



Unravelling archaeological settlement, landscape, and resource use patterns with machine learning in Kurdistan (Iraq)

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EGU General Assembly, Vienna 23 – 27 May 2022, Session: Geomorphology, "Towards the Anthropocene: human-landscape interaction and geoarchaeological challenges "



RESOURCE CULTURES

Resource
Complexe

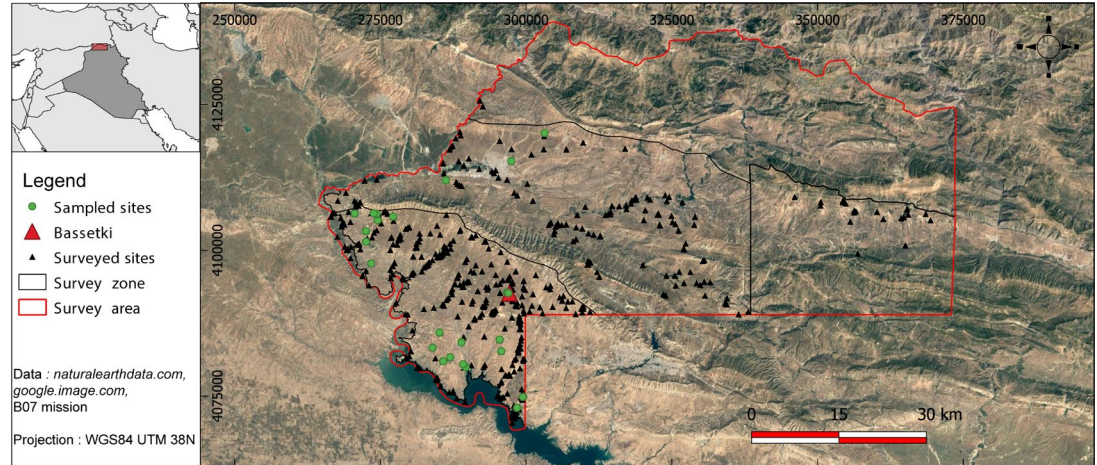
- Network of knowledges, technics, practices, peoples, places and objects/medias

Resource
Assemblage

- State and process at the same time
- Historical contingence of heterogenous practices

Resource
Cultures

- Grasp the overlaps, recurrent phenomena and inherent dependencies
- Diversity of resource cultures in space and time



Study area with sampled sites

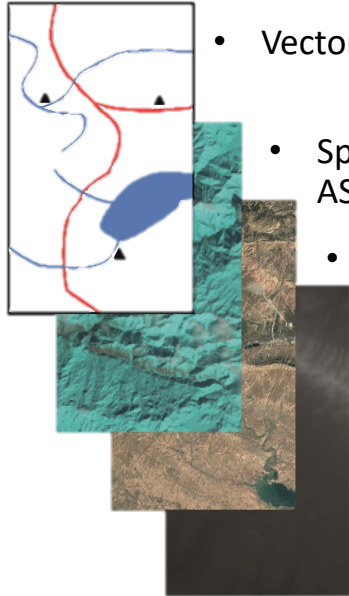
SETTLEMENTS PATTERNS

“Resource hunting” strategy from Mesopotamian empires (monopole, acculturation...)



Local indigenous uses of resources (close environment)

How can new methods in soil sciences help us in revealing settlement pattern in Iraqi Kurdistan?



Multisource data

- Vector: Sites, roads, rivers, mining spot...
- Spectral data: Landsat 8/9, Sentinel 2, ASTER (NIR, color, thermal bands...)
- Ortho-images : Copernicus, CORONA, HEXAGON
- Others raster: SPOT, SRTM, Models (precipitation, temperature...)

