Large fluxes of dissolved iron from coastal sediments revealed by $^{224}Ra/^{228}Th$ disequilibrium

PINGHE CAI[1,2*], XIANGMING SHI[1,2], QINGQUAN HONG[1,2], LIN WEI[1,2], PINGPING MI[1,2], LINGFENG LIU[1,2], YUNING WANG[1,2], XUEYING SHI[1,2]

[1]State Key Laboratoty of Marine Environmental Science, Xiamen University, Xiamen 361005, P.R. China
(*Correspondence: Caiph@xmu.edu.cn)
[2] College of Ocean and Earth Sciences, Xiamen University, Xiamen 361005, P. R. Chin

Coastal sediments represent a potentially important source of dissolved iron (Fe) to the upper ocean. However, accurate quantification of benthic fluxes of Fe from coastal sediments is a major challenge in marine chemistry. Here we report benthic flux estimates of Fe from the China coastal seas based on a novel $^{224}Ra/^{228}Th$ disequilibrium approach. Large benthic fluxes of Fe were commonly observed in the study region, and were an order of magnitude larger than flux values derived from the pore water concentration gradient method. The Fe flux estimates were >20 times higher than historical measurements based on the traditional incubation method (i.e., the benthic chamber method) in other coastal seas. An extrapolation of the Fe flux estimates derived from the $^{224}Ra/^{228}Th$ disequilibrium approach to the global coastal seas suggests that the input of dissolved Fe from coastal sediments overwhelms the global input of total Fe from aerosols, which has traditionally been considered the major source of Fe to the open ocean.