Flexibility versus Specialization

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Flexibility versus Specialization

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4 Discussion

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Research Problem

Gravettian technocomplex of the Western Pyrenees forms according to our knowledge a homogenous unit showing a broad bandwidth of local adaptation covering nearly 10.000 years (34.000-24.000)

For the same timeframe at least five global climatic events are expected to have had a significant effect on the environment of the Western Pyrenees

The Gravettian of the Western Pyrenees

How have Gravettian hunter-gatherers been affected by the environmental fluctuation?

Research Problem

I. The Gravettian hunter-gatherer society was relatively unaffected and had to be therefore highly resilient toward environmental fluctuations

II. Significant changes happened, that are not visible in the archaeological record. The Gravettian hunter-gatherers have actually been affected and were repeatedly forced to adapt to altered environments

Theoretical Model

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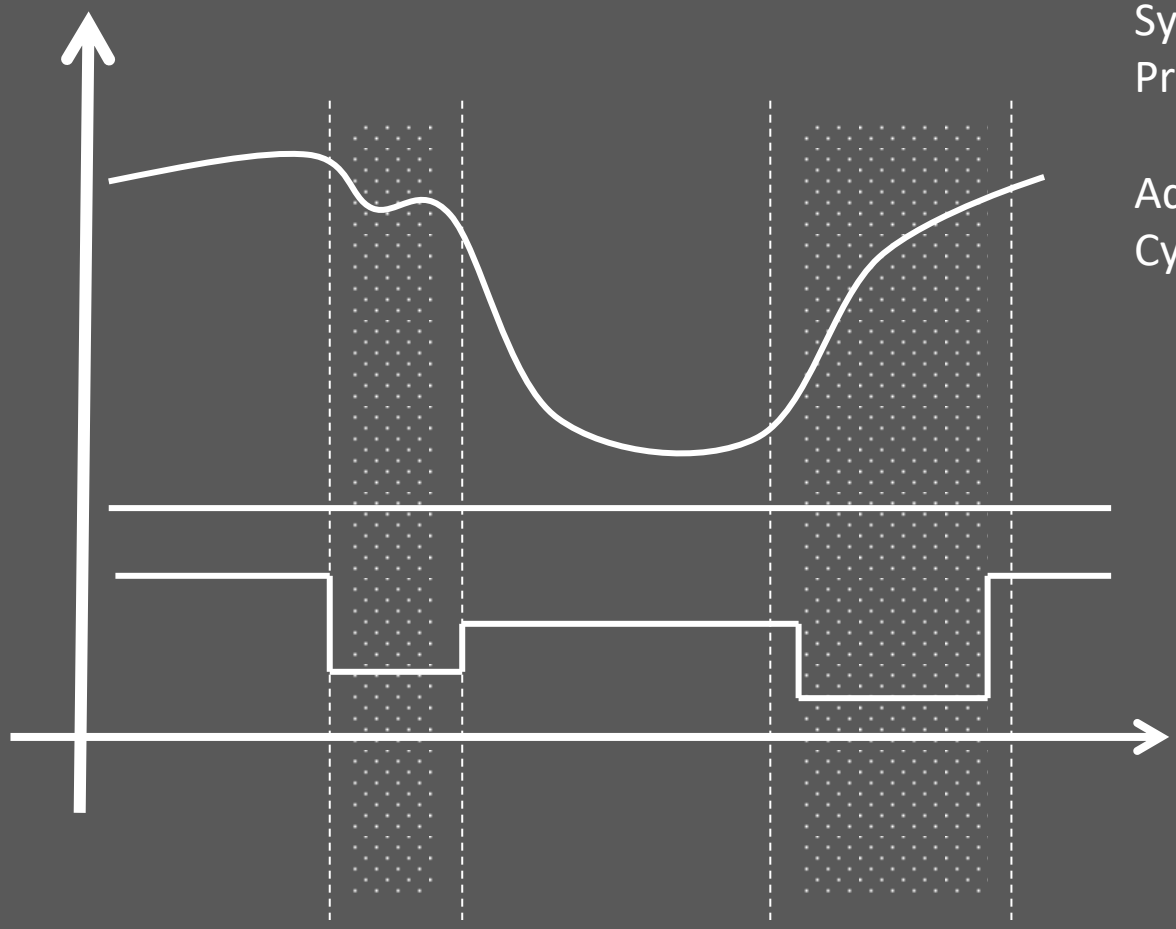
Adaptation

