Reassessing the 'great dispersal': Settlement patterns and ecology under later territorial empires in the Northern Fertile Crescent.

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Structure

- Background
- Objectives
- Study Area
- Units of Analysis
- Methods
- Results
- Conclusions

Background

Background

explanation?

- shift from network to a territorial empire (Liverani, 1988)
- administrative restructuring and institutional colonisation (Wilkinson, 2000; T J Wilkinson et al., 2005)
- creation of a landscape of power (Morandi Bonacossi, 1996)
- *agricultural colonisation* (Parker, 2001)
- change in land ownership (Casana, 2007)
- *universalism* and population dynamics (Altaweel and Squitieri, 2018)
- part of imperial repertoires (Düring, 2020)

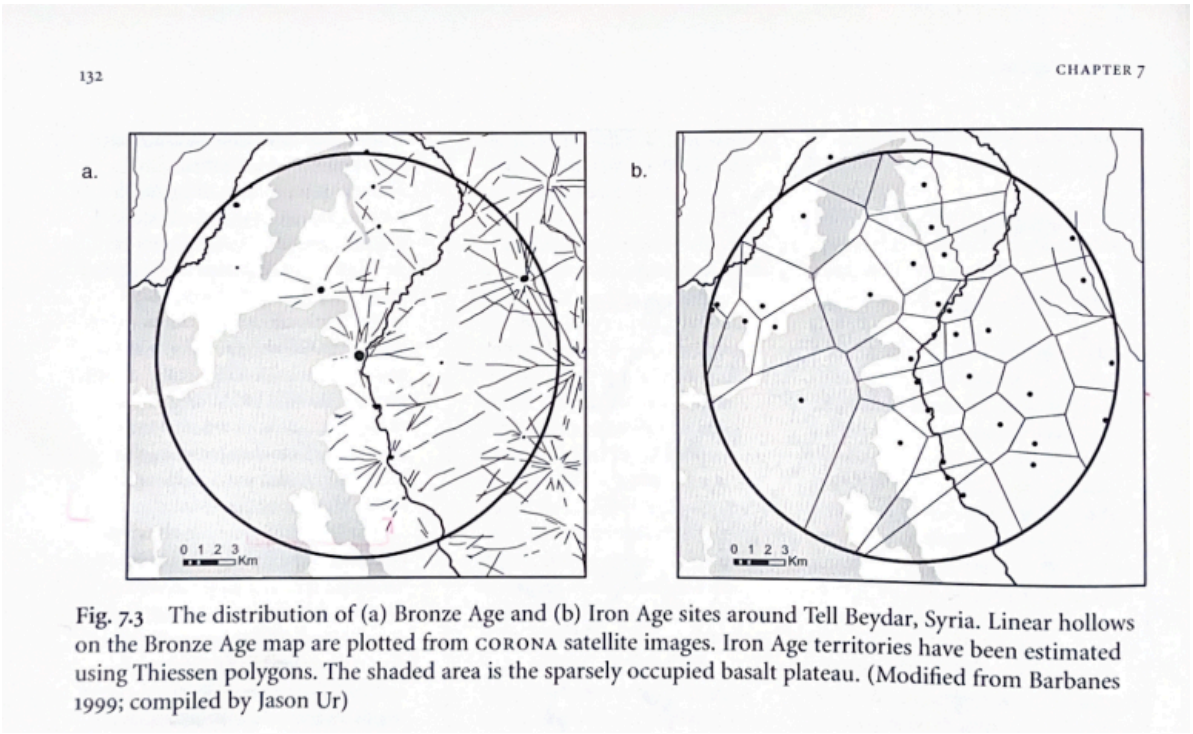


Fig. 7.3 The distribution of (a) Bronze Age and (b) Iron Age sites around Tell Beydar, Syria. Linear hollows on the Bronze Age map are plotted from CORONA satellite images. Iron Age territories have been estimated using Thiessen polygons. The shaded area is the sparsely occupied basalt plateau. (Modified from Barbanes 1999; compiled by Jason Ur)

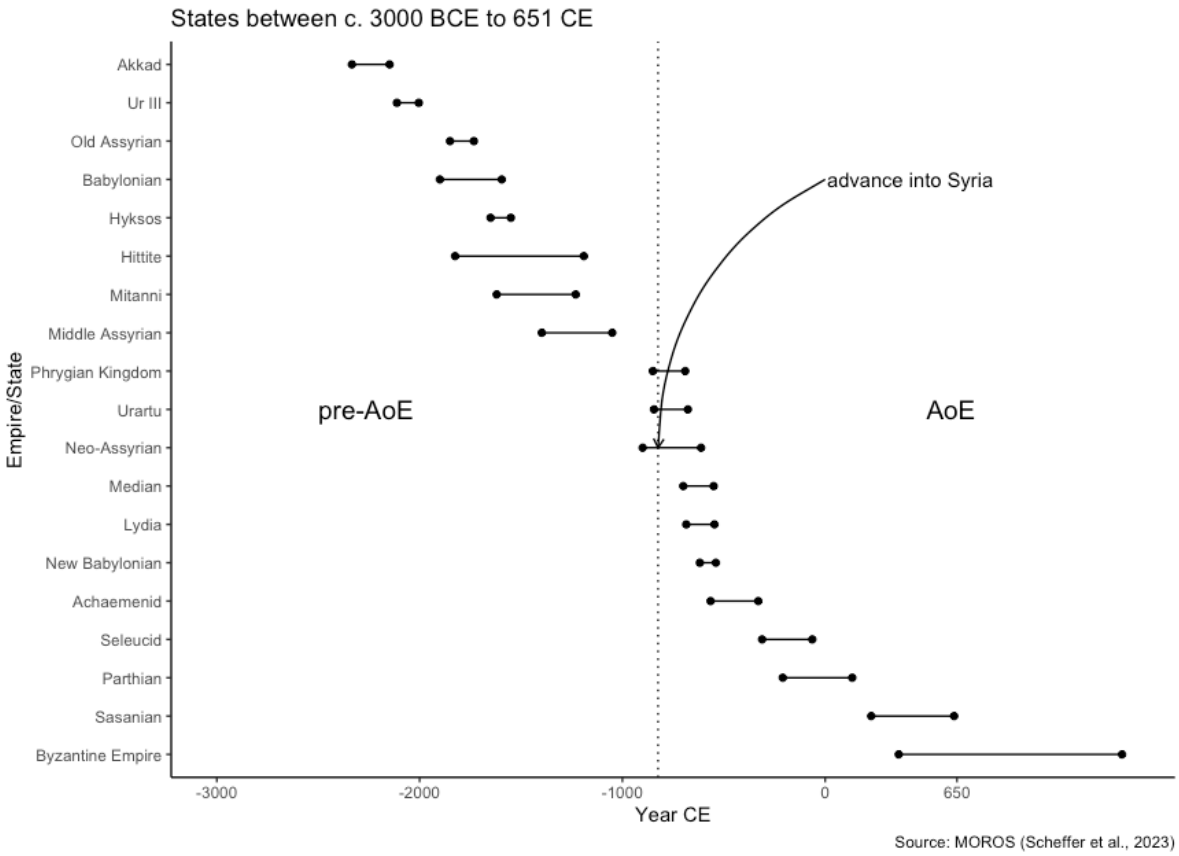
Objective

Overall,my research goal is to investigate and quantify the *"landscape of dispersal"* across the Northern Fertile Crescent.

I argue that timing, sequence and magnitude of the change is pertinent to correlate the transformation in landscape with empires.

Today, I will:

- present Exploratory Data Analysis of the settlement **pattern** deploying quantitative metrics of centralization.
- apply Ideal Free Distribution model to understand the **process** behind the settlement pattern.


States between c. 3000 BCE to 651 CE
Akkad
Ur III
Old Assyrian
Babylonian
Hyksos
Hittite
Mitanni
Middle Assyrian
Phrygian Kingdom
Urartu
Neo-Assyrian
Median
Lydia
New Babylonian
Achaemenid
Seleucid
Parthian
Sasanian
Byzantine Empire
Empire/State
advance into Syria
pre-AoE
AoE
-3000
-2000
-1000
0
650
Year CE
Source: MOROS (Scheffer et al., 2023)

Chronology

Study Area

East-West transect across Northern Mesopotamian plains.

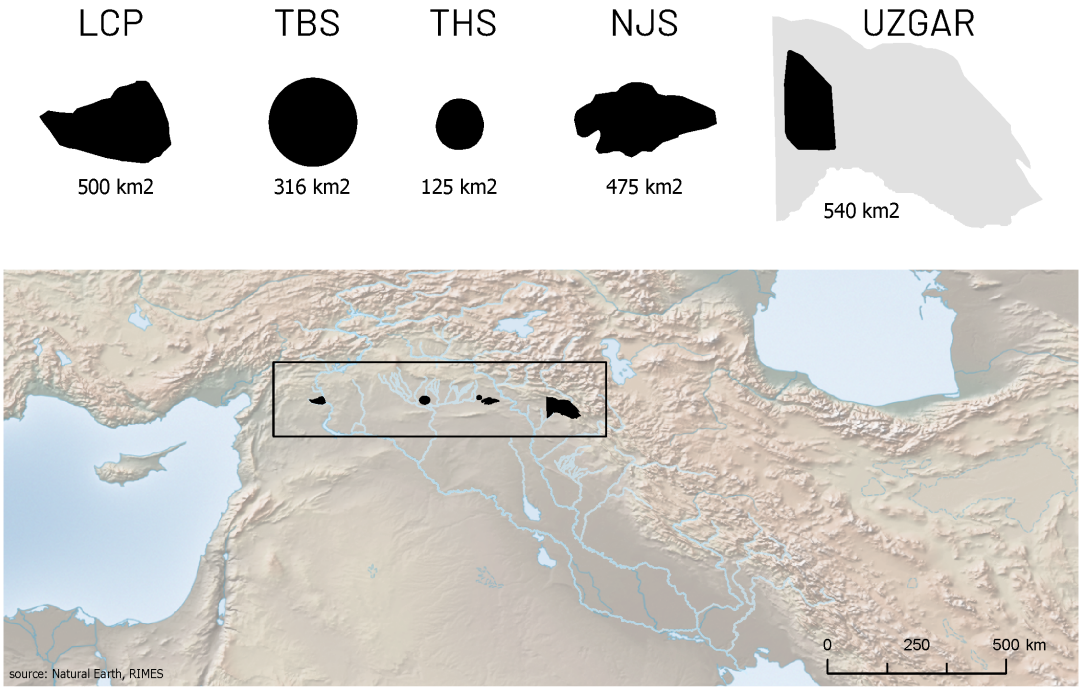


Figure 1: Northern Mesopotamia (n = 396 sites)

