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The Effect of Geology on Distribution of the Radionuclides in the Eastern Pontides, (Trabzon-Rize Region and its vicinity)

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Measurement of the radiation in rocks and soil is crucial for defining absolute dating studies and distribution of the radiation in Geosciences. To a large extent, most of the soils or rock samples taken from a drainage basin can be used to calculate the absorbed dose rate and the concentration of U-226Ra-, 232Th, 40K and 137Cs can be found using the High Purity Germanium Detector on the sediments. The concentration of these radionuclides is depending on both the geological background (e.g. rock type) and atmospheric events (e.g. the Chernobyl accident). The main objective of this study is to determine the concentration of U-226Ra-, 232Th, 40K and 137Cs radioactivity in Holocene marine terrace samples collected from three different levels in the coastal plain of the Eastern Pontides between Trabzon and Rize. Marine terraces were sampled within different drainage basins, which are underlain by metamorphic, magmatic and sedimentary rocks such as granite, limestone, andesite, dacite, rhyolite, gneiss and schist. These rocks are enriched in U-226Ra-, 232Th, 40K and 137Cs due to geological process in the subsurface. Previous studies have stated that the concentration of the 137Cs can be especially attributed to the Chernobyl nuclear accident near to the Black Sea basin. However, we suggest that the elevated concentration of 137Cs might be related to not only atmospheric events both also rock types (e.g. metamorphic and magmatic rocks). According to our laboratory data, the results indicate that: (i) The activity of U-226Ra-, 232Th, 40K and 137Cs ranging from 4.8 $\pm$ 0.3-51.3 $\pm$ 1.45; 9.6 $\pm$ 0.2-44.9 $\pm$ 0.9; 119 $\pm$ 5-660 $\pm$ 14.5; 0.2 $\pm$ 0.1-5.4 $\pm$ 0.5 Bq kg-1; respectively, (ii) the highest values of U-226Ra are concentrated in the central section of the eastern Pontides whereas the others are more uniformly distributed, (iii) high concentrations of 232Th and 40K are observed in all sections of the Eastern Pontides, (iv) the highest concentration of 137Cs is recorded in the eastern section of the Eastern Pontides.
Keywords: Radionuclides, Pontides, Black sea basin, Geochemistry, Chernobyl.