Significance of the mafic rocks in the Cretaceous Itoshima granodiorite, north Kyushu

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The Cretaceous Itoshima granodiorite is exposed around the Sefuri mountain range, north Kyushu. The Itoshima granodiorite consists mainly of tonalite, and quartzdiorite. The tonalite is a dominant rock type in this area, whereas the quartzdiorite is enclosed in the tonalite as a stock. The tonalite consists of hornblende, biotite, plagioclase, quartz, and minor amounts of K-feldspar and titanite. The quartzdiorite is characterized by presence of clinopyroxene. The SiO2 contents of the tonalite range from 60 to 69 %, whereas those of the quartzdiorite vary from 54 to 61%. The quartzdiorite shows distinct geochemical trend compared with the tonalite on the Harker plots. In particular, the former is enrichment in K2O, Rb, Nb and Y, and depletion in Na2O and Sr rather than the latter. These lines of evidence suggest that the tonalite magma cannot be produced by simple fractional crystallization from the quartzdiorite magma. Chemical characteristics of the quartzdiorite resemble to within-plate volcanic rocks. Geological and geochemical features of these rocks indicate that they are derived from different source materials, respectively, and the quartzdiorite may play an important role of the tonalite petrogenesis in the active continental margin.