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Palaeoenvironmental Evolution And Archaeology of the Colchian Plain (Western Georgia)

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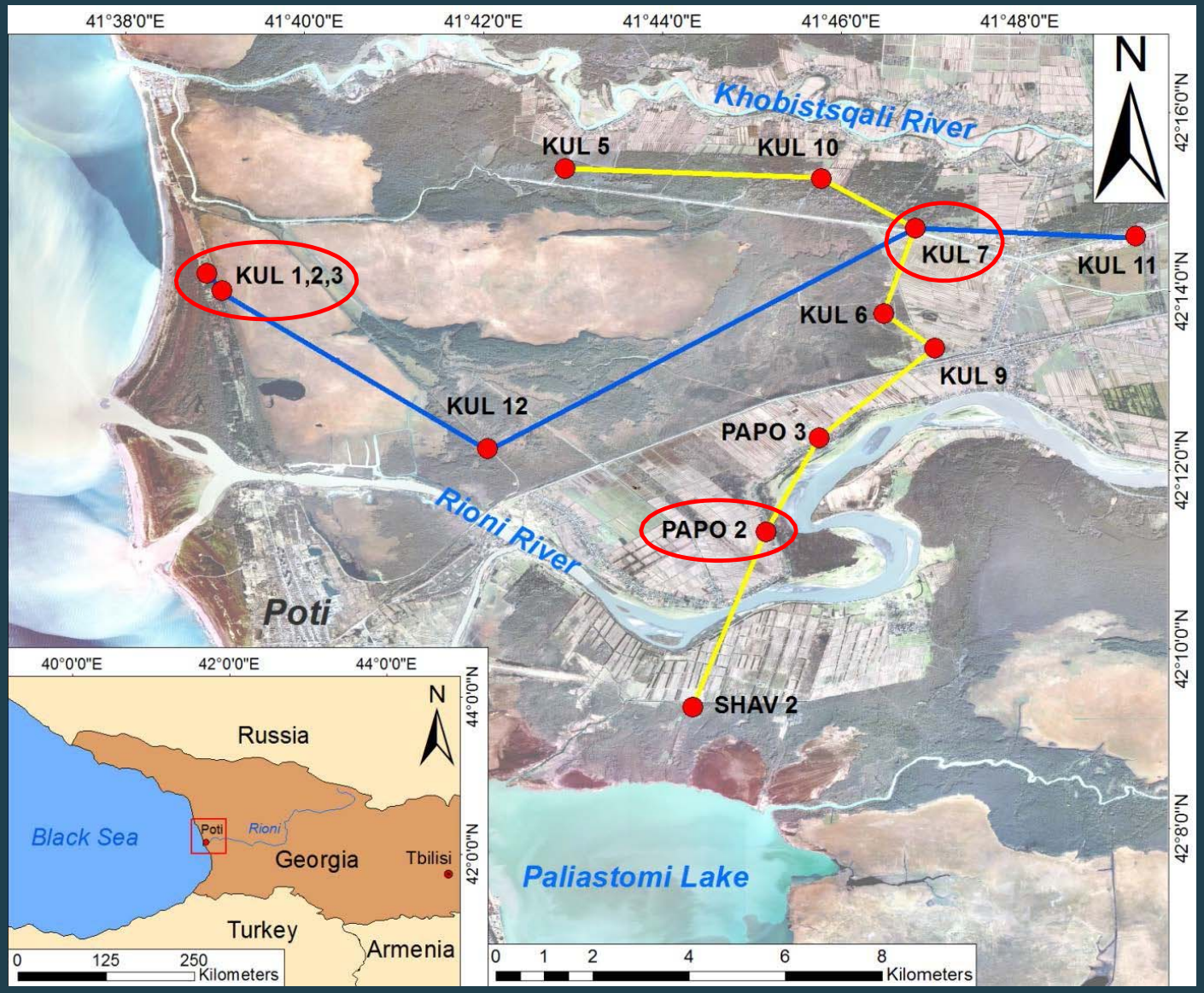
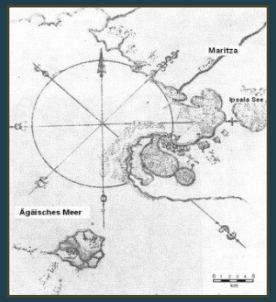
Aims of this research

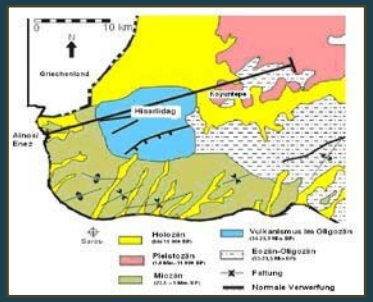
- decipher the evolution of the Kolkheti lowlands
- determine the geographical and environmental changes along the Black Sea coast and its hinterland
- reconstruct the relative sea-level (RSL) changes in the study area
- determine the human-environment interactions (including the settlement mounds)

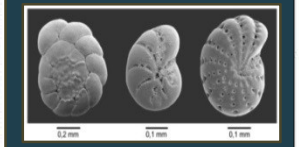
Landscape changes

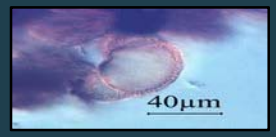
between the rivers Rioni and Khobistsqali

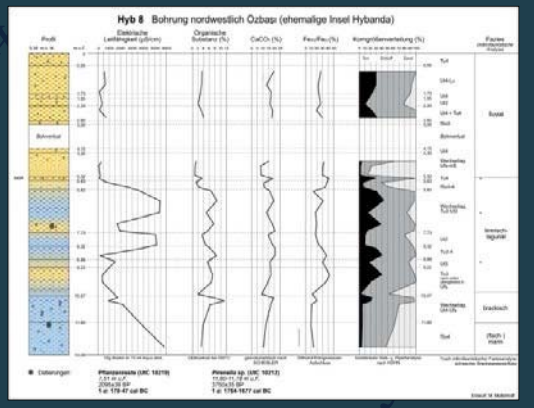


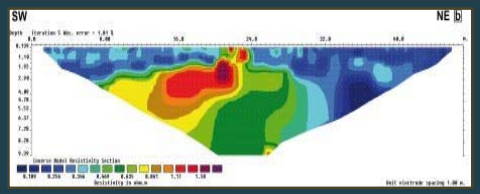


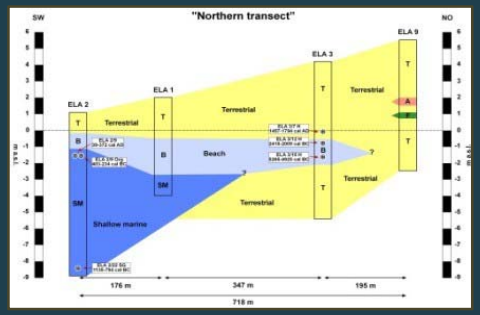


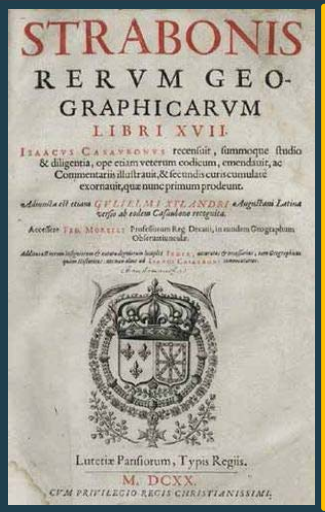












Methods of geoarchaeological research

Area A: **Bronze Age settlement mounds** on the Colchian plain

Area B: **Evolution of the coast** & its hinterland (Kolkheti lowlands)

