

Microearthquake seismicity and focal mechanisms of the west off Kyushu, Japan, derived from Ocean Bottom Seismometer data

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The west off Kyushu, Japan, located at the northern part of Okinawa trough which is an active back-arc basin belongs to Kyushu-Ryukyu arc and considered to be an early stage of the back-arc rifting with extending upper crust. In this area, the earthquake of the M6 class occurs in the past and it is thought about seismic activity being active. But this area is far from land-based seismic station, so we are not able to understand the detailed seismic activity.

We have carried out temporal seismological observation using Ocean Bottom Seismometer (OBS). We deployed 14 pop-up type OBSs in this area, and the observation period is 75 days from April 2007 to July 2007. During this period, we could determine about 1,000 hypocenters and 22 focal mechanism solutions.

Almost all hypocenters were determined in and around the trough axis, in the middle part of the trough. They were in the range of 6 - 12km deep, which were in the upper crust of 2-D P-wave velocity structure provided by marine seismic structure survey (after Nakahigashi et al., 2004). Hypocenters were two kinds of activity groups. One is constantly active, and another is intensively active in the short period. In the middle part of the trough, however, there was also low seismic activity area, which seems to be congruent with distribution of the gravity anomaly. Most of the focal mechanism solutions which were calculated from polarity data of P-wave first motions were strike-slip type with a T-axis of NNE-SSW ~NE-SW direction, and this fact corresponds with characteristic of focal mechanisms in central and southern part of Kyushu. Thus the sea area of west off Kyushu has the same stress field of central and southern part of Kyushu although in the part of the Okinawa trough. The clear evidence that Okinawa trough spread positively was not provided. However, some mechanism solutions were normal fault type in a certain swarm active cluster. This may implicate the trough extension.

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