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About the stratigraphic correlation of events in Holocene geoarchaeology

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Относно стратиграфската корелация на събития в холоценската георхеология

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Abstract. Many researchers work in the field of the newly emerging discipline – marine geoarchaeology during the Holocene. One of the most current scientific studies, which combined the efforts of archaeologists and geologists, are the interdisciplinary ones, the purpose of which is to make a palaeogeographical reconstruction of the natural environment in the period from Prehistory to the Late Antiquity. Based on a broad methodological basis, geological, geomorphological, biostratigraphic, archaeological and historical data are simultaneously interpreted. This type of modern geoarchaeological research proves the need for an increasingly detailed correlation between the stratigraphic schemes on the one hand, which are both event and palaeoecological in nature, and the archaeological scales on the other hand.

Keywords: submerged archaeological landscapes, archaeological chronology, Black Sea, geoarchaeology.

Introduction

The study of climatic changes during the last 11.7 ka of the Quaternary history of the Black sea basin, of changes of sea level and submerged archaeological landscapes, is of extreme importance in palaeogeographical reconstruction, in which the influence of the human factor is also included (Hristova, 2021). Clarification of issues related to the first human settlements in the coastal areas or delineating the geometry of the ancient port systems along the Western Black Sea coast from Prehistory and Antiquity become the basis of integrated geoarchaeological research.

In the present study, we examined the submerged archaeological sites together with some aspects of palaeogeography and Black Sea level dynamics. The study aims to characterize the palaeoenvironment and the habitation of the Western

Black Sea area in the Prehistoric times starting at the beginning of the Holocene until the end of the Early Bronze Age.

Materials and methods

To properly understand events in human history and the influence of the anthropogenic factor, the results of paleogeographic reconstructions related to the study of climate change and sea level changes, which include the human presence, must be analyzed. The focus of such type of integrated research is on the one hand man, his history, his way of life, and on the other hand is the reconstruction of the basic parameters of the surrounding environment in which he was active; of palaeoecological conditions in which he lived during different historical periods and habitations. Stratigraphical investigation, archaeological nondestructive and destructive sur-

veys, and historical analysis provide the necessary and required research tools to trace the spatiotemporal relationships between different types of sites in a complex and dynamic environment such as the seacoast.

Data from field surveys were used for geoarchaeological analysis, in the present study we included the geological and geomorphological information of the areas of the mentioned archaeological sites as well as several previously published data carried out in the case study areas and their neighboring.

Archaeological data in combination with precise stratigraphic analyzes are very useful tool for reconstructing the chronology of paleogeographic events. In Bulgarian Black Sea, there are all of types of underwater historical and archaeological sites. They are combined in different groups according to chronological periods and kinds but one of the most interesting and important group is submerged pre-historic settlements and necropolis previously from the Eneolithic and the Early Bronze Age (Fig. 1) (Peev, 2020).

Results and discussion

The area between the land and the sea has always attracted interest both for scholarship and for social dynamics. Precisely in the littoral areas, which provide the best livelihood setting, one can find one of the earliest concentrations of human settlements at the beginning of the Holocene.

The Bulgarian Black Sea coast is no exception to this pattern of utilization of living space in the Mediterranean. The western Black Sea coast is a region with unique geographical characteristics, playing a crucial geopolitical role as a connecting link in the “North–South” cultural links between the Eastern Mediterranean and the Aegean, the Danube region and North-Eastern Europe.

The study of submerged settlements along the Bulgarian Black Sea coast from the Eneolithic and Early Bronze Age (6500–4000 BP) opened the discussion about the relationship between paleoecological environments at the beginning and the middle of the Holocene epoch and the location of these settlements, their cultural context and chronology.

Establishing the course and amplitude of such complex geological events as: sealevel fluctuations from the Late Paleolithic to today; the process of formation of modern river valleys and sandbars; assess the role of abrasion as a factor in the modeling of ancient coastlines and its relation to the configuration of ancient harbours; analysis of the relic forms of the relief, led to the need to naturally combine the stratigraphic studies with the precise, chronological data of the archaeological studies. Interactions between Quaternary geology and ar-