Area C: **Swamps** between Rioni and Paliastomi

Area D: **Supsa alluvial fan**

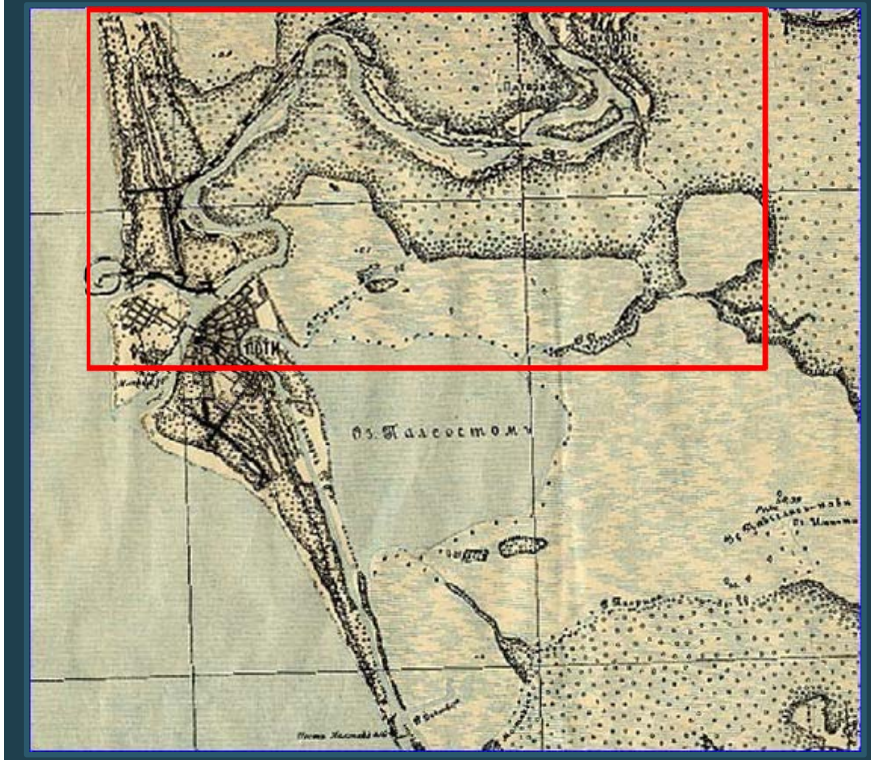
Landscape changes

as seen in maps

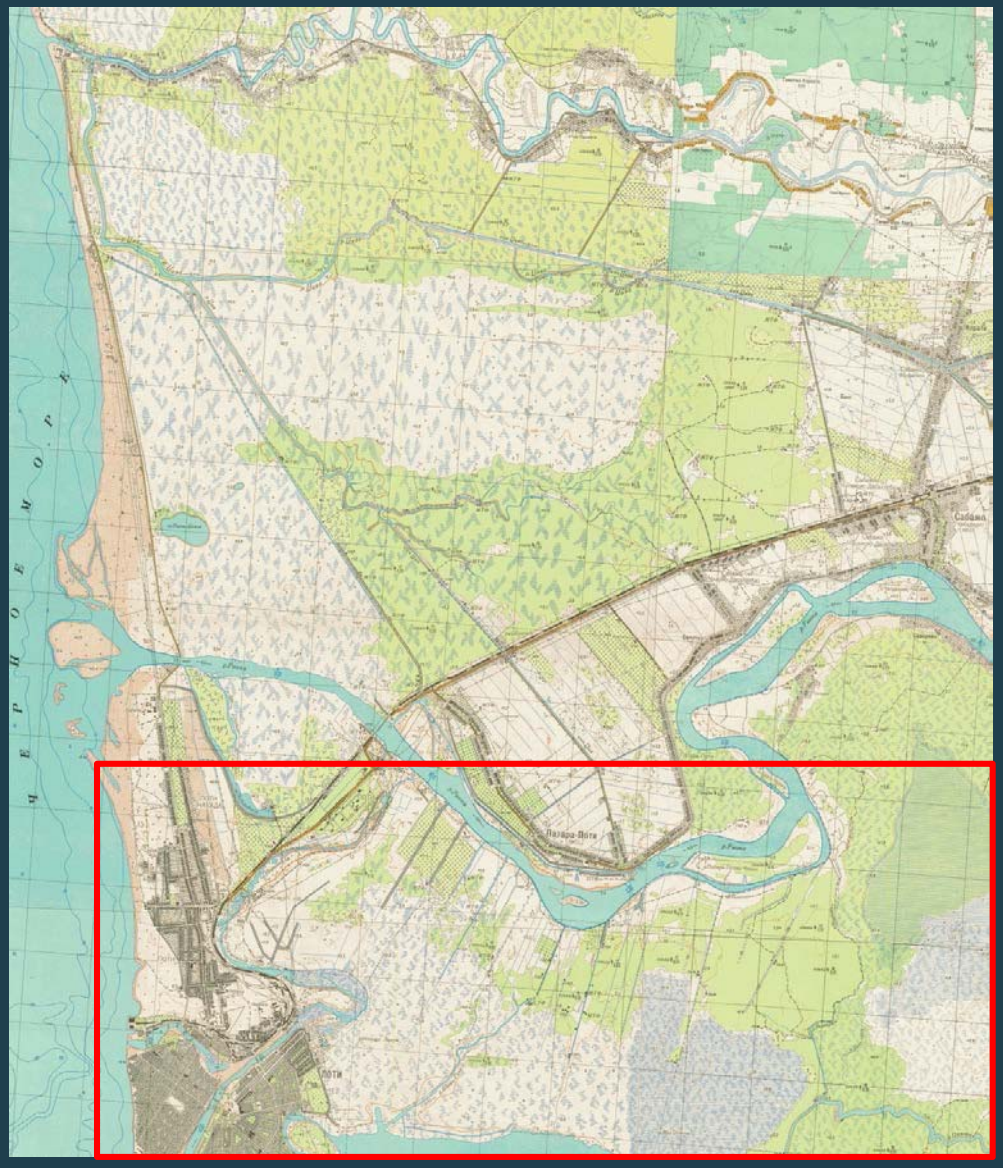
John Baptist Homan; 1720

Landscape changes

as seen in maps



Russian map
ca. 1890-1900

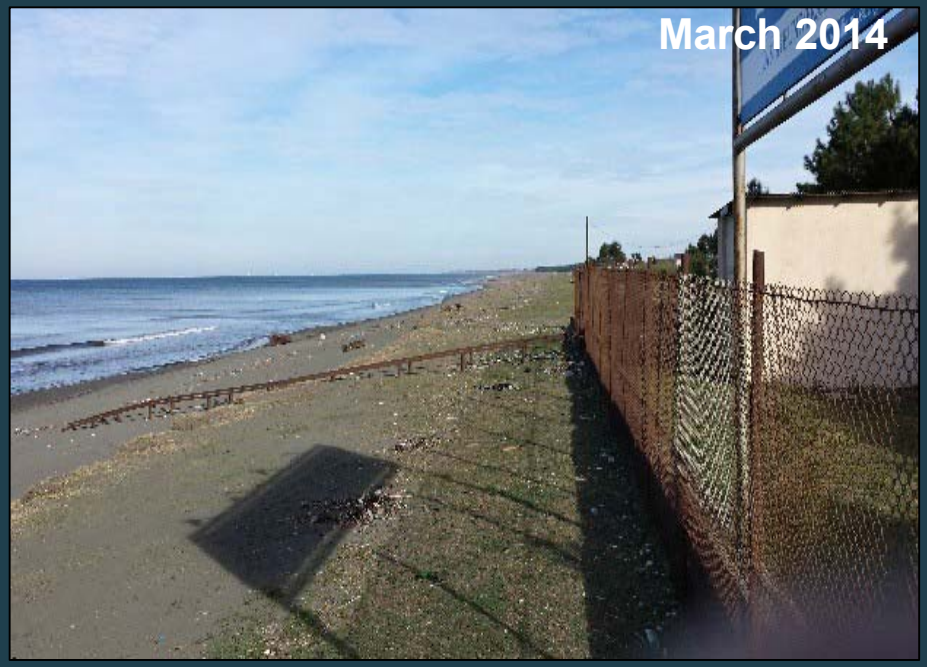


Topographical map from Soviet Period
ca. 1950-1960

Coastline changes – due to climate change

causing (i) sea level rise and marine transgression

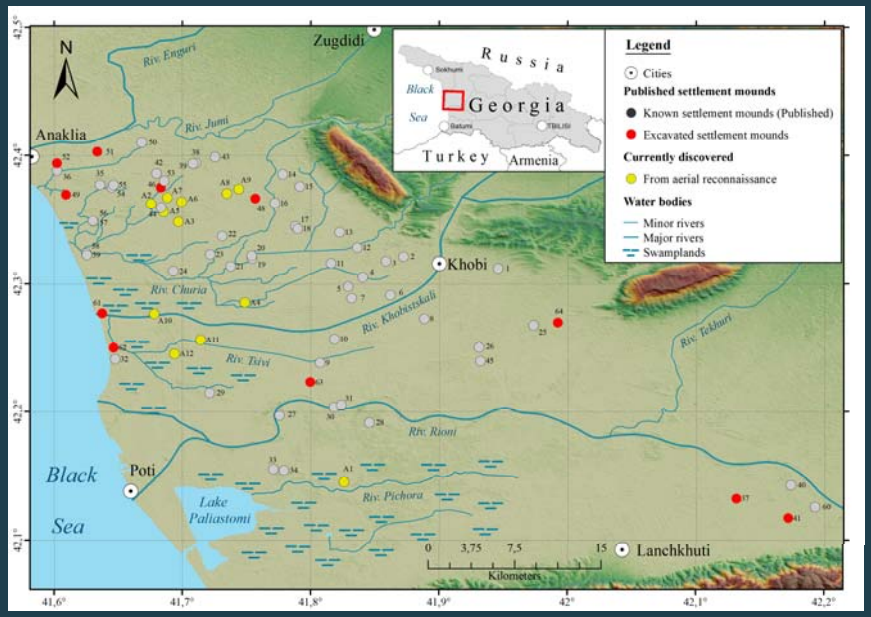
(ii) increased storm frequency (and magnitude?)



Photos: D. Kelterbaum & H. Laermanns

