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# Peridotite xenoliths from the Chersky belt (Yakutia): Infiltrated carbonate-rich melts leaving no metasomatic record

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The Chersky seismic belt (NE-Russia) forms the modern plate boundary of the Eurasian–North American continental plate. The geodynamic evolution of this continent-continent setting is highly complex and it remains a matter of debate, how the extent of the Mid-Arctic Ocean spreading influenced the North Asian continent in this region since the Eocene. We constrained a model (Tschegg et al. 2011, Lithos) showing that volcanism in the Chersky area was triggered by extension and thinning of the lithosphere combined with adiabatic upwelling of the underlying mantle at 37 Ma. This implicates that the rift tectonics of the Mid-Arctic Ocean, at that time, affected the North Asian continent causing volcanic activity. Luckily, the basanites that were studied for these purposes host a representative number of peridotite xenoliths, which allow further constraints on the evolution of this area.
The suite of spinel peridotites (lherzolites and harzburgites), pyroxenites and mega-crysts enable to characterize upper mantle conditions as well as to observe different processes within the lithospheric mantle beneath the Chersky belt. Equilibration temperatures of the spinel lherzolites reveal approx. 900-1000 °C at pressures of 1-2 GPa, with melt extraction volumes around 4 %. The analyzed spinel harzburgites reflect equilibration at lower P-T conditions and around 8 % higher melt extraction rates.
We were able to find a completely preserved interstitial melt droplet in a lherzolite, in which a primary dolomite is in perfect phase contact with Na-rich alumosilicate glass and sodalite. Based on detailed and integrated investigations, we reconstructed origin and evolution of this spectacular carbonatic liquid that at depth differentiated from a carbonated silicate melt to an immiscible carbonate and silicate liquid, entered the lherzolite and quenched shortly before it was transported in the xenolith to the earth surface. To our surprise, the carbonate-rich melt infiltration did not cause any kind of metasomatism of the peridotite mineral assemblage, neither modally nor cryptically. Clinopyroxene trace element compositions clearly indicate that some of the studied rocks were influenced by percolating hydrous and basaltic melts, metasomatism through carbonate-rich melt or $CO_2$-rich fluids, however, can certainly be ruled out for the whole suite of peridotites.