



Radiometric, SEM and XRD investigation of black sands at Chituc placer deposit North of the City of Navodari, Romania

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The black sand of the Chituc marine sandbank situated northern of the city of Navodari (Romania), displayed anomalous high ambient dose rates. Field measurements performed during 2013 Summer campaign recorded in some places dose rate up to 200 nSv/h, significantly overpassing the average value of 44 ± 20 nSv/h recorded along the entire Southern sector of Romanian Black Sea shore.

Here, the sand presented a black-brownish hue, different by the usual white yellowish colour. Gamma ray spectrometry performed on both Slanic-Prahove Underground Low Background Laboratory and Geological Institute Radiometric Facilities showed with clarity the dominance of ^{228}Ac radioisotope in the 50 microns fraction together with the ^{226}Ra and traces of ^{40}K . No significant amount of anthropogenic ^{137}Cs were identified. The other granulometric fractions, i.e. 315, 200 as well 100 microns presented a significant lower level of radioactivity.

X-ray diffraction (XRD) as well as Scanning Electron Microscopy (SEM) data attested the presence of monazite, zircon, magnetite, ilmenite, andradite, quartz, aragonite and albite in different proportions, the monazite and zircon being preponderant in the 50 microns, the most radioactive fraction. Based on both radiometric and XRD determinations we come to the conclusion that the evidenced radioactivity could be attributed to both uranium and thorium series in the zircon and monazite fractions and to a lesser extent in the garnet fraction.

By its position with respect to Danube Delta, the Chituc marine sandbank could be regarded as a placer where heavy minerals discharged in the Black Sea by the Danube River and transported southward by the Great Black Sea Rim are deposited by gravity separation during sedimentary processes. The implications of the Chituc levee radioactive anomaly for any further human activity are analysed and discussed.

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