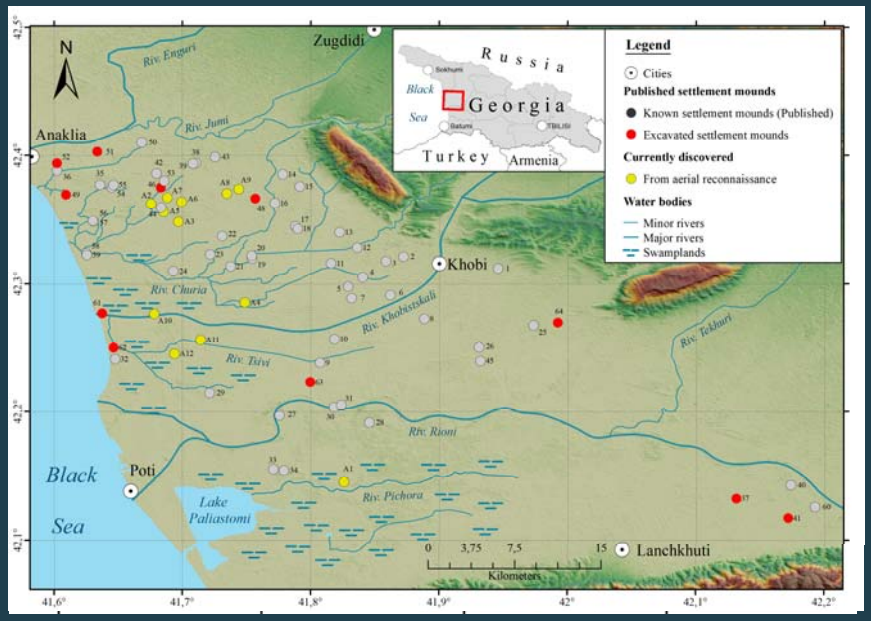
Dramatic coastal erosion south of Poti in only one year.

Settlement Mounds



Area A
Bronze Age settlement mounds
on the Colchian plain

Settlement Mounds



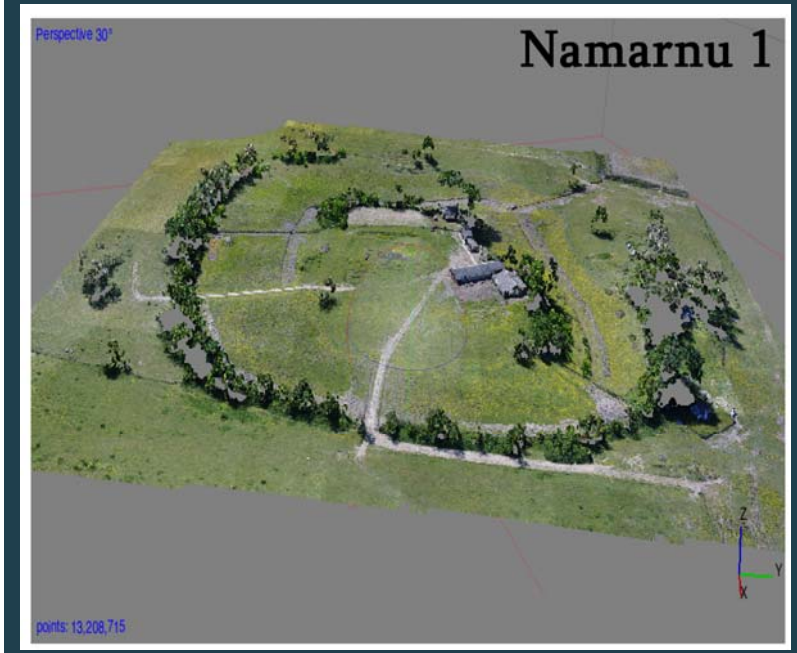
Study aims

(i) establishing a chronostratigraphic framework for the mounds based on ^{14}C dating;

(ii) identifying the settlement history, i.e., time of initial construction and possible phases and gaps in human occupation;

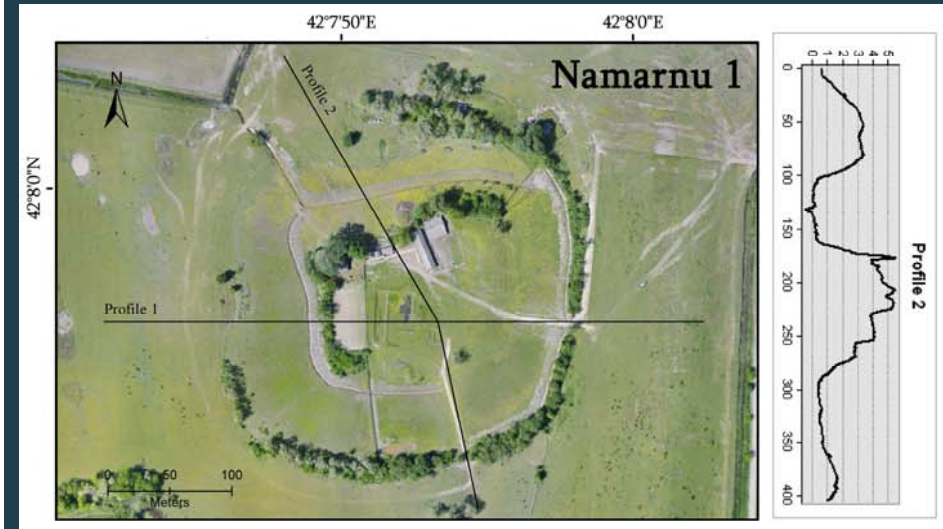
(iii) identifying the spatial extent of the mounds and potential source areas of the construction material;

