Natural Radioactivity in Marine Sediment Cores from the Shallow-sea Hydrothermal System off Milos Island, Greece

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1. Introduction

Milos, being part of the active Hellenic Volcanic Arc, hosts a unique, shallow-sea, hydrothermal system formed at the SE limits of the neotectonic graben which hosts Fyriplaka Volcano [1] (Fig.1).

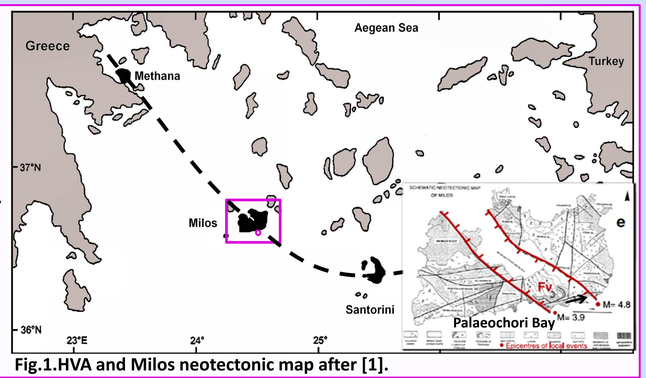


Fig.1.HVA and Milos neotectonic map after [1].

2. Project Scope

Previous studies have focused on sporadic measurements of the radioactivity concentrations on soil, marine sediments and biota [2,3]. This study deals with the determination of the natural radionuclides (^{238}U, ^{232}Th and ^{40}K), as well as the anthropogenic ^{137}Cs, in marine cores from Milos SE hydrothermal sediments, in the framework of a systematic mineralogical and geochemical survey, in places of diffuse venting.

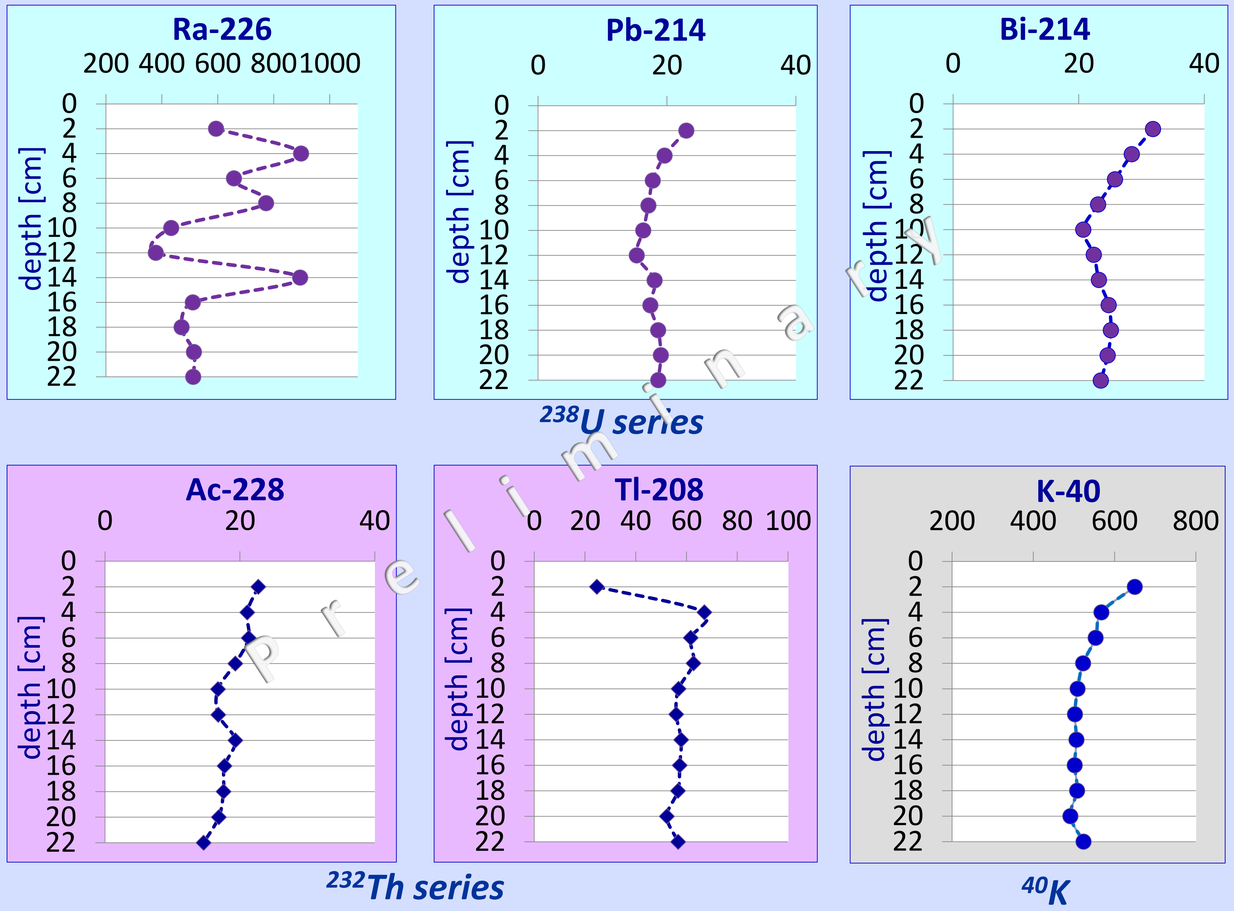
3. Methodology

Fig.2. GEROS station, HPGe detector

The sediment cores were collected by SCUBA diving down to 22 cm depth. Measurements were carried out, for slices of 2 cm thickness, with the UoA GEROS γ-ray spectrometry station (Fig.2) and the spectra were analyzed with the SpectrW software suite [4].

4. Preliminary Results - Discussion

The vertical distribution of the radionuclides in Bq/kg is indicated in the diagrams.



Radionuclide	mean value Bq/kg ± error	min-max
Ra-226	603 ± 4	378-898
Pb-214	18.3 ± 0.2	15-23
Bi-214	24.9 ± 0.3	21-32
Ac-228	18.6 ± 0.4	15-23
Tl-208	55.4 ± 1.8	25-67
K-40	530 ± 6	491-650
Cs-137	1.4 ± 0.03	0.6-2

Table 1. Minimum, maximum and mean values of the radionuclides in Bq/kg.

Generally the depth profiles follow the same trend: the highest values are found near the surface and the lowest around 12 and 20 cm. Mean values are in agreement with the background of the area [2]. ^{226}Ra exhibits a broader range of values (Table 1) and these are, to the best of our knowledge, the highest ever reported for marine sediments in the Aegean Islands. ^{137}Cs was not observed in significant amounts above the background.

References

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Acknowledgments
This work was partially supported by NSF.
We would like to thank the staff of the Tandem Lab at NCSR "Demokritos" for technical assistance.