

Fault distribution around the Nankai Trough

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We have carried out a project for fault evaluation around Japan since 2013. Using many seismic survey data and crustal structural data collected from many research institutes and companies, in particular, Japan Agency for Marine Earth-Science and Technology (JAMSTEC), Japan Oil, Gas and Metals National Cooperation (JOGMEC) and National Institute of Advanced Industrial Science and Technology (AIST), we have mapped fault distribution developed in the crust around Japan Sea, Ryukyu Trench, Izu-Ogasawara arc and Nankai Trough regions. Here, we report the fault distribution around the Nankai Trough.

Large earthquakes with a magnitude of over eight have occurred repeatedly along the Nankai Trough. Izu-Ogasawara island arc collides with the Honshu arc at the eastern end of the Nankai region and the island arc itself deforms by the compression. On the other hand, the Kyushu Paleo Ridge subducts beneath the Kyushu at the western end of the Nankai area and complex tectonics develops there. It is indispensable to understand the fault distribution to monitor the crustal stress field.

In this project, we consider common data analysis and even interpretation, and adopted following methods as common data analysis, which are pre-velocity analysis, stacking, multiple depression, velocity analysis, and time migration. After 3-D velocity cube construction, we converted the time section to the depth. And we applied F-K filter to emphasize continuity of horizons for single channel seismic data. To trace faults, we checked relationship with topography and geological deformation. After depth conversion, we identified the bottom of the fault we can trace and evaluate the scale of the fault.

Characteristics of the fault distribution around the Nankai area are as follows. (1) Faults are little identified around the Suruga Bay except some small anticlines. (2) Incoming plate with the Zenisu Ridge are divided into some crustal blocks by some strike-slip faults. (3) Off Tokai region has Tokai and Kodaiba reverse faults and Enshu strike-slip faults. On the continental shelf off Hamamatsu, some normal faults were identified. (4) Kumano-nada has a large splay fault and many small splay faults. In the Kumano Basin, some small faults were traced. (5) Off Kii-suido region has some splay faults near the trough and the northern root of the Subducting seamount has also small scale reverse faults. On the southern root, normal faults are identified. (6) Off Tosa region has two areas with reverse faults, one is near trough axis like Kumano nada and off Kii-suido area, and the other is southern root of the topographic high connecting to the Cape Muroto. (7) Bungo-suido region has many small scale reverse faults with a strike of NE-SW direction. (8) Hyuganada from southwestern region of the Kyushu Paleo Ridge subduction area has normal and strike-slip faults instead of reverse faults. (9) Off Tanegashima region has a little faults. We constructed database system to manage many types of all data and fault traces and register them.

Keywords: Nankai Trough, fault distribution, Seismic reflection survey