Behavioral Strategies of Gravettian Hunter-Gatherers



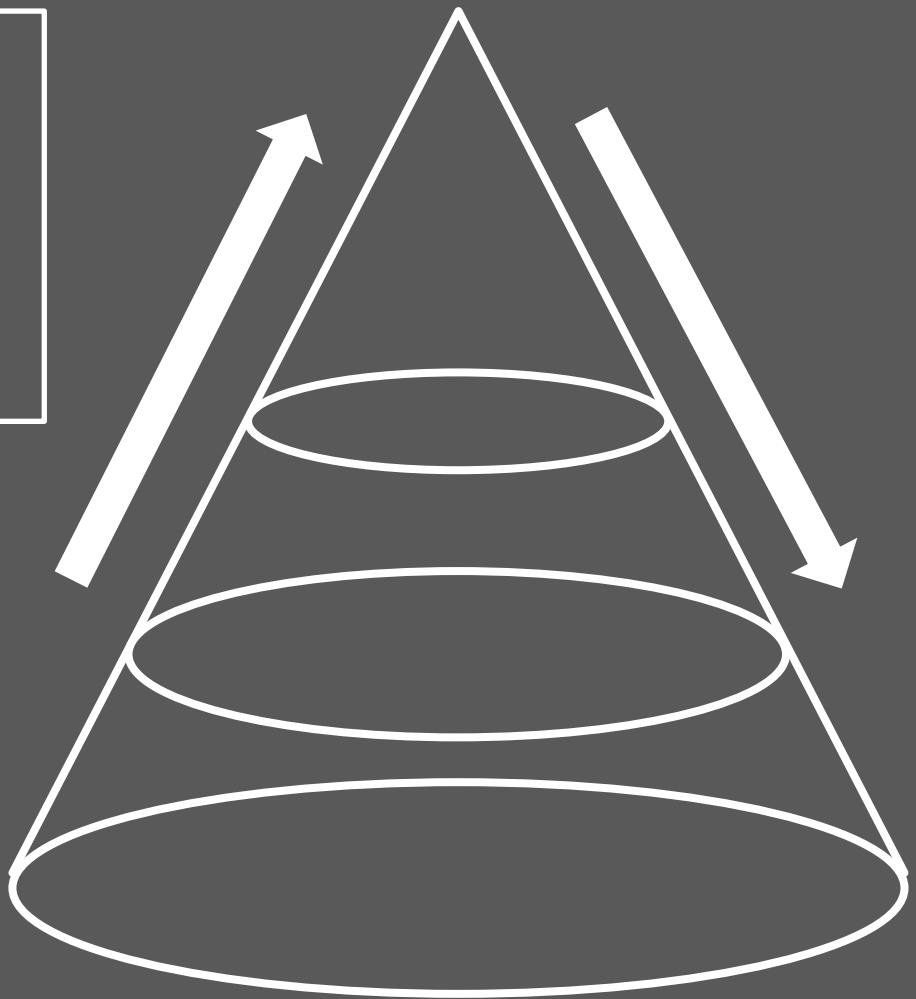
System Properties?

Adaptive Cycles?

