Noble gases and N in carbonatites from Newania, India:Pristine N in subcontinental lithosphere

S.BASU[1,2] AND S.V.S. MURTY[1]

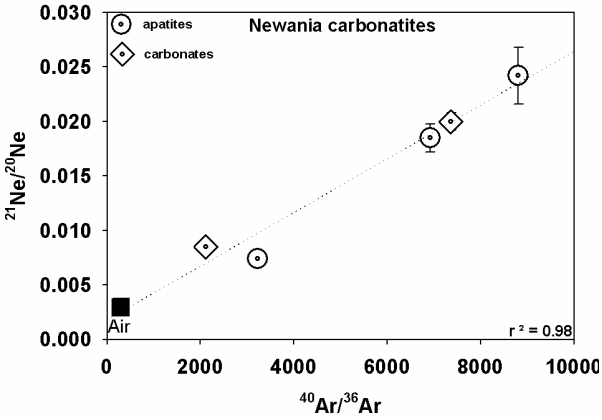
[1] Physical Research Laboratory, Ahmedabad- 380 009, India
[2] SUERC, G75 0QF, Scotland, UK; s.basu@suerc.gla.ac.uk

The mantle source of carbonatites is not unique. Also, it is still debatable if the huge amount of C in these rocks is pristine or subducted.

To constrain the mantle source of 2.7 Ga Newania carbonatites from India, and to trace any subducted component, we analysed noble gases and N from carbonate and apatite seperates by stepwise vacuum crushing. We also analysed N and noble gases from Kola carbonatites and our results agree with reported values indicative of plume [1].

The apatites from Newania show presence of mantle gases in all the crushing steps with $^{20}Ne/^{22}Ne$ up to 12.7 ± 0.3. Their $^{21}Ne/^{22}Ne$ are up to 0.201 ± 0.004. Such enriched $^{21}Ne/^{22}Ne$ (0.201 ± 0.004) is also observed for the carbonates, though their $^{20}Ne/^{22}Ne$ is atmospheric. K (up to 20 ppm) is too low to produce significant *in situ* radiogenic ^{40}Ar in the samples. The $^{40}Ar/^{36}Ar$ in the samples are correlated with $^{21}Ne/^{20}Ne$ (see figure), indicating mixing between air and mantle enriched in K and U, contributing to the excess ^{21}Ne and ^{40}Ar. This is also reflected in fissiogenic Xe composition. Such enriched lithospheric mantle source for Newania is in stark contrast to dominant plume (Kola) and MORB (Sung Valley) components [1,2] observed in other carbonatites.

Light $\delta^{15}N$ signatures in carbonates (-2.58 ± 0.89 ‰) and apatites (-12.6 ± 1.0 ‰) indicate preservation of pristine N composition in the subcontinental lithospheric mantle at least up to 2.7 Ga.



References

[1] Marty B. et al., (1998) *EPSL* **164,** 179-192.
[2] Basu S., and Murty S.V.S. (2006) *Chem. Geol.* (under review)