# High-pressure/-temperature reaction experiments between saline fluid and mantle rocks provide new insight into cratonic mantle metasomatism

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Saline (i.e., Cl-rich) fluids potentially are important metasomatic agents in the lithospheric mantle. Natural evidence for such deep saline fluids exists as high-density fluid inclusions in diamonds [1, 2] and as melt/fluid inclusions within various minerals in kimberlites [3, 4]. Previous experimental studies investigated melting relations in the chloride-carbonate-silicate system at upper mantle conditions [5, 6], however, a systematic investigation of how saline fluids react with the lithospheric mantle is lacking.

Here, we present reaction experiments between a model saline fluid and different mantle rocks (lherzolite, harzburgite, eclogite) at conditions corresponding to the lower cratonic lithosphere, performed over a P-T range of 3-6 GPa and 1050-1300°C using a multi-anvil apparatus. Preliminary results show that interaction between saline fluid and mantle rocks is very reactive. For example, reaction between saline fluid and lherzolite at 4 GPa and 1200°C leads to extensive melting with the restite consisting mainly of olivine and garnet. Pyroxenes are only observed as rare inclusions within garnet. In contrast, reaction between saline fluid and eclogite at 4 GPa and 1200 °C also leads to melting with the restite consisting exclusively of garnet, but the melt is more enriched in $SiO_2$.

These preliminary results demonstrate how saline fluids react with different components of the lithospheric mantle and lend support to evolutionary models for high-density fluids within diamonds [2].

[1] Izraeli et al. (2001). EPSL 187, 323-332. [2] Weiss et al. (2015) Nature 524, 339. [3] Kamenetsky et al. (2004) Geology 32, 845-848. [4] Abersteiner et al. (2018) Chemical Geology 478, 148-163. [5] Safonov et al. (2007) EPSL 253, 112-128. [6] Litasov et al. (2010) Geology 38, 1131-1134.