

FORAMINIFERAL DISTRIBUTION IN THE KARSTIC ZRMANJA RIVER ESTUARY (EASTERN ADRIATIC SEA)

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Abstract

The foraminiferal taxonomic composition and density, granulometric composition, carbonate and organic matter contents were determined in recent surface sediments of the Zrmanja river estuary in June 2008. The results indicate that foraminiferal distribution strongly depends on location in the estuary and organic matter and carbonate contents, and granulometric composition of the sediments.

Keywords: Adriatic Sea, Estuaries, Foraminifera, Sediments

INTRODUCTION

This study was conducted at twelve stations in the Zrmanja river estuary, which is located in the north part of Dalmatia (eastern Adriatic coast). The Zrmanja river is approximately 69 km long and discharges into the Adriatic Sea, forming a highly stratified estuary [1]. The estuary can be divided in the upper (river Zrmanja from Jankovic buk to Novigrad Sea), middle (Novigrad and Karin Sea) and lower part (Velebit channel and the strait between Novigrad and coastal Adriatic Sea) [2]. The correlation between foraminiferal assemblages and sedimentary facies has been determined in estuarine and continental shelf areas [3,4], therefore we aimed to determine the relationships between foraminiferal distribution and chemical and granulometric composition of the sediments in the Zrmanja estuary.

MATERIALS AND METHODS

Surface sediment samples (0-2 cm) were collected using Van Ween grab in June 2008. The sediment was immediately frozen, stored at -20 °C and freeze-dried in the laboratory. Foraminifera were counted in the fraction larger than 125 µm, in the aliquots containing about 300 foraminiferal specimens. The granulometric composition, carbonate and organic matter contents in the sediment were analysed as described in the reference [5];

RESULTS AND DISCUSSION

Based on the statistical analysis of foraminiferal composition and abundances and sediment properties at the investigated stations, the results are as follows: 1) The differences between the five stations in the upper estuary sediments were considerable. Sand content decreased from Jankovic buk (97.5%) to Zrmanja mouth (10.6%). The same trend was noticed for carbonate content (34.2 and 72.3%, respectively), while portion of organic matter increased (1.13 and 6.87%, respectively). Foraminiferal density at these stations ranged from 2 to 971 specimens per 1 gram of dry sediment, and was dominated by the cosmopolitan species *Ammonia tepida* (40.8-80.2%). The other abundant taxa were *Aubignyna perlucida* (0-16.9%), *Criboelphidium decipiens* (0-14.1%), *Elphidium* spp. (1.7- 42.1%) and *Quinqueloculina* spp. (0-10.5%). Species *Ammonia tepida* and *Aubignyna perlucida* are found in other areas with lower salinity [6,7]. The station in the strait between Novigrad and coastal Adriatic Sea had the highest gravel (37.9%) and carbonate contents (72.3%). *Connemarella rudis* (26.5%) and *Triloculina tricarinata* (14.3%) were dominant species. Presence of *Connemarella rudis* is in accordance with its preference for sandy sediment [4], while *Triloculina tricarinata* is usually found in areas with intensive circulation [8]. The six marine stations in the Novigrad Sea, Karin and coastal Adriatic Sea were characterized by the foraminiferal density between 104 and 475 specimens per 1 g of dry sediment, the highest organic matter (6.55-10.68%) and lower carbonate contents (15.8-45.9%). At these stations *Criboelphidium decipiens* (11.1-16.5%), *Ammonia tepida* (1.6-20.8%), *Bulimina aculeata* (0.3-15.2%), *Protelphidium granosum* (0.5-10.7%) and *Asterigerinata mamilla* (0-11.8%) were dominant. Those species are associated with fine-grained sediments [4,9], and at these stations fine-grained clay particles contents were the highest (39.0-53.5%). These results indicate that in the river Zrmanja estuary foraminiferal distribution is strongly affected by the locations in the estuary, as well as by organic matter, carbonate contents, and granulometric composition of the sediment.

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