

# **The formation of skarn deposit of the Kamaishi Mine in the Kitakami Mountains, Japan: constraints from Sr-Nd isotopic data, zircon U-Pb age and Hf isotopes.**

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The Kamaishi mine is located in the Kitakami Mountains, Northeastern Japan. It is a largest Fe-Cu deposit in Japan. Early Cretaceous igneous complexes, the Ganidake granodiorite and diorite, and the Kurihashi granodiorite are occurred in the Kamaishi mine. The Ganidake granodiorite is considered to have formed Fe-Cu mineralization and zonal skarn of the Kamaishi deposit, although there is no age difference between the Ganidake and Kurihashi granodiorites. The zonal skarn was formed at the boundaries between limestones and sedimentary rocks or igneous rocks.

In this study, we examine zircon U-Pb SHRIMP ages and its Hf isotopic compositions, and whole-rock composition and Sr-Nd isotopic compositions of Early Cretaceous igneous complexes around the mine and skarns in the mine to understand the formation of skarn deposit of the Kamaishi mine.

The ages of granitic rocks in Kitakami Mountains range from 127 to 113 Ma and are generally young in the western part. The zircon U-Pb dating of the Ganidake granodiorite and the Kurihashi granodiorite yield  $123.43 \pm 0.70$  Ma and  $119.65 \pm 0.71$  Ma respectively.  $\epsilon_{\text{Hf}}(t)$  values of these rocks are identical. Whole-rock composition of the Ganidake granodiorite shows the adakitic characteristics. On the other hand, the Kurihashi granodiorite shows the geochemical characteristics of island arc affinity. Initial Sr values between them are different. The Sr isotopic and trace element compositions indicate that skarn formed by significant amount of fluid from the Ganidake granodiorite. We also discuss the fluid-rock interaction and fluid composition which formed skarn ores.