Forearc basin development and megasplay fault activity - Results from IODP Expedition 315, Nankai Trough

Juichiro Ashi[1]; Hideki Masago IODP Expedition 315 Scientists[2]

[1] ORI, Univ. Tokyo; [2] -

IODP Expedition 315 was conducted at around the seaward limit of the rupture zone of the 1944 Tonankai earthquake in the central Nankai Trough as one of the Stage 1 expeditions of the NanTroSEIZE. We obtained core samples from two drilling sites located at critical positions to understand splay fault activity and its implication for forearc basin development. Site C0001 is located at the small bench on the hanging-wall of the megasplay fault. Seismic profiles show the slope basin with 200 m thick series of layered reflectors above the transparent unit. The coring revealed that the slope basin was composed mainly of Quaternary to late Pliocene silty clay and clayey silt. The bottom of the basin is composed of a thick sand layer which overlays the late Pliocene to late Miocene accretionary prism unit. Site C0002, located at the southern margin of the forearc basin, penetrated thick Quaternary alternation of fine-grained sandstone and mudstone and basal Pliocene mudstone, and cored the late Miocene accretionary prism rock. The basal mudstone is characterized by low sedimentation rate with partly erosional cahracters such as glauconite concentration and pervasive vein structure suggesting sediment-starved conditions at slope apron facies. The boundary between facies of starved basal basin and thick forearc basin is about 1.7 Ma in age on the basis of nanno fossil and foraminiferal biostratigraphic shipboard analyses. It corresponds to beginning of forearc basin development caused by build-up of the outer ridge. Seismic profiles across the drilling sites show changes of sedimentation pattern from simple filling-up mode of the basin to landward growth tilting mode at about 1.2 Ma. Sedimentary layers after 1.0 Ma are horizontal without landward tilting deformation. Growth tilting of the basin from 1.2 to 1.0 Ma implies active crustal movement near the southern margin of the forearc basin caused by a series of splay fault activities. End of the tilting probably corresponds to a change of plate convergent direction from normal to oblique to the Nankai Trough. A strike slip fault landward of the splay fault might be an expression of oblique subduction after about 1.0 Ma.