Analogue experiments of the fault motion and secondary ruptures at the termination of the lateral fault

Shigekazu Kusumoto[1]; Masaki Tokiwa[1]; Shunsuke Sato[1]

[1] School of Marine Sci. & Tech., Tokai Univ.

We simulated the fault motion and the propagation path of the secondary fracture at the termination of the lateral faults, by analogue experiments that used agar-agar as medium.

In the experiments, the fault motion and the propagation path of the secondary fracture were observed when the external forces were given to the medium. Because it is difficult to give the medium the external force directly, forced deformation was given after determination of the boundary conditions for forming shear zone around the center of medium including discontinuous surface. The discontinuous surface (fault) was made in the center of the agar-agar medium by inserting a thin sheet of aluminum of the thickness 0.5mm.

The fault motion is decided by angle between strike of the fault and the direction of the principal stress. However, the mechanical boundary conditions of the instrument can not change. Thus, change of the angle was done by change of insertion azimuth of the thin sheet.

The propagation path of the secondary fracture at the termination of the fault was quantified by measurements of the angle between the propagation path and the original fault, and relationship between the propagation path and the azimuth angle of the fault plane was discussed.

Because it was difficult to measure the strain and stress in the medium directly, they were estimated by the finite element method under the same boundary conditions of the analogue experiments, and used for the interpretation of results of the analog experiments.

As a result, it was found that the secondary fractures occur in the extension area due to the fault motion, and propagate toward the maximum compressive principal stress direction. In addition, it was found that the relationship between the propagation path and the azimuth angle of the fault plane was linear. On the other hand, when the angle between the strike of the fault and the direction of the principal stress was 10 degrees before and after 0 degree, fault motion did not occur.