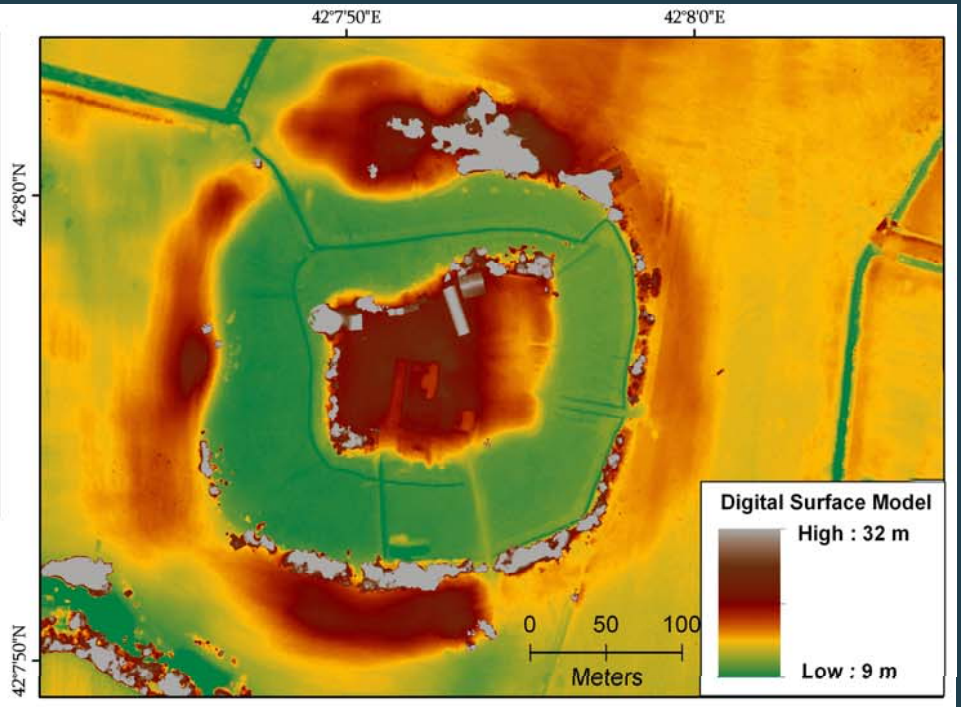
(iv) reconstructing the environmental conditions at the time of their occupation.

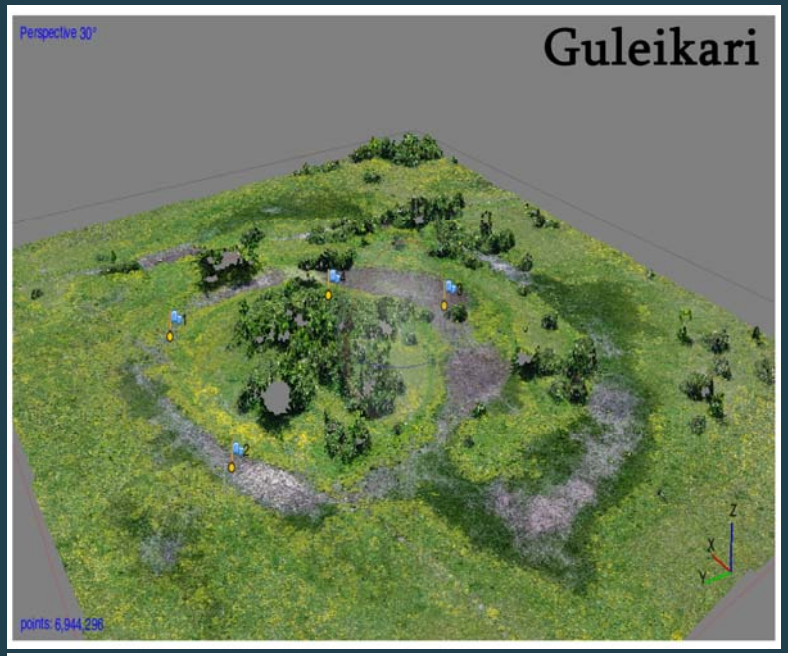


Structure from Motion models (SfM) of studied Settlement Mounds

Models were constructing using the close range aerial photogrammetry from drone







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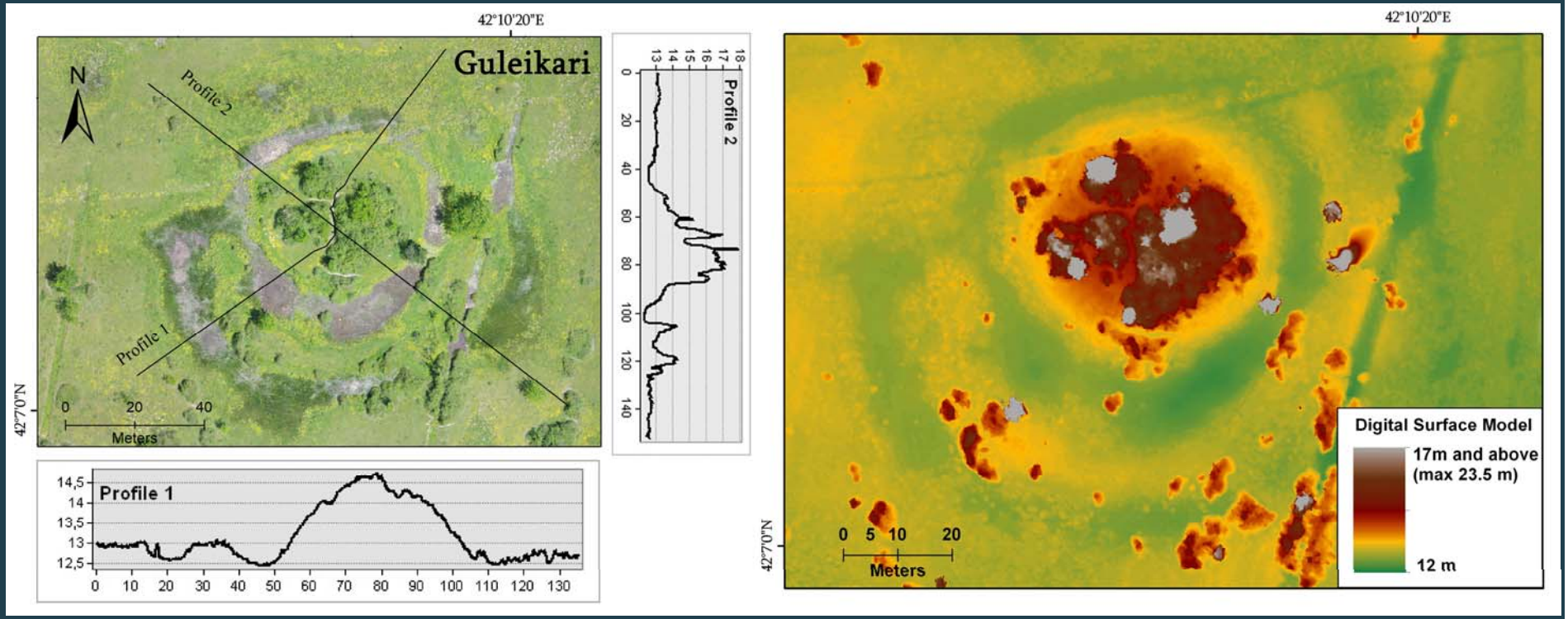

