## Composition and evolution of plume melts in the lower crust; Seiland Igneous Province

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The Seiland Igneous Province (SIP), Northern Norway predominantly consists of large gabbroic and ultramafic intrusions. These formed through continued fluxing of large volumes of melt through the lower crust (25-30 km) within a short duration of time (10 Ma) (Robets 2007). This region may therefore represent a rare glimpse at the plumbing system within a large igneous province.

The Reinfjord ultramafic complex in the south west of the SIP is mostly composed of modally and cryptically layered dunite-wehrlite-olivine clinopyroxenites intruded into pre-existing but cogenetic gabbro-norite. The intrusion also hosts a Ni-Cu-PGE sulphide deposit. Here, we measure trace element and major element compositions in olivine, clinopyroxene and orthopyroxene using LA-ICP-MS and EPMA.

The results show that the parent melts that formed the cumulates have nearly identical REE abundances as picrite dykes observed throughout the region. These have steep REE profiles with OIB affinity. High LREE/HREE ratios indicate that the mantle source region contained a significant component of residual garnet and clinopyroxene (i.e. garnet pyroxenite). Bulk rock analyses of gabbroic rocks in the SIP also have similar REE patterns (Roberts 2007). Analysis of cumulus and intercumulus clinopyroxene allow us to track the evolution of the parent melts as they fractionate at depth. We find that the melts do not undergo significant amounts of fractional crystallization at depth, meaning that large volumes of magma must pass through the system to shallower crustal levels. Lower crustal ultramafic intrusions may therefore play a crucial role in the transport of magmas through the lower crust by acting as more localized conduit systems.

### References:

Roberts, R.J.,2007, *Ph.D. thesis, Univ. of Witwatersrand, Johannesburg, South African Republic*, 225 pp.