

# High resolution deep-tow side-scan survey over the slow-spreading Mariana Ridge

# Anne Deschamps[1]; Toshiya Fujiwara[2]; Miho Asada[3]; Fujiwara Toshiya KR03-12 onboard team[4]

[1] WHOI; [2] Deep-Sea Res. Dept., JAMSTEC; [3] O.R.I., University of Tokyo; [4] -

The Mariana Trough is one of active backarc basins. The central part of the Mariana Trough is opening for ~6 Ma, at 5-6 cm/yr (full rate). Recently, the asymmetric spreading process (Deschamps and Fujiwara, 2003) and the difference of volcanic activities between segments have been studied in the area.

Side-scan images and phase bathymetry data (resolution ~50-90 cm) were collected during KR03-12 cruise in Oct-Nov 2003 using the R/V Kairei (JAMSTEC) and the deep-tow 'WADATSUMI' sidescan sonar system (Ocean Research Institute, Univ. of Tokyo). WADATSUMI was towed on two chosen segments' axial valley floor in the along-axis direction. Total 4 and 10 survey lines covered about 5 km and 12 km width for two segments.

The two distinct spreading segments are characterized by different spreading rates, degrees of asymmetric spreading and magmatic robustness. These new data sets document fine-scale spreading axis morphology, faults and fissures morphological characteristics and distribution, volcanic products geometry and distribution, and major lava flow boundaries. One segment that located at ~18°N (Seg-18) shows a typical morphology of slow-spreading ridges like the Mid Atlantic Ridge. It is characterized by a wide rift valley and an axial volcanic ridge (AVR). The other segment, 'Seg-17', located at ~17°N, is characterized by dome-shaped morphology, an hourglass shape of the valley and no AVR. where an axial magmatic chamber has been imaged in the center of the segment (JAMSTEC, unpublished data).

About 5 km width image on Seg-18 shows hummocky terrain that are dominant over the AVR of the segment. The hummocky terrains are characterized with higher back scattering sonar images and no clear sediment layer is recognized from the sub-bottom profiles. Faults cutting hummocks are few in the area, however some large faults that are cutting hummocks on both sides of the AVR are observed. On the other hand, both hummocky terrains and very smooth flows are observed within Seg-17. Smooth flows, that indicate high extrusion rates during eruptions, are dominant in the segment center. The relative abundance of smooth flows in the segment center is increasing from the valley axis toward walls. Hummocks become dominant toward the segment end. Within the lava flow region, overlapped two distinct trends of faults are also observed. One set of faults is perpendicular to the direction of opening and trends parallel to the global orientation of the spreading segment, and the other set is clearly oblique with respect to the global direction of opening.

The completed processed data and interpretations will be presented at the meeting.

\* WADATSUMI was operated as: 100 kHz sonar, 6 kHz sub-bottom profiling, 1s frequency, 1024 m swath, 50 cm and 87 cm resolution for swath and towed direction, and towed at 1.7 knots of ship speed above 250 m of seafloor.

\*\* KR03-12 boarding team; Fujiwara Toshiya, Anne Deschamps, Nakamura Yasuyuki, Pascal Gente, Yamamoto Fujio, Grant Blackinton, Watanabe Masaharu, Kameo Katsura, So Akira, Sugiyama Tomohiko, Naito Kazuya, Horikawa Hiroki, Saganuma Satoru, Arnauld Heuret, and AsadaMiho