

Preliminary results of new geophysical survey expeditions in the West Philippine Basin

Takeshi Matsumoto[1]; Ryuichi Shinjo[2]; Seiko Inoue[3]

[1] U.Ryukyus; [2] Dept. Physics and Earth Sci., Univ. Ryukyus; [3] Physics and Earth Sciences Sci, University of the Ryukyus

<http://www.u-ryukyu.ac.jp>

The structure and tectonics/evolution history of the West Philippine Basin were studied by the KR03-04 and KR04-14 expeditions (in 2003 and 2004, respectively). During the two expeditions a detailed topographic map around the Okinawa-Luzon Fracture Zone (OLFZ, derived from a fossil transform fault – fracture zone system) and the Central Basin Fault (CBF, a fossil spreading centre) was obtained. The new topographic map allows us to make the following interpretation about the seafloor evolution:

(1) The depth of the survey area generally ranges between 5000m and 6000m. The depth is much shallower at the vicinity of the Urdaneta Plateau, where it rises up to 3400m and the Benham Rise, up to 2000m. The depth of the Ryukyu (Nanseishoto) Trench located northernmost part of the study area falls down to 7000m.

(2) Eight survey lines parallel to the OLFZ were added in these cruises to complement the interpretation of the seafloor spreading history. The northern part of the study area (north of 22.5N) is characterised by the lineation of the horsts and grabens corresponding to the spreading fabric trending N135E on the eastern side of the OLFZ. The trend generally continues from the OLFZ to Urdaneta Plateau. The orientation of the horsts and grabens is almost normal to the OLFZ.

(3) Contact of the N135E graben and the OLFZ is characterised by nodal basins similar to those observed at the ridge-transform intersections of slow-spreading ridges. Some are V-shaped and others L-shaped. Maximum depth of the nodal basin exceeds 6000m towards the OLFZ.

(4) At three locations in the northern part of survey area (north of 22.5N), deep curved valleys were identified at 23 45'N/127 40'E, 23 10'N/127 05'E and 22 10'N/127 15'E. Immediately south of these valleys, discordant spreading fabrics are systematically observed. These fabrics generally trend NW-WNW. It is interpreted as fabric formed between overlapping spreading centres. The location and shape of the successive failed rifts and associated discordant fabrics indicate that discordant fabric was formed when the current spreading axis was overlapped by another stronger one located more to the south. New spreading axes did propagate from east to west in the east of FZ. Failed rifts have retreated also from east to west.

(5) The OLFZ is estimated as a dextral fault with the offset of ca. 100km if the topographic highs at 21 45'N and 22 30'N on the sides of the OLFZ were a single seamount but split into two along the fracture zone.

(6) The central part of the study area (18.5E - 22.5E, 125.5E - 126.5E) is characterised by at least three series of the arcuate lineations of the horsts and grabens and all of them have both convex and concave features. These features are apparently the relics of the fossil seafloor spreading. Although the topographic lineation shows similar to that of the overlapping spreading centres observed in the northern part, it is not likely to be so because the pair of convex-concave series of horsts and grabens has an extent of more than 100km square. It is to be interpreted that both convex and concave spreading centres were active and the area among the spreading ridges expanded to form a microplate.