Cultural Heritage and Environment Research Center
ILIA STATE UNIVERSITY, GEORGIA

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Reconstructing the Holocene paleoenvironment of the semi-arid Shiraki Plain of eastern Georgia – a center of settlement activity during the Late Bronze and Early Iron age

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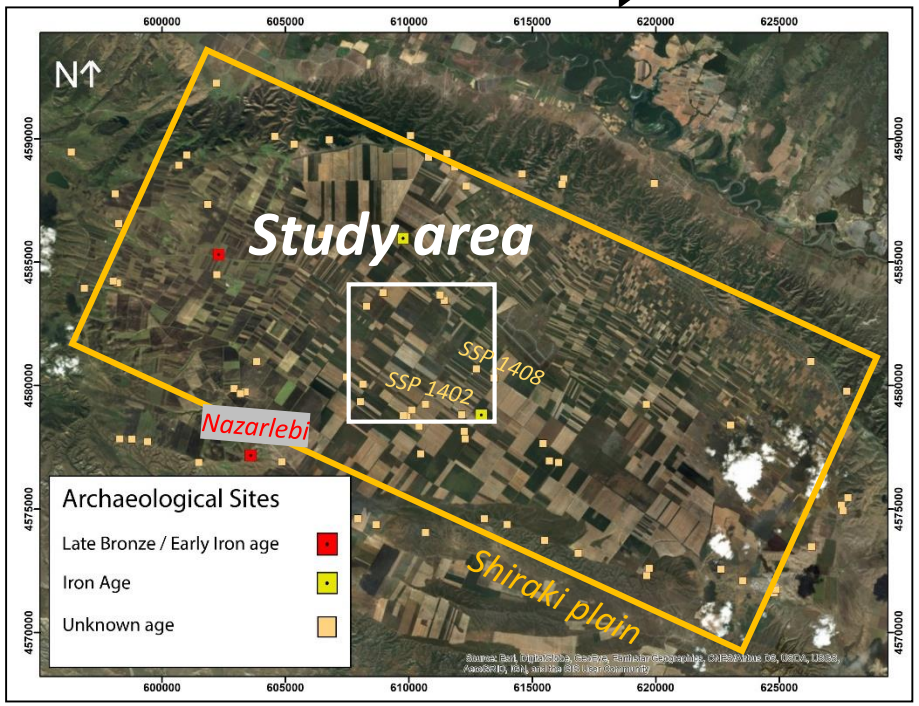
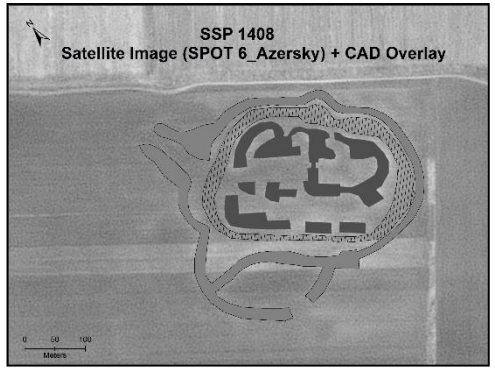
Regional background and goals of study



Distribution of archaeological sites in the Shiraki Plain

The semi-arid Shiraki Plain in eastern Georgia (< 500 mm annual precipitation) is characterized by an open dry steppic landscape today. Due to missing water resources the area is currently largely devoid of settlements. However, recent archaeological data collected using remote sensing and ground-proven by ongoing archaeological excavations gave evidence of an active former human inhabitation of this area mostly during the Late Bronze - Early Iron Ages (ca. 3.2 – 2.5 ka) that suddenly stopped afterwards. Several large, city-type settlements of those periods suggest even early state formation under favourable environmental conditions in the Shiraki Plain.

