Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36037

Zircon U–Pb and Hf isotopic records of Cretaceous–Paleogene plutons in the Gyeongsang Arc, Korean Peninsula: Implications for the magmatic flare-up along the East Asian continental margin

DR. HUI JE JO, PHD AND SUNG WON KIM
Korea Institute of Geoscience and Mineral Resources

Cretaceous–Paleogene arc magmatism is extensive along the East Asian continental margin; however, the timing and sources of magmatic flare-ups and their links to changing slab dynamics remain debated. Here we compile new and published zircon U–Pb ages and Hf isotopic data for plutons (mainly granitoids) hosting MMEs and xenoliths in the Gyeongsang Arc. By comparing these isotopic records with adjacent regions (NE–SE China, NE–SW Japan, and the Russian Far East), we evaluate spatiotemporal variations in magma generation and crust–mantle contributions.

In the Gyeongsang Arc, magmatism is characterized by episodic activity primarily between 99 and 48 Ma, punctuated by magmatic lulls during 140–99 Ma and 48–27 Ma. Zircon Hf isotopic records reveal an isotopic pull-down during the Late Cretaceous to Paleogene (ca. 110–60 Ma), with εHf(t) values decreasing to ~−5. This is followed by a rapid isotopic pull-up to ~+20 at 54 Ma (Namsan A-type granite), and a subsequent isotopic pull-down continuing to 27 Ma. Regional comparisons show that in NE Japan, εHf(t) decreases to ~−12 during 130–100 Ma. In contrast, SW Japan exhibits an overall rise in εHf(t), reaching up to +19 between 80 and 19 Ma, with a magmatic hiatus at 64–46 Ma. In NE–SE China, εHf(t) values generally decreased between 144 and 73 Ma. This region shows a marked spatial transition: magmatism waned in NE China by 135 Ma, followed by the onset of large-volume magmatism in SE China after 117 Ma, before a cessation of magmatic activity after 73 Ma. Finally, in the Russian Far East (Sikhote-Alin Orogenic Belt), a magmatic lull persisted from 109 to 92 Ma, after which εHf(t) values show a pull-up to ~+16 (92–78 Ma) and a subsequent pull-down until the termination of activity at 56 Ma.

Notably, the disparate isotopic records in the Gyeongsang Arc, highlighted by the pronounced εHf(t) pull-up at 54 Ma, reflect significant heterogeneity in magmatic flux and a dynamic interplay between juvenile input and crustal reworking. These findings provide a refined framework for understanding the evolving subduction history along the East Asian continental margin.