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210Po distribution in different compartments of the Briozzo Lagoon

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210Po is a natural radionuclide, which is present in the environment as a result of the decay of 238U and is characterized by high radiotoxicity and bioaccumulative behavior in certain tissues of living beings.
The main source of 210Po explaining its presence in different compartments of the environment is the exhalation of 222Rn from the ground and its subsequent decay in the atmosphere, resulting in 210Po deposition on earth surface through fall out and rain out.

In shallow coastal lagoons, although the main contribution of 210Po to water and sediments is directly from the atmosphere, rivers and runoff can be additional sources to the water column. In the lagoons, aquatic organisms are capable of concentrating within their tissues various toxic elements including radionuclides, although the concentration of most of these elements or radionuclides in the medium occur generally at trace levels.

The Briozzo lagoon, is a natural freshwater shallow lake, located on the east coast of Uruguay, without anthropic influences and an average depth of 3 meters. In that area of Uruguay, several black sand deposits are present, which have radioactive activity due to their content of thorium and uranium. In order to study the distribution of 210Po in the different compartments of this ecosystem, samples of water, sediment, clams (Diplodon sp), freshwaters snails (Pomacea caniculata) and different species of aquatic plants (Luciola peruviana, Salvinia sp., Schoenoplectus californicus), were collected.

The activity concentrations of 210Po in all the samples analyzed have been determined by applying the high-resolution alpha-particle spectrometric technique. In particular, an alpha-particle spectrometric system, Alpha-Analyst from Canberra Co., formed by a total of eight independent chambers working in parallel, each one equipped with a PIPS type silicon detector (450 mm2 active area), has been employed, being reached typical minimum detectable activities in the order of 10–1 mBq. The application of this technique implies the previous isolation and deposition in thin layers of the radioelement of interest in order to avoid interferences in the measurements.

In addition to the activity concentrations of 210Po determined in the different environmental matrices, the corresponding transfer or concentration ratios were calculated. In particular, high bioaccumulation of 210Po in the analysed aquatic organisms was inferred.

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