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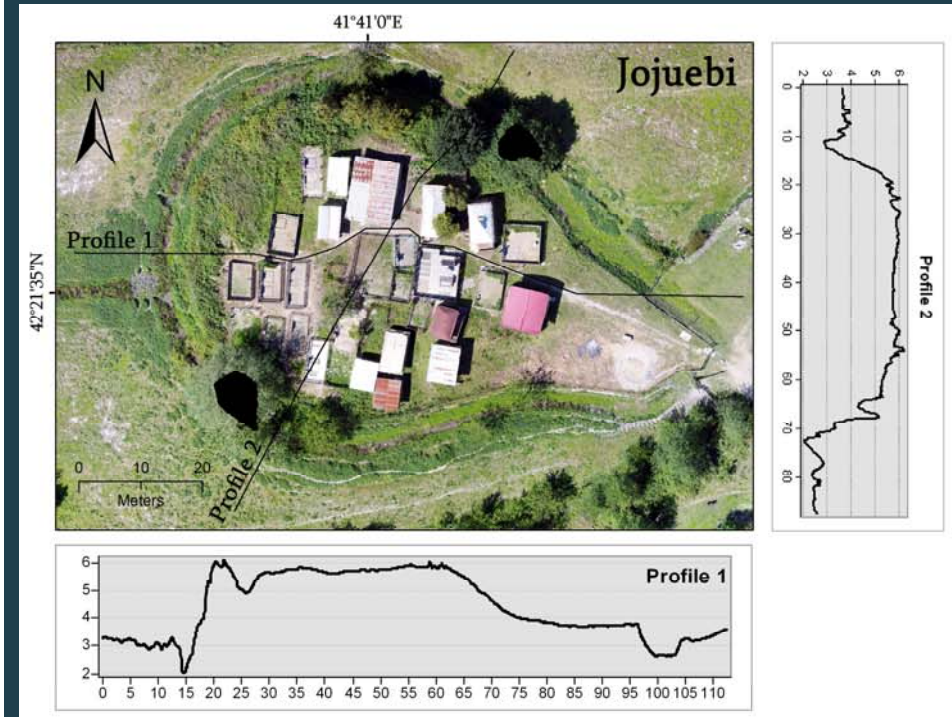
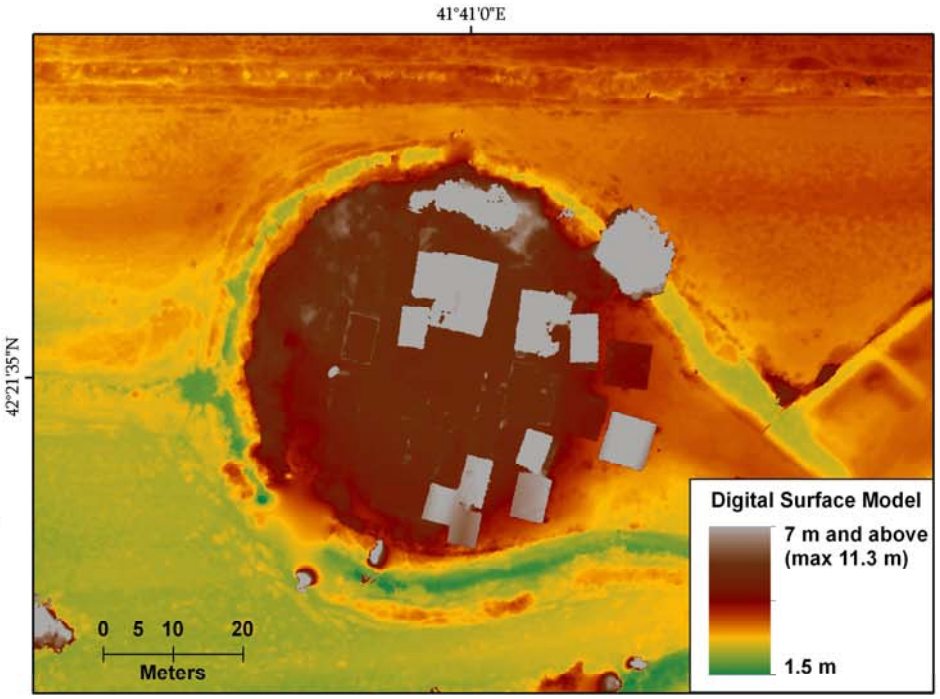
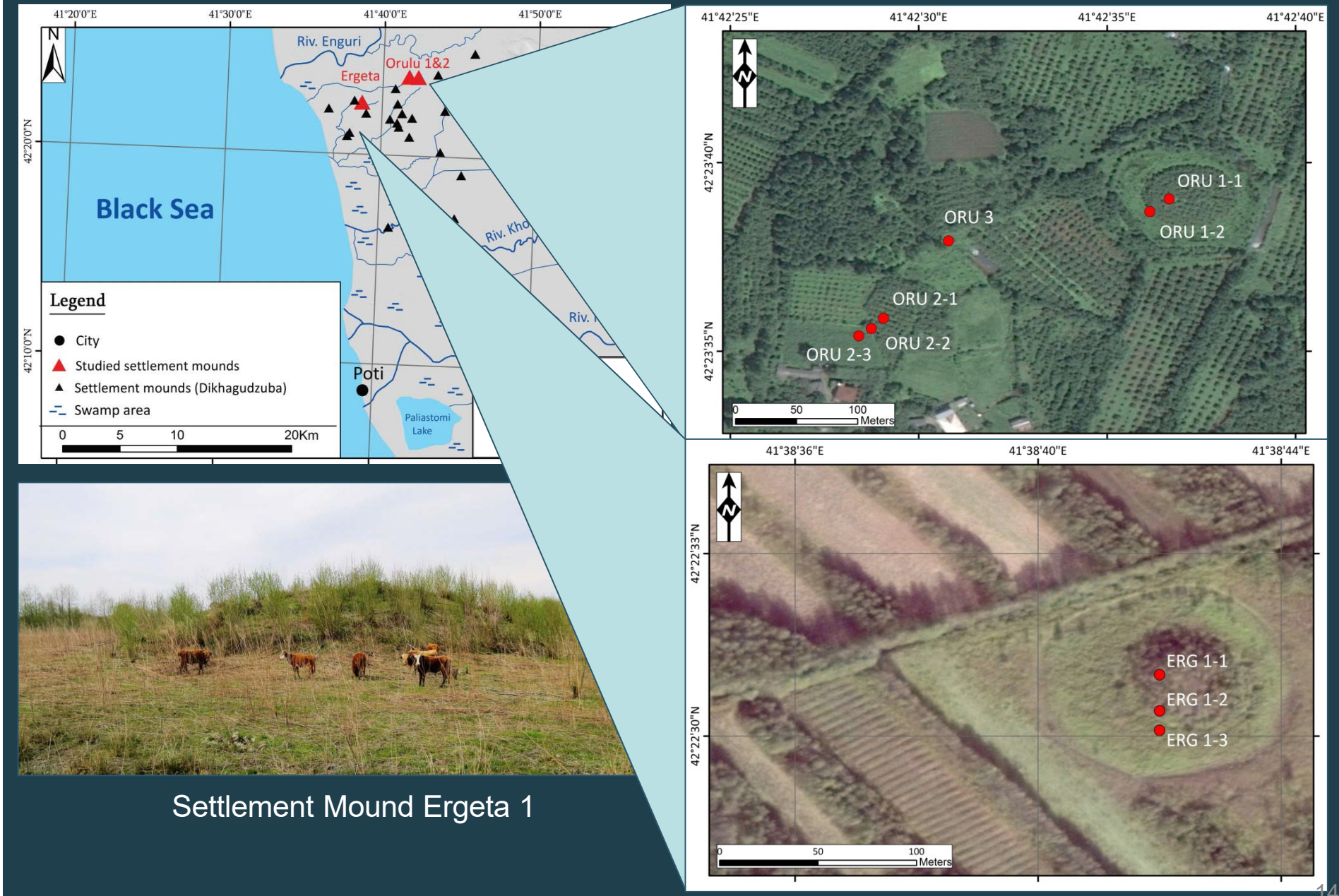
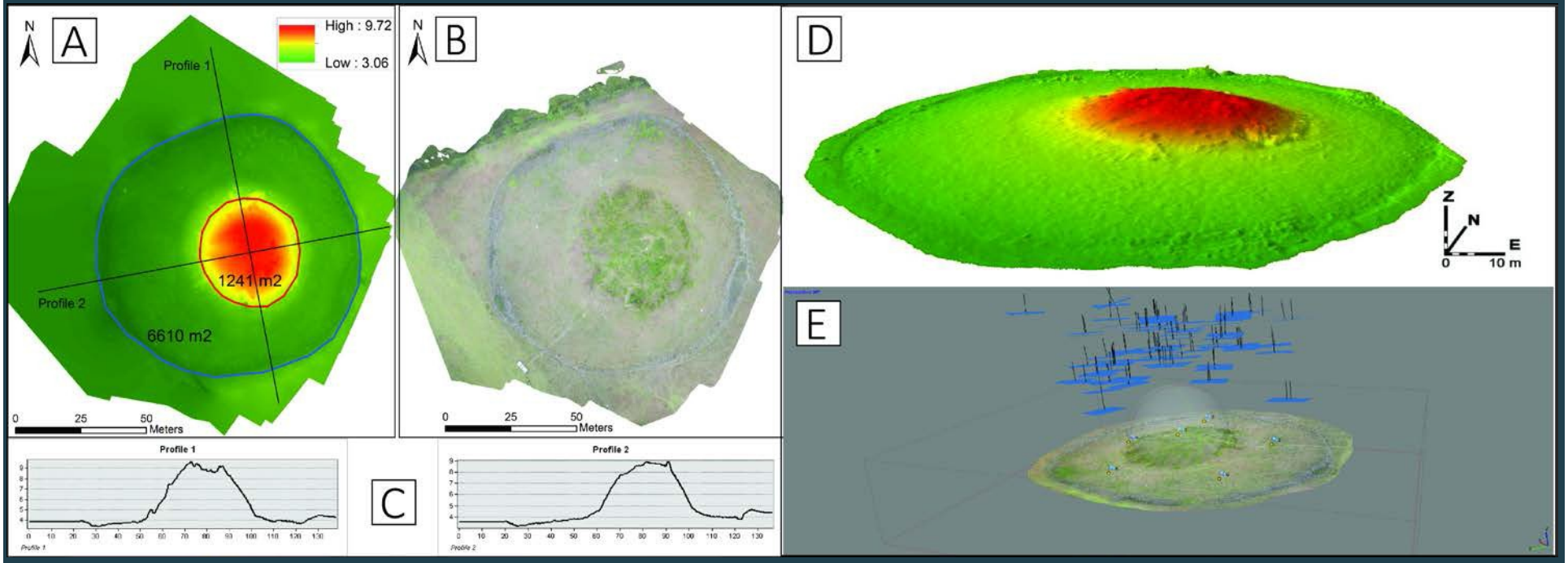




