



	Experiment title: Interactions between olivine polymorphs and aqueous fluids in the Earth's deep interior	Experiment number: ES-918
Beamline: ID15B	Date of experiment: from: 14 March 2021 to: 17 March 2021	Date of report: 05 October 2021
Shifts: 9	Local contact(s): Davide Comboni, Michael Hanfland	<i>Received at ESRF:</i>
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Report:

The aim of the current experiment was to advance our understanding of high-pressure-high-temperature interactions between rock-forming minerals and aqueous fluids by means of *in situ* synchrotron-based X-Ray diffraction (XRD). Several diamond anvil cells have been prepared at the Bayerisches Geoinstitut (BGI) prior to the beamline. A single crystals of ringwoodite, perovskite, and ferropericlasite with the size of $\sim 30 \times 30 \times 10 \mu\text{m}^3$ were be loaded inside a DAC along with a ruby sphere for the pressure monitoring. Laser-heating sessions were performed using the system installed at BGI. Mapping of the heated area with collection of the powder and single crystal XRD have been performed at ID15B. No indication of a chemical reaction have been found. While by Synchrotron Mossbauer Source we see evidences of reactions taking place, we suppose that the X-ray beam size of ID15B is relatively large to detect the products of rock-forming minerals' decomposition.

While we faced difficulties to study laser-heated samples, we have performed two SCXRD experiments on water-rich hydrous phases H and B, still aiming to advance our understanding of deep water cycle. The single crystals of phases H and B have been selected at ID15b and loaded in DACs along with rubie spheres for pressure monitoring. The DACs were loaded with neon as pressure-transmitting medium. The SCXRD experiments have been performed up to 60 GPa with a step of 3-5 GPa (Figure 1). The preliminary analysis shows that the data is of the good quality and will underlie a base for the upcoming publication.

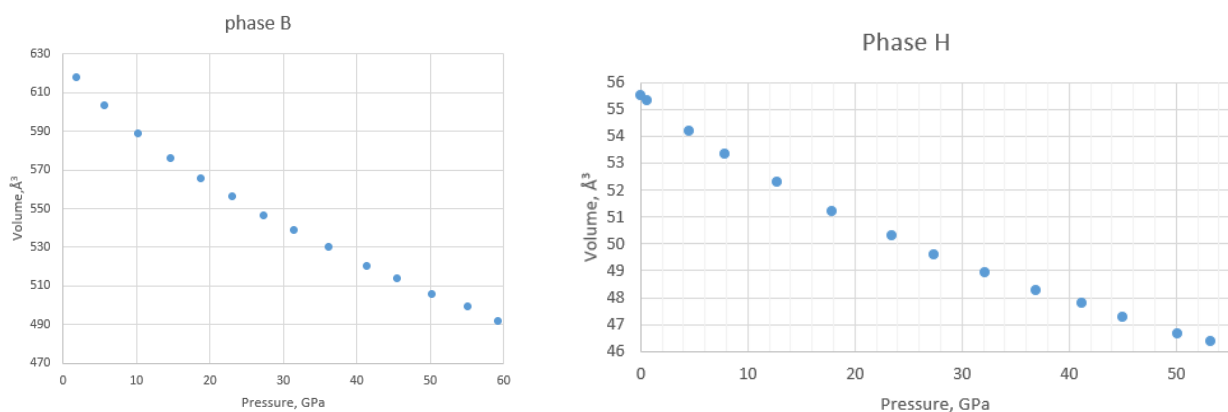


Figure 1. Pressure-induced evolution of unit-cell volumes of phase B and phase H