Spatial distribution of POC export flux estimated using $^{234}Th/^{238}U$ disequilibrium along the GEOTRACES GI03 section

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To estimate the spatial variability of upper ocean POC export flux in the southeastern Arabian Sea, Andaman Sea, Bay of Bengal and the Indian Ocean, 14 water column profiles of total ^{234}Th were measured as a part of the Indian GEOTRACES programme during March-May 2013. The disequilibrium between ^{234}Th ($t_{1/2}$ = 24.1 d) and its parent ^{238}U ($t_{1/2}$ = 4.47 x 10^9 y) and the POC/^{234}Th ratio in sinking particles is used to calculate the export flux of carbon settling from the euphotic zone. ^{234}Th export fluxes in the entire study region varied from negligible to 2025 dpm m^{-2} d^{-1}. These fluxes were high in the Indian Ocean (mean: 1373 dpm m^{-2} d^{-1}) followed by that in the Bay of Bengal (mean: 752 dpm m^{-2} d^{-1}) and the Andaman Sea (148 dpm m^{-2} d^{-1}). High ^{234}Th export was recorded in the stations sampled near the equatorial Indian Ocean (5°N to 11°S). The reduced ^{234}Th export in the Bay of Bengal may be attributed to the prominent occurrence of mesoscale anticyclonic eddies. Very low ^{234}Th export in the Andaman Sea is perhaps due to low biological production, currents and proximity of the stations to the shelf region. The POC/^{234}Th ratio varied from 0.976 to 5.11 μmol dpm^{-1}. The high values were found in the Bay of Bengal (13.5°N 91°E) as well as near the equatorial Indian Ocean (3.63 and 4.87 μmol dpm^{-1} at 5°N and 11°S, respectively). The computed POC export fluxes varied from negligible to 7.3 mmol C m^{-2} d^{-1}, highest value being observed at 11°S near the equatorial Indian Ocean. Weak upwelling along the equatorial region could have enhanced the carbon export flux. The average POC export flux in the Indian Ocean was 3.5 mmol C m^{-2} d^{-1}, whereas, the Arabian Sea, Bay of Bengal and the Andaman sea recorded very low carbon export (negligible to 1 mmol C m^{-2} d^{-1}) during the premonsoon season (March-May).