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Study of the spatial distribution of natural radioactivity in the upper Egypt Nile River sediments

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Abstract

Sediment samples were collected along the Upper Egypt Nile River region starting from Aswan in the south to the north of El-Minia Governorate. Gamma radiation measurements were performed using high resolution HPGe detector with low background PC multichannel spectrometer. The gamma measurements of the alluvial sediments revealed the presence of the natural long-lived radioisotopes ^{238}U, ^{232}Th and ^{40}K. The ranges of their activity concentrations were $3.83Â±1.54â€“34.94Â±4.01$, $2.88Â±1.07â€“30.10Â±1.83$ and $112.31Â±4.77â€“312.98Â±12.24\ Bq/kg$, respectively. The measured activity concentrations differ widely as their presence in the Nile River depends on the pertinent [illegible]uch as the presence of dams, barrages and sediments type.

The other factors controlling the distribution of the detected natural radioisotopes have been discussed. Absorbed dose rates have been calculated for each location with range $12.71Â±0.96â€“38.17Â±1.55\ \mathrm{nGy/h}$. Also, the estimated activity utilization indexes have been presented. The ratios between the detected radioisotopes have been calculated.

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Keywords

Uranium; Thorium; Potassium; Alluvial sediments; Absorbed dose rate; Th and U ratios; Activity utilization index

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