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A new record of submarine landslide history in the Nankai accretionary wedge: Results from IODP Expedition 333

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Here, we present results from Integrated Ocean Drilling (IODP) Expedition 333, which drilled and cored a Pleistocene-to-Holocene stratigraphic succession of a slope basin seaward of a margin-dominating out-of-sequence thrust (termed megasplay) in the Nankai accretionary wedge, offshore the Kii Peninsula, southwest Japan. The slope-basin represents the depocentre for downslope sediment transport from various sources such as the hanging-wall block of the megasplay, anticline structures within the accretionary prism and the slope apron sedimentary cover. The stratigraphic succession comprise stacked mass-transport deposits (MTDs), including an up to 150 m thick MTD, as identified in 3D reflection seismic data. Continuous coring to 315 meter depth at a location where the MTD bodies wedges-out and where basal erosion by mass-transport events is minimal, reveal a nearly complete stratigraphic succession recording more than 1 Million years of the submarine landslides history in this active tectonic setting.

We present D/V Chikyu shipboard results from IODP Site C0018, including litho- bio- magneto- and tephra- stratigraphy and physical property data. Six MTDs of thickness ranging from 50 cm to 60 m at the drill site were identified from visual core description and X-ray CT-scans. The thick MTD is the oldest and its stratigraphic position coincides with a lithological transition between a sandy turbidite sequence below and ash bearing hemipelagites comprising several MTDs above. The deformation style of these MTDs appeared heterogeneous, with intervals of remoulded sediments and intervals inferred to retain original, coherent bedding. Shear zones and faults have been identified in the lower part of the MTDs and, in three occurrences the base of the MTD is defined by a shear zone within fine-grained sediments. A thick sandy ash layer attributed to a cataclysmic eruption on Kyushu Island dated 1.05 Ma was found immediately below the thick MTD. We hypothesize that part of the ash layer was characterized by excess pore pressure and that liquidization within this layer during earthquakes is one mechanism by which submarine landslides could be triggered in subduction zones.

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