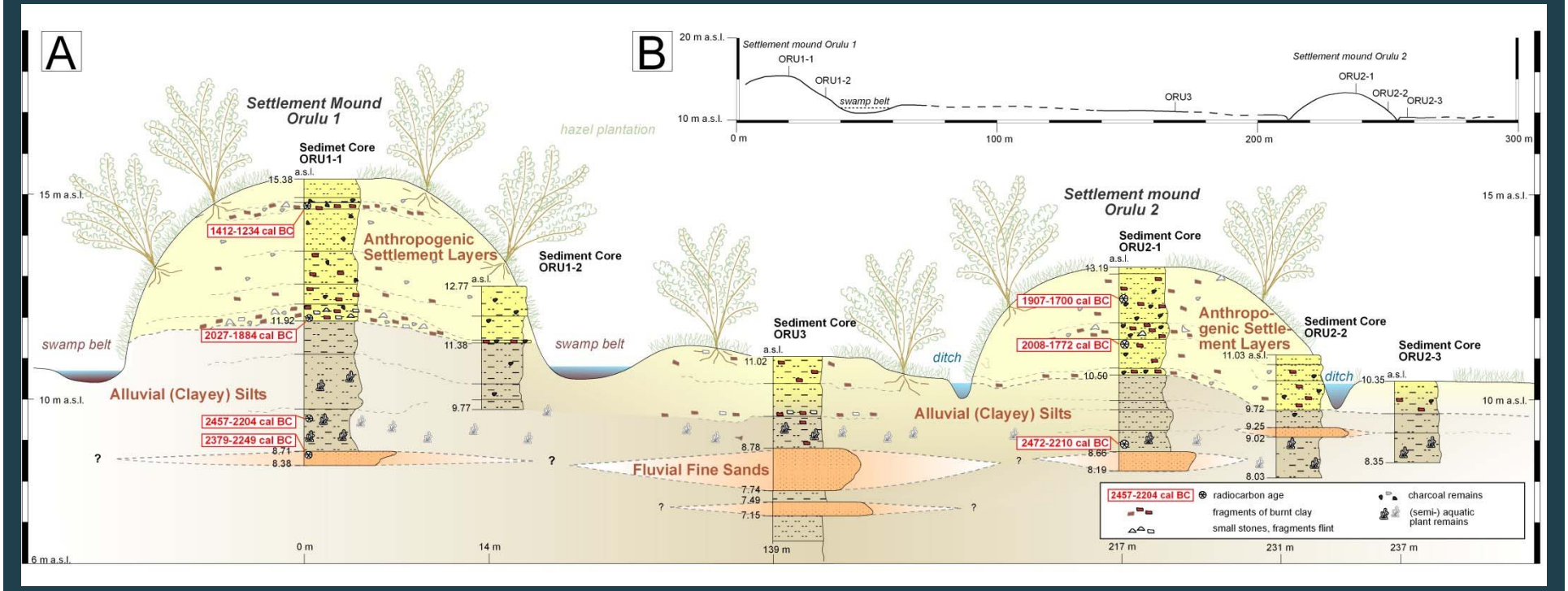
Settlement Mounds

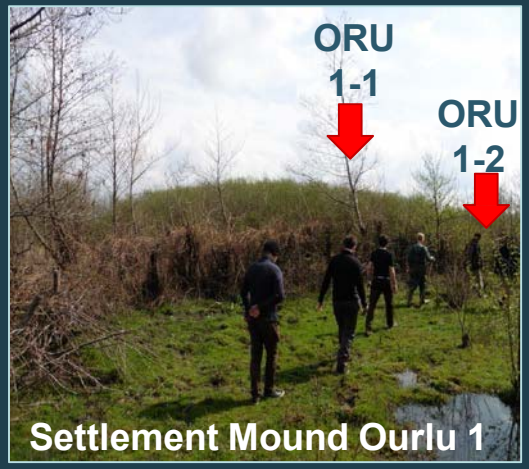


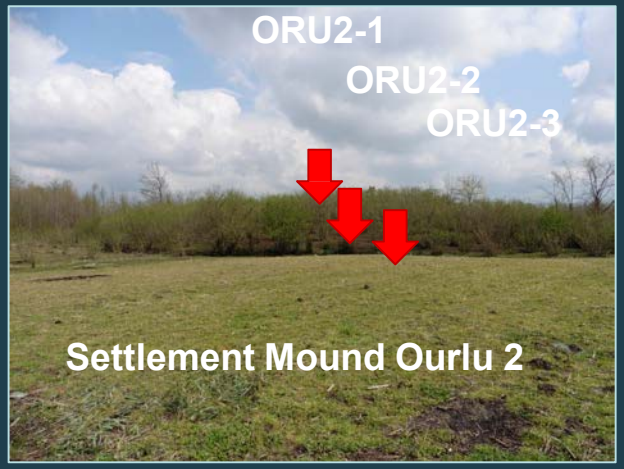
Settlement Mound Ergeta 1



Settlement Mound Ergeta 1







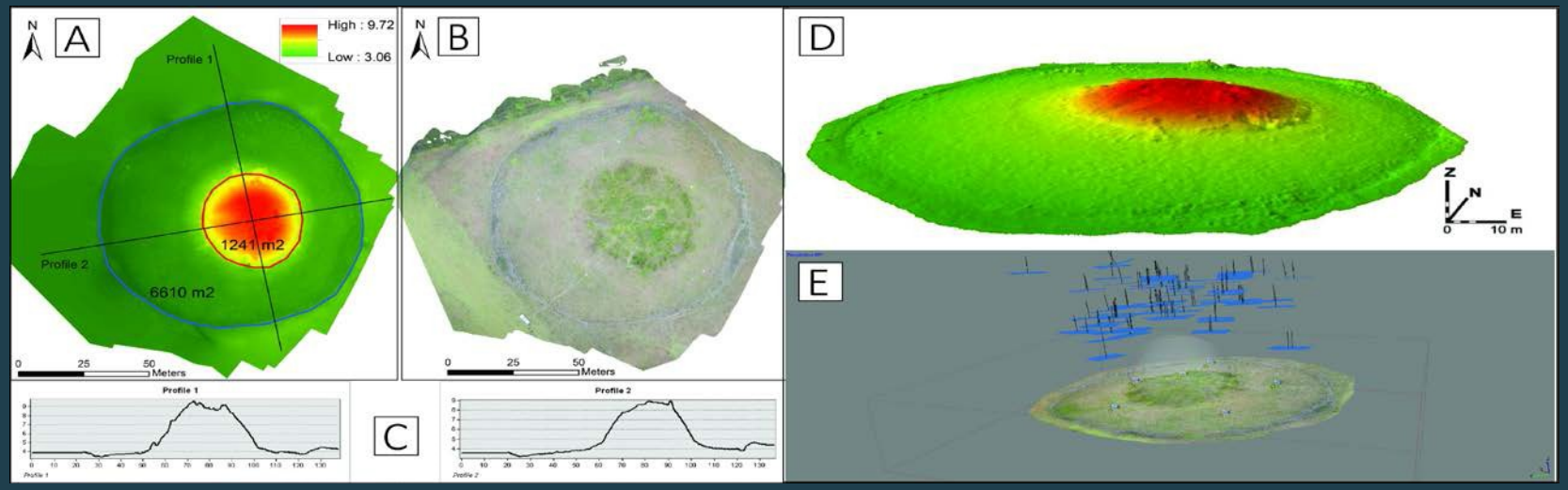
Flint flake (Ourlu 2)

