The genesis of felsic magmatism in a convergent margin setting: evidence from Mesozoic granitoids from West Qinling, Central China

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To better understand the origin of voluminous silicic rocks in a convergent continental margin, we have carried out an integrated study in which we have obtained geochronological, mineralogical, and isotopic data, of the Mesozoic plutons in West Qinling. Detailed elemental data demonstrate that these I-type granitoids underwent fractional crystallization of hornblende and apatite, with plagioclase accumulation to some extent. Except for some porphyritic granodiorites, Pb isotopes for other analyzed samples are characterized by high radiogenic and uniform Pb isotopes, together with limited variations in initial Sr and Nd isotopes, collectively pointing to a derivation from the Mesoproterozoic basement rocks at the lower crustal level, or a comprehensive mixing of different-age components that generated an average crustal residence age. Compared with experimental melt compositions of amphibolites, the these I-type granitoids are probably derived from an amphibolitic source under hydrous conditions due to incongruent breakdown of amphibole and biotite. A K-rich protolith is not required to produce high-K I-type granitoids. Based on the temporal–spatial distribution of granitic intrusions in West Qinling and the regional tectonic evolution, our interpretation is that these I-type granitoids was formed due to the northward subduction of the Paleotethyan ocean and subsequent collision. Together with previously published data and our new data, we propose that the I-type granitoids were generated by partial melting of lower crustal amphibolites, with minor mantle-derived materials. By contrast, the coeval K-rich Sangke leucogranites in West Qinling were generated from an aluminous source (e.g. metapelite) under fluid-absent conditions [1] during the subduction stage, and the Na-rich Xiaogouli leucogranites were derived from partial melting of metabasaltic protoliths under thickened conditions during the collision stage.

[1] Luo et al. (2018) JP. **59**, 447-482.

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