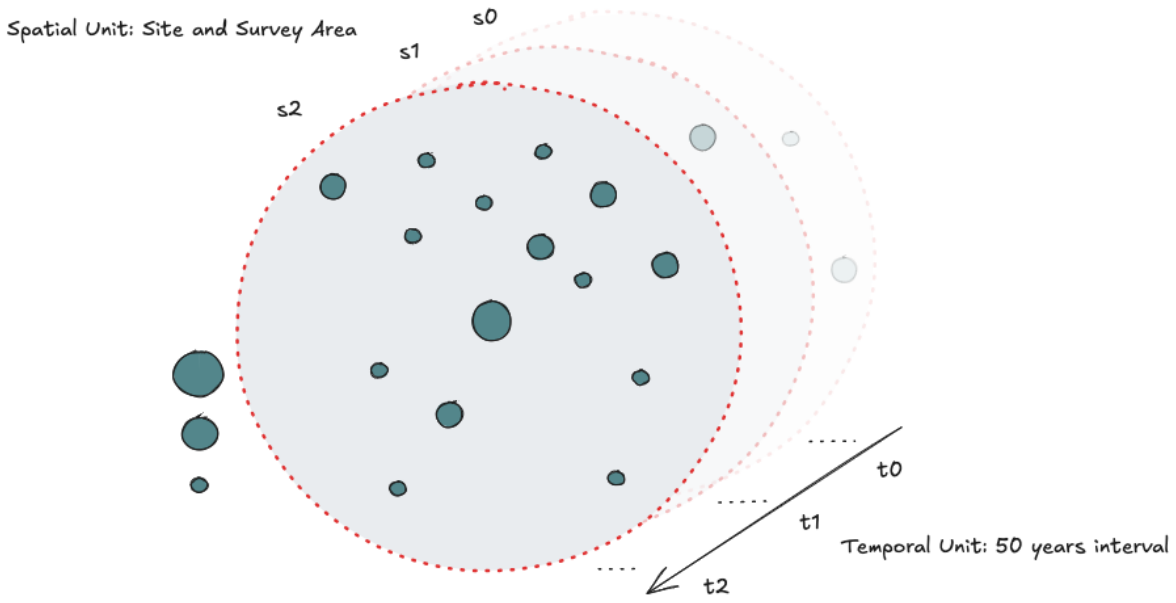
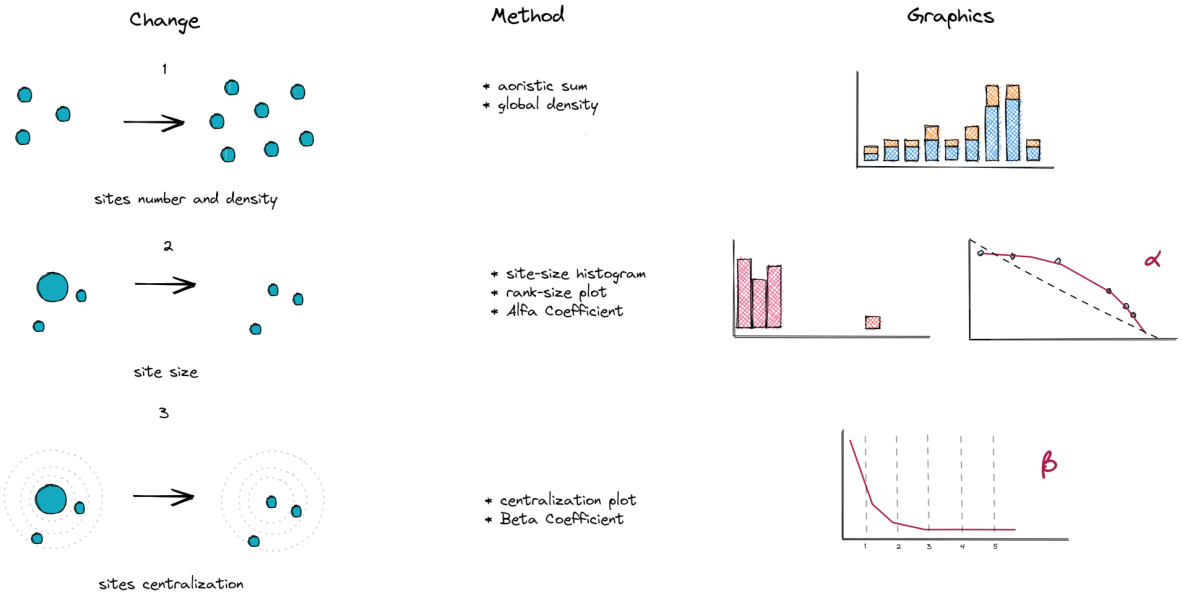
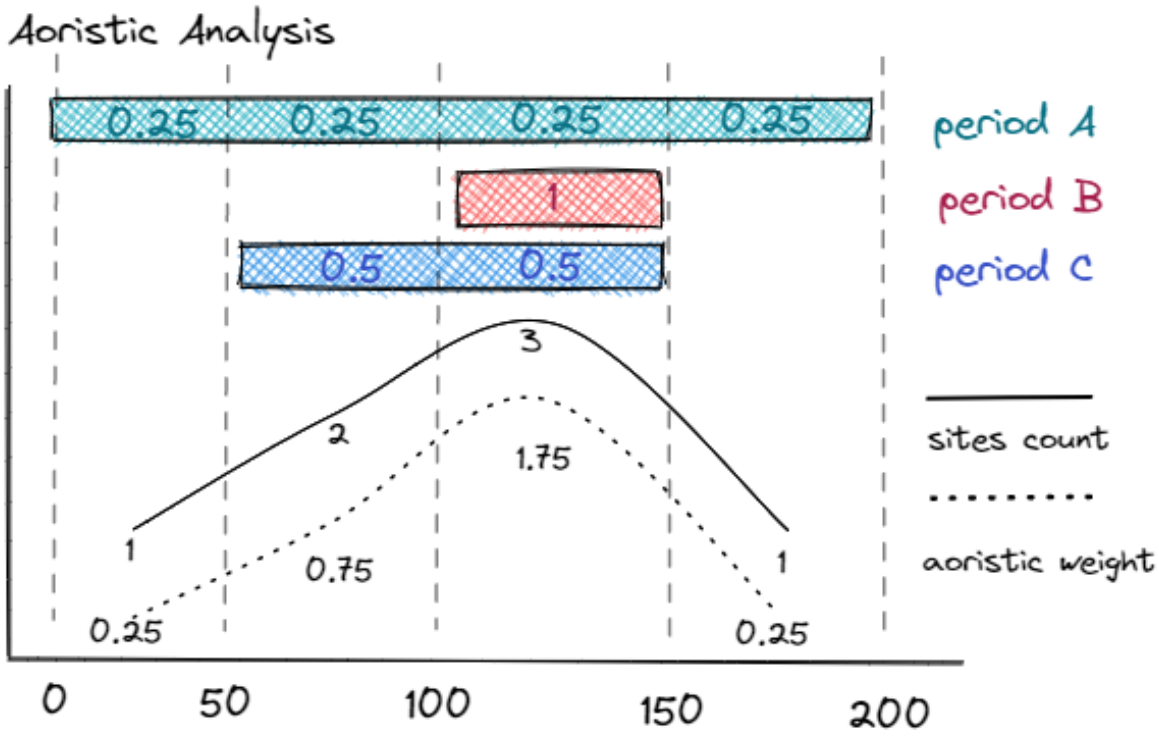
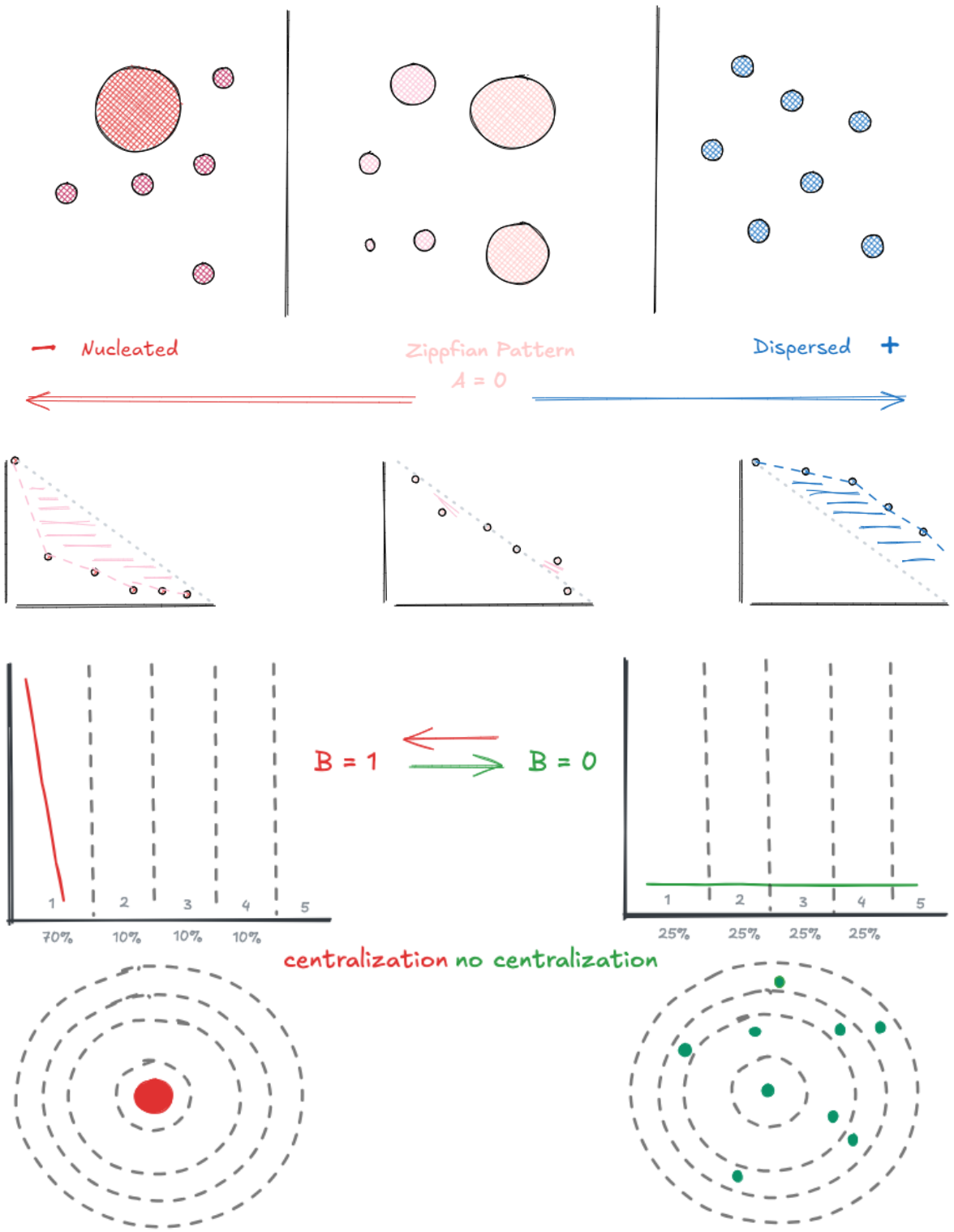


Figure 2: Sequence of Snapshots: *Si* represents settlement system state at particular time *Ti*.