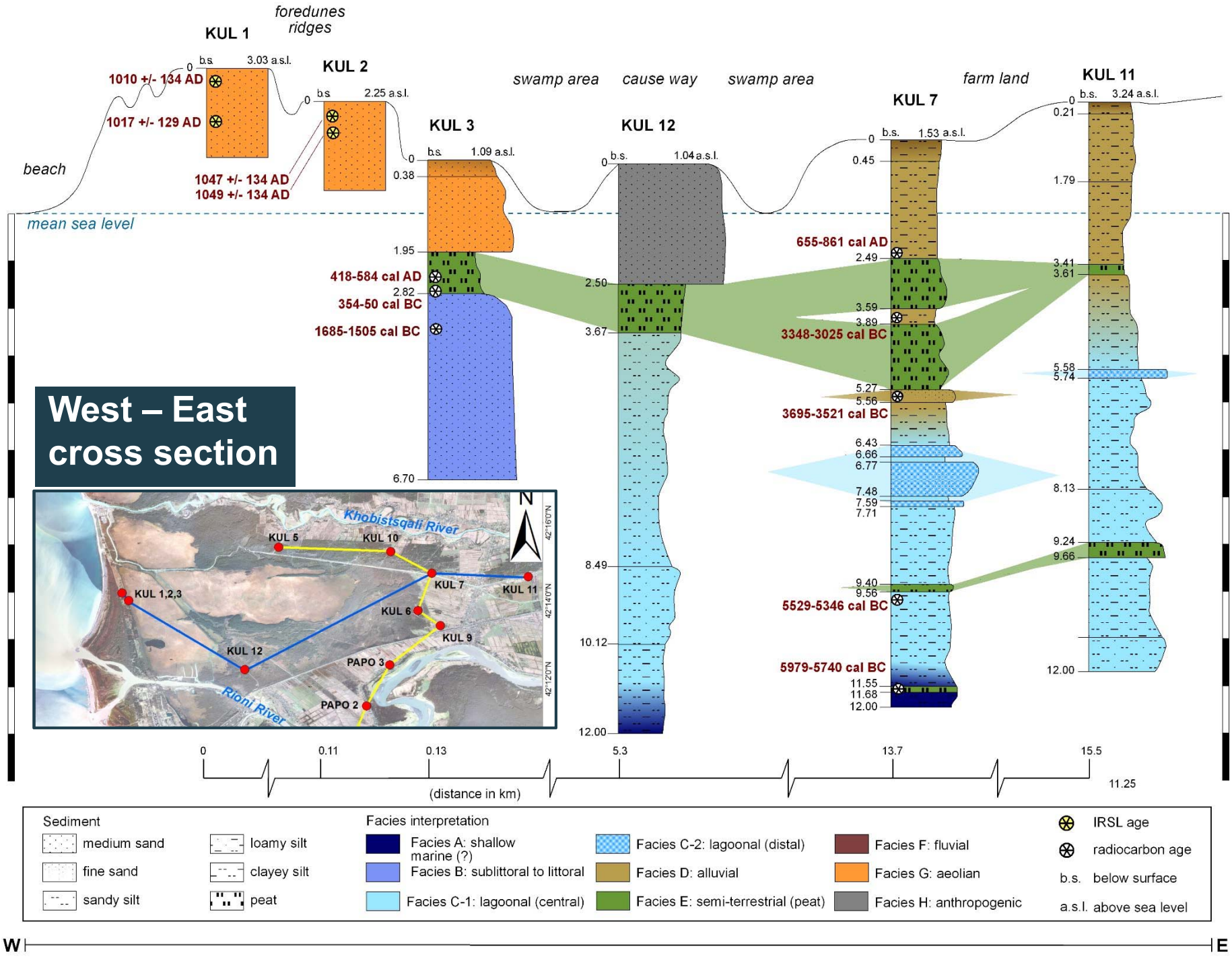
Settlement Mounds Orulu 1 and Orulu 2

Settlement Mounds in NW Georgia

Conclusions

- Construction phases: mound Orulu 1 constructed in several phases; mounds Orulu 2 and Ergeta 1 in only one phase
- Initial construction of the mounds: during Bronze Age (first half of 2nd millennium BC)
- Comparison with other tells: mounds stand out with relatively young age, small size and grouped occurrence; construction material originates from direct surroundings
- Environment at time of occupation dominated by extensive wetlands, with fluctuating alluvial and fluvial deposition (these milieus of deposition existed at least since 4th millennium BC)



