

# Geochronology and historical records of heavy metals in the marine sediments from western part of Black Sea Coastal Area, Varna/Bulgaria

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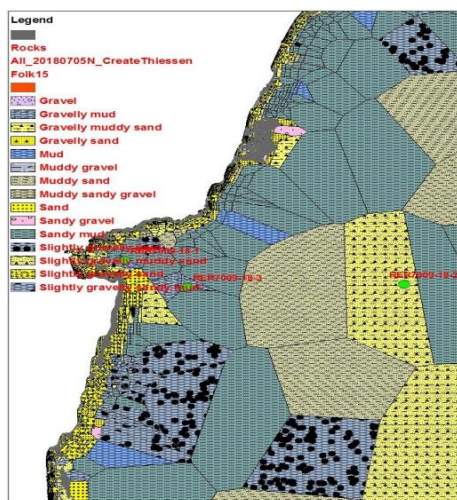
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**Introduction:** The influx of nutrients, pesticides, industrial waste from the surrounding countries, oil shipments, and to a great extent introduced debris by the Danube River, brought the Black Sea marine environment to the precipice of almost damage due to Black Sea a semi-enclosed basin. Therefore, there is much interest and research of the Black Sea environment because of its particularities related to the contemporary ocean and seas priorities, in terms of global sustainable development. Marine sediments can be sensitive indicators and serve as natural archives for environmental changes in the aquatic systems and sediment dating provides a chronology of these changes. This study deals with the combined use of <sup>137</sup>Cs and <sup>210</sup>Pb radiotracers for sediment dating and heavy metal pollution history from western part of Black Sea Coastal Area, Varna, under the frame of IAEA Regional TC Project RER-7009.

**Methods:** One-day sampling expedition was conducted in Varna Coastal region /Black Sea on 26th September 2018, onboard of R/V *Akademik*. The sampling has been performed using Multi-Corer sampler. The sampling stations were selected based on recent preliminary information about the regional geology, bottom morphology and bathymetric maps as shown in Fig.1.



**Fig. 1:** Sedimentology map of selected RER7009-18 sampling stations.

On the frame of IAEA Regional TC Project RER-7009, the labeling cores as “*Core RER7009-18-02-04* (with length 27.0 cm; sliced at resolution of 1cm) were dated in the Institute of Nuclear Science, Ege University, Turkey. The sediment cores were representative and undisturbed. The retrieved material consisted of olive gray/dark greenish gray (color by Munsell soil colour chart) very fine sandy mud (or silt) with whole and broken shells. The quantitative determinations of the <sup>210</sup>Pb and <sup>137</sup>Cs have been carried out by HPGe gamma spectrometry. Heavy metal analyses were performed by Wavelength Dispersive XRF spectrometers.

**Results:** In the study, CRS and CIC Model were applied to date the sediment cores [1-3]. Furthermore, the validation of the <sup>210</sup>Pb-based geochronology by <sup>137</sup>Cs as independent time markers gives additional credit to the suitability of the techniques. The greater concentrations are observed in the recent sediments, after the 1970s according to the established chronology. Sediment Quality Guidelines (SQGs) were used for heavy metals. According to ERM criteria, all concentrations are normal while Cr and Ni concentrations exceed the limit values for ERL criteria.

**Discussion:** The combination of trace metal analysis, <sup>210</sup>Pb and <sup>137</sup>Cs dating as well as sediment quality data in the studied coastal region provided vital information on the historical accumulation of the metals in the sediments.

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