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Rheology and texture development in olivine deformed in the D-DIA at mantle PT-conditions

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In the Earth's upper-mantle, rheology is mostly constrained by the plastic properties of olivine. Over the recent years, several groups have been carrying out deformation experiments on olivine at mantle pressure (P) and temperature (T). Yet, the dynamics of the upper mantle is still not well constrained. To better constrain the rheology of the upper mantle, we carried out deformation experiment on San Carlos olivine and Fe-free olivine aggregates, at PT-range ranging from 4 to 10 GPa and 1373 to 1673 K respectively, and a strain rate range from 10^{-4} to 10^{-6} s^{-1}, using the D-DIA apparatus that equips the NSLS beamline X17B2(NY). The obtained diffraction data is used to extract the stress and the development of lattice preferred orientations (LPO) in the deformed materials. Lasts results for rheology indicate an activation volume ranging from 10 to 20 $cm^3.mol^{-1}$ and from 5 to 15 $cm^3.mol^{-1}$ for olivine and forsterite aggregates respectively, in "dry" conditions. The observed evolution of LPO in forsterite during deformation in different conditions shows that the glide of dislocations in the (010) plane is a dominant deformation mechanism during our experiment under 1673 K and 7 GPa, with an observed change of texture above 7 GPa. Experimental results are now being compared to results of VPSC numerical models to better constrain the effects of individual deformation mechanisms and connect both observations of texture and rheology.