

## Why carbonatites in the Lesser Qinling have high HREE compositions?

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Carbonatites are typically characterized by very high concentrations of LREE. They have very high LREE/HREE ratios. However, the carbonatite dykes in the Lesser Qinling, China, shows flat to weakly LREE enriched chondrite-normalized patterns ( $La/Yb_n=1.0-5.5$ ), which is in marked contrast with all other published carbonatite data. The calcite crystals analyzed by LA-ICPMS also show similar geochemical feature to their whole rocks. Xu et al. (2006) suggested that the carbonatites represent calcite-rich cumulate that had crystallized from a carbonatite melt. However, it cannot explain that why they contain higher HREE (e.g.  $Yb>30$  ppm) than all other published carbonatite data. Calcite-rich cumulate is common in carbonatites (Woolley and Church, 2005). But the process cannot produce that other carbonatites have high HREE. Xu et al. (2006) considered that strong enrichment of HREE in the carbonatites may require their derivation by small degree of melting from a garnet-poor source. The explanation is not ideal, because other carbonatites may also derive from a garnet-poor source, and do not show high HREE contents. In addition, these carbonatite dykes is rarely intergrowth with pegmatitic quartz vein. Field observation indicates that their ages are close. Thus the high HREE abundances in the carbonatites may indicate that they underwent complex genesis processes. Regrettably, we cannot get unambiguous answer.

Woolley A.R. and Church A.A., (2005), *Lithos* **85**, 1-14.

Xu C., Campbell I.H., Allen C.M. et al., (2006), *Lithos* (in press).