During this study we apply a multi-disciplinary palaeoenvironmental approach to reconstruct the Holocene landscape history of the Shiraki Plain. The goal is to better understand the interplay between natural environmental changes and human activity in this fragile semi-arid landscape. Our paleoenvironmental study provides key information to reconstruct the archaeological past of this region including the question of rapid depopulation and further abandonment of this area after ca. 2.5 ka.



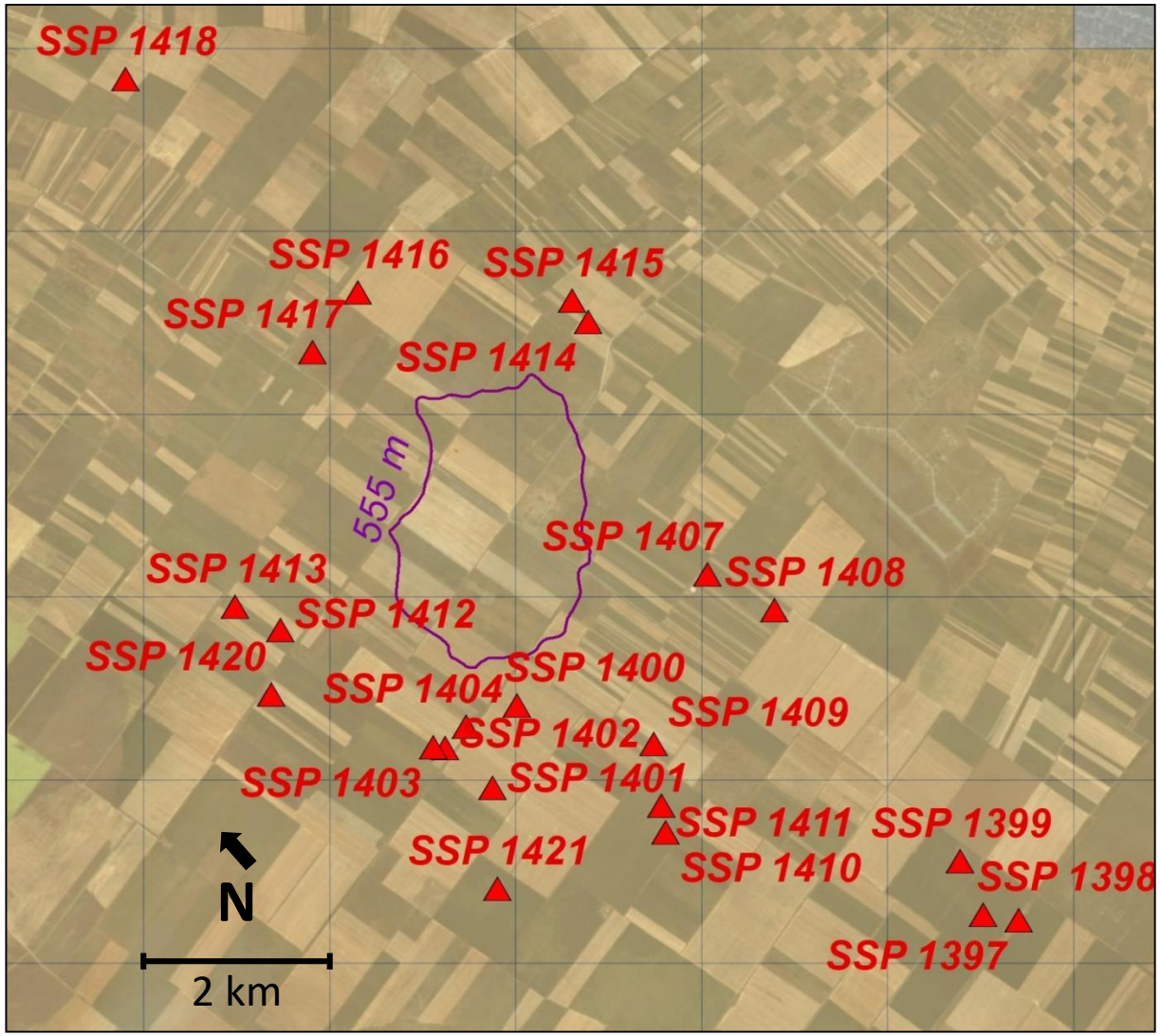
Late-Bronze age archaeological site; Satellite image (SSP 1408)

Clay dtamp from archaeological site (SSP 1402)

Nazarlebi, Late Bronze age archaeological site, aerial view.

