Sedimentary characters of surface sediments in the southern Mariana Trench, western Pacific

MIN LUO [1] AND DUOFU CHEN [1]

[1] *Shanghai Engineering Research Center of Hadal Science and Technology, Shanghai Ocean University, China; mluo@shou.edu.cn & dfchen@shou.edu.cn*

The way sediment particles are transported and deposited within hadal zones is distinct from that in continental margins and abyssal settings. Horizontal migration of particles is widespread and could be the major mode of sedimentary fill within the trenches. This is attributed to the funnel-like topography and relatively intensified seawater dynamic in this restricted environment as well as sediment instability triggered by plate subduction. In that case, it is imaginable and reasonable that the sediments age with increasing water depths because younger sediments are always transported downslope and ultimately accumulated at the trench axis. ^{14}C-AMS ages of the bulk organic matter were determined in three gravity cores (GC03, GC04, and GC05) and one box core (BC11) collected in the southern Mariana Trench with water depths ranging between 5289 and 7118 m. The progressive increase in ^{14}C-AMS ages of the bulk organic matter with enlarging water depths (GC04, GC03, and GC05) suggested a downslope transport of sediment particles towards the trench axis. The estimated sedimentation rates of GC03 and GC05 based on ^{14}C-AMS dating were ca. 100-200 cm kyr^{-1} and ca. 20-40 cm kyr^{-1}, respectively, which were 2-3 orders of magnitude higher than that expected from the fitted relationship between water depth and sedimentation rate based on a large dataset (Burwicz et al., 2011). One may expect an increase in the sedimentation rate with water depth within trenches if downslope movement of sediment particles is assumed. However, the sedimentation rates of GC05 at the water depth of 7118 m were slower than those of GC03 at the water depth of 6310 m, and the sediments of BC11 in close proximity to GC05 were deposited at a much lower rates. Therefore, hadal trenches represent a changeable and complex sedimentary domain which require further detailed investigation.

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