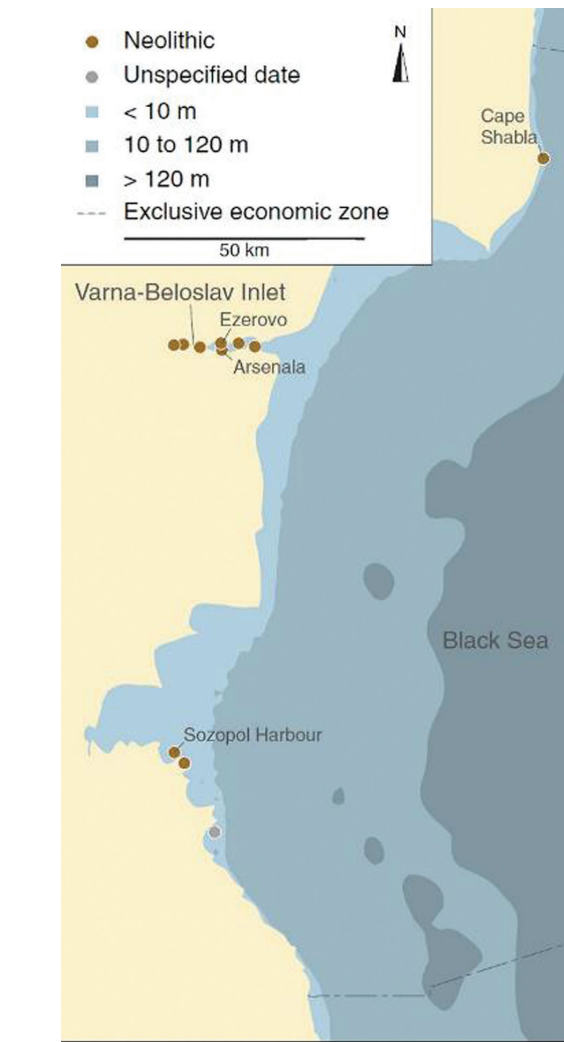


Fig. 1. Detailed map of submerged sites on the Bulgarian coast. Site information from the SPLASHCOS viewer <http://splashcos-viewer.eu> (Drawing by Moritz Mennenga) (after Peev et al., 2020).

cheology are not limited to providing stratigraphic information during archaeological surveys or exposures during excavations. Quaternary geology is increasingly applied to gain insight into landscape and environmental development (Hoek, 2014).

The chronology of principal subdivisions of the archaeological sequence in Bulgaria from the beginning of the Neolithic to the end of the Early Bronze Age is based on the data of few sites which have been directly dated by radiocarbon dating and many sites and culture layers are dated by comparison of their ceramic typology with better dated sites elsewhere (after Boyadzhiev, 1995; Todorova, 1995). Note that the boundaries are approximate and that some may be time-transgressive.

Some of the last received radiocarbon dating support our suggestion. For example, from Alepu

Table 1. Principal subdivision of the climatic, palaeogeographical and archaeological sequence in Bulgaria

Chronological scale, ka BP	International stratigraphic scale (Cohen et al., 2013)		Alpine stratigraphical scale	Transgressive-regressive cycles (Fedorov 2000)	Chronostratigraphic scheme of the Bulgarian shelf zone (Shopov 1993)	Archaeological period	Data range, cal BP
	Series	Stage					
4.2	Holocene	Meghalyan	Subatlantic	Nympaeon transgression	Black Sea sub-stage	Iron Age	1100–.....
				Phanagorian regression		Bronze Age Late Middle Early	3600–1100 4550–3600 5150–4550
8.2	Holocene	Northgrippian	Subboreal	Newchernomorian transgression	Black Sea sub-stage	Trans. Period	5800–5150
			Atlantic	Oldchernomorian regression		Eneolithic	6800–5800
11.7	Greenlandian	Greenlandian	Boreal	First influence of Mediterranean water	Stage	Neolithic Late Middle Early	7100–6800 7400–7100 8450–7400
			Preboreal			Mesolithic	12000?–8450

5.5 m bpsl layer archaeological materials is dated 3371–3102 BC (Flaux et al., 2016). This data is very similar to the well-known prehistoric settlements at the mouth of the River of Ropotamo. The Early Bronze Age layer at depth between 4.15 and 5.25 m bpsl is dated 3080–2970 cal. BC (5050–920 cal. BP) (Peev et al., 2020). There are a number of published data from the Early Bronze Age settlement at Kiten that are in the chronological range of 2900–2300 BC (Görsdorf, Bojadžiev, 1996).

Furthermore, in the comparing the Holocene stages (International Chronostratigraphic Chart v. 2018/08) with the archaeological periods, a remarkable coincidence with the changes of cultures is revealed (Cohen et al., 2013; updated) (Table 1).

Conclusion

At the studying the list of registered underwater archaeological sites, showing chronology, depth below present sea level, and presence or absence of wood preservation and animal bone etc., we understood that all of these prehistoric sites have been established and developed in the same or very similar natural environment. The dating of the sites with correlation of the stratigraphic, palaeogeographic and archaeological sequence in the eastern part of the Balkan Peninsula reveal a remarkable synchro-

nicity in climate change and the change of archaeological cultures.

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