Methods

1. Remote sensing-based archaeological reconnaissance using satellite images and close-range aerial photogrammetry to detect archaeological sites.
2. Topographical measurements using D-GPS and aerial photogrammetry to construct a highly resolved DTM of the central plain.
3. Geomorphologic-stratigraphic sediment mapping using vibracore drillings and trenches to detect possible former lake sediments.
4. Sedimentological and palaeoecological analyses of obtained sediments (granulometry, geochemical composition, macroremains) to trace former geochemical and ecological changes.
5. Numerical dating (^{14}C and IRSL-luminescence) for age control of the sediments.
6. Hydrological modelling to trace the former regional water balance through time (after Brusaert 1982, Schmugge & Andres 1991 and Blodgett et al. 1997)

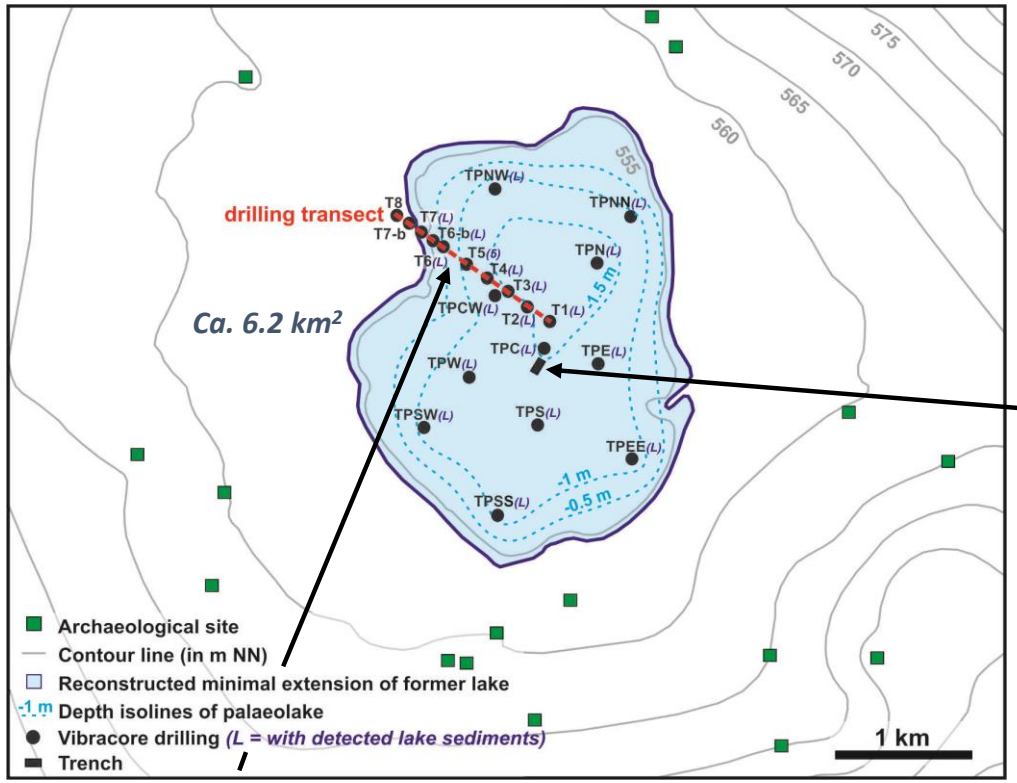


Distribution of archaeological sites (red triangles) around central depression (violet line) of the Shiraki plain.