- Over 4.400 km² surveyed
- > 350 sites
- 21 sites sampled

Prepare data (ICP, FTIR, ML)
Probability map of site
Validate classification

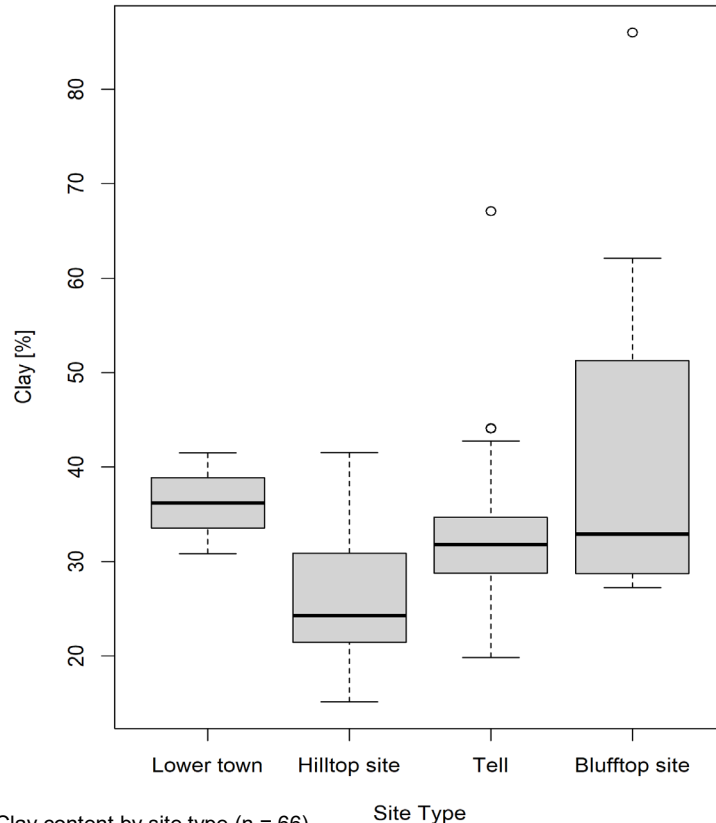


Add news information's
(Natural component,
vectors data)



Analyse the patterns
for each periods and
sites type

Three steps of the methodology

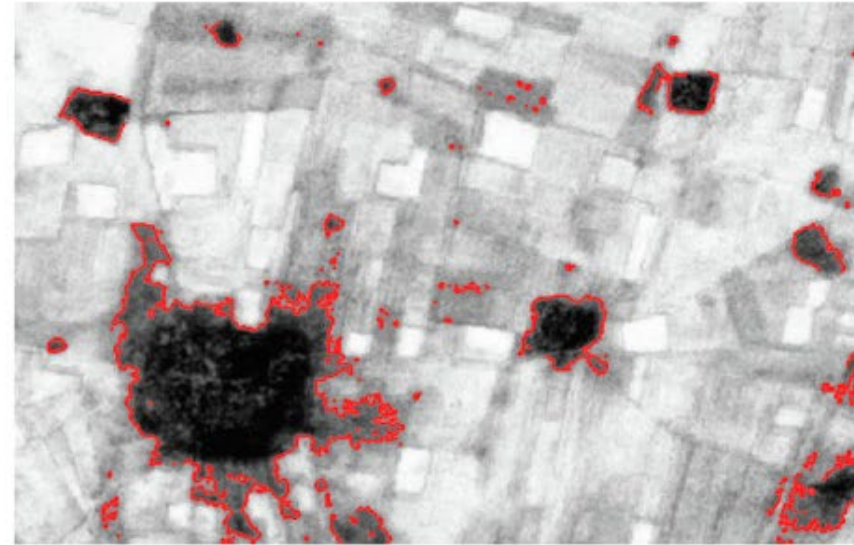
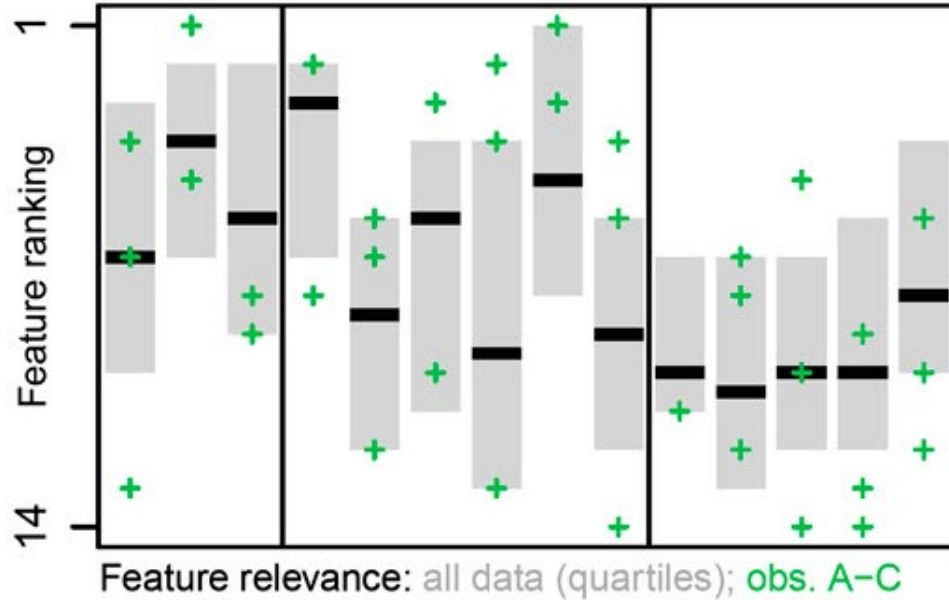


Anova on clay content per site type → Pr(>F) = **0.002**

Tukey HSD table points out significant differences between

- Hilltop/Blufftop sites (p.value = **0.0012**)
- Hilltop/Tell sites (p.value = **0.0266**)

Clay content as a **significant influence** on site type



Prediction map and features rating (Menze and Ur, 2012)



- ❑ Machine learning combined with statistics can underline unseen relation between sites and their environments
- ❑ Multi-proxy and multi-scalar analysis needs Big data but not necessarily heavy costs
- ❑ Next steps will be the realization of complex predictive maps, settlements patterns analysis for the whole corpus

Based on new methodology and later archaeological interpretation we are able to defines ResourceCultures in link with the settlement patterns and resources uses



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Thank you for your attention