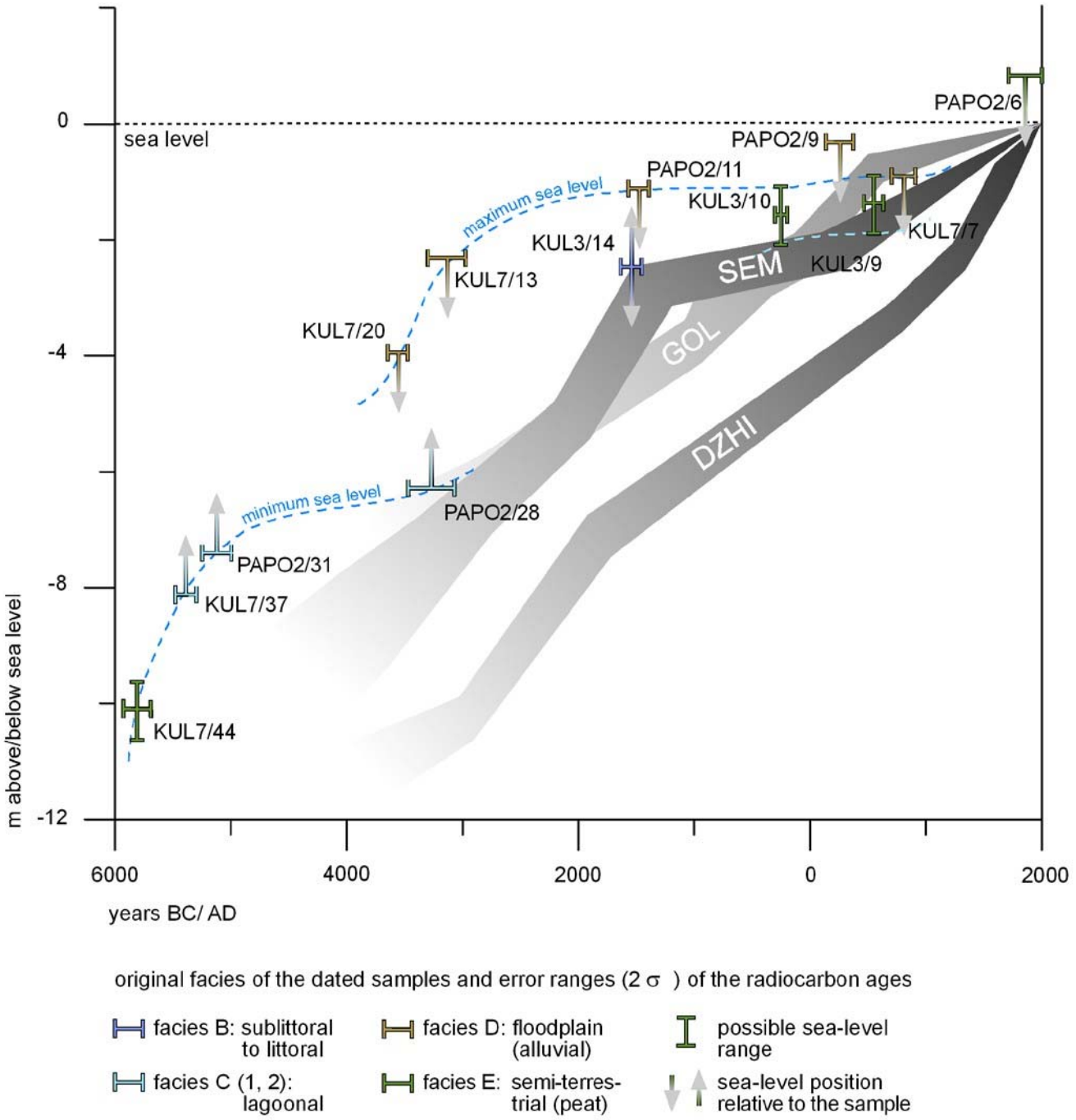

West – East cross section
foredunes ridges
beach
mean sea level
swamp area
cause way
swamp area
farm land
KUL 1
KUL 2
KUL 3
KUL 12
KUL 7
KUL 11
b.s.
3.03 a.s.l.
2.25 a.s.l.
1.09 a.s.l.
1.04 a.s.l.
1.53 a.s.l.
3.24 a.s.l.
1010 +/- 134 AD
1017 +/- 129 AD
1047 +/- 134 AD
1049 +/- 134 AD
418-584 cal AD
354-50 cal BC
1685-1505 cal BC
655-861 cal AD
3348-3025 cal BC
3695-3521 cal BC
5529-5346 cal BC
5979-5740 cal BC
0
0.38
1.95
2.82
6.70
2.50
3.67
8.49
10.12
12.00
0.45
2.49
3.59
3.89
5.27
5.56
6.43
6.66
6.77
7.48
7.59
7.71
9.40
9.56
11.55
11.68
12.00
0.21
1.79
3.41
3.61
5.58
5.74
8.13
9.24
9.66
12.00
Khobistsqali River
Rioni River
KUL 5
KUL 10
KUL 7
KUL 11
KUL 1,2,3
KUL 6
KUL 9
KUL 12
PAPO 3
PAPO 2
N
42°16'0"N
42°14'0"N
42°12'0"N
0
0.11
0.13
5.3
13.7
15.5
11.25
(distance in km)
Sediment
medium sand
fine sand
sandy silt
loamy silt
clayey silt
peat
Facies interpretation
Facies A: shallow marine (?)
Facies B: sublittoral to littoral
Facies C-1: lagoonal (central)
Facies C-2: lagoonal (distal)
Facies D: alluvial
Facies E: semi-terrestrial (peat)
Facies F: fluvial
Facies G: aeolian
Facies H: anthropogenic
IRSL age
radiocarbon age
b.s. below surface
a.s.l. above sea level
W
E

Sea-level trend curve

for the Kolkheti lowlands

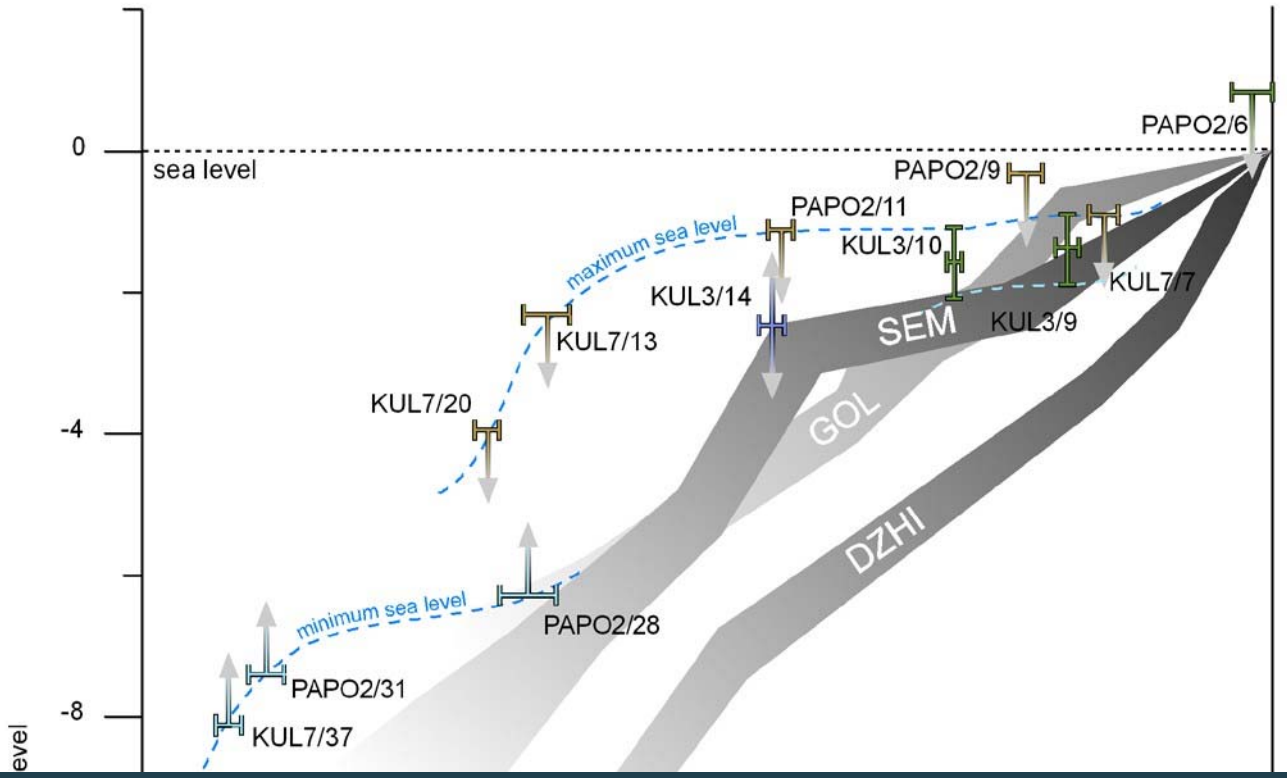
^{14}C-dated samples (2 sigma) and their relative position to local sea level

Comparison with sea-level curves of Taman peninsula, SW Russia, (Brückner et al., 2010; Kelterbaum et al., 2011; Fouache et al., 2012)



Sea-level trend curve

for the Kolkheti lowlands



Considerable landscape changes have taken place:

- Holocene transgression, then formation of a barrier-lagoon system until ca. 5000 BC.
- Delta-progradation of the Rioni with silting up of huge areas between 3500 and 1500 BC; formation of peat bogs.
- No evidence for significant oscillations of sea level, no regression-transgression cycles; instead: progressively and moderately rising sea level, with decelerated speed since 3000-2000 BC

Summary

- Significant palaeoenvironmental changes in surroundings of Rioni delta during last eight millennia.
- A marine embayment and shallow marine conditions existed during the 6th mill. BC.
- The environment changed from open marine conditions to brackish-lagoonal ones.
- Since 4th mill. BC deposition of flood-plain-related fine-grained alluvia.
- This indicates the beginning of the delta evolution.
- Alluvia and lagoonal deposits are interdigitated with peat layers (evolution of swamps).
- ^{14}C age estimates of paralic peats enable reconstruction of sea-level curve.
- Continuous sea-level rise during Holocene, decelerated speed since 3rd mill. BC.
- Formation of sand spit complex started during 2nd mill. BC; last mobilisation of dunes 9th – 12th cent. AD.
- Settlement mounds date from Bronze Age; initial construction during first half of 2nd mill. BC.