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Foraminiferal shells in sediment traps: Implications of biogenic particle transport in the Kao-ping submarine canyon, Taiwan

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Abstract

Foraminifera collected from sediment traps deployed at two depths in the Kao-ping submarine canyon were analyzed to provide information on biogenic particle transport. The discovery of benthic foraminiferal shells in the collecting cups was unexpected because the sediment traps were deployed at levels of 54 and 104 m above the seafloor of 290 m depth. The presence of shelf-originated benthic foraminifera captured by the sediment traps suggests that the canyon is not only a conduit for delivering terrestrial materials into the ocean but also acts as a passage allowing particles of marine-origin to be transported toward the shore. Furthermore, during the passing of Typhoon Kai-Tak, the cups at both upper and lower levels collected a higher diversity of benthic foraminifera species than at other time intervals, while there was also an increased similarity in the species collected by all cups. Most of the benthic taxa found in collecting cups were also present at as forms living in surface sediments from the shelf and slope as determined by staining, supporting a shore-wards transport particles of marine origin in the submarine canyon. Nevertheless, the stable isotopic compositions of the benthic foraminifera *Cibicides wuellerstorfi* displayed a similar range of variation as the other planktonic foraminifera (*Globigerina bulloides, Globigerinoides sacculifer* and *G. ruber*), indicating these species dwelled at a relatively shallow depth (<50 m). The similarity of $\delta\,^{18}O-\delta\,^{13}C$ compositions for both planktonic and benthic foraminifera collected from the sediment traps and also from the underlying surface sediments implies that most of the foraminiferal shells precipitated their shells locally and were transported by either settling out of the water column from the adjacent shelf or resuspension from the underlying sea floor.

Keywords: Kao-ping submarine canyon; Sediment traps; Foraminiferal shells; Isotope

1. Introduction

Sediment traps are designed to collect sinking particles from the sea surface and hence are expected to provide information about particle transport prior to deposition (e.g., Honjo, 1982; Nair et al., 1989; Hung et al., 1999; Monaco et al., 1999). Unfortunately, lateral drift at continental margins often affects the descent of particles from the upper water column down to the ocean floor. For example, lateral transports from the shelf and upper slope were responsible for the low $^{210}Po/^{210}Pb$ activity ratio determined from the trapped particulates collected in a canyon off northeastern Taiwan (Hung and Chung, 1998). The planktonic fluxes of foraminifera

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