

The Reinfjord Ultramafic complex, Seiland Igneous Province, Norway

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The Seiland Igneous Province (SIP) consists of large volumes (>5,000 km³) of mafic, ultramafic, silicic and alkaline melts intruded into the lower continental crust (25-30 km depth) from 570-560 Ma under an extensional regime. The SIP may therefore represent the exposed deep plumbing system of a large igneous event. Ultramafic melts were intruded into partially solidified gabbro-norite in three separated phases. The first two phases are composed of rhythmically and modally layered pyroxene dominated cumulates whereas the final phase is a cryptically layered dunite. Contamination of ultramafic melts by partial melting of gabbro is evident, but the variations in geochemistry and mineralogy of the ultramafic series are dominated by fractional crystallization and reactive melt infiltration processes. Sulphides are present throughout the complex and two reef deposits were identified; one enriched in Ni + Cu (0.38% Ni, 0.12% Cu) and the other in PGE (0.64 ppm Pt+Pd+Au, 0.15 ppm Os, 0.27 % Ni). These are locally associated with mafic OPX rich-pegmatites. Whilst the two reefs have similar chondrite normalized PGE spectra, they have distinct $\delta^{34}\text{S}$ isotope signatures. A positive Os anomaly is also observed.