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## Pressure dependence of olivine grain growth at upper mantle conditions

Filippe Ferreira<sup>1</sup>, **Marcel Thielmann**<sup>1</sup>, and Katharina Marquardt<sup>2</sup>

<sup>1</sup>Universitaet Bayreuth, Bayerisches Geoinstitut, Germany

<sup>2</sup>Imperial College London, Department of Materials, United Kingdom

The convective motion of Earth's upper mantle is controlled by two main deformation mechanisms: grain size-insensitive dislocation creep and grain size sensitive diffusion creep. Grain size thus plays a key role in upper mantle deformation, as it has a significant impact on the viscosity of the upper mantle. Moreover, grain size also affects seismic velocities as well as seismic attenuation.

Despite the importance of grain size and its evolution during deformation, there is still a lack of experimental data on grain growth of olivine at upper mantle pressures. For this reason, we here investigate olivine grain growth at pressures ranging from 1 GPa to 12 GPa and temperatures from 1200 to 1400°C. The experiments were done using piston cylinder and multi-anvil apparatuses. We used as a starting material olivine aggregates with small amounts of pyroxene (<10%) produced via sol-gel method.

Our results indicate that grain growth is reduced at increasing pressures. This suggests that the enhanced grain growth due to the temperature increase with depth may be offset, thus facilitating a change from dislocation to diffusion creep in the deep upper mantle. This might have an important impact on the dynamics of the upper mantle.