Relationship between submarine landslides, channel erosion and thrust fault activity in the Nankai Trough, Japan

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Abstract

Following IODP Expedition 333, frontal ramps of submarine landslides were investigated together with a submarine channel-gully system. In this presentation they are shown to reflect thrust-fault activity in the Nankai accretionary wedge, prior to one of the major stages of movement of the large megasplay fault (MSF). Variations in channel bed slope, height and width of channels and gullies indicate uplift and sediment by-pass seaward from the MSF at <1.67-1.46 Ma. Above the channel-gully system, slabs of a younger mass-transport deposit (MTD 6) were detached at different depths between ~1.05 and 0.85 Ma. The work undertaken shows a more diffuse distribution of deformation within the Nankai accretionary wedge than previously assumed for the MSF region. In addition, it is postulated that developed channel systems, as the axial channel in the study area, can erode the upper continental slope and lead to bypass of substantial volumes of sediment to distal parts of the study area. This process bears the potential of generating periods of more intense thrust-wedge deformation, at least locally, than those predicted by mathematical and physical models based on present-day taper geometries.

As for MTD 6, its direction of transport differs 30^{o}-45^{o} from the strike of scarps and ramps at its base, which are parallel to the structural contours of thrust anticlines underneath. This character contrasts to the geometries frequently documented in frontally-emergent submarine landslides, with lateral and frontal ramps in the study area forming significant boundaries between zones of MTD 6 with distinct acoustic and petrophysical properties. The ways these acoustic properties vary in the study area are presented.