

Characterization of the mass transport deposits and sediment waves in the NE South China Sea continental margin and the submarine Taiwan accretionary wedge

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Abstract

The Quaternary deposits in the South China Sea (SCS) continental margin near Taiwan are characterized by mass transport deposits (MTDs) and sediment waves (SWs). We study the temporal and spatial distribution of MTDs and SWs both in the SCS continental slope and its adjacent submarine Taiwan orogenic wedge in order to decipher the origins of MTDs and SWs in both tectonic regimes. Multibeam bathymetric data and multichannel reflection seismic data are used to characterize the MTDs and SWs. In the SCS continental slope, 4 large complexes of MTDs occurred during the early Quaternary around ~2-1 Ma in the lower slope. The largest MTD is up to 60 km long and 30 km wide and 120 m in thickness. The MTDs are then overlain by widespread SWs since around 1 Ma. The modern SWs occur only to the west of the deformation front and are characterized by two fields showing different orientation and geometry. In the orogenic wedges, local MTDs are found in the thrust-bounded slope basins with a limited spatial distribution with a thickness up to ~ 400 m. The spatial extent of MTDs in the SCS continental margin is a lot more than that in the accretionary wedge. This indicates that large-scale and widespread mass movements tend to occur in continental margins, while the mass movements in the accretionary wedge tend to be more localized. Although the origin for the sequential development of MTDs during ~2-1 Ma followed by the development of SWs since ~ 1 Ma is still unknown, the spatial distribution and sizes of MTDs bear important implications for tsunami hazards in the coastal regions around the SCS.

Keywords: South China Sea, continental margin, accretionary wedge, mass transport deposits, sediment waves