

Green schist facies metamorphic rocks in the Richo formation, Yoron-jima, Ryukyu Islands, Japan

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Yoron-jima, a member of the Ryukyu arc, is located in approximately 20 km NE of Okinawa-jima almost 27 km SW of Okinoerabu-jima the nearly center of the Ryukyu Islands, southwest Japan. Yoron-jima has no tranquil-flow river and terrace topography is developed. Two active fault result in fault scarp in the N-S and E-W direction, and divide the island into three regions topographically. For the relationship between the two active faults, it is currently interpreted that Tsujimiya fault, which extends from N-S to NNW-SSE in the central part of the island, is cutting the Asado fault in the east-west direction (Ota and Hori, 1980; Katsudansou-Kenkyukai, 1980). The duration of activity of these faults is still unclear. Yoron-jima is a small island with a diameter of 5 km in the N-S direction and, 6 km in the east-west, an area of 20.82 km², and the highest point of 97.2 m. The island is, A fringing reef and barrier reef are developed along the coast with a little exception. Most of the island is covered by the Ryukyu Group formed by Quaternary limestone, which derived from coral and foraminiferal shell, and gravels derived from the basement rock. In the middle and south east of the island the Richo Formation, which is a basement rock below the Ryukyu Group, is exposed. According to Nakagawa (1967), Richo formation consists of limestone, slate, quartzite, sandstone and tuff, and they are suffered by low-grade metamorphism to be phyllites with quartz and calcite veins. Regarding Ryukyu Group, stratigraphy has been established by Odawara and Iyu (1999), but the details of the Richo formation is still unclear. Richo formation was considered to be Paleozoic (Oba, 1955) and Mesozoic (Odawara and Iru, 1999), however, no precise work on dating has been done.

In this research, we aim to determine the affiliation and the possible formation age of the Richo formation, which hasn't been discussed much so far. We conducted field survey, sample collection, optical microscope observation and X-ray diffraction (XRD). For the estimation of age, we compared with the work by Nakagawa (2007, 2010) at the Okinawa-jima southern neighboring island of the Yoron-jima. We confirmed that the exposure of the outcrops of the Richo formation as previous works reported. We recognized that green schists and limestones, suggesting that the basement rocks are suffered by green schist facies metamorphism. The results of XRD analysis reveals that the mineral composition between the Richo formation and the Motobu unit in Okinawa-jima resemble each other so that the Richo formation is assumed to be Mesozoic in its geological age belonging to the Chichibu belt.

Keywords: Ryukyu arc, Chichibu belt, Okinawa-jima