

A two stage P - T - t history of the Sanbagawa metamorphic terrane constrained by Grossular U–Pb geochronology

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U–Pb geochronology of grossular garnet

The geochronology of metamorphic minerals have an essential role in constraining Pressure-Temperature-time (P - T - t) paths of metamorphic rocks for further understanding of orogenic activities. Among metamorphic mineral species, Grossular (Grs)–Andradite (Adr) series garnet is a potential target for determining both U–Pb ages [1] and P - T conditions. We conducted in-situ U–Pb dating of Grs with sub-ppm level of uranium occurred in a metamorphic marble by using multiple spot Laser Ablation-Multiple Collector-ICP-Mass Spectrometry (msLA-MC-ICP-MS) [2][3][4]. The sample was collected from the eastern margin of the Eastern Iratsu body in the Sanbagawa metamorphic terrane [5].

Results and Discussions: two-stage P - T - t history

The U–Pb ages of 97 ± 10 Ma (Grs core) and 106 ± 16 Ma (Adr-rich rim) can be linked to the P - T conditions of the eclogite-facies stage and the juxtaposition of the eclogite and non-eclogite units (550–650 °C and 1.0–1.3 GPa), respectively. The combined geochronological data of this study and previous studies disclosed a two-stage P - T - t history of the Sanbagawa eclogite-facies rock; the rapid exhumation (~ 27 mm/yr) from the eclogite-facies stage to the juxtaposition within ~ 1 Myr and the slow exhumation (~ 6 mm/yr) after the juxtaposition.

[1] Seman *et al.* (2017) *Chem. Geol.*, **460**, 106-116.

[2] Obayashi *et al.* (2017) *J. Anal. Atom. Spectrom.*, **32**, 686-

691 [3] Hattori *et al.* (2017) *J. Anal. Atom. Spectrom.*, **32**, 88-

95. [4] Makino *et al.* (2019) *J. Anal. Atom. Spectrom.*, **34**,

1794-1799. [5] Takasu & Kohsaka (1987) *J. Geol. Soc. Japan*, **93**, 517-520.