

Neoproterozoic (ca. 860 Ma) A-1 type volcanic activity of the Gyemyeongsan metavolcanics in the Okcheon Metamorphic Belt, Korea: a prelude to the Rodinia breakup?

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The Gyemyeongsan Formation is composed of mainly metavolcanic rocks and is distributed over the northeastern part of the Okcheon Metamorphic Belt. In general, constituent rocks show very high abundances of rare earth elements (REE) and high field strength elements (HFSE). In part, contents of magnetite and/or rare earth minerals approach to ore grade. Lack of noticeable Nb negative anomaly on spider diagram indicates negligible contribution of crustal material in their generation and also excludes the arc environment for their tectonic environment. If we apply the tectonic discrimination diagram utilizing immobile HFSE Nb and Y, the metatrachytes of the Gyemyeongsan Formation are categorized as within-plate products. They also show the typical features of A-type magma, such as noticeably high contents of REE, HFSE and Ga. Their geochemical characteristic can be classified further as A-1 type that is one of the distinctive features of the continental rifting. Hafnium isotopic composition of zircons yields positive initial epsilon values about 5, indicating their derivation from slightly enriched mantle. SHRIMP U-Pb zircon age determination of the metavolcanics yields eruption ages of ca. 860 Ma in the Neoproterozoic. The age of metavolcanics of the Gyemyeongsan Formation is somewhat earlier than generally accepted initiation of breakup of the supercontinent Rodinia, i.e. ca. 830 Ma based on evidences from the South China Block. However, considering the facts that the metavolcanics of the Gyemyeongsan Formation have A-1 type geochemical characteristics and hafnium isotopic signature of mantle, it would be natural to seek possible link with a continental rifting event. Probably it was a prelude to the breakup of supercontinent Rodinia.

Keywords: A-type, U-Pb zircon age, breakup, Rodinia