

U-Pb geochronology and geochemical characteristics of the Oritate travertine, Toyama Prefecture, Japan.

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In-situ U-Pb dating of carbonate minerals can be applied to understand the timing of vein-type mineralization, fault movements, and other geological events forming calcites, which are difficult to be dated by other methods. However, it is often difficult to obtain reliable estimated ages of calcite because calcite usually contains high common Pb content.

In this study, we present the geochronological results of the Oritate travertine from Unazuki area, Toyama Prefecture, Japan. The U-Pb dating of calcite provides the timing of hydrothermal fluid activity, as travertines are typically formed by a precipitation of carbonate minerals from hot spring. The Oritate travertine is called as 'Onyx Marble' by its texture. It shows layered texture with different colors from gray, white, to brown. It consists of aragonite and calcite.

High initial $^{238}\text{U}/^{204}\text{Pb}$ (μ) content is requirement for precise U-Pb dating of calcite, because calcite generally contains significant amount of common Pb. It is also better to contain high U in the order of several tens of ppm for U-Pb dating. The U and Pb concentration of Oritate travertines are very low which is less than 1 ppm. Although the chemical compositions of Oritate travertine imply the difficulty to apply U-Pb method, we examined U-Pb dating of calcite with relatively high common Pb. The U-Pb dating of Oritate travertine was attempted with the LA-ICP-MS utilize a New Wave Research 193UC excimer laser ablation system, coupled to an Agilent 7700 quadru-pole ICP-MS. The results show that the Oritate travertine formed at Late Cretaceous-Paleogene.