

Structural characteristics of the Nankai trough subduction zone off Kii channel revealed from densely obtained seismic reflection profiles

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Shallow very low frequency events (SVLFs) activity has been recently investigated using offshore and onshore stations in the Nankai Trough. SVLFs have been active off the Kumano basin, off Kii channel and Cape Muroto, but not active off the western Kii peninsula. To explore possible structural factors relevant to the SVLFE activity, we conducted seismic surveys in the Nankai trough between off Cape Shionomisaki and Cape Muroto. Two seismic reflection surveys were conducted in November –December 2018 and December 2019 –January 2020 using R/V Kaimei and R/V Kairei. In total, 44 seismic reflection profiles across the trough axis were acquired with 4km separation. In addition, eight profiles along the trough axis were obtained. Pre-stack time migrated profiles from the data collected in the 2018 survey and post-stack time migrated profiles from the data obtained in the 2019 –2020 survey were interpreted to map the structural features, e.g., top of the subducting oceanic crust, decollement, thrust faults. We observed the thickness of the sediments above the subducting oceanic crust is constant along the trough axis in the shallow most part of the Nankai subduction zone off the western Kii peninsula, where the SVLFE activity has been low. On the other hand, the thickness is variable off the Kii channel to Cape Muroto, where the SVLFE activity has been reported. The variation could be originated from the past subduction of the seamount and could be related to the local undulation of the subducting oceanic crust. Interpreted decollement in the shallow megathrust has positive polarity off the western Kii peninsula but shows negative off western Kii channel to Cape Muroto. We also recognized that the depth of the subducting oceanic crust could be greater in the landward portion of the survey area off the western Kii peninsula. Another local deep part of the subducting oceanic crust was detected around 32.7°N, 135°E where the SVLFE activity was reported to be lower.

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