Generation of intraplate basalts in an hetrogeneous big mantle wedge

YI-GANG XU[1]*, HONG-YAN LI[1] AND LU-BING HONG[1]

[1]State Key Laboratory of Isotope Geochemistry, Guangzhou Institute of Geochemistry, CAS, Guangzhou, 510640, China (*correspondence: yigangxu@gig.ac.cn)

The genesis of intra-continental basalts remains obscure. A number of petrogenetic models have been proposed including hotspots, rifting extension and mantle metasomatism associated by high fluid flux. Eastern China presents a special case where the presence of the stagnant Pacific slab in the mantle transition zone (MTZ) limits basaltic genesis within the upper mantle, rather than being rooted from the lower mantle. Geochemistry of Cenozoic basalts in this region therefore provides insights into the composition of the big mantle mantle (BMW) and the interaction/exchange between the upper mantle and the stalled slab in the MTZ. Ubiquitous recycled crustal components (oceanic crust, water, sediments) are present in the source of Cenozoic basalts from eastern China. Specifically, coupled high Fe_2O_3, water contents and low $^{87}Sr/^{86}Sr$ ratios are indicative of the involvement of a young HIMU-like component [1]. The ubuquitously low $\delta^{26}Mg$ of basalts compared to the normal mantle suggests a huge sedimentary carbonate reservoir in the depth [2]. Further studies on high-Si and low-Si basalts delineate a compositionally stratified BMW: in addition to the ambient mantle, the upper part of the BMW is composed of garnet pyroxenites with predominant EM1 and Indian mantle components, whereas the lower part consists of carbonated peridotite and/or eclogite with HIMU and Pacific Mantle components [3, 4]. The former may inherit eroded continental lithosphere mantle which is originally linked to dispersal of the Gondwanaland, whereas the latter gained its geochemical signature through continuous interacaction/exchange bwteen the BMW and the slabs in the MTZ. The basaltic generation in eastern China is likely driven by enhanced fluid/melt flux from the MTZ, which facilitated melting and upwelling of the mantle at a great depth. This model explains why the intra-continental basalts exhibit geohemical characteristics similar to oceanic island basalts, and why Indian and Pacific type mantle components co-exist in the Pacific tectonic regime. Investigation into how dehydration and decarbonization of the slab in the MTZ take place is desiered in the future.

[1] Xu Y.G. *et al.* (2012) *Chem. Geol.* **328**: 168-184. [2] Li S.G. *et al.* (2016) *Nat. Sci. Rev.,* doi: 10.1093/nsr/nww070. [3] Li H. Y. *et al.* (2016) *Geochimi. Cosmochim. Acta.* **178**: 1–19. [4] Li H. Y. *et al.* (2017) *J. Geophy. Res.* doi:10.1002/2016JB013486.