understand its genesis and make inferences about processes in the mantle source.

A variety of methods are applied to ascertain the fluid composition of kimberlites, including fluid inclusion studies, infrared spectroscopy of olivine, and diamond surface features. Studies of fluid inclusions in a Canadian coated diamond showed high concentrations of Cl (26.6 ± 5.1 wt%). Additionally, high Cl content in a melt inclusion from olivine (18.5 wt%) and groundmass minerals (≥ 8 wt%) in the exceptionally fresh Udachnaya-East kimberlite (Siberia) imply high Cl^- content in kimberlitic melts and fluids. However, studies of diamond surfaces and olivine infrared spectra suggest H_2O-rich kimberlitic fluid compositions. Furthermore, Cl^--bearing minerals are not typically abundant in kimberlites, perhaps due to secondary Cl^- dissolution.

Natural diamond surfaces show a wide variety of different surface forms produced by fluid oxidation during magma ascent. Surface features are fluid composition-dependent, at least in the H_2O-CO_2 system. Hence, establishment of diamond surface forms produced by Cl^--bearing fluids will help further constrain kimberlitic fluid composition. To this end we explore diamond oxidation in the H_2O-Cl^- and CO_2-Cl^- systems at 1300 °C and 1 GPa in the piston-cylinder apparatus. Preliminary results show characteristic forms produced in NaCl-H_2O and KCl-H_2O compositions. Following completion of additional experiments, we will compare our results to diamonds from Lac de Gras kimberlites to constrain fluid composition in these kimberlites.

Chloride in kimberlites? Constraints from diamond oxidation experiments

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Kimberlites are the surface expression of deep-seated magmas derived from the subcontinental mantle. They intrude Precambrian cratons, forming pipe-shaped discordant structures, and erupt explosively at the surface forming pyroclastic deposits and craters. Kimberlites are often classified as ultramafic and alkaline rocks, but their primary composition is poorly constrained due to extensive contamination and secondary alteration. Volatile loss during eruption further compromises the record of volatile species. It is critical to improve constraints on kimberlite composition before we can

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