

IN SITU MEASUREMENTS OF RADIATION BACKGROUND AT THE SEA SURFACE

IN SITU MJERENJA PRIRODNE RADIJACIJE PRI MORSKOJ POVRŠINI

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The basic radiation was measured by the field gammaspectrometric kit containing HPG detector, multi-channel analyzer, and the necessary electronic components. Measurement was performed one meter above the sea surface. Measurements were made in the Neum-Klek Bay and on the open sea from the research ship "Andrija Mohorovičić". The results indicate that there are fission radionuclides Cs-137 and Cs-134 found along with the natural radionuclides from the uranium and thorium families. Lower values were obtained in the open sea, where there is no terrestrial radiation, and higher in the Neum-Klek Bay where the terrestrial radiation from the coast and the sea bottom influences the radiation background.

INTRODUCTION

The knowledge of the radiation background is of fundamental importance for the study of the additional radioactive contamination of environment because it represents the basis for building subsequent criteria and norms of the populations radiation safety of estimating the radiation hazard (Horšić *et al.*, 1989)

The basis of the radiation background over marine ecosystems is comprised of cosmic radiation and natural and artificial radioactive elements in the sea water (Eisenbud, 1973). Terrestrial radiation has a great influence on the radiation background measured near the coast and almost none on the radiation background measured in the high sea.

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RESULTS AND DISCUSSION

Values of the dose rate of gamma-radiation over the sea surface are given in Table 1. From these results it can be seen that the highest dose rate origins from the uranium and thorium daughters (12.98 E-2 and 6.65 E-2 nC/kg, respectively), while the dose rate originated from the fission radionuclides are much lower (0.08 E-2 to 0.49 E-2 nC/kg).

Specific ecological characteristics of Klek-Neum Bay influence the radiation background, especially because of Neretva River runoff into the Adriatic Sea with great amount of fresh water. The way of the additional radioactive contamination is also important. Radioactive contamination of the bay has taken place in two ways: bay fallout and rinsing out from the land.

Due to the bay is narrow and shallow, closeness of the land and sea bottom surely influence the background, although the doses measured under the land (Kljajić, 1984) were higher than those measured under the water surface of the bay. Terrestrial radiation can be negligible only in case when we are measuring the background in the high sea.

Table 1. Level of radiation background one meter under the sea

Radio nuclide	dose (nC/kg)					
	1988		1989		x	S
	station I	station II	station I	station II		
1. Bi-214	7.5E-2	5.40E-2	3.22E-2	6.35E-2	5.64E-2	1.84E-2
2. Pb-214	12.98E-2	8.94E-2	4.39E-2	2.34E-2	7.16E-2	4.76E-2
3. Ac-228	5.84E-2	6.25E-2	6.65E-2	6.45E-2	6.30E-2	0.35E-2
4. K-40	1.14E-2	1.41E-2	1.68E-2	1.28E-2	1.38E-2	0.23E-2
5. Cs-137	0.42E-2	0.46E-2	0.49E-2	0.49E-2	0.47E-2	0.03E-2
6. Cs-134	0.08E-2	0.09E-2	0.10E-2	0.11E-2	0.10E-2	0.01E-2

CONCLUSION

Dose rates of gamma radiation measured on the sea surface originate mainly from the cosmic radiation, and their values are lower by 30 % than those measured on the land.

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KRATKI SADRŽAJ

Poznavanje radijacionog fona je od fundamentalne važnosti za studije dodatne radioaktivne kontaminacije okoline zbog toga što predstavlja osnovu na kojoj se grade posljedični kriteriji i norme radijacione sigurnosti populacije i procjenjuje njen radijacioni rizik. Osnovu radijacionog fona iznad morskih ekosistema čine kosmičko zračenje i prirodni i vještački radioaktivni elementi koji se nalaze u morskoj vodi. Terestrijalno zračenje može imati veliki utjecaj na radijacioni fon mjeren u blizini obale i uvijek se razlikuje od onog mjerenog na otvorenom moru. Osnovno zračenje je mjereno putem terenskog gamaspektrometrijskog seta koji sadrži HPG detektor, višekanalni analizator i ostale neophodne elektroničke komponente. Mjerenje je vršeno jedan metar iznad morske površine. Istraživanja su obavljena u zaljevu Klek-Neum i na otvorenom moru na istraživačkom brodu "Andrija Mohorovičić".

