

Chronological and isotope geological study of Cretaceous granitic rocks, upper reach of the Nakagawa river, Fukuoka Prefecture

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Cretaceous granitic rocks, consisting of Itoshima granodiorite and Sawara granite, are occurred at upper reach of the Nakagawa river, Fukuoka Prefecture (e.g., Karakida, 1985; Owada et al., 1999). Ages of the Itoshima granodiorite and the Sawara granite are 116 to 97 Ma and 114 to 82 Ma, respectively (Karakida et al., 1965; Shibata & Karakida, 1965; Owada et al., 1999; Yanagi et al., 1999). The Itoshima granodiorite is occupied at northwest and south parts of study area, whereas the Sawara granite is exposed at northeast part of the area. The granodiorite composing of amphibole, biotite, plagioclase, quartz and potassium feldspar, is ash to dark greenish coarse grained rocks. The regional strike of foliation in the granodiorite is NW-SE with S dip. The Sawara granite characterized by potassium feldspar mega crystals is ash whitey granite, which consists of potassium feldspar, quartz, plagioclase and biotite with small amounts of muscovite and sphene. Fine grained granite (Sawara fine granite) distributed around contact with the Itoshima granodiorite.

Nine whole rock samples from the Sawara fine granite and the Sawara main granite yielded an Rb-Sr whole rock isochron age of 101.2 ± 10.9 Ma with an initial Sr isotopic ratio of 0.70531 ± 0.00014 and that of 96.6 ± 5.9 Ma with an initial ratio of 0.70545 ± 0.00006 , respectively. Furthermore, an Rb-Sr mineral isochron ages of the Sawara main granite and the Itoshima granodiorite are 88.3 ± 0.5 Ma with an initial Sr isotopic ratio of 0.70561 ± 0.00004 and 88.9 ± 0.2 Ma with an initial ratio of 0.70545 ± 0.00013 , respectively. If the Sawara fine and main granites are derived from same magma, Rb/Sr ratio of source magma for both granites is calculated 0.74 by obtained whole rock isochron ages and initial Sr isotopic ratios. However, the Sawara fine granite has Rb/Sr ratios of 0.23 to 0.46, it doesn't harmonize with the calculation result. It is suggested that both granites have been originated from different magmas. The idea that the Sawara fine and main granites have same origin, is also denied from Rb/Sr vs. Rb and Sr(t) vs. 1/Sr diagrams.

From mentioned result, activity of Cretaceous granitic rocks in this area estimated as follows. (1) The Itoshima granodiorite formed at 116 Ma (Owada et al., 1999). (2) The magma for the Sawara fine granite intruded into the Itoshima granodiorite at 101 Ma, and temperature of the granodiorite have been heated to over the closure temperature of biotite in Rb-Sr system. (3) The magma for the Sawara main granite intruded into the Sawara fine granite at 96.6 Ma. (4) The granitic rocks in this area gradually cooled and the temperature reached the closure temperature of biotite at 88 Ma.