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Origin of ¹²⁹I in the environment of Slovenia

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I-129 is considered as a global pollutant and its role as a global tracer to follow the dissemination of radionuclides from a source point such as nuclear fuel reprocessing plants increases. The natural I-129/I-127 isotopic ratio in the order of 10^{-12} was significantly influenced by releases of anthropogenic I-129 to the environment. The ratio of I-129/I-127 in the marine environment has increased to 10^{-11} – 10^{-10} , and in the terrestrial environment to 10^{-9} – 10^{-7} , even 10^{-6} in the vicinity of nuclear fuel reprocessing plants. Anthropogenic I-129 predominates in the biosphere, soil and in upper layers of the oceans, therefore it can be expected that the isotopic ratio I-129/I-127 is increasing in these compartments of the ecosystem.

At the Josef Stefan Institute we have developed a radiochemical neutron activation analysis method (RNAA) for the determination of I-129 in environmental samples and the detection limit of the method is $5 \cdot 10^{-14}$ g I-129 / g solid sample. The developed method was used to trace I-129 in the environment of Slovenia. From marine environment seawater, alga, thorny oyster and sediment samples were analyzed and from terrestrial environment precipitation, soil and pine needles. The results found were in the range from 7.2 to $120.8 \cdot 10^{-7}$ Bq/kg for precipitation, up to $75 \cdot 10^{-4}$ Bq/kg for soil, from 0.1 to $2.12 \cdot 10^{-4}$ Bq/kg for seawater, from 7 to $62 \cdot 10^{-4}$ Bq/kg for thorny oyster and from 17 to $73 \cdot 10^{-4}$ Bq/kg for brown alga *Fucus virsoides* (Donati) J. Agardh., which is endemic to the Adriatic Sea. The content of I-129 in marine sediment and pine needles samples analyzed till now was below the detection limit of the method.

The data of this study represent a survey of I-129 in the environment of Slovenia. The most likely source of I-129 are nuclear fuel reprocessing plants in La Hague and Sellafield, which are known to be the major sources of I-129 in the environment of North Europe. I-129 is transferred to the atmosphere and washed out to the marine and terrestrial environment of Slovenia by precipitation, so it is of atmospheric-precipitation origin.

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