

TRACE ELEMENT DISTRIBUTION IN SEA WATER AND SEDIMENT PORE WATER FROM THE NOVIGRAD SEA AREA (EASTERN ADRIATIC)

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Abstract

In order to study water geochemistry, diagenetic changes within the sediment and processes at the water/sediment interface, levels of trace elements (As, Ba, Co, Cr, Fe, Li, Mn, Mo, Ni, Rb, Sb, Sr, Ti, U and V) in sea water and sediment pore water from the Novigrad sea area were investigated.

Keywords: Adriatic Sea, Geochemistry, Sediments

Introduction

The Novigrad sea is a small, semi-closed bay located in the central part of the eastern Adriatic coast, about 20 km from Zadar (Figure 1). It is connected to the Adriatic sea in the northwest by Velebit channel and the Karin sea in the southeast. Sedimentation processes in the Novigrad sea are dominantly influenced by small karstic river Zrmanja, which discharges in its eastern part, forming highly stratified estuary [1]. Smaller streams like Baštica, Draga and Slapaca, as well as water inflow from Karin sea have less pronounced but still important influence on the sedimentation in this basin. The aim of this study was to investigate geochemistry of sea water and sediment of the area and establish possible natural and anthropogenic influences on the trace element levels.

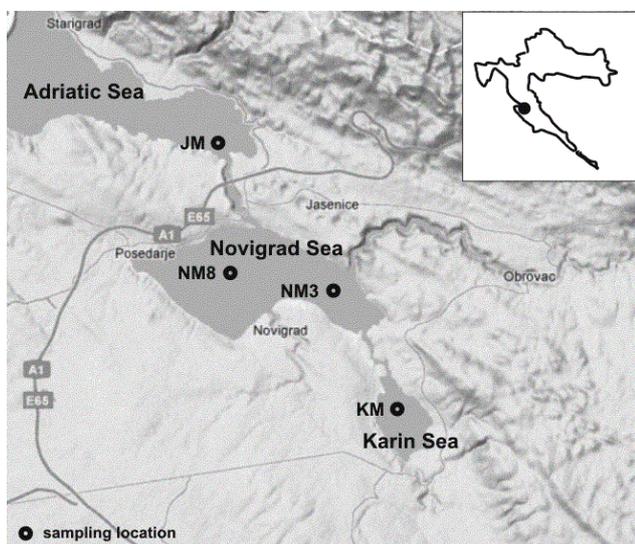


Fig. 1. The map of investigated Novigrad sea area.

Sampling and methods

Samples were taken at four locations, including Novigrad sea, Karin sea and Velebit channel (Figure 1). The sea water was sampled from the surface and bottom layers, whereas pore waters were extracted by centrifugation from sediment cores previously cut into subsamples at 2 cm intervals. Immediately after sampling Eh and pH were measured in sediments, at the same locations. Concentrations of trace elements in sea water and pore water were measured by high resolution inductively coupled plasma mass spectrometry (HR ICP-MS).

Results

The Eh values in the cores became negative almost immediately below the sediment-water interface, while the pH values exhibited small variations along the profile. The measured Eh values imply anoxic conditions starting already from the sediment surface. Comparing to the sea water, the pore waters were found to be generally enriched in trace elements. The redox-sensitive elements, Fe and Mn, generally follow the Eh distribution pattern. Co is often associated with Mn oxides which could explain their similar depth profiles (Figure 2). The concentrations of Ba, Mo, Sr and Rb were variable in the upper 8 cm, whereas As, Cr, Li, Ni, Ti, U and V concentrations show variations throughout the profile in all cores. Concentration levels of all analyzed elements in examined surface and bottom water samples were in the range of values reported by Mikac et al. [2] for Krka river estuary and are considered to reflect natural

levels. Pore water trace element content is believed to reflect mineralogy of sediments and ongoing diagenetic processes in anoxic environment.

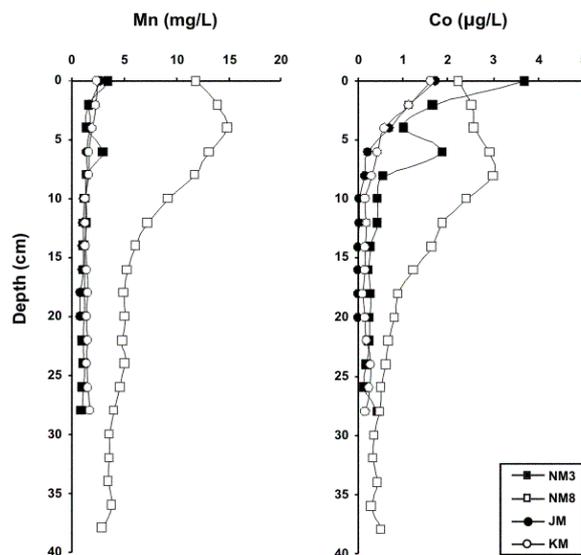


Fig. 2. Vertical distribution of Mn and Co concentrations in the sediment cores from sampling stations NM3, NM8, JM and KM.

References

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