Behavioral Systems

- Connectivity
- Resilience
- Size

Behavioral Patterns on Group and Society Level



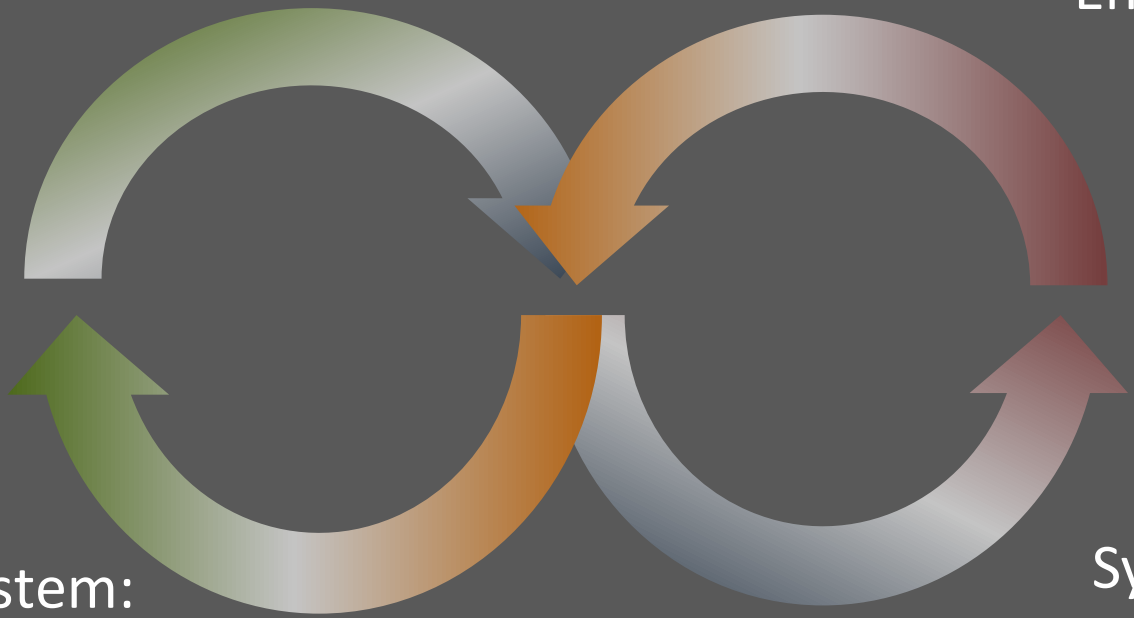
Individual Behavior

- Interaction Strategies
- Heterogeneity
- Adaptation Capacity

Adaptive Cycles

Exploitation (α)
Adaptation Process

Release (Ω)
Environmental Change



‘Dissolved’ System:
Autonomous and Flexible Subunits
Renewal (r)

System of highly interconnected Subunits
Conservation (K)

