# The seasonal variation of the particle export in the South China Sea: The impact of the Asian monsoon and mesoscale eddies

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This study aimed to examine the temporal variation of the particle export during 2004-2014 in the SouthEast Asian Time-series Study site (SEATS) of the Northern South China Sea. The radioactive $^{234}$Th was used to trace the particle export in the upper ocean. Large variations of $^{234}$Th and POC fluxes were found during the 10-year long observation. In the upper 100 m, $^{234}$Th fluxes ranged from 478±104 dpm $m^{-2}d^{-1}$ in May 2005 to 2323±71 dpm $m^{-2}\,d^{-1}$ in January 2009, and POC fluxes varied from 1.8±0.4 mmol C $m^{-2}\,d^{-1}$ to 17.9±1.9 mmol C $m^{-2}d^{-1}$. The general pattern of particle export was high under northeast monsoon but low during intermonsoon and southwest monsoon season. We proposed that the deepening of the mixed layer forced by the northeast monsoon triggered an enhancement of the nutrient intrusion from the deep water, and ultimately elevated the particle export. However, the Asian monsoon might not be the only forcing that controlled the temporal variation of the particle export in the South China Sea. For example, $^{234}$Th fluxes in January 2009 was 2323 dpm $m^{-2}\,d^{-1}$, but 1349 dpm $m^{-2}\,d^{-1}$ in the same season of 2010. Similarly, it was 632 dpm $m^{-2}\,d^{-1}$ in August 2009, but 1400 dpm $m^{-2}\,d^{-1}$ in the same season of 2012. Such difference of the particle export in the same seasons might be induced by the eddy activities. In fact, mesoscale eddies are ubiquitous phenomenon in the adjacent area around SEATS station which was also considered as one of the major conduits of the deep nutrients. The highest particle fluxes in January 2009 might be resulted from the cascade of the forcing between northeast monsoon and mesoscale eddies.