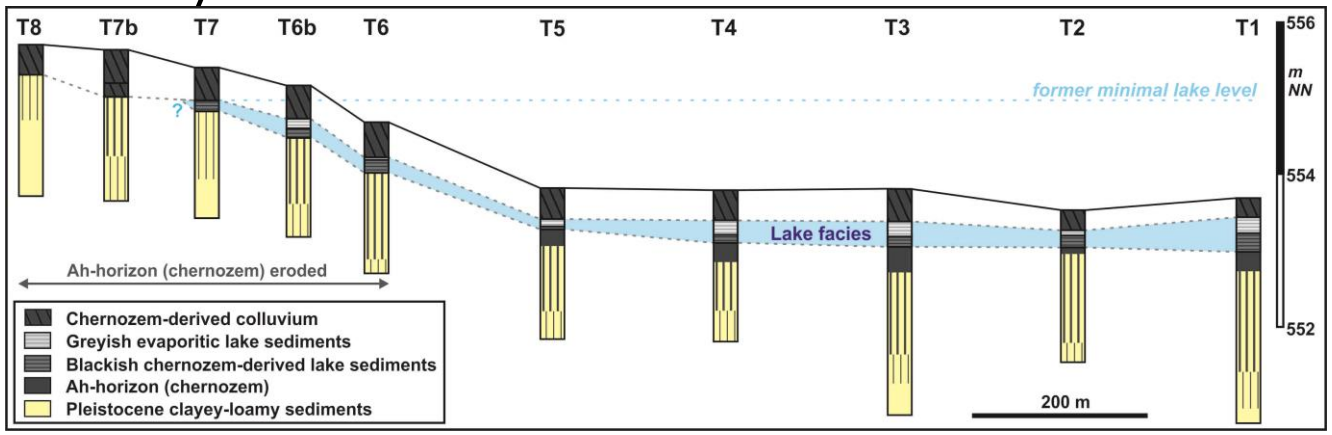
Concept of the study

No permanent surface water exists in the Shiraki Plain today. The violet line delineates the central depression of the plain where water should have collected in case of a more positive regional water balance such as should have existed during intensive Late Bronze/Early Iron Age settlement. Therefore, the central depression was the focus of this study to find hints for the possible existence of a paleolake during that period.

