

Origin and distribution of mass-transport deposits in the Pleistocene forearc basin, central Japan, deduced from tephro- and biostratigraphy

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We introduce a field-based study on the basin-wide mass-transport deposits (MTDs) by means of biostratigraphy and the marker tephra beds. The Kazusa Group, the Pleistocene forearc-basin fill exposed in central Japan, is characterized by high sedimentation rate and its stratigraphy is well-established. We focused on three MTDs referred to as MTDs-8–10. They consist of folded blocks that range from tens of centimeters to more than tens of meters in width and thickness, in a sandy mud matrix commonly containing volcanoclastics (e.g., pumice grains and euhedral crystals). The overall thickness of these MTDs ranges from ~20 to 100 m. Based on the lateral correlation of the tephra marker beds, these MTDs can be traced laterally for more than several tens of kilometers. MTD-8 (1.3 Ma) and MTD-9 (1.2 Ma) contain blocks characterized by folding, internal minor faulting, different attitude of bedding planes from the general trend, and occasionally overturned. The blocks in MTD-8 contain tephra beds and calcareous nanofossils that are typically found in the older strata down to 250 m below it, which suggest that the blocks are considered to have originated from the upstream excavated area and spread out laterally to cover the open seabed. On the other hand, MTD-10 (1.2 Ma) is characterized by a laterally-stacking pattern showing lamp-flat geometry, and the original stratigraphic positions of the blocks are consistent with the host strata, indicative of translational movement. The sedimentary dykes were observed in the basal slide plane, suggesting excess pore pressure within the slip zone. The different modes of occurrence are likely to be a result of local variation in slope gradient and distance of downslope migration. That is, initial phase of mass transportation on low-gradient slope represented a slide (MTD-10), whereas moving over a sufficiency long distance exhibited more mixed and deformed slump (MTDs-8 and 9). Combination of studies on MTD textures, tephro- and biostratigraphy has great advantage to know their spatial distribution, original stratigraphic position where the MTDs were initiated, and mechanism to generate variable occurrence of MTDs.

Keywords: submarine landslide, mass-transport deposit, Kazusa Group, calcareous nanofossils, tephra