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Cambrian tonalite from Horei, Ofunato in southern Kitakami Mauntains, Japan

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The Lower Cretaceous volcanic rocks of Ofunato Group and plagioclase quartz diorite porphyry dikes are distributed in Ryori district, south Kitakami belt, Japan. The felsic volcaniclastic rocks and tonalite is discovered within the Ofunato Group in Horei, Ofunato, Japan. The felsic volcaniclastic rocks occur as blocks less than 10 m size, and tonalite are found as blocks less than 2 x 1 m in size. The tonalite composed mainly of plagioclase, quartz, biotite, and hornblende and is characterized by poverty of K-feldsper. The tonalite is rich in SiO_2 (73.1–73.4%), and is classified as volcanic arc granite after Pearce et al. (1984). However, it is characterized by low K_2O (0.72–1.27wt%), Rb (16–32ppm), and Ba (91–97ppm) concentrations. This rock is considered to be derived from arc magmatism in immature oceanic arc setting.

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 tonalite concentrate around ca. 500 Ma, 8 analyses from 8 grains define a concordia age of 498 +/- 7 Ma. U-Pb zircon age obtained here correspond to latest Cambrian age, and is similar to U-Pb zircon SHRIMP age of the granitic rocks from the Daiouin granite in Hitachi metamorphic rocks (490.8 +/- 6.1 Ma) and the Hikawa granite in Higo metamorphic rocks, Kyushu (502.5 +/- 9.6 Ma) after Sakashima et al. (2003). In addition, Tagiri et al. (2010) described U-Pb zircon SHRIMP age of metamorphic porphyry (505.1 +/- 4.4 Ma) and metamorphic granite clast (499.6 +/- 5.6 Ma), and Tagiri et al. (2011) reported U-Pb zircon SHRIMP age of felsic schist (510.0 +/- 4.0 Ma) from the Hitachi metamorphic rocks. These rocks are considered to be resulted from Cambrian arc-trench system in proto-Japan (Isozaki et al., 2010). In south Kitakami Mountains, Shimojo et al. (2010) described U-Pb zircon SHRIMP age of trondjhemite in Hayachine complex (466 +/- 6 Ma), and Sasaki et al. (2013) reported that the solidification age of the Hikami granites is 450 Ma. In addition, Osanai et al. (in press) described U-Pb zircon LA-ICPMS age of granitic rocks in the Kurosegawa tectonic line in Kyushu (446–472 Ma). These data suggests that the granitic activity in early Paleozoic of proto-Japan arc occurs at ca. 500 Ma and ca. 450 Ma.

Keywords: Kitakami, Cambrian, zircon, U-Pb age, tonalite