

南海トラフへ沈み込む物質の初期状態 : IODP第322次航海の成果

Stratigraphy of subduction inputs off Kii Peninsula: Results from IODP Expedition 322

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Integrated Ocean Drilling Program Expedition 322 is part of Nankai Trough Seismogenic zone Experiment (NanTroSEIZE) and was designed to document characteristics of incoming sedimentary strata and igneous basement prior to their arrival at the subduction front. To accomplish these objectives, coring was conducted at two sites in the Shikoku Basin on the subducting Philippine Sea plate. Site C0011 is located on the northwest flank of the Kashinosaki Knoll, whereas Site C0012 is located near the crest of the knoll. Although some coring intervals are missing, the resulting data provide a wealth of new information on presubduction equivalents of the seismogenic zone. The merger of lithofacies and age-depth models from the two sites spans across the Shikoku Basin from an expanded section (Site C0011: TD=881 m CSF) to a condensed section (Site C0012: TD=576 m CSF) and captures all of the important ingredients of basin evolution, including an interval of late Miocene tuffaceous and volcanoclastic sandstone designated the middle Shikoku Basin facies. Equivalent deposits were not cored within either the Muroto or Ashizuri transects, and the closest volcanic source is the Izu-Bonin arc. An older (early?middle Miocene) turbidite sandstone/siltstone facies with siliciclastic/volcanoclastic detrital provenance occurs in the lower Shikoku Basin; this unit may be broadly correlative with superficially similar Miocene turbidites that were recovered at Site 1177 along the Ashizuri transect. Recovery of basal pelagic deposits in contact with pillow basalt at ~540 m CSF constitutes a major achievement at Site C0012. We know that the age of the basement is older than ~18.9 Ma, based on nanofossil assemblages in the overlying pelagic sediment. In addition to material properties, profiles of pore water geochemistry for Site C0012 represent the closest we have seen to a true geochemical reference site for the Nankai Trough. Unlike Site C0011, where a freshening trend is obvious in the pore water, Site C0012 yields no evidence for significant in situ dehydration reactions or movement of freshened fluids updip to the crest of the bathymetric high. Instead, pore fluids on top of the basement high show clear evidence of a seawater-like source, with chlorinity values increasing toward basement because of hydration reactions and diffusion; the fluids are largely unchanged by the effects of focused flow and/or in situ dehydration reactions associated with rapid burial beneath the trench wedge and frontal accretionary prism. These geo-chemical data, together with the precise fingerprints of isotopic analyses, will be crucial for evaluating the evolution of fluid-rock interactions from the distal reaches of the Shikoku Basin through the frontal accretion zone, and finally into the seismogenic zone.