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Analysis of natural and artificial radioactive emission pattern in Qarasu River catchment in Gorgan Bay, northern Iran

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Abstract

Knowledge of distribution and emission pattern of natural and artificial radioactive elements and their radiation level in the environment is very important to assess its effects on human health and living organisms. In this study, the specific activity of natural and artificial radioactive elements for 30 soil and sediment samples collected from upstream and the outlet of Qarasu River to Gorgan Bay as well as sediments in the eastern part of Gorgan Bay were measured using High-Purity Germanium detector and their distribution map with using SURFER and GIS software was drawn. Specific activity of ^{226}Ra , ^{232}Th , ^{40}K and ^{137}Cs was obtained from 8.80 to 31.92, from 11.16 to 43.19, from 183.77 to 562.88 and from 0.83 to 12.72 in Bq/kg respectively. Upstream of the Qarasu River, the average concentration of ^{226}Ra , ^{232}Th , ^{40}K and ^{137}Cs in the soil samples beside the Qarasu River was higher than the sediments of the river, which indicates the washing of sediments and the transport of radioactive elements by water flow and transfer of these elements to lower areas. In Qarasu estuary and Gorgan Bay, ^{232}Th and ^{40}K distribution patterns are almost similar and the highest concentrations of ^{226}Ra , ^{232}Th and ^{40}K elements are related to Qarasu estuary sediments. The concentration of ^{137}Cs in the mouth of Qarasu River has the lowest value and increases with its distance from the mouth to the middle parts of Gorgan Bay, which indicates a high mobility and a tendency to sediment in calmer places for ^{137}Cs . The measured values for radiological parameters and risk indices due to nuclear radiation in this study are within the allowable range and the amount of available nuclear radiation does not threaten the health of the inhabitants of the region.

Keywords: radiation, emission pattern, ^{137}Cs , Gorgan Bay, Qarasu River

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