

Anthropogenic ^{137}Cs , ^{237}Np , ^{239}Pu and ^{240}Pu in the Mediterranean Sea

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The Mediterranean Sea received artificial radionuclides from atmospheric nuclear weapon tests (1950s-1960s), the Chernobyl accident (1986) and discharges from the spent fuel reprocessing plant of Marcoule, in France (1960s-1990s). During the GA04S GEOTRACES cruise (May 2013), 85 seawater samples were taken in the Mediterranean Sea to investigate the distribution, behavior and fate of ^{129}I , ^{137}Cs , ^{236}U , ^{237}Np and Pu isotopes. Here we present the results of ^{137}Cs , ^{237}Np , ^{239}Pu and ^{240}Pu from 10 full depth profiles in the Western and Eastern Basins. This dataset represents the first oceanic section of ^{237}Np and the first data of Pu isotopes in the Eastern Basin. The concentration distributions of ^{137}Cs (0.7 to 2.0 Bq·m⁻³) and ^{237}Np (0.1 to 0.2 mBq·m⁻³) in the Mediterranean Sea were driven by water circulation, and showed maxima between 200-600 m due to Levantine Intermediate Water and minima at 1000-2000 m depth associated with oldest waters. In contrast, $^{239+240}\text{Pu}$ concentrations (<5 to ~20 mBq·m⁻³) were low at the surface, increased until 1000 m, and were fairly constant in deeper waters. $^{239+240}\text{Pu}$ profiles indicate the downward transport of Pu through particle scavenging followed by remineralization, and through dense water formation. The contribution from the aforementioned sources to the presence of radionuclides will be discussed considering radionuclide distribution, inventories and ratios (e.g. $^{240}\text{Pu}/^{239}\text{Pu}$ atom ratios).