

Geologic structure of Northernmost Okinawa Trough and Koshikijima-Islands, Kagoshima Prefecture

hisashi Oiwane[1]; Satoshi Tohnai[2]; Shoichi Kiyokawa[3]

[1] Earth and Planetary Sci., Kyushu Univ.; [2] Oce. res. ins., Univ. of Tokyo; [3] Earth & Planetary Sci., Kyushu Univ.

Two fault systems, called F1 and F2 each, are dominant in Northern Koshikijima-Islands, which is on the Northeastern margin of Okinawa Trough. F1 are NW-strike and F2 are NNE-strike normal faults (Tohnai et al., submitted). We did detailed field survey and made geologic map and cross sections in the Koshikijima-Islands and identified these fault systems. We also did field survey in Amakusa and Nagasaki area to know how extensively these faults are distributed. Furthermore, we did experiments to estimate the activated depth of these fault systems by fluid inclusion. In addition, we did structural analysis by mapping of submarine topography of Northernmost part of Okinawa Trough.

Geologic structure of middle part of Koshikijima-Islands: Himenoura Group, Cretaceous marine sediment is distributed in this area. It's about 1650m thick. Himenoura Group is cut by two fault systems which have same features as those of Kamikoshiki Island's F1 and F2. Major features of F1 are 40-70 degree dipping normal fault, brittle-ductile deformation, and wide deformation zone 20m maximum. Based on the K-Ar dating of ilite derived from two faults of F1, they activated in 22-14Ma (Tohnai MS 2005). Features of F2 faults are steeply dipping, brittle deformation with gouge and breccia. F2 cuts 7Ma porphyry dike.

Fluid inclusion derived from F1 and F2: We did experiments to estimate the formation depth of fluid inclusions, which are inside the vein derived from shear zone of both faults. The temperature and pressure of fluid inclusions from F1 is 202 degree celsius, 114-165MPa. This condition corresponds to 4.5km depth. The temperature of fluid inclusions from F2 is about 70-90 degree celsius. Calculating from mean thermal gradient 25 degree celsius per kilometer, this value corresponds to 2-3km depth. Approximately 4.5km uplift of Himenoura Group is estimated.

In Amakusa and Nagasaki area, there are some faults which have similar features as F1 and F2.

Geologic structure of Northernmost Okinawa Trough: We made detailed submarine topographic map and mapped subsurface fault systems in the Northernmost Okinawa Trough. NNE-trending faults are dominant in this area. Over 3000m-thick sediments cover the seafloor at the deepest part of this area. NNE-trending fault systems may have been formed by rifting of Northernmost part of Okinawa Trough. Features of submarine fault system are very similar to that of F2 faults in Koshikijima-Islands. So it is possible to think that F2 faults in Koshikijima-Islands have been formed in lifting of Okinawa Trough.

On the other hand, there are some small sedimentary basins on the surface of the seafloor. They are formed by ENE-trending normal faults (F3). Beppu-shimabara graben is now on North-South extensional stress field. F3 can be formed in the similar stress field as that of Beppu-Shimabara graben, therefore they can be still active.

(Summary)

Koshikijima-Islands and Northernmost part of Okinawa Trough are experienced 3 stages of deformation.

D1: NW-trending normal fault system F1 are formed in 22-14Ma.

D2: NNE-trending normal fault system F2 are formed after 7Ma.

D3: ENE-trending normal fault system F3 are formed, this stage can be active now.