

North-South extension and compression during the Japan Sea opening in the Amakusa, western Kyushu, Japan

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The opening of the Japan Sea in the early to middle Miocene was believed to be accompanied by compressional tectonics at its southwestern margin, i.e., northern and western Kyushu, Japan; and the compression resulted in the folds in Tsushima Island between Korea and Kyushu and in Amakusa Islands, western Kyushu (Ishikawa and Tagami, 1991; Sakai, 1993). Eocene formations are folded with NNE-trending axes in Amakusa. In the present work, we collected orientation data from planar intrusive bodies in Amakusa-Shimoshima Island to test their hypothesis.

We observed altered andesite intrusions, i.e., 50 dikes and 18 sills. Their ages are loosely constrained to be 14–20 Ma by the radiometric ages of intrusive bodies in Amakusa (Nagao et al., 1992; Hamasaki, 1996). The method of Yamaji and Sato (2011), which fits a mixed Bingham distribution to the orientations of planar intrusions, was applied to the 68 data. As a result, we obtained normal-faulting and reverse-faulting stress regimes, indicating N-S extension and N-S compression. The latter is oblique to the fold axes, so that the previous researchers' hypothesis about the folding accompanied by the Japan Sea opening is improbable. A few NNE-trending rhyolitic dikes in the island led Yamamoto (1991) to suggest horizontal maximum stress in the trend. The rhyolitic dikes may have been accompanied by the first phase rifting in the Okinawa Trough to the southwest of the island.

Keywords: stress, Japan Sea opening, dike, Kyushu, Okinawa Trough