Aoristic Analysis
0.25
0.25
0.25
0.25
1
0.5
0.5
3
2
1.75
1
0.75
1
0.25
0.25
0
50
100
150
200
period A
period B
period C
sites count
aoristic weight


Nucleated
Zippfian Pattern
A = 0
Dispersed
B = 1
B = 0
1
2
3
4
5
70%
10%
10%
10%
25%
25%
25%
25%
centralization
no centralization

Unit of Analysis

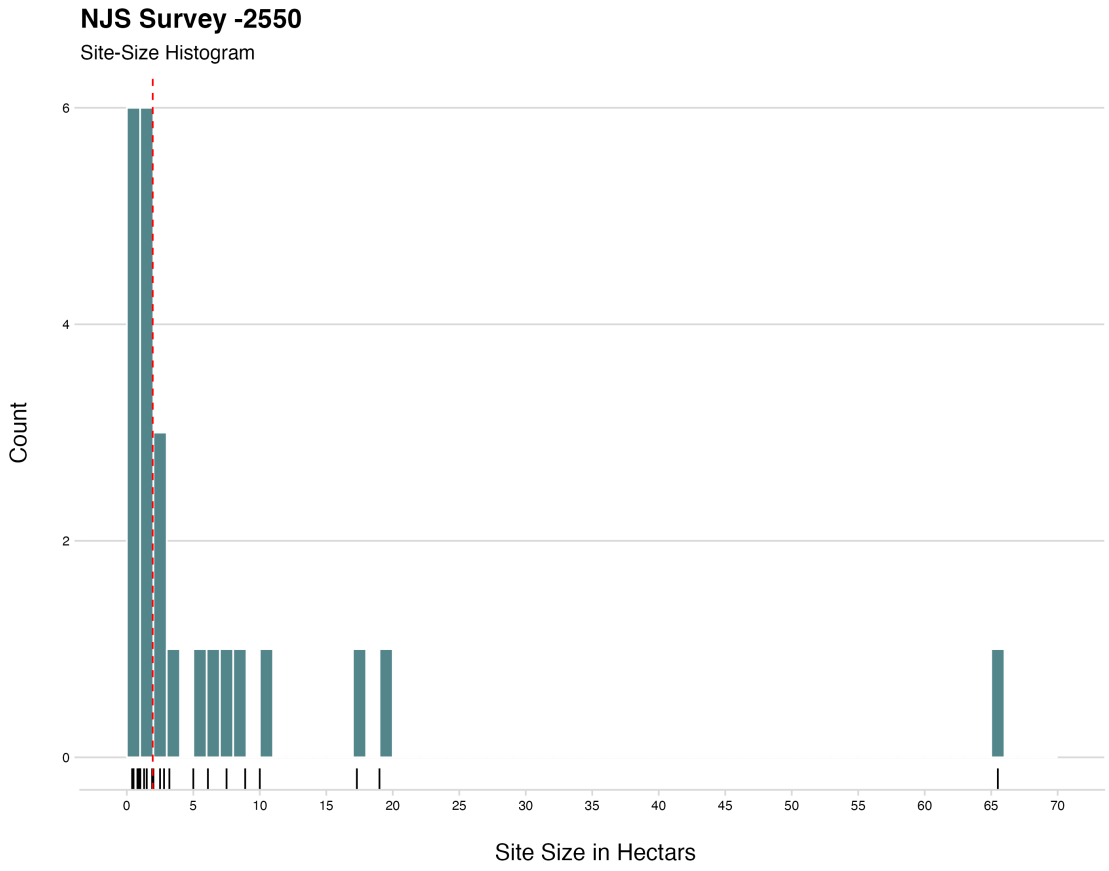
Methods: Settlement System

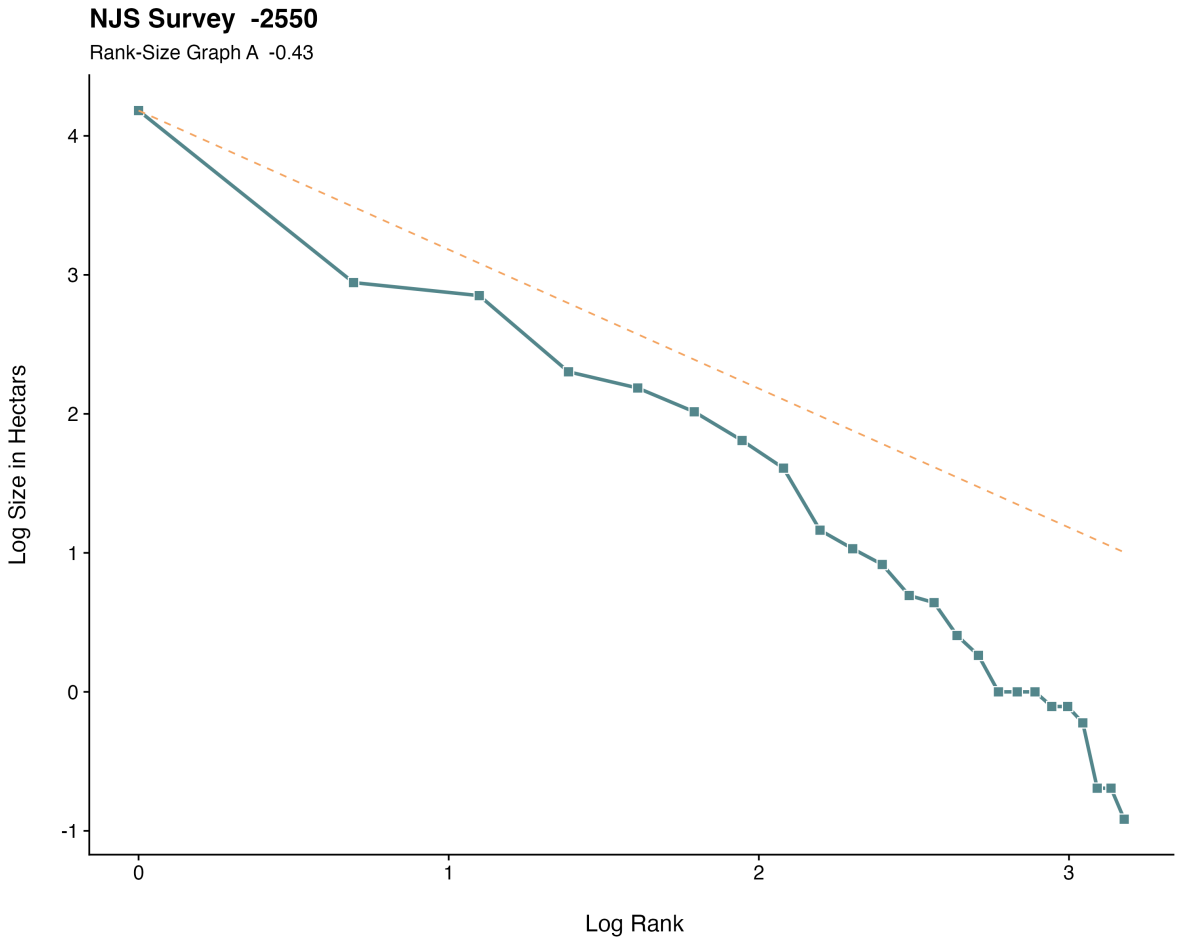
Methods: Aoristic analysis

Methods: Rank-Size and A Coefficient

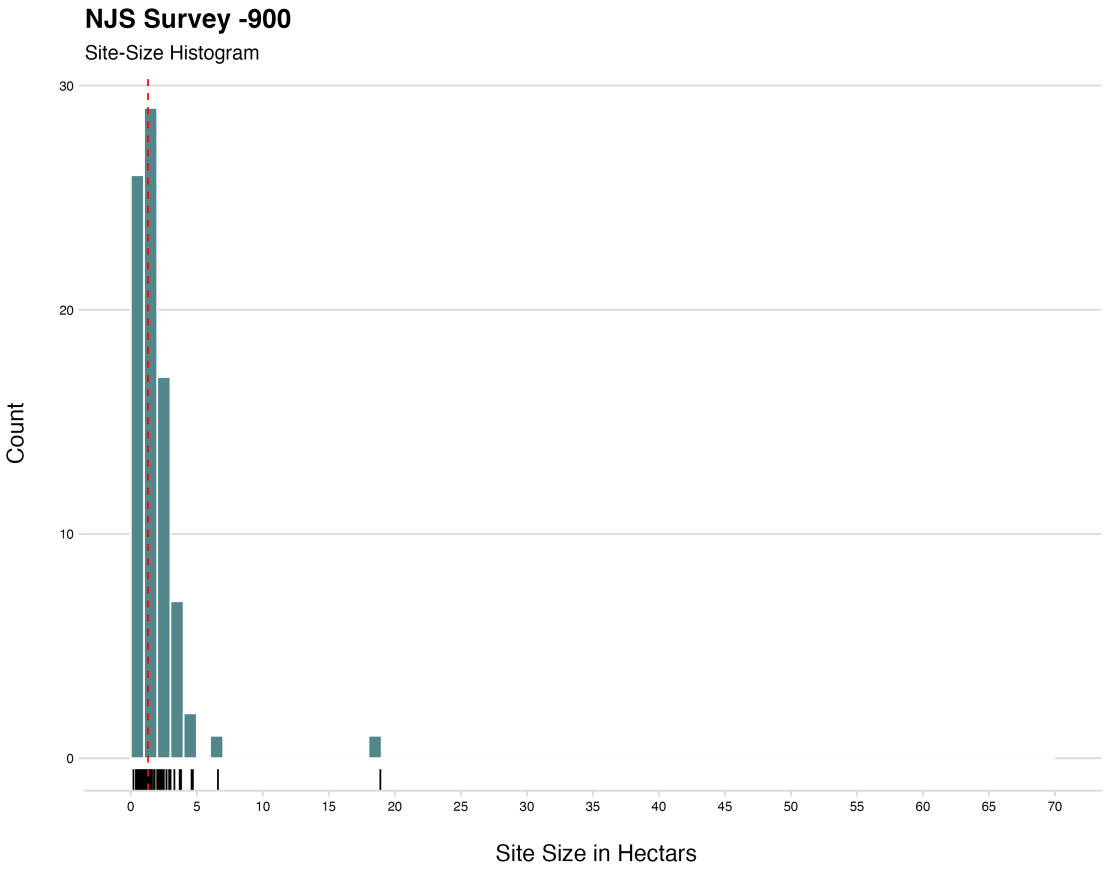
Methods: Centralization and B Coefficient

