

Active-passive seismic studies in the Nankai trough for improving a physical model of the seismogenic zone

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Since the last decade, JAMSTEC has been conducting a series of active source seismic studies in the Nankai Trough, which have revealed structural factors controlling lateral rupture propagation of the 1944 Tonankai and the 1946 Nankai earthquakes. For example, a large scale subducted ridge and seamount are imaged at edges of the rupture zones. This may indicate the large scale convex structures may prevent lateral rupture propagation of the megathrust earthquakes. In addition to those observations, an active-source seismic study detected a high seismic velocity body forming a strongly coupled patch at the Nankai-Tonankai segment boundary. The numerical simulation incorporating those structural variations explained the historic rupture patterns, and demonstrated occurrence of a giant earthquake which ruptures the entire Nankai trough. Although, the numerical simulation well demonstrated the historic rupture patterns of each segment, the simulated slip distributions within each segment does not take into account those obtained by earthquake and tsunami data. In order to further improve a physical model of the Nankai seismogenic zone, a new 5-years active-passive seismic studies has been started since 2008. In 2008, we conducted an active-passive seismic study in the western edge of the Nankai Trough (i.e., Hyuganada region). Preliminary results from those surveys clearly shows lateral crustal thickness variation along the trough; i.e., the subducted crust abruptly thicken toward the Kyusyu-Palau ridge (KPR) from the Shikoku-basin oceanic crust through very thin crust at immediately east of the KPR. This may be a key structure for considering westward extension of a rupture in a future Nankai earthquake. Passive seismic data observed in the 2008 experiment may help to resolve even deeper part of the structure, which is not possible to image by the active source data. In 2009, as the second year experiment, a similar scale of an active-passive seismic study was conducted off Shikoku region. In this presentation, we introduce an outline of the project and summarize the most up-dated results of the 2008 experiment as well as the data from the 2009 experiment.