dry) mantle wedge, leading to mantle hydration and partial melting. This process has been extensively studied at intermediate depths (70-300 km), although recent high-pressure experiments showed that dense hydrous magnesium silicate (DHMS) phases may survive in the cold slab down to the core mantle boundary (Nishi et al., 2014). A recently established collaboration with the ELSI-Tokio Institute of Technology (Dr. Vincenzo Stagno) will allow to define the physical properties and water content in ultramafic rocks in the whole mantle for realistic P-T conditions. Dry and wet lower mantle solidii will be implemented through Simon-Glatzel equations that are normally used to describe the pressure dependence of the melting temperature found experimental studies (e.g., Nomura et al., 2014, Tateno et al., 2014). Results from this pioneering study will allow to determine 1) whether deep mantle flux melting associated with deep slab dehydration is feasible, 2) which are the geodynamical consequences for such process, and 3) how geophysical methods could detect the presence of melt in the mid and lower mantle.

References

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