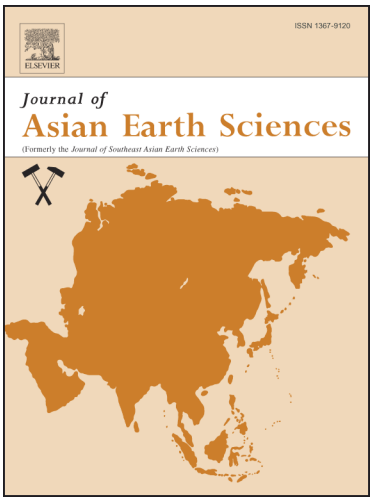


Full length article

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# An evolving magmatic-hydrothermal system in the formation of the Mesozoic Meishan magnetite-apatite deposit in the Ningwu volcanic basin, eastern China

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**Abstract**

The Meishan iron deposit contains 338 Mt of iron-ore reserves at 39% Fe and represents the largest magnetite–apatite deposit in the Ningwu Basin of eastern China. Controversy has long existed about whether this deposit had a hydrothermal or iron-oxide melt origin. Iron mineralization is genetically related to plutons that are composed of gabbro-diorite, which were emplaced at 130 ± 1 Ma. These rocks have $SiO_2$ contents of 51.72–54.60 wt.%, $Na_2O$ contents of 3.47–4.04 wt.%, $K_2O$ contents of 2.02–2.69 wt.%, and $K_2O/Na_2O$ ratios of 0.51–0.73. These rocks are enriched in LILEs and LREEs and depleted in Nb, Ta, and Ti, which indicates that the magma originated through partial melting of an enriched lithospheric mantle source in a subduction environment. A pattern of decreasing initial Sr isotopic ratios and increasing εNd(t) values with time in Early Cretaceous magmatic rocks of the Ningwu Basin may indicate incorporation of increasing proportions of asthenospheric mantle material into the source magma, which is consistent with the processes of lithospheric thinning and asthenospheric upwelling in eastern