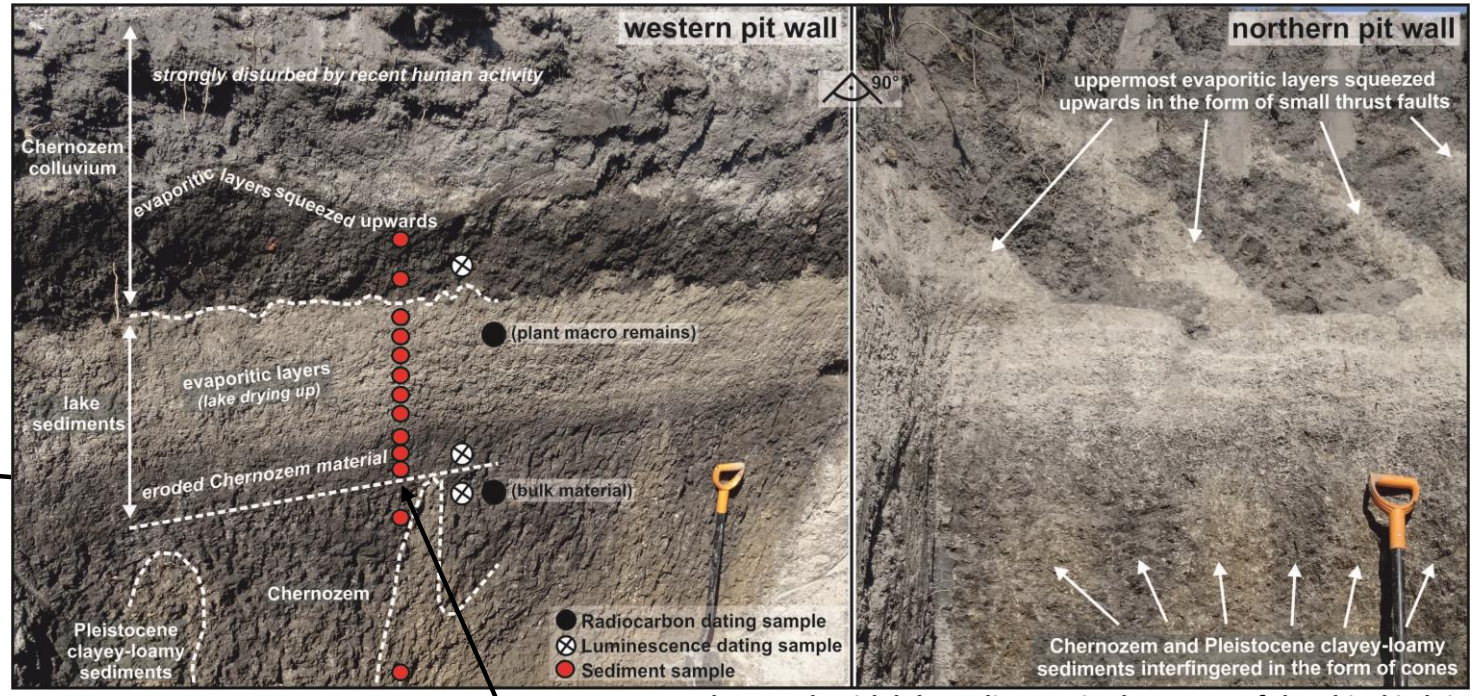
First results



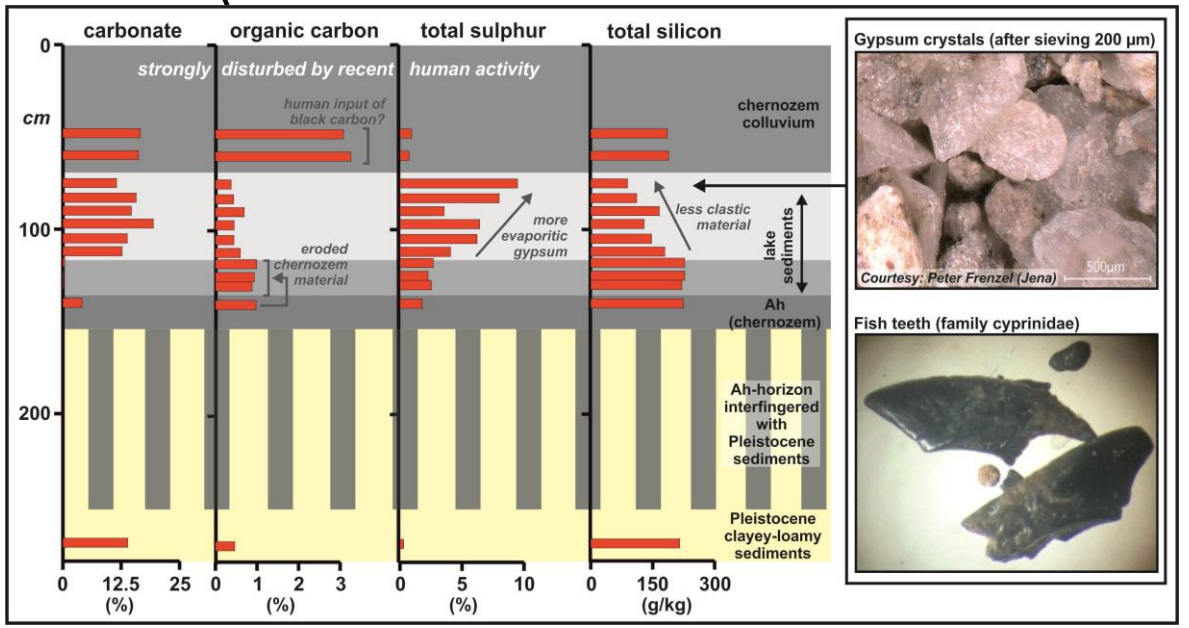
The study area with archaeological sites, drillings, trench and the minimum extension of an endorheic paleolake (based on finding of lake sediments in the drillings)



