5.7.P06

Late Mesozoic evolution of the Ganhang belt, south China: Constraints from geochemistry of volcanic rocks

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This paper studied new petrochemical and isotopic geochemical data from the Ganhang volcanic belt, south China. Two periods of magma activities, i.e. 139~143 Ma and 98~105Ma basaltic eruptions, are recognized in this belt, each representing the results of previous tectonic events. Rock types associated with the two eruptions have obvious differences in mineral assemblage and chemical compositions. During the first episode, a large scale of basalts occurred and dated at 139+/-0.7~143+/-1.1 Ma, they have Rb-Sr and Sm-Nd isotopic compositions: $(^{87}Sr/^{86}Sr)_I$ =0.7041~0.7048 and ε_{Nd} =+3.78~+4.38, indicating that the magma came from the deficit mantle and mixed with little crustal materials. During the second episode of magmatism which took place in the late period of early Cretaceous, volcanism was accompanied by intense regional extension and development of a series of red basins. Erupted basalts yield 98~105 Ma isotopic age. Because of the inhomogeneous mixing with the crustal materials, the geochemical characteristics of these basalts exhibit both tholeiite and sub-alkaline basalt bearing olivine. The tholeiites have medium-high $^{87}Sr/^{86}Sr$ ratio (0.7054 ~0.7070) and lower (1.69~0.70), indicating that the magma of these basalts came from an unchanged mantle. The sub-alkaline basalts, on the other hand, have relative high $^{87}Sr/^{86}Sr$ ratio (0.7076~0.7080) and relatively lower value ofε_{Nd} (-6.43~-5.18), indicating that these magma came from an enriched mantle by mixing with crustal materials. The two stages of volcanism in the Ganhang belt resulted from interactions among the East asian and the Pacific plates during Mesozoic times. The Ganhang belt has been formed under compressional setting during late Jurassic-Cretaceous. This process shortened and thinkened the crust, and made the crust materials melted partially into S-type Granitic Magma.

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Partial melting and metasomatism in the subcontinental lithospheric mantle of NE Spain

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Ultramafic type I xenoliths entrained by alkaline mafic lavas of Neogene- Quaternary age from NE Spain are studied to assess the subcontinental lithospheric mantle in the area. Protogranular spl lherzolites and harzburgites are the most widespread lithologies, but porphyroclastic spl harzburgites and clinopyroxenites are also found.

Major element compositions in minerals from protogranular xenoliths define a melting depletion trend, from which minerals in porphyroclastic harzburgites and in clinopyroxenites differ.

Trace elements, analysed by LA-ICP-MS, in minerals further confirm partial melting, but also cryptic metasomatism affecting these rocks. Cpx concentrates the higher amount of trace elements and shows the classical decoupling between trace and major elements: the less fertile the rock is, the higher enrichment in incompatible elements the cpx shows. This is also observed in opx and spl. Both porphyroclastic harzburgite and clinopyroxenite always differ from the melting depletion trend observed in protogranular xenoliths.

REE patterns in cpx from some lherzolites are explained by low degree (< 10%) of either batch or fractional melting from a primitive mantle source in the spl domain field. However, multielement patterns fit in better batch melting, otherwise HFES (viz., Th, U, Nb) must have been already increased by metasomatism in these lherzolites. HREE fractionation in cpx from other lherzolites suggests moderate degree of fractional melting in the grt domain field, followed by grt transformation into spl+ pxs. HREE in cpx from protogranular harzburgites can be explained by higher degree (15- 25%) of fractional melting in the spl domain field. No cpx was observed in porphyroclastic harzburgites. Finally, REE pattern in cpx from clinopyroxenites indicates a cumulte origin from an alkaline melt different from the host lavas.

On the other hand, U- shaped REE patterns in cpx from some of the lherzolites and high LREE/HREE in cpx from all protogranular harzburgites provide evidence of metasomatism affecting these rocks, with chromatographic fractionation of REE from a percolating melt. Significant negative anomalies in Nb-Ta, Zr- Hf and Ti with respect to REE, along with high La/Yb_N vs. low Ti/Eu in cpx favour a carbonatic nature for this melt.

Opx in porphyroclastic harzburgite differs by higher LIL, Ti and other transition elements, pointing to other type of metasomatism related to a silicate melt.