

## Fault distribution around the Nansei-Shoto

\*Nobuaki Sato<sup>1</sup>, Shoshiro Shimizu<sup>1</sup>, Narumi Takahashi<sup>1,2</sup>, Rei Arai<sup>1</sup>, Goro Ando<sup>1</sup>, Minako Katsuyama<sup>1</sup>, Shigeyoshi Tanaka<sup>1</sup>, Yoshiyuki Kaneda<sup>1,3</sup>

1. Japan Agency for Marine-Earth Science and Technology, 2. National Research Institute for Earth Science and Disaster Resilience, 3. Kagawa University

This is a part of the project “Comprehensive evaluation of faults information on offshore Japan”, by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The project consists of three themes, 1) Collecting seismic survey data and building a database of offshore faults, 2) Interpreting distribution of offshore faults using seismic data collected, and conducting the seismic re-processing by leading-edge seismic technology for the seismic data obtained in previous decades, 3) Building the fault models for a simulation of strong motion and tsunami disaster, based on the interpreted faults. This report is the outcome, fault distribution around the Nansei-Shoto (Ryukyu Islands), in 4<sup>th</sup> year since the start of the project.

Interpretation of fault distribution must be based on features of geography and geological structure from seismic reflection data. Bathymetric data are one of the important clue to understand offshore fault distribution. The effective use of high resolution bathymetric data makes progress in the comprehensive study of the relationship among seafloor topography, subsurface structure and seismicity. In the project, we have created detailed bathymetric maps around the Nansei-Shoto (e.g. red relief image map) by the integration of topographic data including high quality bathymetric data with multi-narrow beam echo sounder, and achieved the interpretation of offshore faults with the bathymetric map, seismic profiles by front-line seismic processing and earthquake mechanism information from the Japan Meteorological Agency. As a result, 441 offshore faults were found out around the Nansei-Shoto through the project. The Ryukyu Islands is a chain of islands that extends about 1,200 km from Kyushu to Taiwan. The Ryukyu Islands system is located at a convergent plate margin where the Philippine Sea Plate is subducting beneath the Eurasia Plate along the Ryukyu Trench. In the southwestern Ryukyu arc, the subduction is oblique to the trench, while in the northeastern Ryukyu arc, it is perpendicular to the trench. The Oblique subduction causes extensional stress in the back-arc and compressive or extensional stresses in the fore-arc depending on the sense of arc curvature and the relative motion of the plates.

The study area can be divided into three regions, based on differences in the basic stress pattern and developing fault type: back-arc, fore-arc, and island arc. In the back-arc basin called as the Okinawa Trough, there are numerous normal faults with echelon structures, east-northeast to northeast trending, resulted in the initial rifting and subsequent spreading process. In the southeastern area of the Kyushu Island, where is a rift zone in the northeastern extension of the Okinawa Trough and is under E-W compression with strike-slip faulting type, normal faults and lateral strike-slip faults develop concurrently. For the fore-arc region, on the trench side, reverse faults, that are considered to be spray faults derived from the plate boundary, exist within accretionary prism or fore-arc basins, meanwhile on the island arc side, normal faults are formed on the terrace slope in parallel to the island arc. In the island arc region, normal faults, which cut perpendicular to the axis of the arc like transvers fault, develop such as the Tokara Gap, the Kerama Gap and the Miyako Saddle, and these structural gaps play structural transmit zone between the trench and the trough.

Here we will introduce the fault distribution with several seismic profiles around the Nansei-Shoto.

Keywords: offshore fault, seismic reflection survey, Ryukyu Arc, Ryukyu Trench, Okinawa Trough

