Thickness of the Holocene aggradational package in the valleys of rivers Fakiiska and Yavuz Dere, SE Bulgaria, in the light of the hypothesis for abrupt change of the Black Sea level during the Holocene

Дебелина на холоценския аградационен пакет в долините на реките Факийска и Явуз дере, ЮИ България, в светлината на идеята за внезапно покачване на нивото на Черно море през Холоцена

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Introduction

During geological and geomorphological mapping in SE Bulgaria it was found that a package of silty clays, 2, 5–3 m thick, has covered two eneolithic settlements. One, located in the valley of Tundzha river near the village of Konevets, and the other in the valley of Kalnitsa river near the village of Drama (Dimitrov et al., 2011). It was concluded that these settlements were situated several meters higher than the river’s water level but later they were buried in sediments and at present are located in the flooded terrace. It happened, because of a general rise of the river’s erosional bases, accompanied by deposition of an aggradational package (according to models of Walker, 1976; Miall, 1990).

The observations of Dimitrov et al. (2011) were made for the Tundzha river system, which is connected to the Aegean basin. It is of scientific interest to compare the shift of the erosional bases of the rivers draining to the Aegean basin with those draining to the Black Sea basin. At present insufficient data are available for the evolution of the Quaternary system in the interior of Southeast Bulgaria (e. g. Shopov, 1996). The erosional levels of the river channels can be examined in the light of the hypothesis for abrupt change of the Black Sea’s water level during the Holocene (Ryan, Pitman, 1997).

It can be assumed that if the level of the Black Sea was much lower than the level of the Aegean basin during part of the Holocene, than the Holocene’s aggradational package in the rivers draining to Black Sea should be much thicker than similar package in the valleys of rivers draining to the Aegean. In the course of this logic, the thickness of an aggradational package of a river, measured several kilometers from its delta or estuary at the Black Sea cost, must be much thicker than the aggradational package of river, measured at least 150 km from it Aegean delta.

Field observations in Southeast Bulgaria

For the purpose of our study we selected parts of river valleys, in which prospecting for building materials (sand and gravel) was accompanied by trenching, drilling and excavations along the river channels. Five river channels were studied in total (Fig. 1). These of rivers Fakiyska and Veleka, draining to Black sea, and these of Tundzha and its subsidiaries Kalnitca, Yavuz Dere and Popovska draining to the Aegean. The observations in the valley of Fakiyska and Yavuz Dere are most complete, because extensive excavations were made along several kilometers of their channels.

The observations can be summarized as follows:

1) South of the village of Drachevo and approximately 13 km from its estuary in the Mandra Lake, which is hydrologically connected to Black Sea, Fakiyska river passes through a deep valley, in which deposits of sand were prospected for industrial use (unpublished report of I. Dimitrov, archive of Ministry of Economics, Energetics and Tourism). The sand is located in the river channel and under package of silty clays (the aggradational package). Along a three-kilometers long section, drilling of 50 shallow drill holes, electrical resistivity study and trenching was done in the course of a prospecting effort. It was established that the silty clay package is consistent along the entire prospected length and has an average thickness of

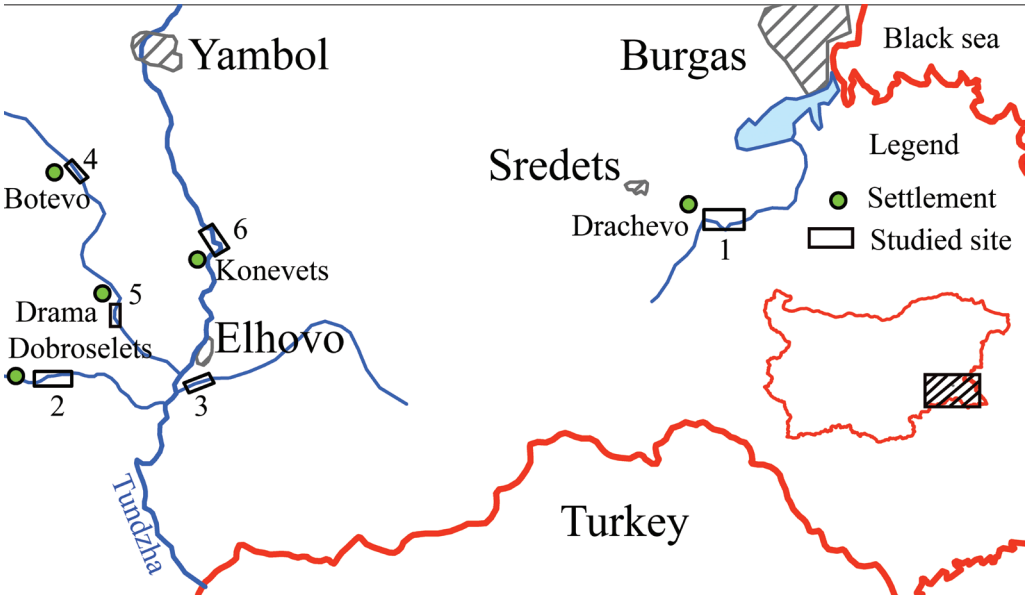

Fig. 1. Location of the studied area

7 m. It is underlain by well washed sands and coarse conglomerates, presumably related to the more humid glacial environment prior to the Holocene.

The silty clay package is correlated with sedimentologically similar deposit found in the first river terrace of the subsidiaries of Tundzha river and the valley of Tundzha itself.

2) South of the village of Goliam Manastir, 3.5-kilometer long section of the Yavuz Dere river channel (also Sinapovska river) was subjected to excavation in the course of a channel correction (deepening and straitening), accompanied by extraction of raw materials. Similar to the channel of Fakiyska river, here the well-washed sands are located under a package of silty clays with an average thickness of about 5 meters. The silty clays are underlain by much coarser and well washed sands and conglomerates. The studied section of the Yavuz Dere however is located about 150 km from the Evros Delta, which discharges the waters of the Tundzha system into the Aegean.

Discussion and conclusions

The difference between the two studied sections is that one is located far from the sea and at elevation of about 150 m above sea level, and the other one is close to the sea and at elevation of about 45 m above sea level. These can explain the small difference in the thickness of the aggradational packages (2 m) but leave no room whatsoever for speculations regarding deeper erosional bases, connected with low sea level for the Black Sea. It appears that the water levels of the Black Sea and the Aegean were very similar during the deposition of the silty clay package, located on top of the well washed sands of the glacial time.

Even though in Bulgaria real glacial conditions did not exist, prior to the Holocene dominated much more humid environment, which resulted in distinctive well washed and coarser grained sediments easily recognizable from the overlying silty clays. The relationships described here can be confirmed for all river channels of southeast Bulgaria. They will be published in detail in an extended publication.

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