

THE CLIMATIC OPTIMA ASSESSED USING SEDIMENTS OF THE BLACK SEA

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Abstract

The database for palynological studies of marine, lagoon, alluvial and bog sediments of the Black Sea coastline on the territory of Georgia includes 26 profiles of Holocene sediments. The analysis and synthesis of the plotted pollen diagrams allowed us to make a stratigraphic subdivision of Holocene sediments and to reveal climatic fluctuations for the last 10000 years. Most informative appeared to be pollen spectra of marine formations where there are no intervals and sediment accumulation.

Keywords: Black Sea, Sea Level, Paleoceanography, Sediments

Introduction

The palynological and sedimentological analysis showed, that the lowest level of the Black Sea occurred 18 – 17 thousand years ago. During this regression corresponding to the last phase of the Würm Ice Age the sea level was located 120m lower than at present. The cooling was replaced by the intensive warming, glaciers began to melt and a New Black Sea transgression began. By the onset of the Holocene (10 thousand years ago) the sea level increased nearly by 70 m [1]. According to the palynological data, the combination of vast number of pollen of heat-loving arboreal species which grow in lower mountain belts and low values of redeposited pollen are markers to reveal the Black Sea transgressive phases. On the contrary, during the Black Sea regression, the role of heat-loving elements decreases and there is a sharp increase in the quantity of secondary redeposited pollen caused by enhancement of erosion processes due to lowering of the general erosion basis. During the Holocene, transgressive phases with warm climatic conditions lasted longer than the regressive phases. The most significant warming and, accordingly, the sea transgression took place in the Atlantic period when during nearly three millennia (8000 - 5500 BP) the climatic trend was directed towards the increase both in precipitation and temperatures. This process reached its peak 6000 – 5500 years ago and the sea in Colchis for the first time for the whole post-glacial period exceeded by several meters the present-day level [2]. At the beginning of the Atlantic period, with establishment of humid and warm conditions, there appeared the first Neolithic agricultural settlements on the alluvial plains of Southern Kartli, where, besides grain-growing, gardening, viticulture, beekeeping and even weaving was developed. In the Eneolithic the warming process continued and mild climatic conditions facilitated the occurrence of new cultures and penetration of agriculture into the high mountains. The second significant ingress of the Black Sea waters took place at the end of the Subboreal period (3800 – 2400 years ago), which was also due to climate warming. The sea level again was higher than nowadays. Broad-leaved forests with participation of chestnut, lime, wing nut and dzelkva are expanding their areas. In high mountains stock-breeding is being replaced by agriculture where, besides grain-growing, viticulture and horticulture were developed. Trade might also have successfully developed, since in the archaeological monuments dated to the 15th – 14th cents. B.C., besides other imported inventory, cotton fabric and its numerous fibers were found. It is known that at that time cotton was manufactured only in India. The last 2000 geological years are characterized by more frequent transgressions and climatic fluctuations among which rather a long climatic optimum of the Middle Ages which lasted nearly for five centuries (7th – 11th cents.) is distinguished. The last warming and significant transgression of the Black Sea lasted for 200 years and took place in the 15th – 16th centuries. The influence of human activity on development of the landscapes had been observed since the Subboreal time when deforestation took place not only on the Colchis lowland, but also in the mountains of Western and Southern Georgia.

Conclusions

The comparison of the suggested scheme of climatic changes with similar schemes of mountain territories of the southern part of Europe and the Near East perfectly demonstrates the global character of climatic fluctuations resulting afterwards in oscillations of the level of the southern seas in Europe, including the Black Sea [3].

References

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