Corundum eclogites: Partial melting residues of subducted troctolites from the mid-Archean

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The subcratonic lithospheric mantle underneath an Archean crust is the potential site for the storage of the residues of Hadean to Archean partial melting, of the partial melts and of their fractional crystallization products. The (subducted) melts and cumulates are brought to the Earth's surface as eclogite and garnet pyroxenite xenoliths. Many are interpreted in broad terms as seafloor altered basalts and gabbros. A more detailed reconstruction is possible as shown by Jacob et al. (2003) for quartz eclogites from Roberts Victor (Kaapvaal craton). These authors found by the presence of positive Eu anomalies, $\delta^{18}O$ values different to the Earth and close geochemical similarities with the plutonic section of ODP hole 735B that these rocks were originally cpx+plag cumulates. We will show for corundum eclogite xenoliths from the Bellsbank diamond mine in South Africa that kyanite and corundum bearing eclogites with their positive Eu-anomalies and low REE abundances and flat middle to heavy REE patterns were originally low pressure cumulates of mostly olivine and plagioclase (= troctolites) with intriguing similarities with modern day analogues from the plutonic MOR section, including LREE depletion like in N-MORB's. They were also partially melted after eclogitisation. The minimum age of partial melting is indicated by $^{87}Sr/^{86}Sr$ isotope ratios of 0.7007 in two clinopyroxenes which corresponds to 3.2 Ga with the bulk Earth evolution as reference line.