Oxygen, Sr and Nd isotopic evidence from kyanite-eclogite xenoliths (KL-2 pipe, Wajrakarur) for pre 1.1 Ga mantle metasomatism in Eastern Dharwar SCLM

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Kyanite-eclogite xenoliths from Wajrakarur are considered as remnants of subducted ocean-floor crust [1]. Here trace element concentration and isotopic data are presented in garnet (Grt) and kyanite (Ky) from xenoliths KL-2 E1-E4, characterized by [2]). We use the precise $^{87}Sr/^{86}Sr$ host kimberlite groundmass perovskite ratio (0.70312-0.70333, [3]) as a proxy for the extent of kimberlitic magma infiltration at 1.1 Ga. The xenolithic Grt and Cr-rich (upto 1506 ppm) Ky have more radiogenic $^{87}Sr/^{86}Sr$ values than kimberlite, at 1.1 Ga, of 0.703829-0.705203 and 0.703811-0.704502, respectively. Furthermore, the Grt and Ky $^{143}Nd/^{144}Nd$ ratios, at 1.1 Ga, are 0.509321-0.511372 and 0.510951-0.511156, respectively, and are distinctly lower than those of the host kimberlite (0.511870-0.512290, [4]).

This indicates that the infiltration of kimberlitic fluid has not altered the $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios in the Grt and Ky, and therefore their isotope compositions must be inherited and predate the kimberlite magma generation event at 1.1 Ga.

Trace elements in Grt and Ky indicate extreme metasomatism (Sr in Grt 104-296 ppm, in Ky 672-8713 ppm [limit Sr<2ppm] and Nb in Grt 0.64-1.78 ppm, in Ky 1.7-4.54 ppm [limit Nb<0.5ppm]). The xenoliths underwent at least one major melting event inferred from extreme depletions in Re, Os and $^{177}Os/^{178}Os$ ratios [5].

Their mantle-like $\delta^{18}O$ values (Grt 5.3-5.4‰, Ky 5.3-5.9‰), positive Eu anomalies in both Grt and Ky (similar to Group 1 HREE-depleted garnets of [1]) suggests that the protolith likely was a chromite-bearing leucogabbro, emplaced as a high-pressure cumulate at the crust-mantle boundary, which was later eclogitized due to deep-seated subduction and underwent episodes of extreme melting and metasomatism before 1.1 Ga and at least before 1.7 Ga, as inferred from their youngest Re depletion dates [5].

[1] Dongre *et al.* (2015) *GCA* **166**, 165-188. [2] Patel *et al.* (2009) *JAES* **34**, 336-346. [3] Paton *et al.* (2007) *Geology* **35**, 1011-1014 .[4] Gopalan & Kumar (2008) *PrecambRes* **167**, 377-382. [5] Anand *et al.* (2008) *9 IKC*-**A-00322**.