Monitoring sediment transport in the deep South China Sea using ^{231}Pa-^{230}Th isotopess of sediment trap samples

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The ^{231}Pa-^{230}Th isotope package of suspended sediments is a promising tool for tracking semi-quantitative vertical sinking versus lateral scavenging of marine particles. In this study, ^{231}Pa-^{230}Th isotopes and clay minerals are measured on samples collected by 5 sediment traps deployed in the northern South China Sea at water depth of 2000 m, covering a time span of two years from May 2013 to May 2015. Trapping efficiency of the sediment traps was calculated using the excess ^{231}Pa-^{230}Th isotopes. Our results indicate that lateral transport is the overwhelming dominant way of deep-sea sediment transport, while vertical particle sinking plays only a minor role. The highest trapping efficiency is observed at the mooring station in the Kaoping submarine canyon off Taiwan. The efficiency decreases southwestward gradually along the northern slope. Combining with clay mineral compositions in these sediment trap samples, we find that Luzon also contributes considerable amount of sediments to the deep South China Sea. Sediments from Taiwan and Luzon, however, are transported along two distinct trajectories: continental slope and east-west deep water pathway. The major agent for sediment transported from Taiwan is the contour currents flowing southwestward generally parallel to the continental slope, while sediments from Luzon is carried by the trans-basin deep currents westward from the Luzon Strait. It is also indicated that Taiwan is the most important sediment source for the northern South China Sea, while Luzon is less important in term of the sediment contribution.