

Tectonic evolution of west part of the Goto islands, Nagasaki Prefecture

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The Goto islands situated in the western part of Japan expose after Lower to Middle Miocene sedimentary and igneous rocks. The geologic evidences in this area are very important to identify relation between the north west of Kyushu and the Asian continent. We examined stratigraphy and geological structure of the Fukue Island of the southwest part of the Goto islands.

Stratigraphy: In The Fukue Island, three lithofacies, Goto Group, Goto granite intrusion and Fukue Rhyolite are observed. The Fukue Rhyolite is reported that the age is about 13Ma. Lower Goto Group consists of green colored volcanoclastics and massive tuff, based on the petrographic observation, there are very rounded quartz, siltstone lithic fragments and volcanic rock fragments. Upper Goto Group consists of alternation of sandstone and mudstone with upward grading structure, which is considered fluvial-lacustrine. And these were intruded by granitic dike.

Deformation: In center of the Fukue Island, there are about 10-20 degree plunges into north NE-SW trending fold, which is called 'Goto central fold'. In the northwest side of the fold hinge, high angle dipping beds and asymmetric fold are observed. On the other hand, in the southeast side of the fold hinge, dipping to east gentle bedding structure is observed.

In the Fukue Island, the following three structures can be recognized. D₁; NE-SW trending normal fault and fault related fold; The Goto center fold, which is one of the main structure in the deformation. D₂; NE-SW trending west dipping normal fault and right lateral strike-slip fault. In the southwest region, the high angle bed formed by D₁ is bended from NE-SW trend to N-S by D₂. D₃; NW-SE trending normal fault and left lateral strike-slip fault. The trend of this structure is vertical to NE-SE trending of The Goto islands. Because of the cross cutting relationship, we consider that D₁ and D₂ were formed from 15 to 7 Ma, and D₃ was formed in later 7Ma.

Based on age data and lithology, we suggest that the Goto Group was deposited in the rifting area of the southwest end of the Japan sea. In the near northwest off the Goto islands, there is NE-SW trending tectonic line that is west end fault of the Japan sea opening, called the Tsushima-Goto TL. The early stage volcanic activity which formed the lower Goto Group and D₁ might be related to the TL movement. The trend of D₃ is parallel to the Goto submarine canyon at the south of the Fukue Island, we consider that D₃ possibly related to the opening of the north Okinawa trough.