EVOLUTION OF THE PONTO-CASPIAN REGION DURING LAST 800 KA: EVIDENCE FROM BENTHIC FORAMINIFERA.

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Keywords: sea level, water exchange, spatial-temporal migration

This paper provides an overview of the Late Quaternary (last 800 ka) stratigraphy and palaeoceanography of the Pontic region based on the taxonomy, ecology, and spatial-temporal migration of benthic foraminifera, supplemented by geological and radiocarbon records obtained from bottom sediments and coastal outcrops.

The data have been collected since 1971 throughout the course of a large-scale geological survey of the Black Sea shelf. Materials from the Eastern Mediterranean, the Sea of Marmara, and the Caspian Sea were used as supporting evidence for the origin of the Black Sea foraminifera as described in Yanko-Hombach (2007). According to their ecological preferences, benthic foraminifera were divided into oligohaline (1–5‰), strictoeuryhaline (11–26‰), polyhaline (18–26‰), and euryhaline (1–26‰) species (Yanko-Hombach 2007).

In our stratigraphic work, we have followed the Russian subdivision of the Quaternary System (Zhamoida 2002) into the Eopleistocene (1.8-0.8 Ma), Neopleistocene (0.8-0.01 Ma), and Holocene (0.01-0.0 Ma). Boundaries between the major Late Quaternary subdivisions preserve traces of the most significant changes in foraminiferal assemblages. In the Pontic region, it is the percentage of Caspian forms present: 54% in the Early Neopleistocene, 18% in the Middle Neopleistocene, 3% in the Late Neopleistocene, and 6% in the Holocene. Besides this, there are Eopleistocene relics in the Early and Middle Neopleistocene (3% and 11%, respectively). There are no Eopleistocene relics among the benthic foraminifera in the Late Neopleistocene and Holocene. The more detailed subdivision is based on the spatial-temporal migration of foraminifera from the Mediterranean or Caspian water bodies as well as the number of species, their genesis, and abundance. In the Pontic region, an increase in the number of strictoeuryhaline and polyhaline forms correspond to transgressive stages, and their decrease and replacement by oligohaline and euryhaline species is typical for regressive stages. It is *vice versa* in the Caspian region.

In total, nine major transgressions are discernable in the Pontic basin since 800 ka (Table 1). Three transgressions were caused by Caspian water (Caspian-type), whereas six others were the result of Mediterranean water (Mediterranean-type). The sediments of Caspian-type transgressions contain exclusively Caspian microfossils, reflecting a connection between the Caspian and Pontic basin. The sediments of the Mediterranean-type transgressions include a mixture of Caspian and Mediterranean microfossils in the early stages of the transgressions. Upward in the cores, the mixed assemblages are replaced by Mediterranean microfossils in a gradual but fluctuating manner. The transformation is especially pronounced at the Neopleistocene-Holocene boundary (ca. 9.4 ka BP).

According to the foraminiferal evidence, the Caspian basin discharged its water into the Pontic basin during the Early Bakinian, Old Neoeuxinian (Drevnechernomorian), Early Uzunlarian, and Neoeuxinian stages, increasing the level of water in the Pontic basin significantly. The first Pleistocene penetration of Mediterranean water into the Pontic basin occurred in Karadenizian time (Table 1). It was repeated again and again in Late Uzunlarian, Karangatian, Tarkhankutian, and Holocene times. The Karangatian transgression, as evidenced by the Eltigen stratotype on the Kerch Peninsula, was the most prominent, increasing salinity in the Pontic basin to ca. 30‰. An increase in the level and salinity of the Pontic basin was not catastrophic, nor was it gradual. It occurred in an oscillating manner

from its lowest point at about –100 m during the LGM (27–18 ka BP) to +2 m above the present sea level during Holocene optimum (Yanko 1990).

Table 1. Stratigraphy of the Pontic region for the last 800 ka.

Division	Section	Age - kaB	MIS	Alps		Pontic region	
						Fedorov 1978, 1982	Yanko (1990)
Holocene	Upper	0.0	1	Holocene		Recent	Recent*
		4.5				Korsunian	Korsunian***
						Nymphaean	Nymphaean*
		7.8				Phanagorean	Phanagorian***
						New Black Sea	Dzhemetinian*
							Egrissian**
							Kalamitian*
	Lower	9.5				Old Black Sea	Pontian**
		27					Vityazevian*
							Kolkhidian**
							Bugazian*
Neopleistocene	Upper		2-3	Würm		Upper Neoeuxinian	Upper Neoeuxinian **
						Lower Neoeuxinian	Lower Neoeuxinian ***
		56	4			?	Tarkhankutian*
							?***
		120	5	Riss-Würm		Upper Karangatian	Upper Karangatian*
		200					
							Middle Karangatian*
						Lower Karangatian	Lower Karangatian*
	Middle		7	Riss	R_3	Regression	?***
		240			R_2	Uzunlarian	Upper Uzunlarian*
					R_1	Upper Old Euxinian	Middle Uzunlarian*
						Regression	Lower Uzunlarian*
						Paleouzunlarian	?***
		500	8-11	Mindel-Riss		Lower Old Euxinian	Upper Old Euxinian*
		780					Lower Old Euxinian**
			12-14	Mindel		Regression	?***
	Lower		15-21	Günz-Mindel		Chaudinian	Upper Chaudinian: Karadenizian*
							Upper Chaudinian: ?***
							Lower Chaudinian**
Eopleistocene	Upper Eopleistocene		22-23	Günz		Gurian Chauda	Gurian

* Mediterranean-type transgressions; ** Caspian-type transgressions, ***regressions

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