Submarine mass movements: From accretionary prism evolution and climate preconditiong to paleoseismologic implications

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For the Kumano accretionary margin transect, we document the Nankai Trough Submarine Landslide History (NanTroSLIDE) spanning ~2.5 million years. More than 50% of the long-term total sedimentation in the studied accretionary wedge-top basin (IODP sites C0018 and C0021) occurs by mass-movement. Modes and scales of slides link to the different morphotectonic settings in which they occurred. The impact of the additional mass-movement sedimentation on accretionary wedge evolution is studied by numerical erosion/sedimentation-coupled thermomechanical plate subduction models revealing sedimentation may control generation/reactivation of out-of-sequence thrusts. Interestingly, precise dating of MTDs revealing the timing of major slide event, hints at climate preconditioning for sediment instability and reveals that margin destabilization does not occur systematically during single megathrust earthquakes. However, new observation after recent earthquakes discovered a new mode of dynamic earthquake ground motion response for surficial (<5-10 cm) seafloor sediments. This can trigger seafloor mud-brecciation and remobilization of the surficial, mostly fine-grained, young sediments over large areas into terminal basins, where the stratigraphic record of respective deposits may provide paleoseismic event records of high continuity.

Keywords: Submarine Landslide, Accretionary prism evolution, Paleoseismology, Nankai Trough, IODP

