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Activity concentration analysis of Ra-226, Ra-228 and Pb-210 in a sedimentary profile of Admiralty Bay, South Shetland archipelago - Antarctica

Tamires de Araujo Mora¹, Joselene de Oliveira¹, Rubens Cesar Lopes Figueira²

¹Instituto de Pesquisas energéticas e Nucleares/USP, SÃO PAULO, Brazil

²Instituto Oceanográfico da Universidade de São Paulo/IOUSP, SÃO PAULO, Brazil

The natural radioactive series of U-238, U-235 e Th-232 have been used in environmental studies for understanding the dynamics that occur in marine and terrestrial environment. The natural radionuclides have been used as tracers of particulate material flows into the ocean, which occur in the water column or on the sedimentary column. Scientists have used natural radionuclides in geochronological applications models for obtaining historical information on samples of certain regions. In this study was determined the activity concentration of Ra-226, Ra-228 and Pb-210 (mBq g⁻¹) in a sedimentary profile (1B) of about 248 cm collected in the area of Admiralty Bay, South Shetland archipelago - Antarctica. The methodology used included the acid leaching of sediment samples follow by the radiochemical sequential separation of Ra-226, Ra-228 and Pb-210. The precipitate of Ba(Ra)SO₄ obtained was measured 21 days after the final date of precipitation in a low background gas flow proportional counter. The PbCrO₄ precipitate was measured 10 days after the final date precipitation by gross beta counting of its Bi-210 decay product. Considering the results get in a set of 140 samples, it was estimated the unsupported Pb-210 activity. The activity concentration of ²²⁶Ra ranged from 11±1 (mBq g⁻¹) to 48±2 (mBq g⁻¹), and the ²²⁸Ra varied from 48±5 (mBq g⁻¹) to 155±16 (mBq g⁻¹). The activity concentration of ²¹⁰Pb ranged from 8±1 (mBq g⁻¹) to 458±46 (mBq g⁻¹), while estimated unsupported ²¹⁰Pb varied from 4±1 (mBq g⁻¹) to 434±65 (mBq g⁻¹). Based on unsupported Pb-210 data and implementation of the CIC model (Constant Initial Concentration), it was possible to determine the sedimentation rate of 0.63±0.02 cm year⁻¹ in the sediment profile of the Admiralty Bay region.