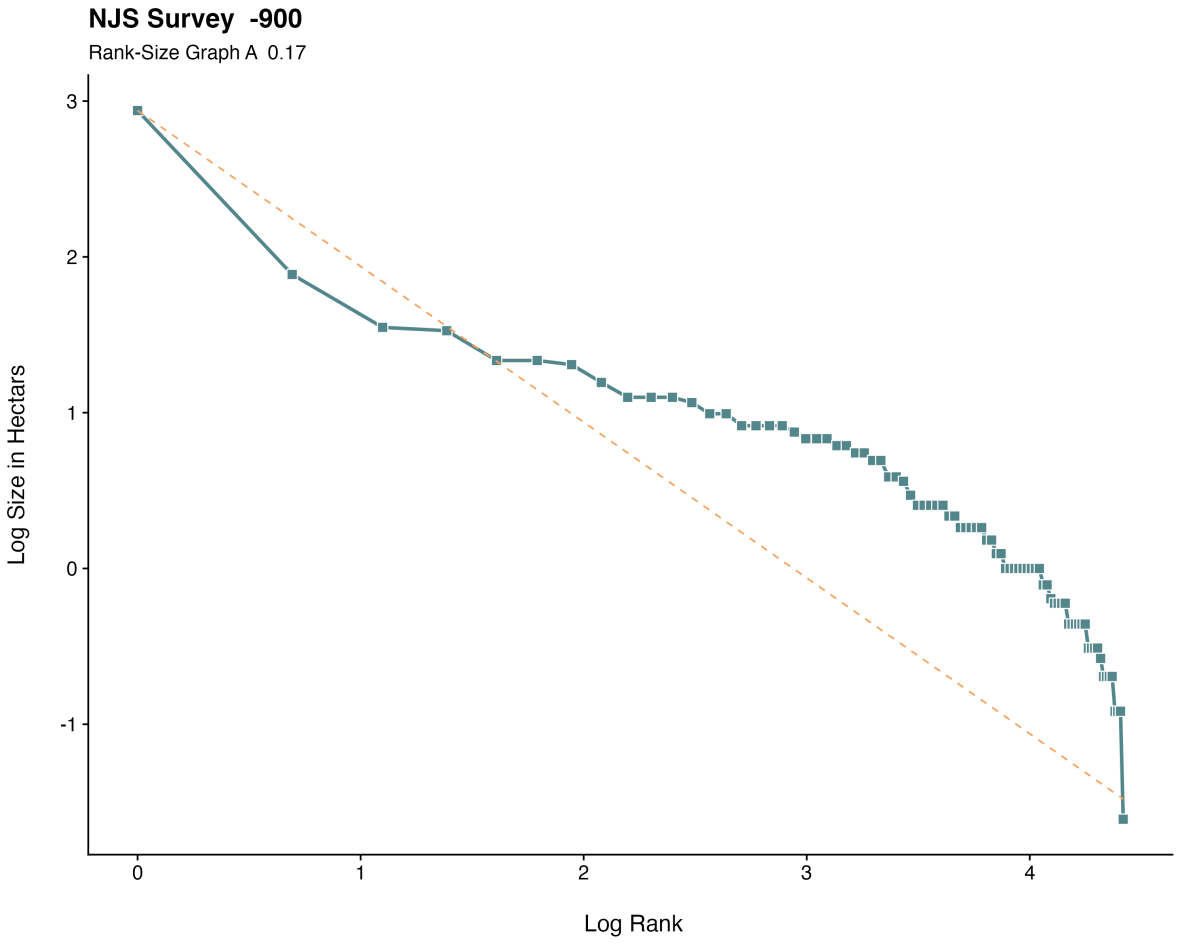
Example: NJS at 2550 BCE



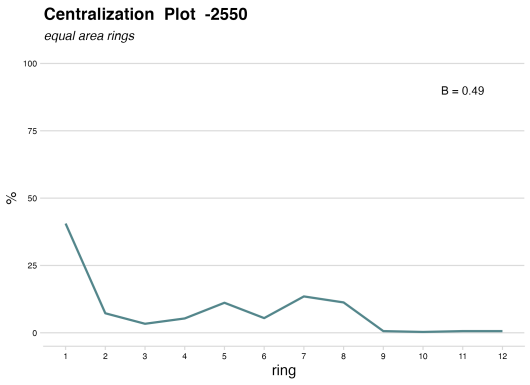

NJS Survey -2550
Rank-Size Graph A -0.43
Log Size in Hectars
4
3
2
1
0
-1
0
1
2
3
Log Rank