The vibracore drilling transect extending from the center to the W-margin of the former endorheic lake



The trench with lake sediments in the center of the Shiraki Plain

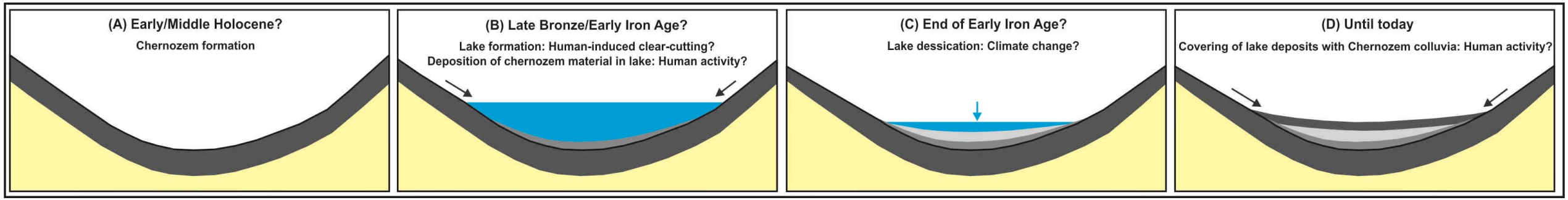


Selected sedimentological proxies & microscopic photos from the trench

First results

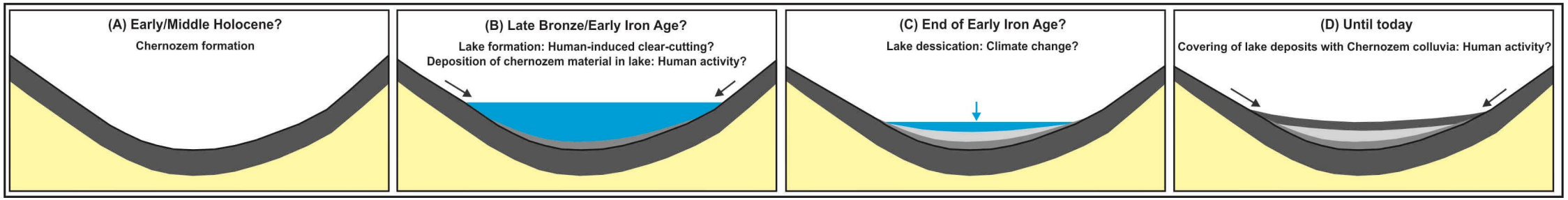
- In the center of the Shiraki Plain we found lake sediments that overlie chernozem soils. This lake had an extension of ca. 6 – 10 km^2.
- The basal lake sediments are formed by (possibly anthropogenically) eroded chernozem material.
- These basal lake sediments are overlain by a succession of gypsiferous evaporitic layers, indicating successive drying up of the lake.
- After drying up, the lake sediments were covered with chernozem-derived colluvia.

