Rheology of San Carlos Olivine at High Pressure and Temperature	X17B1

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Rheological properties of San Carlos olivine have been measured under high pressure and temperature using the DIA cubic anvil apparatus at the X-17B1 beamline. The variation of the differential stresses with the temperature has been measured in detail at the transition from low-temperature plasticity to power-law creep.

Our experimental results on San Carlos Olivine ($Mg_{0.91}Fe_{0.09}SiO_4$) exhibit identical rheological behavior at similiar pressure and temperature conditions. At room temperature, the differential stresses increase linearly with the loading pressure at first, and saturate around 3 GPa which indicates yielding. The yield stress is around 5.2 GPa for San Carlos olivine. This result is a little lower than the yielding differential stress of forsterite. Similiar to the forsterite sample, the differential stress of San Carlos olivine decreases with the increasing temperature. The abrupt change occurs in the temperature range 400-500°C. In this San Carlos run, we observed the differential stress dropped 1.5GPa when we increased the temperature by about 10°C (see Figure 1). This dramatic transition may reflect the change of the deformation mechanism from low-temperature plasticity to high temperature power-law creep. Further data analysis is under way.

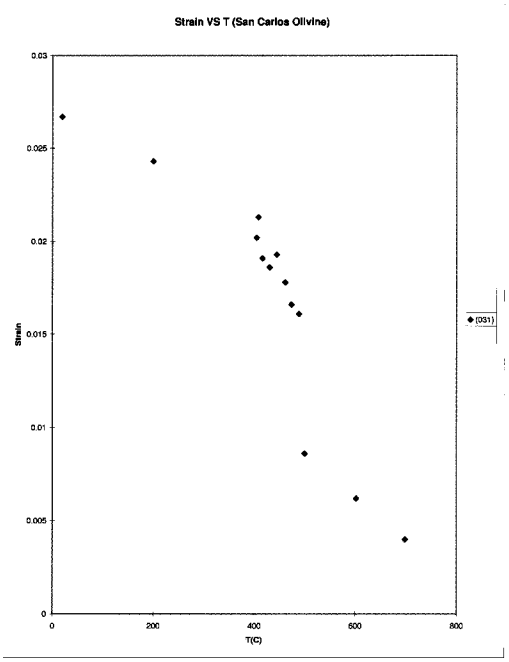

Figure 1. The variation of the differential stress with temperature at high pressure.