

Characteristics of the seismic gap in west part of the central Kyushu, Japan

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The seismicity in Amakusa islands located at west part of Kyushu Island, Japan is much lower than other part of Kyushu. Investigating characteristics of the seismicity gap is important for knowing the mechanism of earthquake generation. Here, we conducted analyses to consider cause of the gap and effect on the surrounding area.

In this study, we considered three models to explain the low seismicity. (1) high strength model: elastic property is much higher than the surrounding area. (2) weak zone model: no brittle failure occur in the area because of weak strength, and (3) low shear loading model: weakening shear stress loaded to the region due to inelastic deformation in the surrounding area. For verifying reliability of models (1) and (2), we considered an infinite elastic plate with a circular inclusion having different elastic constants from surrounding infinite plate. And then, we compared the spatial pattern of strain based on two dimensional theoretical equation by Nishimura and Sezawa (1931) with that of observed strain rate obtained from the GNSS network. For model (3), we calculated the distribution of the inelastic strain rate due to the earthquakes using the method of Kostrov (1974). The results reveals that the crustal deformation around Amakusa islands can not be explained by the models (1) and (2). Therefore it seems the model (3) is presumable because the region with the high inelastic strain rate ($\sim 10^{-8}$ /yr) is seen to surrounding Amakusa islands. However, we need to revise the model (3) by taking into account the estimated stress field, velocity structure, and viscous structure in the Kyushu obtained by previous study.