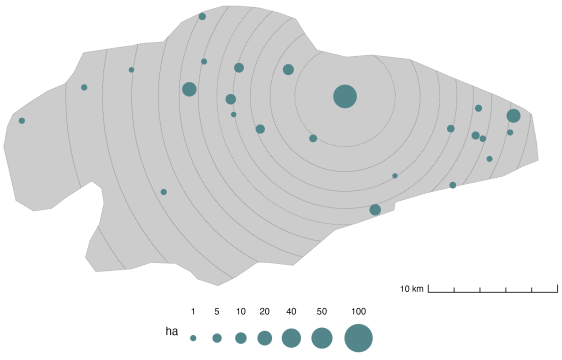
Example: NJS at 900 BCE



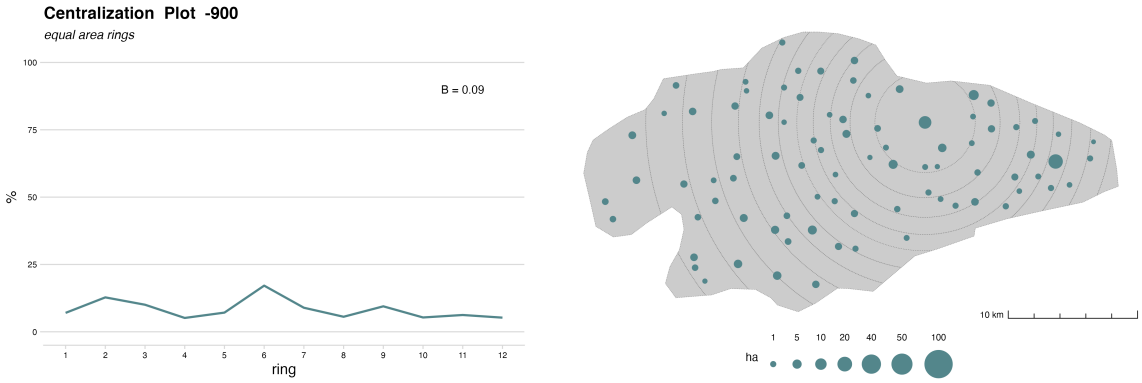


Example: NJS at 2550 BCE

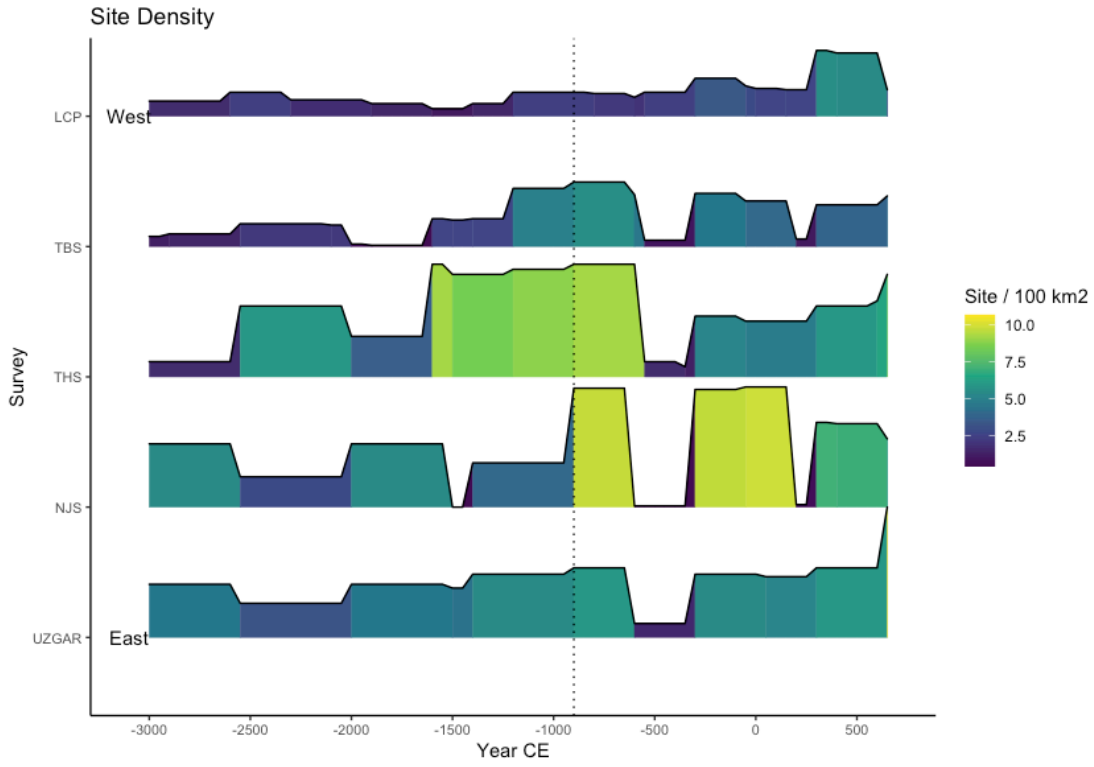




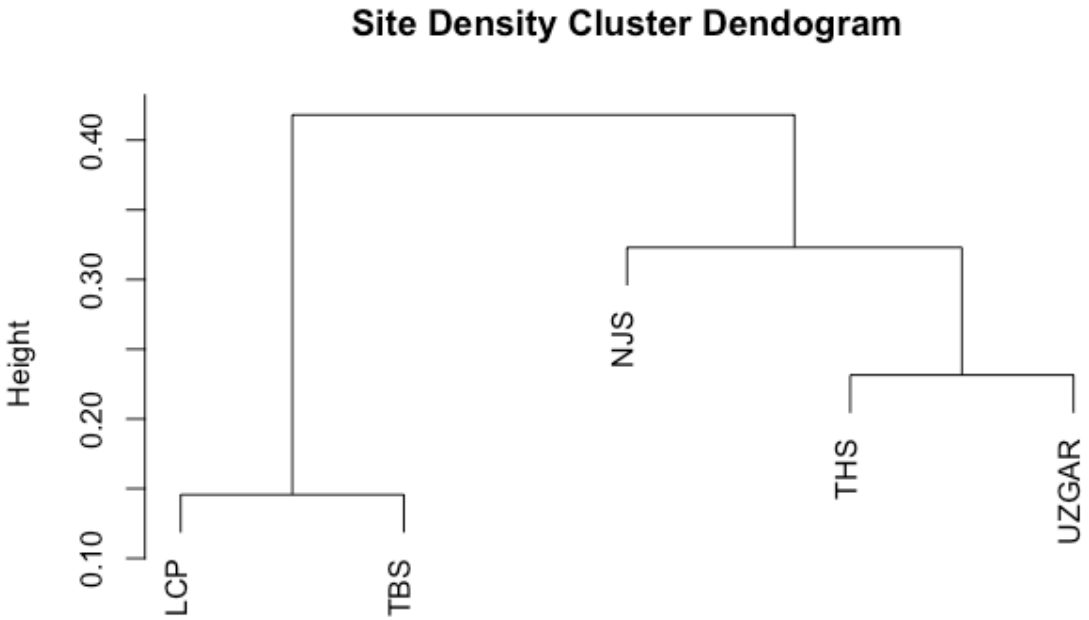
Example: NJS at 900 BCE



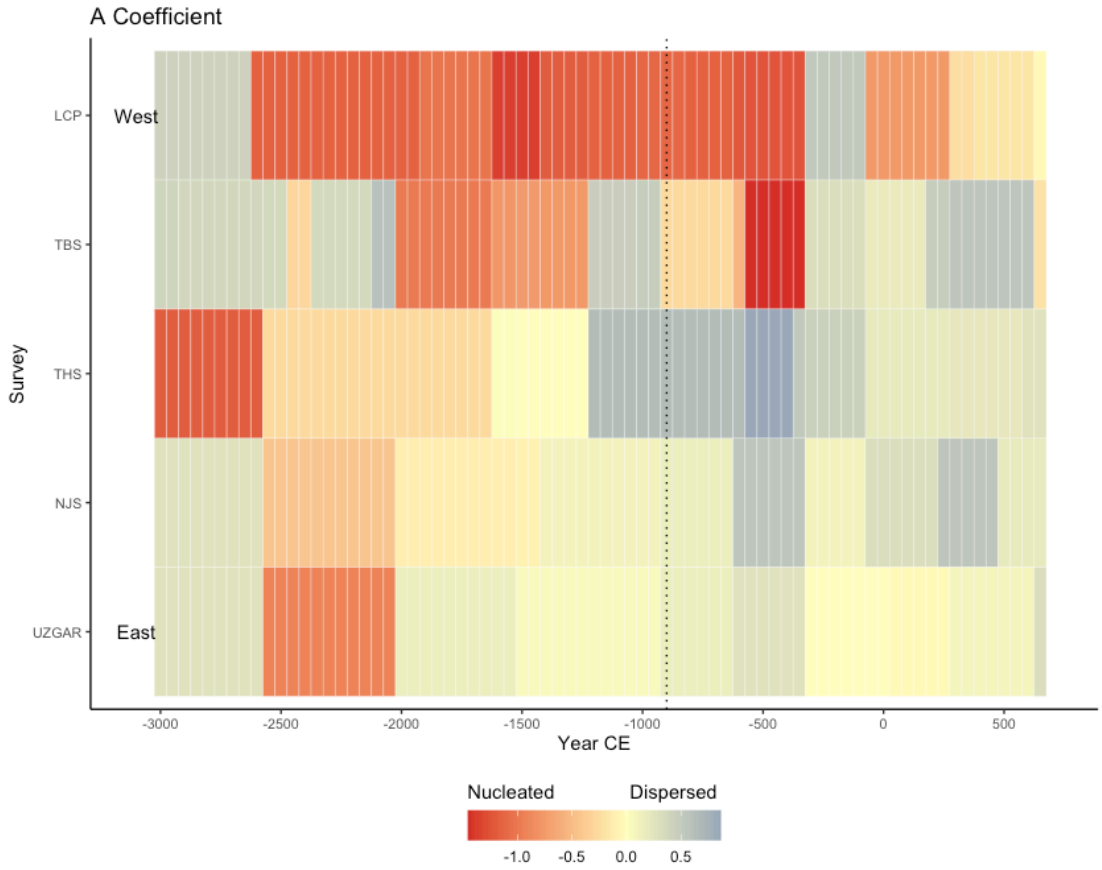
Results: Site Density



Results: Density Cluster



Results: A coefficient



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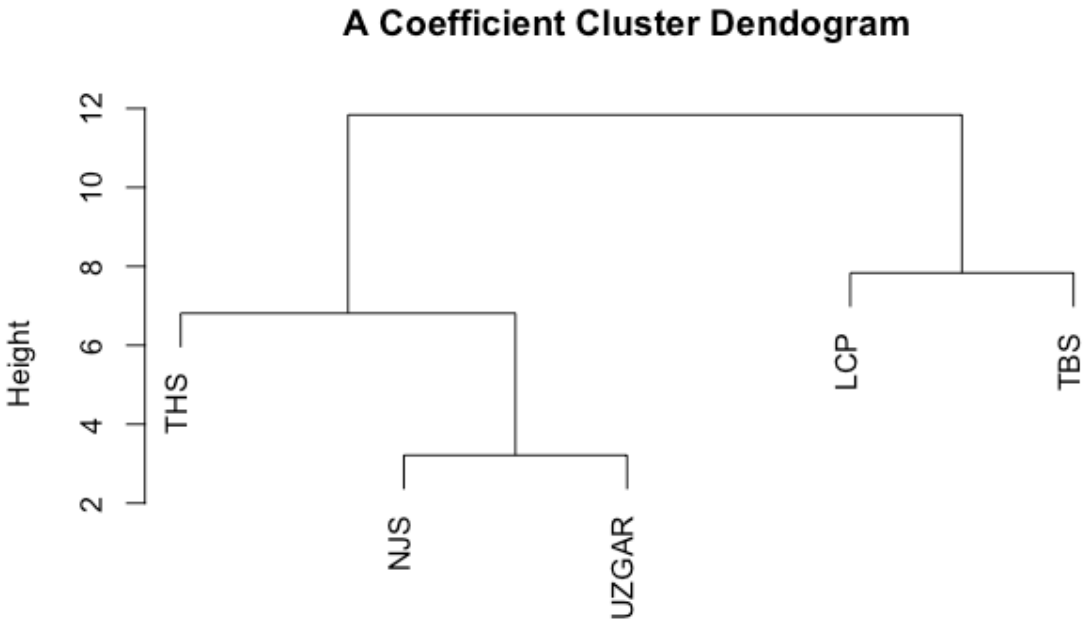
Results: A coefficient Cluster

