Sediment budget in the East China Sea elucidated from fallout nuclides

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Using three fallout nuclides (^{210}Pb, ^{137}Cs and $^{239,240}Pu$) as tracers, an attempt was made to elucidate the budgets, sources and pathways of sediments and these nuclides in the East China Sea (ECS). A large number of box and gravity cores were collected from this marginal sea and analyzed for this purpose. Multiplying the area of the ECS as defined in this study (353,000 km^2) by the ^{137}Cs-based mean sedimentation rate (0.372 $g.cm^{-2}.yr^{-1}$) yields an annual sediment flux of $1.3x10^9$ $tons.yr^{-1}$. This is about twice the sum of the reported annual discharge from the Yangtze River (~$5x10^8$ $tons.yr^{-1}$) and erosion from Taiwan (~$2\ x10^8$ $tons.yr^{-1}$). To account for the substantial imbalance, input from the Yellow River's dispersal system from the north is required. Spatial distribution of sediment inventories of ^{137}Cs and $^{239,240}Pu$ shows that input from the Yangtze Rivers's drainage basin constitutes the dominant source of these two anthropogenic nuclides in the ECS. As for the natural nuclide ^{210}Pb, boundary scavenging and atmospheric fallout are equally important whereas riverine input is negligible. By comparing the mean sediment inventories of ^{210}Pb, ^{137}Cs and $^{239,240}Pu$ in the study area (71, 5.2 and 0.72 $dpm.cm^{-2}$, respectively) with corresponding values expected from global fallout (37, 7.1 and 0.21 $dpm.cm^{-2}$, respectively), it can be seen that ^{210}Pb and $^{239,240}Pu$ precipitated from the atmosphere are effectively scavenging from the water column, whereas ^{137}Cs is not.