Reconstruction of the central Mariana Trough

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We present detail sea-floor spreading history of the central Mariana Trough (16N-19.5N) using the multi-narrow beam bathymetry and the vector geomagnetic field data obtained by these cruises (KH92-1,Y96-13,YK99-11,YK00-13,YK01-11,KR02-14). Tectonic evolution can be inferred from the direction of spreading fabric, the trace of non-transform offsets, and by crustal ages identified by vector geomagnetic anomaly field. The traces of the non-transform offsets in bathymetry define the ridge segments, which indicate that the central Mariana Trough consists of many ridge segments with their length of 20-50km. Further, these segments varies; some segments disappear, some segments merge each other, or a new segment appears, accompanied with a ridge propagation. Location and strike of normal/reverse magnetic boundary were precisely determined by vector geomagnetic inversion, which uses the Genetic Algorithm in a spatial domain calculation to determine the best fitting '2.5' dimensional structure (Yamamoto and Seama, submitted). The 2.5-D model is composed of magnetic boundaries with arbitrary strikes and magnetic intensity. The results lead: 1) the crustal age identifications indicate all the segments started seafloor spreading at 6Ma, 2) the spreading axis directions have gradually changed with age from N20W to N10W in the north of 17.5N, while they occurred at 3.5-3.0Ma from N35W to N5W just south of 17.5N, 3) the spreading rates vary between 10-30 mm/yr, and 4) asymmetry spreading is a common feature, which has resulted in migration of the ridge-axis or small ridge jumps toward the trench. Then, we perform a reconstruction by using these results and tracing along the large non-transform offset(17.5N) which called Pagan fracture zone. In the south of Pagan fracture zone, the remanent arc seamounts correspond to the base of volcanic arc as a counterpart. If that correspondence applies to in the north of Pagan fracture zone, the volcanic arc(18.25N-19.5N) should extend 50km northward.