Results: Beta coefficient

Results: B coefficient

Methods: Settlement Ecology

Human Behavioral Ecology – Ideal Distribution Models


A Coefficient Cluster Dendogram
Height
2
4
6
8
10
12
THS
NJS
UZGAR
LCP
TBS

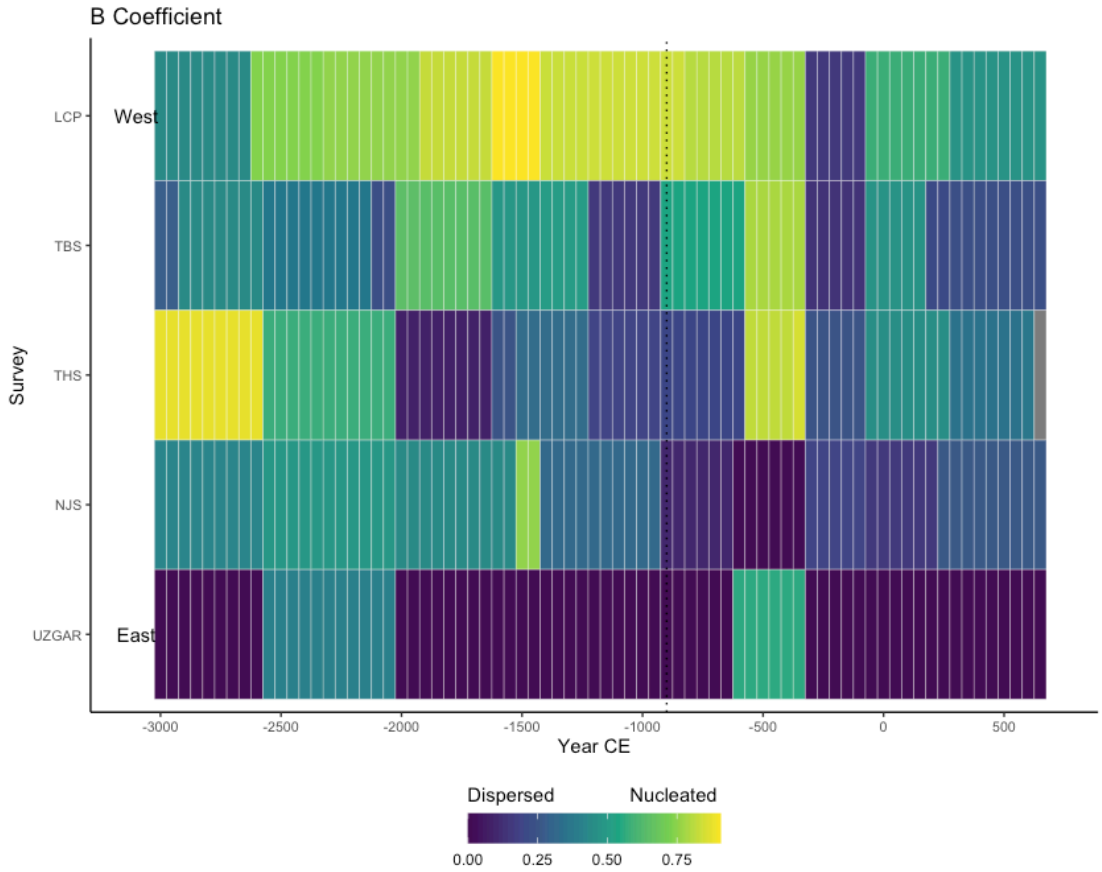
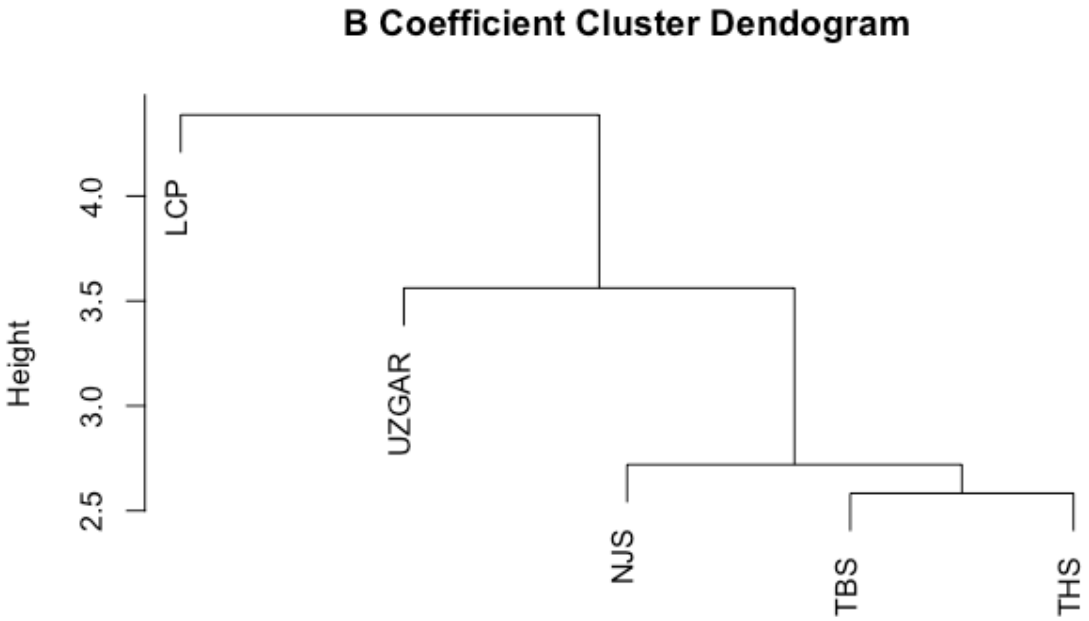


Figure 3: *Modifiable areal unit problem


B Coefficient Cluster Dendogram
Height
2.5
3.0
3.5
4.0
LCP
UZGAR
NJS
TBS
THS

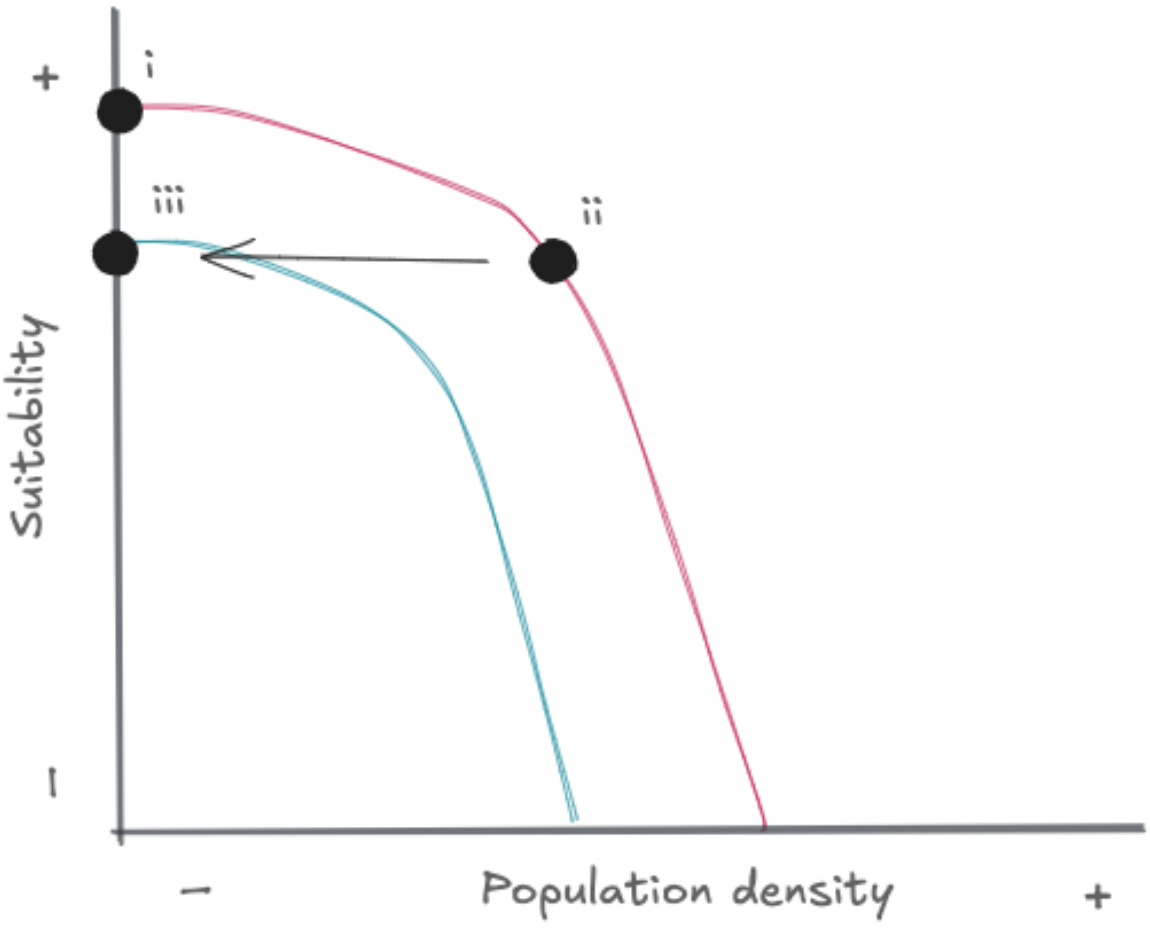
The fundamental premise of the model is that individuals seek to maximize suitability such as subsistence yields.

variants:

- Ideal Free Distribution (IFD)
- Ideal Free Distribution with Allee effect (IFDA)
- Ideal Despotic Distribution (IDD)

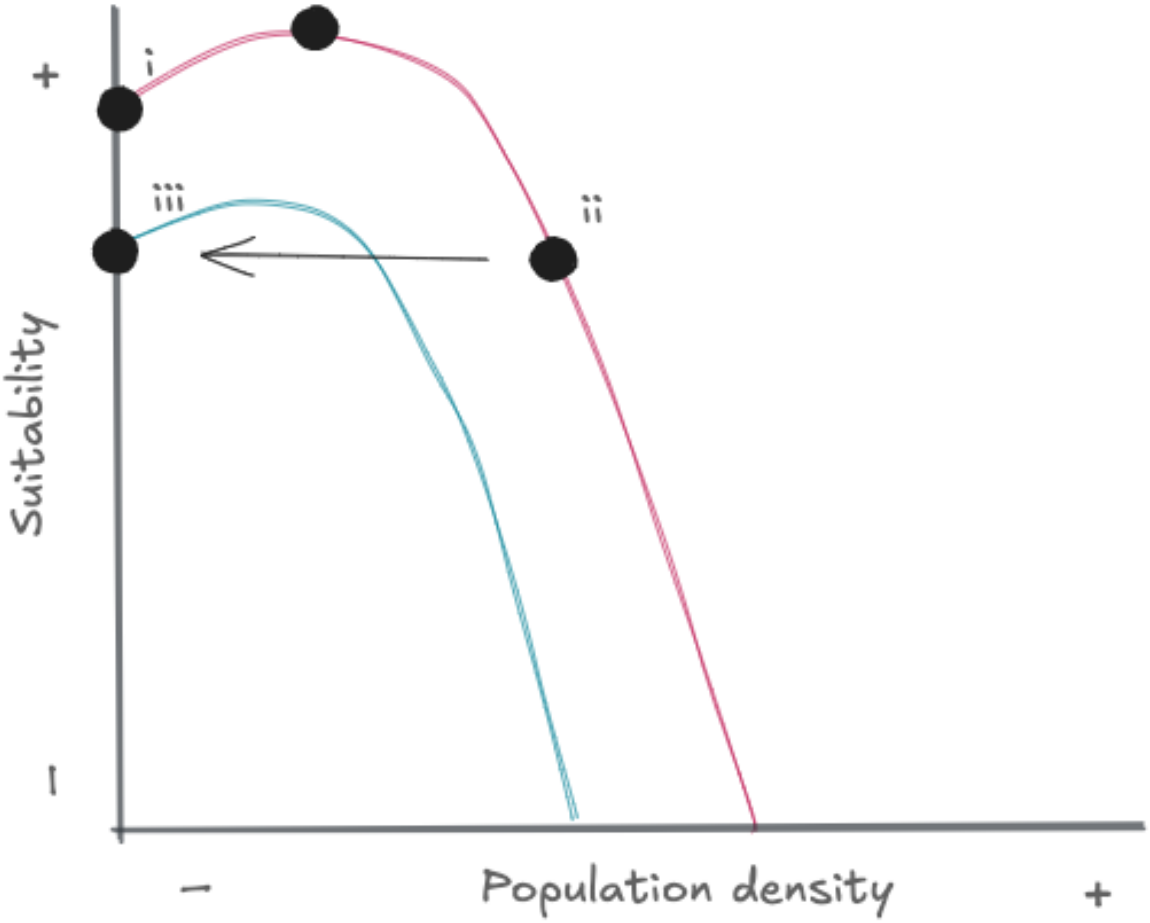
Question: Do the settlement patterns show properties predicted by the IFD model?

