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What controls the polarity change of decollement reflection along the Nankai Trough? What controls the polarity change of decollement reflection along the Nankai Trough?

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Understanding of the structure and physical properties of the decollement, which is a plate boundary fault in a subduction zone, is important to elucidate a mechanism of megathrust earthquake generation. Variation of reflection polarity, which is one of the key natures of the decollement, appears to be closely related to fluid flow process in the subduction. In spite of previous seismic reflection studies to show a locality of polarity change of the decollement reflection in the Nankai Trough, its general pattern and causes are still controversial. In this study, we aim to figure out what controls the polarity change of decollement reflection along the entire Nankai Trough. We interpreted multichannel seismic reflection profiles that have been acquired in the Nankai Trough margin by Japan Agency for Marine-Earth Science and Technology (JAMSTEC) since the year of 1997. We focus on three features of the decollement reflection: regional distribution, polarity, and seismic stratigraphy.

We separated the Nankai subduction zone into ”stable sliding” and ”stick slip” zones, based on location of the decollement step-down to the subducting oceanic crust. According to the reflection polarity (i.e., normal or reverse) of the decollement, we divided the entire Nankai subduction zone into 5 different regions along Trough. Assuming that the reflection polarity is closely related to incoming sediments, we could recognize 5 different cases in relationship between the decollement reflection polarity and seismic facies. (1) Reverse polarity on the Top of Turbidites, (2)Normal polarity on the Volcanic Ash layer with the Turbidites below, (3)Reverse polarity in the Hemipelagic Mud, (4)Normal polarity on the Kumano Basin, (5)Reverse polarity on the Volcanic Ash with the Hemipelagic mud below. Bedding planes of turbidites shows reverse polarity. It suggest that bedding planes may be used as fluid paths. When the decollement is developed within hemipelagic muddy sediments, it shows reverse polarity. In case of kumano Basin, whole sediments subduct under the accreation prism. The case of off Shiono, and east side of Kumano basin, there are not turbidites and only Vocanic Ash layer and Hemipelagic Mud below. For the dehydrate -smectite to illite- in Hemipelagic Mud, on the vocanic Ash layer with high porosity, the decollement may be easily formed.

Keywords: decollement, polarity, Nankai Trough