

Lateral variation in structural characteristics of the décollement zone and underthrust sediments in the Nankai accretionary prism: Preliminary results from IODP Expedition 370

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Integrated Ocean Discovery Program (IODP) Expedition 370 penetrated the toe of the Nankai accretionary prism and plate-boundary décollement zone, and touched the oceanic basement at Site C0023, off Muroto Peninsula, SW Japan. The drilling site is located at ~4 km NE from legacy two sites (Sites 808 and 1174), and therefore gives us great opportunity to examine lateral variations in structural geology, physical properties, fluid flow. Lithological and structural key observations made on cores recovered from Site C0023 are:

- a) Sediments recovered from the Site C0023 are composed of the same 5 lithologic units encountered at legacy sites.
 - b) Typical early-stage diagenetic minerals found between 200-700 mbsf are carbonate and pyrite with a clay mineralization-stage beginning at 700-1000 mbsf. Hydrothermal strata-bound mineralization in the form of anhydrite, barite and rhodochrosite is focused between ~700 and 1100 mbsf. The Apparent temperature limits for co-occurrence of anhydrite, veins of barite and rhodochrosite may represent in the 150-200 °C, slightly higher than present in-situ temperature.
 - c) Most of the core-scaled reverse faults are located above and within the décollement zone (~758-796 mbsf), whereas dense populations of normal fault were identified beneath the décollement zone (underthrust sediment). This variation apparently reflects stress decoupling between the décollement zone.
 - d) Mineral veins composed of calcite, barite, and anhydrite occur beneath the décollement zone and most of these are located within or closely associated with faults and the strata-bound mineralization. Variations in bedding dip and healed fault distribution in Site C0023 are broadly similar to Site 1174. On the other hand, the thicknesses of fault zones within the décollement zone and the nature and distribution of deformation structures in the underthrust sediments at Site C0023 is totally different from sites 808 and 1174. At site C0023, the décollement zone is characterized by a thinner fault zone sandwiched between intact mud-rock intervals, apparently a weaker deformation compared with the pervasive pulverization in the décollement zone in legacy sites. A dense population of faults and mineral veins in the underthrust interval is also unique point in Site C0023. Additional paleomagnetic studies are necessary to consider the deformation mechanisms. In addition, physical properties variations (i.e. porosity/density, P-wave velocity) above and below the décollement zone at the Site C0023 were lesser than those in the legacy sites.
- Seismic cross sections indicate Site C0023 is located towards the center of a low amplitude syncline where the seismic décollement zone is faint and intermittent. On the other hand, previously-drilled legacy sites are located above the strong amplitude décollement zone. These lateral variations in deformation and physical properties correspond with predictions made from seismic images.

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