

P-V equation of state of deep Earth's mantle-like glasses

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In this presentation we've investigated the evolution of the density of silicate amorphous systems, with composition relevant for the deep earth, as a function of pressure. We've adapted the X-ray absorption technique used in large volume presses to the Diamond Anvil Cell environment to measure directly the density in situ at high pressure. We've determined the P-V equation of state of silicate glasses in the high pressure domain, above 20 GPa, where a few data have been acquired for SiO₂ only and none on other geological relevant compositions, such as MgSiO₃ and MgFeSiO₃. We've used state of the art techniques to prepare the samples: the glasses were synthesized with an aerodynamic levitation system and cut with a focus ion beam, prior to the loading in the beryllium gasket. Details of the sample preparation and measurement techniques at the synchrotron beam line will be provided in the presentation.

Ultimately, the data will be used to constrain the physical behavior of glasses at high pressure, i.e. by determining their compressibility and bulk modulus etc. Due to similarities between melts and glasses, results will be extrapolated to better understand melt properties in the deep Earth.

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