FORAMINIFERAL DISTRIBUTION IN THE MIDDLE ADRIATIC SEA

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Abstract
The distribution of foraminifera from the middle Adriatic Sea has been studied from ten surface sediment samples. Different water depth (from 52 m of water depth down to 262 m), different characters of the substrates (organic matter and carbonate content, granulometric properties) have affected foraminiferal diversity along Palagruža sill and Jabuka pit. However, among all listed factors, here, the organic matter content seems to be the most important.

Key words: middle Adriatic Sea, foraminifera, surface sediment

Introduction
Adriatic Sea is Epicontinental Sea. The middle part of the Adriatic Sea separates north shallow from deepest south part. In the middle part are located Jabuka pit and Palagruža sill. The aim was to investigate changes in foraminiferal associations along two profiles across Jabuka pit and Palagruža sill.

Methods
Surface sediment samples (from surface to 4 cm deep in sediment) were taken in June 2002 at ten stations in the middle Adriatic Sea (Fig. 1). Foraminifera were counted in the fraction larger than 63 μm, from the aliquots containing about 300 foraminiferal specimens. Multivariate cluster analysis, Fisher index and Shannon-Wiener index were done in order to define the foraminiferal diversity.
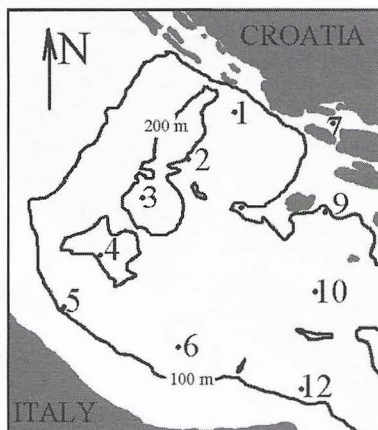

Fig. 1. Sampling locations in the middle Adriatic Sea.

Results and discussion
The 3762 foraminiferal specimens picked from the 10 samples were assigned to 52 genera and 72 species. Rotaliina are predominant (80-95 %). The most abundant are *Globigerina* sp, *Brizalina spathulata*, *Eponides* sp, *Cassidulina laevigata carinata*, *Nonion* sp., *Cribroelphidium decipiens* and *Textularia agglutinanas*. In investigated area fine grain sediments (< 63μm, muds) prevail, except at the station #9 (Table 1).

Cluster analysis on foraminiferal associations of the samples grouped split them into three clusters:

a) Stations #1, #2 and #10. The samples (about 180 m water depth), have carbonate content ranging from 30 to 36%, and organic matter between 4.51 to 7.08%. Foraminiferal diversity is moderate (Shannon-Wiener index 2.4-2.5, Fisher index 3.4 - 5.7). The most common foraminifera are *Globigerina* sp., *Brizalina* sp. and *Uvigerina mediterranea*.

b) Stations #3, #4, #5 and #6. These stations are located in west part of investigated area, starting at 114 m down to 262 m depth. Numbers of foraminifera per gram sediment is the lowest (under 1000), species diversity shows consistency in all stations; carbonate content between 26-27% in sediment, while organic matter content is highest. The most abundant foraminifera are *Globigerina* sp., *Brizalina* sp. and *Uvigerina mediterranea*.

c) Stations #7, #9 and #12. These stations are the shallowest, percentage of coarse grain fraction (>63μm) is the highest as the carbonate content (36-68%). The Diversity indexes show the largest variety of values (H(S) from 2.2 to 3.1; Fisher from 3.4 to 6) *Textularia agglutinans* and *Cribroelphidium decipeiens* are most abundant species.

Table 1. Water depth, granulometric properties, sediment type, organic matter and carbonate content, number of species and total foraminifera, Fisher index and Shannon-Wiener index (Mz - mean size, Sediment type according to Folk classification [1], S – number of species, N – total number of foraminifera per gram sediment, α – Fisher index, H(S) - Shannon-Wiener index)

Stations	Water depth (m)	Mz (μm)	Mud (%)	Sediment type	Organic matter (%)	Carbonates (%)	S	N	α	H(S)
1	170	2.05	96.3	mud	7.08	36	38	4270	5.7	2.4
2	187	1.7	96.9	mud	6.04	31	30	4326	4.3	2.4
3	262	1.27	98.2	mud	6.32	27	35	736	7.6	2.9
4	207	1.24	99	mud	6.79	26	27	900	5.2	2.4
5	114	1.64	98.9	mud	7.1	26	44	875	9.8	2.7
6	132	1.1	98.6	mud	7.03	26	31	635	6.8	2.6
7	52	2.12	94.8	mud	6.79	50	23	3116	3.4	2.2
9	102	38.03	43.4	gravelly mud	3.22	68	30	23167	3.4	2.9
10	172	2.67	95.8	mud	4.51	30	25	5186	3.4	2.5
12	112	3.03	92.5	slightly gravelly mud	5.47	36	43	7522	6.0	3.1

Different ecological conditions along Palagruža sill and Jabuka pit, seen through different water depth, differences in composition of substrate (organic matter content, carbonate content and granulometric composition), have resulted in differences in diversity of studied foraminiferal associations. The good relation occurs between organic matter content and Fisher index. The highest content of organic matter in station #5 follows the highest diversity Fisher index of 9.8, or the lowest organic matter content at station # 9 is characterized by the lowest Fisher index of about 3.4. It seems that quantity of organic matter at sea bottom is the most important factor determining benthic foraminiferal composition.

Palagruža sill stations are located near the coast (except station #10), consequently the content of coarse-grained particles is higher and the total numbers of foraminifera are the highest. However, percentage of planktonic foraminifera along this transect is the lowest (3.4-14.4 %) except at station #10 (37.5%).

References
1 - Folk, R.L. 1954: The distinction between grain size and mineral composition in sedimentary rock nomenclature. *J. Geol.*, 62:344-356.