Jurassic magmatic flare-up along the Korean Peninsula: Geochemical perspectives and tectonic implications

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The Jurassic magmatic activity in the Korean Peninsula marks the most distinguished flare-up in the Phanerozoic. The Jurassic flare-up initiated along the outboard Yeongnam Massif in association with the subduction of the Paleo-Pacific plate and migrated toward the inboard Gyeonggi Massif. The earliest phase of the flare-up (203–192 Ma) is represented by dominantly sodic, calc-alkalic plutons that evidently incorporated primitive mantle-like components. The crustal signatures of the Yeongnam plutons became progressively more prominent with decreasing ages. The inboard plutons occurring in the Gyeonggi Massif and the intervening Okcheon Belt are dominated by Middle Jurassic peraluminous, high-K granites showing conspicuous old crustal isotopic signatures. The isotopic compositions and inherited zircon age patterns shared between the Toarcian Yeongnam plutons and the Middle Jurassic inboard plutons collectively suggest their common crustal source. Their Nd-Hf isotopic compositions are distinctly less radiogenic than those reported for the Jurassic plutons in South China, corroborating the North China affinity of the Yeongnam and Gyeonggi massifs. Geochronological, geochemical, and isotopic data compiled in this study lead us to propose a tectonomagmatic model consisting sequentially of (1) an extension-dominated arc system in the margin of the Yeongnam Massif (203–192 Ma), (2) low-angle subduction and development of an advancing arc system (192–183 Ma), and (3) continued low-angle subduction, extensive underthrusting of melt-fertile crustal materials to the arc root, and culmination of magmatic flare-up in the inboard region (183–167 Ma). Subsequent magmatic lull and previous Rb-Sr/K(Ar)-Ar ages of synkinematic rocks and minerals indicate that the compressional arc system had been maintained until the Early Cretaceous (c. 110 Ma).