Chronology of Holocene environmental changes at the tell site of Uivar, Romania, and its significance for late Neolithic tell evolution in the temperate Balkans

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Results

The geomorphologic survey reveals significant changes of the alluvial landscape around the Late Neolithic/Early Copper Age tell site of Uivar. Today the plain is filled and almost evenly levelled by mid-late Holocene sediments (figs. 3-4). Underneath, a more pronounced tell site was situated at the fringe of the floodplain, presumably on a slightly elevated river terrace remnant.

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Problem

Compared to the alluvial landscapes of the southern Mediterranean Balkans (Thrace, Macedonia, Thessaly, fig. 1b), Neolithic tell mounds in the valley bottoms of the northern temperate Balkans (Slavonia, Vojvodina, Banat, Hungarian Tisza region) appear later in time and are abandoned earlier. According to available radiocarbon dates their shorter duration of existence is restricted to the first half of the 5th millennium BC. The north-westernmost occurrences of Middle to Late Neolithic tell sites are found in the SE Carpathian Basin. Here the tell site of Uivar, situated in the wide lowland of the lower courses of the rivers Timis and Bega in the upper Tisza drainage in SW Romania, rises ~4.2 m above the valley bottom covering a surface of 3 ha (fig. 1). Its comparable size indicates an important settlement with central functions. The sedimentary archives of the surrounding alluvial landscape and the colluvia eroded from the settlement mound bear the potential to record and store the palaeoenvironmental information necessary for a Holocene landscape reconstruction. Therefore, geoarchaeological investigations were taken up to evaluate whether environmental changes might have been the reason for the short-cadet settlement activities.

Methods

As the alluvial plain does not provide any natural exposures, sediments were gained from undisturbed drilling cores and artificial open-cuts (fig. 1). Analyses include the determination of grain-size distribution, pH-value, carbonate contents, total organic contents and pollen assemblages. A chronology was established using 14C-dating of organic components and optical stimulated luminescence (OSL) dating of the minerals. Quartz coarse-grain aliquots were analyzed with a single aliquot regenerative (SAR) protocol using small aliquots (~200-500 grains) (Fuchs & Wagner 2003) (fig. 2), while the feldspar component of polymineral fine-grains (4-11 μm) was dated with an inhaled stimulated multiple aliquot additive (IRSL MAA) protocol (Lang et al. 2003).

Corresponding contemporary changes in fluvial dynamics were observed at tell localities on the Telemoor river in S-Romania (Bailey et al. 2002) making a climatic signal likely. This hypothesis is confirmed by the climatic record of a stalagmite from Ursilor Cave, NW-Romania, which after a cooling event with increased rainfall ~7 ka ago reveals normal-wet conditions after ~6.8 ka (Onac et al. 2002). At Uivar all the other sediments clearly post-date the Neolithic settlement period. No geoarchaeological evidence was revealed that might explain the early abandonment of the settlement mound in the Early Copper Age period.

Fig. 1: Study site of Uivar with positions of drillings (cross 1signature) for sedimentological (HDS) and palaeoecological analyses (POS), sondages and trenches. The figure is based on the geomagnetic site map of Becker (2004), which reveals an inner ditch system at the tell foothills (e.g. at trench IV) and an outer ditch system encircling the tell at a distance of ~100 m (e.g. at BLSL-2022, HDS-24).

Fig. 2: BLSL SAR DE-estimation of a quartz coarse-grain aliquot from the coeval sample HDS-1293 (a-d). Measurements were carried out on a P1-TLS Reader Riso DA15. SAR parameters are: protocol: IRSL (blue-light stimulation (BLSL) 20 s @ 125°C (LED-irradiance 300 mW cm-2), single aliquot regeneration (SAR) 10°E

Fig. 3: Geomorphic evolution of the alluvial plain showing the major erosion surfaces and relative height changes.

Fig. 4: View into the tell site from the northernwestern outside, leveling an underlying relief of a former fluvial landscape.

Fig. 5: Schematic section through the study site. The tell site started to develop when the fluvial activity ceased at the beginning of the mid-Holocene climate optimum ~6.5 ka. The top of the tell reaches ~4.2 m above the surrounding ground level of the alluvial landscape. Orange zigzag-lines between archaeological periods indicate probable intercalated periods of erosion.

Fig. 6: Stratigraphy and OSL-ages at Sondage-2.

Fig. 7: Stratigraphy and OSL-ages at Sondage-1.

Fig. 8: View into Sondage-1, showing the upper layers (ploughing horizon, alluvium, colluvium) of the profile wall.

Fig. 9: View into Sondage-2, showing the upper layers (ploughing horizon, alluvium, colluvium) of the profile wall.

Fig. 10: View into Sondage-6, showing the upper layers (ploughing horizon, alluvium, colluvium) of the profile wall.

Fig. 11: View into Sondage-7, showing the upper layers (ploughing horizon, alluvium, colluvium) of the profile wall.

Fig. 12: View into Sondage-8, showing the upper layers (ploughing horizon, alluvium, colluvium) of the profile wall.

Fig. 13: View into Sondage-9, showing the upper layers (ploughing horizon, alluvium, colluvium) of the profile wall.