

Studies on the radioactivity of sea-bed sediments were carried out in Albania in the bays of Durres, Treport and Porto-Novo. The aim in the case of Durres Bay was to study the in-filling of the port channel. The studies in the bays of Treport and Porto-Novo were concerned with the construction of a new port in the Vlora Bay (1,2). The natural radioactivity measurements were made in order to construct maps of the lithology of the sea-bed of these areas and to draw possible conclusions about the movements of the sea-bed sediments. Maps of the natural radioactivity give the mean effect of the action on the sediments by hydrometeorological elements over a period of several years. Changes can be distinguished within a distance of several kilometers to several hundred kilometers. This work was the first phase of radionuclide studies which aimed at understanding the mechanism of the movement of sea-bed sediments and, at the same time, to discern the quantity and the direction of their movements.

From a large number of sea-bed samples, the granulometry of the sediments was determined. Later, a dynamic survey of the total gamma radioactivity of the seabed sediments was also carried out. The probe (NaI(Tl), $d=3.8$ cm, $h=2.5$ cm), fixed on a sled 5 cm above the sea-bed, was towed by a boat at a speed of 1m/s.

The results from a large number of measurements (902 in Treport Bay) were plotted on probability paper. Both in the case of the Durres Bay and Vlora Bay, the points were not regularly distributed around the median value. As a first approximation, one can discern three groupings that seem to correspond to different contents of clays in the sediments (Table 1). Note that for our probe and geometry, the pure siliceous sand gives 12 cps.

Table 1. Total gamma radioactivity (count per second) in sediments from the Albanian Bays.

Family	Durres Bay		Treport Bay	Porto-Nova Bay
	Percent	Med. $\pm 1\sigma$, c/s	Med. $\pm 1\sigma$, c/s	Med. $\pm 1\sigma$, c/s
I	25	18.9 \pm 0.8	11.9 \pm 0.9	12.8 \pm 1.8
II	60	21 \pm 0.85	15.3 \pm 1.5	18.8 \pm 3.8
III	15	24 \pm 0.8	20.4 \pm 1.4	25.5 \pm 2.5

The following conclusions were made :

A. Durres Bay

1. The sediments of the bottom represents a mixing of sands (60-70%) with a median grain size of 70 μ m and clay (30-40%, with a mean diameter of 2-3 μ m).
2. The zones of clay accumulation were determined from lesser depths to depths of 10 m not only in the channel but in the outer parts.
3. The vast clay-like stocks are sufficient to fill in the channel many times over without any need to import clays from the outer areas.

B. Treport Bay

1. According to the above-mentioned groupings, the sea-bed can be divided into three zones. The first extends to depths of 7-8 m. The sediments here are more than 80% sands ($d > 100$ μ m, mainly 100-200 μ m). The second zone extends from that depth to 10-11 m. The sediments here contain sands (60-80%, $d < 100$ μ m). Beyond these depths is the third zone with material that is mainly alevrolite and clay.
2. Generally, the boundaries between these zones follow the isobaths. There are no zones of high radioactivity in the areas with generally lower radioactivity. Therefore, there are no clay-like areas in the sand media. This fact indicates that the wave action has resulted in a good selection of granulometry.

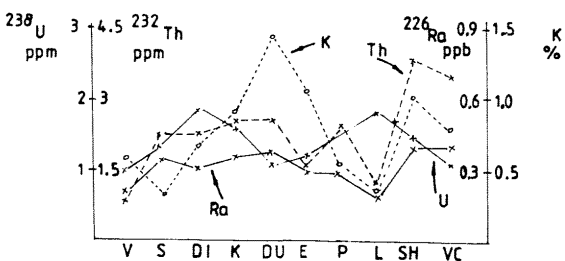
C. Porto-Nova Bay

1. The first zone extends to 8 m depth and consists of pure sand. The second zone extends from that boundary to depths of 12-13 m. In the third zone at greater depths, clay-like sediments are found.
2. The western wave action has also resulted in a good selection of granulometry.

The distribution of U-238, Ra-226, Th-232 and K-40 nuclides in the coastal sediments are especially interesting for understanding the local sedimentology and geology. Not having the possibility to undertake a full-scale study, short-term sampling was carried out with the aim of obtaining limited data and drawing some conclusions about the distribution of these nuclides in the coastal zone. The results of 28 sand samples collected from 10 beaches are given in Fig. 1. The measurements were made with a Hp-Ge detector and the overall errors are 20-50% (U-238), 5-8% (Ra-226), 5-10% (Th-232) and 2-5% (K-40).

The suspended sediment samples taken from Vjosa Seman, Shkumbin and Erzen rivers were analyzed for Cs-137, U-238, Th-232 and K-40. The mean values were 4.6, 25, 32, and 360 Bq/Kg respectively. It should be noted that the mean activity and typical range of U-238, Th-232 and K-40 activities in soils is 25 (10-50), 25 (750) and 370 (100-700), respectively (3). Our rivers every year transport in suspension to the sea about 50 million tons of sediments ; therefore, about 200 GBq Cs-137, 1200 GBq U-238, 1600 GBq Th-232 and 28000 GBq K-40 are entering Albanian coastal waters every year.

Fig. 1. Natural radioactivity of different sands from the Albanian coast.



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