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Upper Carboniferous adakitic granite from eastern margin of the Abukuma Mountain and its geological significance

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East block of the Hatagawa fault in the eastern part of the Abukuma Mountains are considered to the southern extension of the south Kitakami belt (Kubo and Yamamoto, 1990). Wariyama granitic body occurs along the east of the Futaba Fault, juxtaposed to the east of the Hatagawa fault, in eastern end of the Abukuma Mountains. The Wariyama granitic rocks are adakitic granites poor in K_2O and Rb, and similar granitic rocks occur as borehole samples from Matsukawaura (Abe and Ishihara, 1985; Kanaya, 1996) and Tomioka, these adakitic granites are considered to be the southern extension of the Lower Cretaceous adakitic granites in Kitakami (Tsuchiya et al., 2007). However, Ohtomo et al. (2008) described monazite, uraninite, and zircon U-Th-Pb age around 300Ma, and Tsutsumi et al. (2010)described zircon U-Pb SHRIMP age of 293.0 +/- 1.8Ma, 300.3 +/- 1.5Ma, and 304.3+/- 1.7Ma from the granitic rock in the borehole sample in Tomioka. From this, geological position of the Wariyama granitic body should be further studied in detail.

The Wariyama granitic body occurs along the east of the Futaba Fault, eastern end of the Abukuma Mountains, and exhibits an N–S-trending elongated shape about 0.5 to 1.5 x 15 km (Fujita et al., 1988). The Wariyama granitic rocks composed mainly of strongly foliated biotite-hornblende tonalite, which is characterized by poverty of K-feldsper. Kink and microcracking in plagioclase and subgrains in quartz are generaly shown. Nevertheless the degree of foliation shows remarkable local variation, modal compositions of constituent minerals are homogeneous. U-Pb dating of zircons were carried out using Agilent 7500cx quadrupole inductively coupled plasma mass spectrometer (ICP-MS) with a New Wave Research UP-213 Nd-YAG UV (213 nm) laser ablation system (LA) installed at the Kyushu University (Adachi et al., 2012). Zircon grains from biotite-hornblende tonalite (KAKUDA7) are 0.005–0.03 mm, elongated and euhedral with oscillatory zoning. All data concentrate around ca. 300 Ma, 8 analyses from 8 grains define a concordant age of 302.1 +/- 3.9 Ma (MSWD = 5.7, probability of concordance = 0.017). U-Pb zircon age obtained here is similar to those of the granitic rocks from the Tomioka borehole after Ohtomo et al. (2008) and Tsutsumi et al. (2010). Therefore, granitic rocks distributed to the east of the Futaba fault are considered to be adakitic granites of Upper Carboniferous age.

Kobayashi (2000) divided the Paleozoic granitic rocks in Japan into two groups; Ordovician to Lower Carboniferous granites (450-350Ma) and Permian granitic rocks (280-250Ma). In addition, Isozaki et al. (2011) shows five major granitic activity in the geotectonic history of the Japanese Island; Cambrian to Silurian (520-470Ma, 440-400Ma), Permian (280–250Ma), Triassic to Jurassic (240-210Ma, 190-150Ma), Early Cretaceous (110-90Ma), and Paleogene (60–30Ma). In these granitic rocks, Cambrian to Jurassic rocks are mostly digested by the past tectonic erosion processes in the fore-arc domains (Isozaki et al., 2011). Discovery of the 300Ma adakitic granite of this study indicates that the Permian granitic activity began from 300 Ma by the adakitic activity. The occurrence of the typical adakitic rocks indicates the possibility of ridge subduction and/or young plate subduction around 300Ma in the Japanese Island.

Keywords: zircon geochronology, adakite, Wariyama, Abukuma, Upper Carboniferous