Methods: IFD



IFD makes assumption of unconstrained movement into habitats of highest suitability that will decline with rising population density.

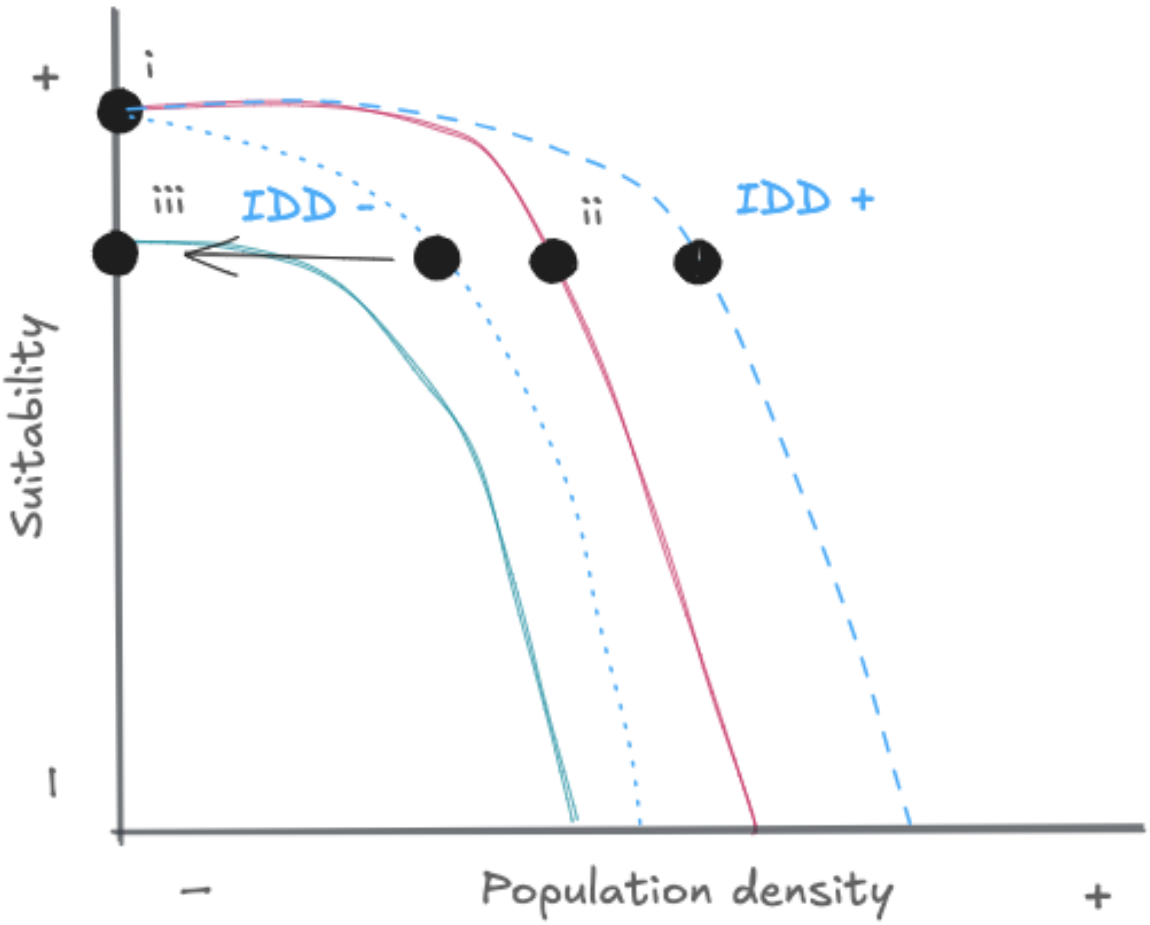
Methods: IFDA



IFDA incentivize cooperation and investments in landscape to increase habitats suitability but in time population pressure is leading to degradation and habitat depletion .

Methods: IDD

The access to habitats of individuals is controlled by other settlers. **IDD negative** – despots defended access to high ranked habitats forcing settlers to occupy habitats with lower rank.


+
i
iii
IDD -
ii
IDD +
Suitability
–
Population density
+

IDD positive - despots allow to occupy their high ranked habitats in return for share in harvest.

Suitability Index

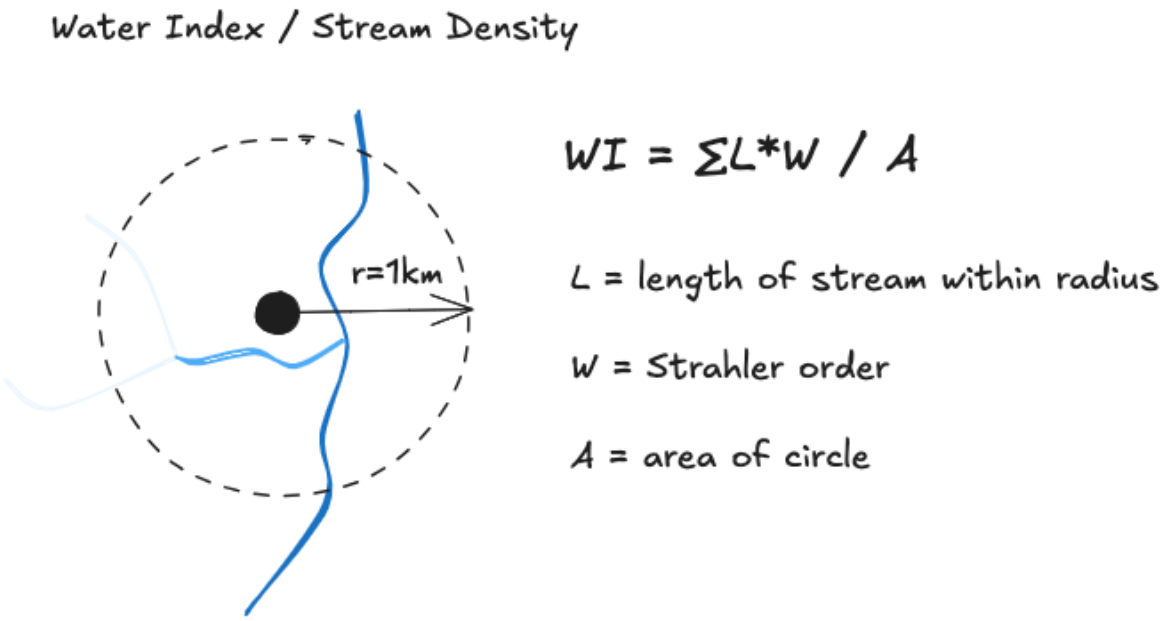


Figure 4: *Menze and Ur (2012) showed correlation between settlements volume / density and river size in Upper Khabur Basin.Data: hydrograph90m

Model Predictions

IFD and IDD

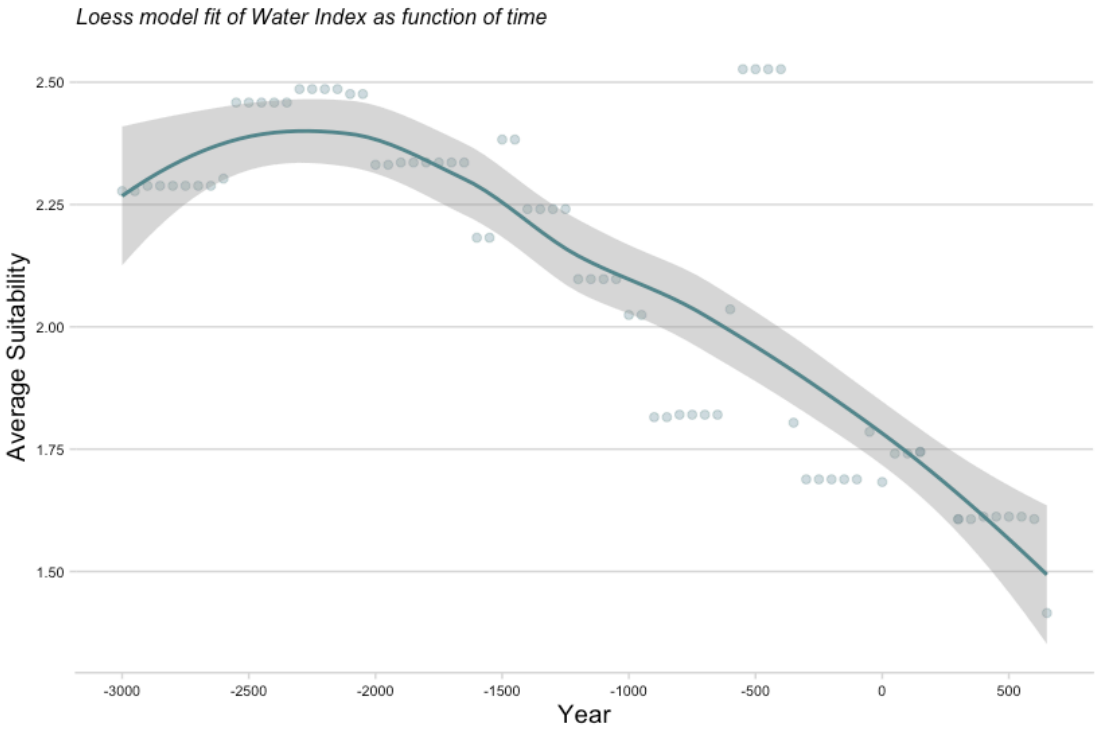
- The first habitats settled will be the most suitable.
- The most suitable habitats will be occupied longest.
- The average suitability of a settlement pattern should decrease as sites increase in number.

