^{239}Pu and ^{240}Pu inventories and ^{240}Pu/^{239}Pu atom ratios in the Andaman Sea water column

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Introduction

Significant quantities of Pu isotopes have been released into the marine environment as the result of atmospheric nuclear weapons testing. The dominant source of anthropogenic radionuclides in the early 1960s can be attributed to global stratospheric fallout from atmospheric nuclear weapons testing by the former Soviet Union. In the Pacific Ocean, there were significant contributions from close-in tropospheric fallout as a result of atmospheric tests on Bikini and Enewetak Atolls at the Pacific Proving Grounds in the Marshall Islands. Since the ^{240}Pu/^{239}Pu atom ratio is characteristic for the Pu emission source, information on the Pu isotopic signature is very useful to better understand the transport process in the oceans and to identify the sources of Pu [1]. The objective of this study was to measure the $^{239+240}$Pu concentrations and ^{240}Pu/^{239}Pu atom ratios in seawaters of the Andaman Sea.

Results and discussion

The $^{239+240}$Pu concentration was 1.3 mBq/m^3 in the surface water; a sharp maximum was identified at 200 m depth and then the concentration decreased gradually with depth. The ^{239}Pu, ^{240}Pu and $^{239+240}$Pu inventories in the entire water column were 9.6, 8.2 and 17.8 Bq/m^2, respectively. The ^{240}Pu/^{239}Pu atom ratios ranged from 0.22 to 0.23. These ratios were slightly lower than those observed in the South China and Sulu Seas and were higher than the mean global fallout ratio of 0.18. These high atom ratios proved the existence of close-in tropospheric fallout Pu from the Pacific Proving Grounds.

[1] Yamada & Zheng (2012) *Sci. Total Env* **430**, 20-27.