Trace element composition of zircon in Kofu granitoids: Quantitative indicator of sediment involvement in parent magma

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Zircon has been used as a geochronological and geochemical indicator for constraining the nature of their host rocks. Recent developments of analytical methods enable us to extract information concerning the host rock from a single zircon grain. As such an example, oxygen isotope ratio of zircon is often used to estimate contribution rates of mature sediments into granitoid magma. Trace element in zircon is also expected to reflect chemical nature of host rock. Some previous works tested the availability of REE concentrations in zircon as a proxy of sedimentary species incorporated into parent magma, but its usability has not been fully established. This is partly attributed to the fact that initial melt composition, type of incorporated sediment, and crystallized minerals are variable within each analyzed granitoid. Thus, by using granitoids that were originated from similar initial melts and involved similar sedimentary materials during magma ascent, we tried to select useful trace elements for the evaluation of amount of sediment involvement.

Kofu Granitic Complex (KGC) is the largest granitic body within the South Fossa Magna region, and is subdivided into 8 plutons; Ashigawa, Tonogi, Sasago, Shiodaira, Sanpo, Hirose, Mizugaki, and Shosenkyo plutons. Saito et al. (2007) suggested a hybrid lower crustal anatexis model to produce the parental magmas of each pluton. They explained diversities in whole-rock Sr isotopic composition and K content within the KGC as variable involvement of the Honshu arc metasedimentary component (Shimanto belt) into the hybrid source. In the above-mentioned order, involved amount of sediment increases, and Mizugaki and Shosenkyo plutons are expected to have incorporated most sedimentary materials. This study uses the whole-rock Sr isotopic composition as a benchmark of the incorporated sediment, and checks zircon trace elements that reflect the amount of sediment involvement.
Trace element concentrations in zircons were determined with a LA-ICP-MS/MS at Gakushuin University. Because sedimentary components are generally enriched in incompatible elements, zircons in granitoids that have involved large amount of sediments are also expected to be enriched in the elements. Nb and Ta concentrations in zircons show positive correlations with whole-rock Sr isotopic composition, whereas Th content in zircon seems independent of the amounts of sediment involvement. We will report the preliminary results in this presentation.

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