IDD

- The population density in IDD at the higher ranked habitats is lower than in the IFD (IDD vs IFD dynamics)

Results

1. The first habitats settled will be the most suitable.

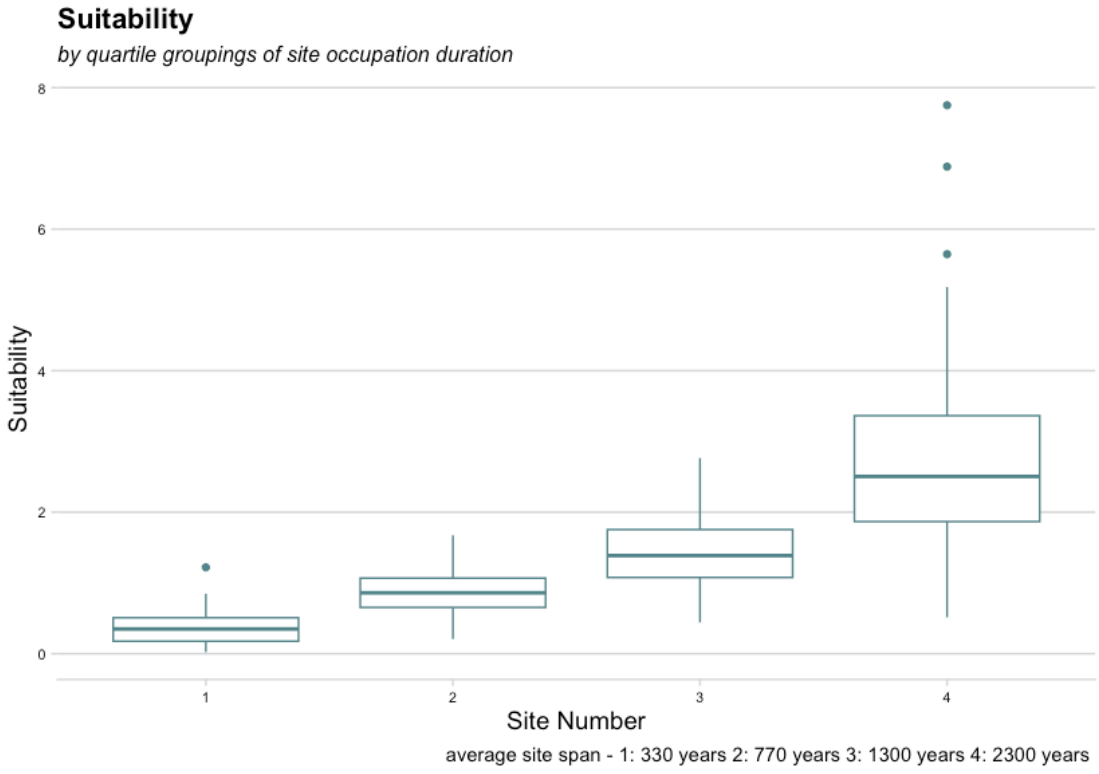


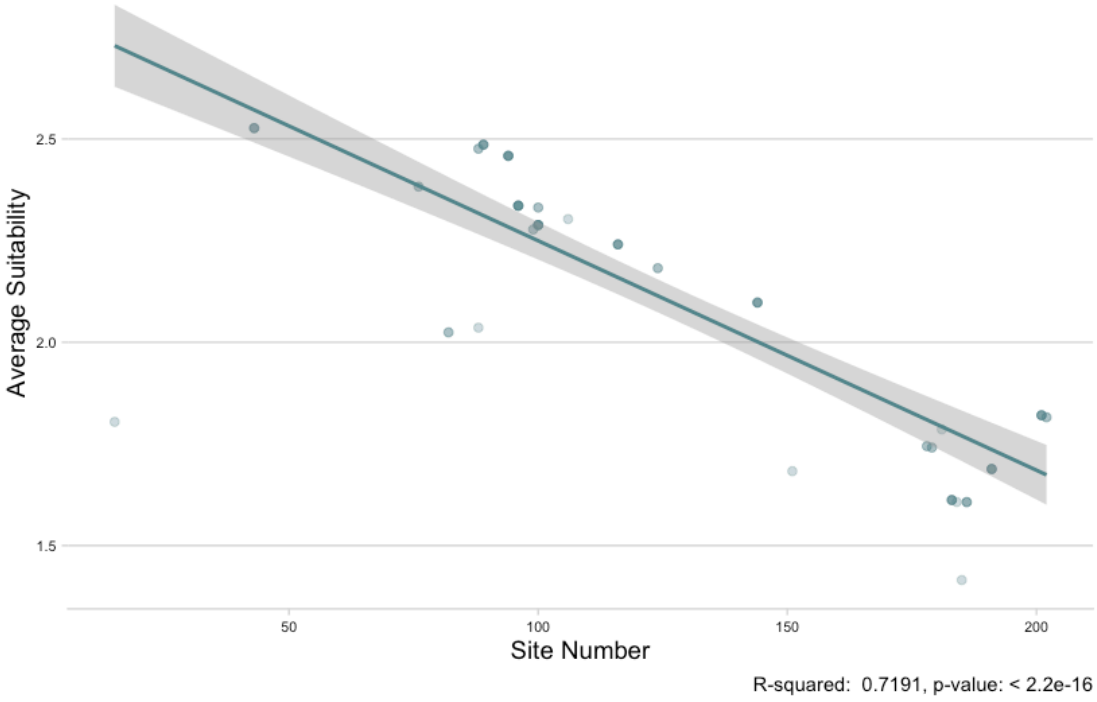
Results

2. The most suitable habitats will be occupied longest.

Results

3. The average suitability of a settlement pattern should decrease as sites increase in number.


Suitability
by quartile groupings of site occupation duration
Suitability
8
6
4
2
0
1
2
3
4
Site Number
average site span - 1: 330 years 2: 770 years 3: 1300 years 4: 2300 years


Average Suitability
2.5
2.0
1.5
50
100
150
200
Site Number
R-squared: 0.7191, p-value: < 2.2e-16

Results

4. The population density in IDD at the higher ranked habitats is lower than in the IFD (IDD vs IFD dynamics)

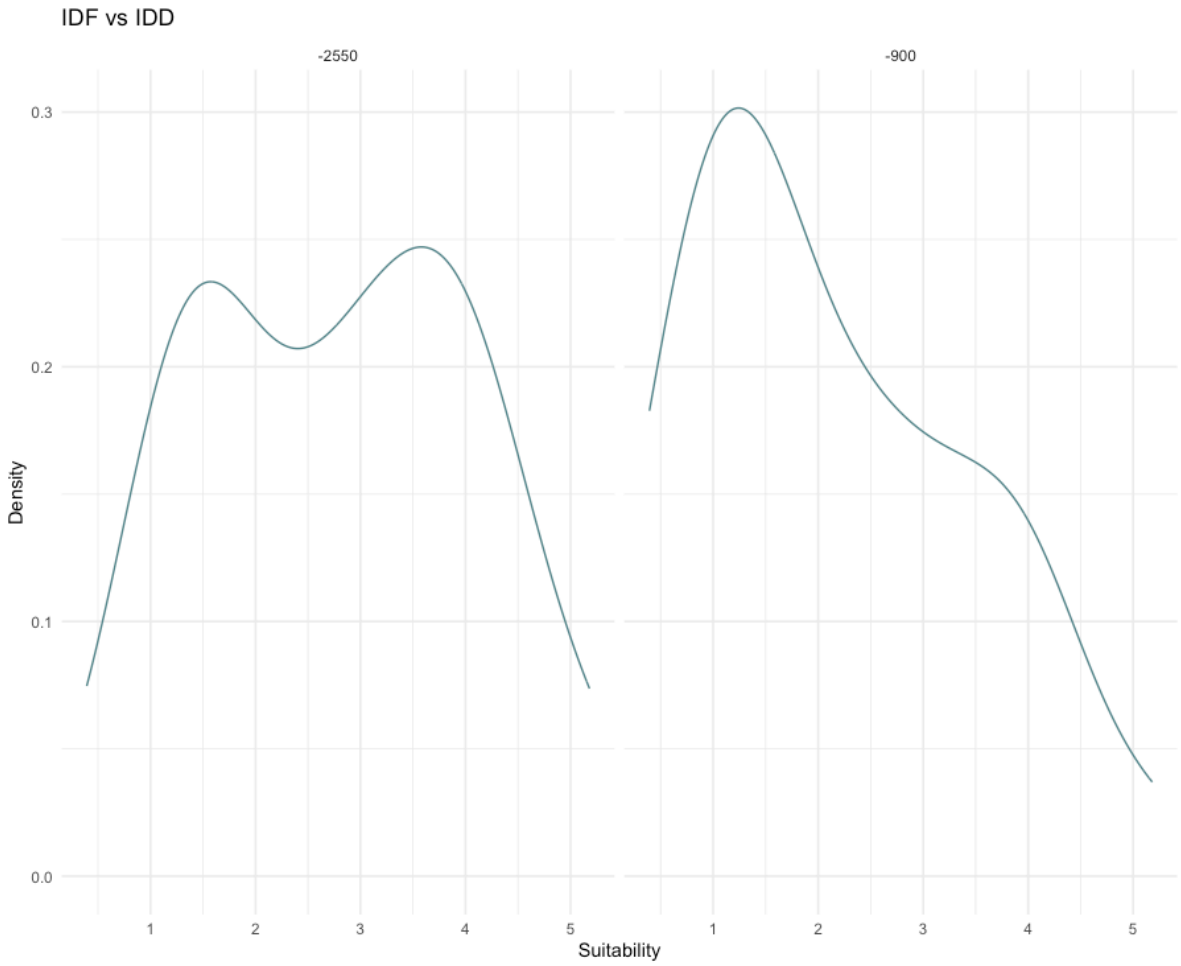


Figure 5: * not fully tested, requires further work

Conclusions - same old

- settlements dispersion coincided with Middle Assyrian (1400BC) and Neo-Assyrian (900BC) expansions
- areas (NJS, THS) in proximity to Assyrian imperial core experienced increase at higher rate comparing to more modest growth in western Khabur (TBS) and the eastern Navkūr plain (UZGAR)

- LCP area was dominated by site of Charchemish until population disperse in Hellenistic period (300BC)

Conclusions - same new

- results show a general conformity with IFD models
- settlement strategies sought to maximize agricultural input (as far as access to water is concerned)
- larger increase in settlement density accompanied by faster drop in suitability around 900 BC shows IDD model properties whereas more sustainable growth may indicate IFD model distribution.

Discussion / Further work

- to integrate more archaeological surveys
- to evaluate centralization metrics
- model Allee effect by integrating irrigation systems
- expand on ecological and social variables
- operationalize distinction between various IDM variants

Thank you

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https://github.com/topographos