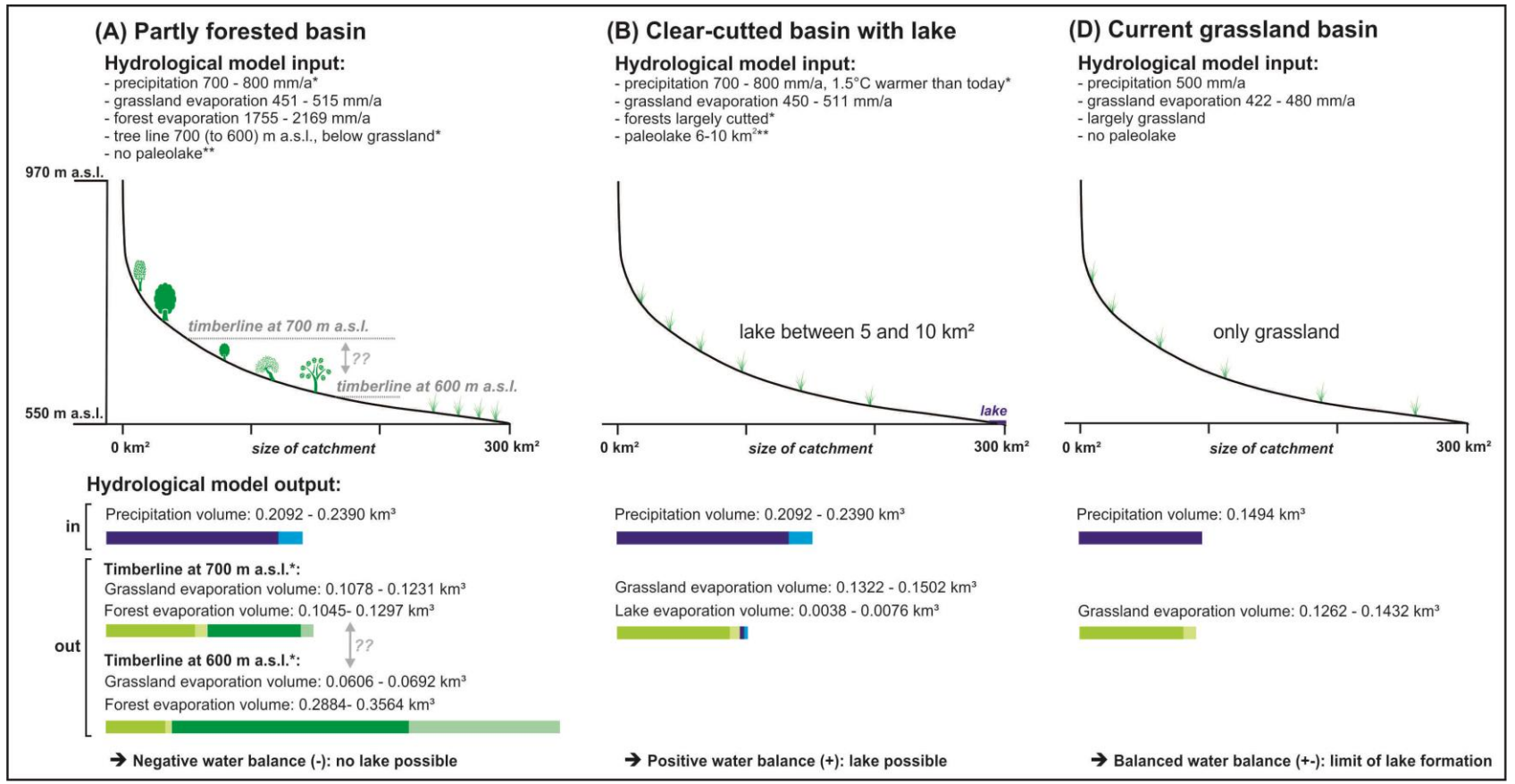
Based on these results we built up a preliminary model of the Holocene landscape evolution of the central Shiraki Plain, however, without any dating-based chronostratigraphical classification but only chronological hypotheses so far:



First results and conclusions

Finally, we linked this preliminary model of the Holocene landscape evolution in the Shiraki Plain with first hydrological modelling results:





** Taken from regional pollen data of Kvavadze & Todria (1992)*
*** Results from this study*

- The first hydrological modelling results can obviously explain Holocene lake formation and desiccation due to climatic changes and human activity.
- However, numerical datings (being in progress) are needed for robust paleoenvironmental interpretations.