Physical properties of the Nankai accretionary prism, off Cape Muroto: Preliminary results of IODP Expedition 370

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International Ocean Discovery Program (IODP) Expedition 370 was carried out to explore the limits of life in the deep subseafloor biosphere at a location where temperature exceeds the known temperature maximum of microbial life (~120°C) at the sediment/basement interface ~1.2 km below the seafloor. Drilling Site C0023 is located in the vicinity of Ocean Drilling Program (ODP) Sites 808 and 1174 at the protothrust zone in the Nankai Trough off Cape Muroto at a water depth of 4776 m. Continuous physical property measurements on cores were performed to identify the occurrence of the accretionary prism and plate boundary fault and to characterize the habitat of subseafloor microbial communities. In the presentation, we will report our preliminary physical properties of the Nankai accretionary prism at Site C0023.

Physical property measurements on shipboard, including moisture and density (MAD), thermal conductivity, electrical resistivity, *P*-wave velocity, natural gamma radiation, and magnetic susceptibility were carried out on core samples from 204 to 1176 mbsf under room temperature and pressure conditions. Porosities through the wedge facies (Unit II) to the upper Shikoku Basin facies (Unit III) are characterized by high variability and generally decrease from 45% to 37% in average with increasing depth. Within the lower Shikoku Basin facies (Unit IV), porosities continue to decrease with depth to 33% at the top of the décollement zone at ~760 mbsf. However, deeper than 760 mbsf, they turn to increase gradually by 5%–7% with depth to ~830 mbsf. This porosity increase is accompanied by a decrease in P-wave velocity and apparent formation factor (i.e., electrical resistivity). Deeper than ~830 mbsf, porosities resume a general compaction trend to the base of Unit IV and then rapidly increase within Unit V, where tuffaceous mud becomes the dominant lithology. Basaltic rocks in the basement exhibit a range of porosity between 5.5% and 25%. Similar porosity depth profiles were reported at Sites 808 and 1174 (Taira et al., 1991; Moore et al., 2001). However, in contrast to these sites, porosities at Site C0023 begin to elevate gradually within the décollement zone.

In situ temperature measurements between 189 and 408 mbsf and laboratory thermal conductivity measurements indicate a heat flow of 140 mW/m^2. Assuming that the heat flow is purely conductive and steady state, temperatures of 86° and 120°C are projected for the top of the décollement and the bottom of the hole, respectively.

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