High-pressure and high-temperature in situ X ray observations of pyrope

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In situ X ray experiments on pyrope (Mg3Al2Si3O12) at pressures of 17 - 25 GPa and temperatures of 300 - 1300 K were carried out using an MA8-type high-pressure apparatus combined with synchrotron radiation. The compressivity at room temperature and the thermal expansivity at 21 GPa were determined from interpolation of the P-T-V data obtained in the present study. The bulk modulus, 167 GPa, was determined from a fit to a second order Birch-Murnaghan equation of state, consistent to the previous data. The determined thermal expansivity, 2.3*10^-5/K, is one of the largest in the mantle minerals which are stable at 600 km depth (e.g. ringwoodite, stishovite). So the buoyancy of a garnetite at 600 km depth is discussed.