Typology

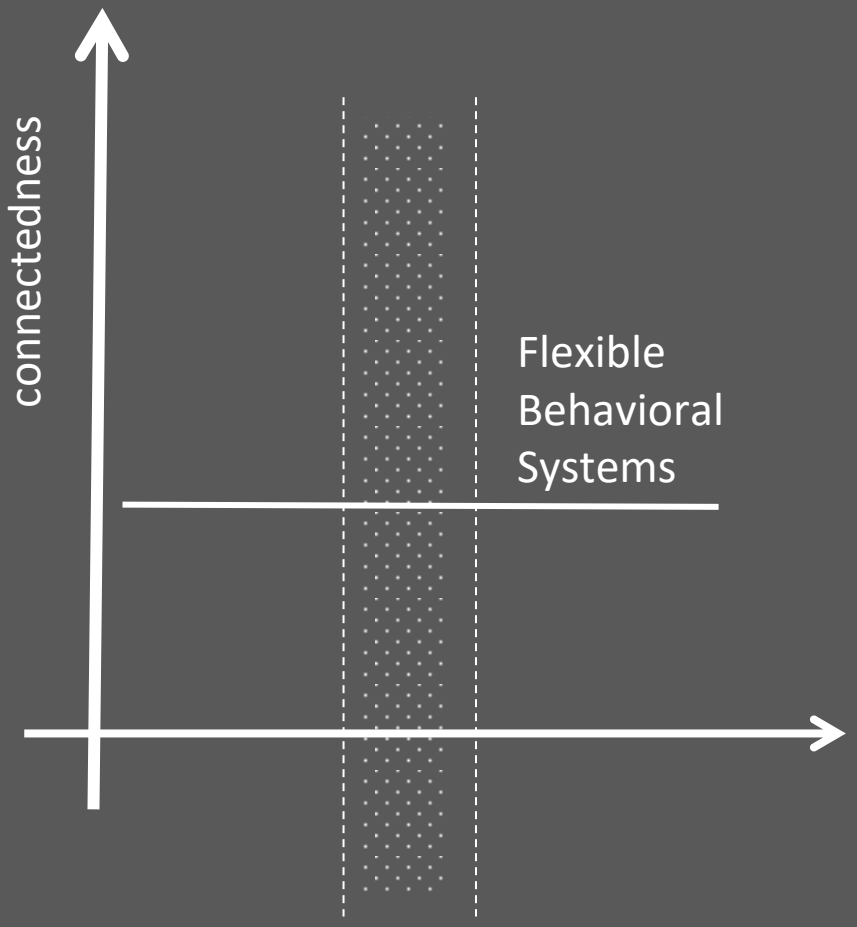
‚Opportunistic'/Flexible HG

- Autonomous
- Small Groups
- Highly Mobile
- Fluctuations in Group Size and Composition
- Generalized Foraging Strategies
- No or Low Territoriality

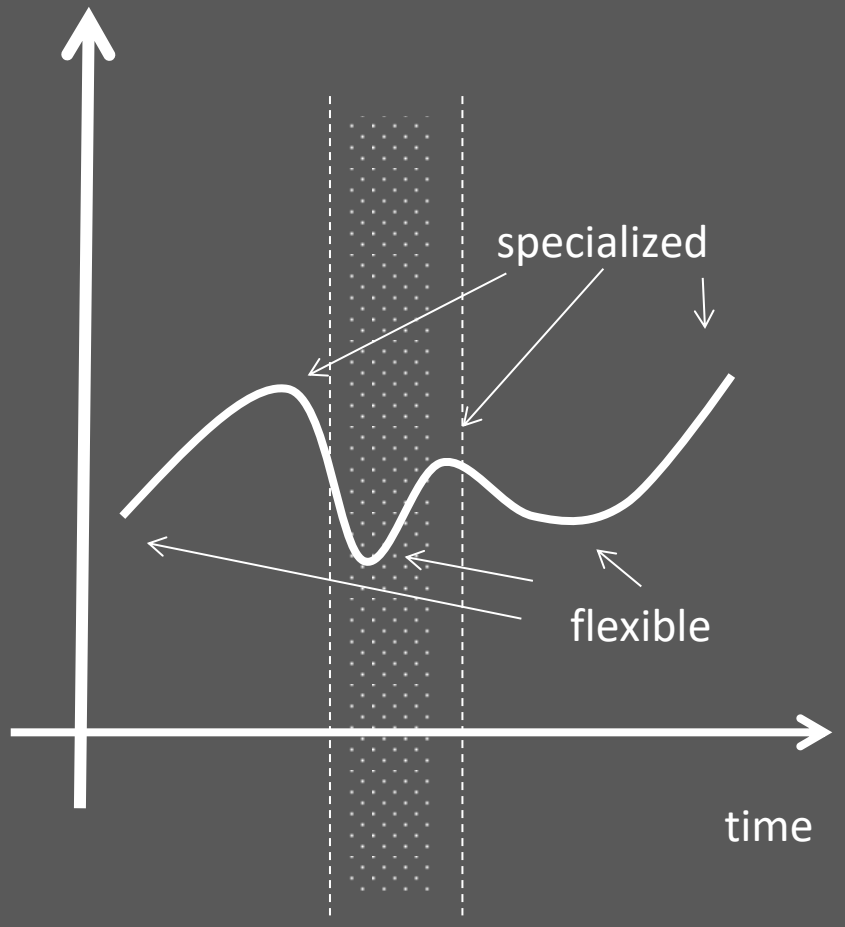
Specialized Hunter-Gatherer

- Strong Social Networks (quality against quantity)
- Stable seasonal dependent Group Sizes and Compositions
- Stronger interconnectivity of indiviuals
- Higher Territoriality and lower Residential Mobility due to stronger interconnectivity to particular localities
- Specialized Foraging Strategies

Models for the WP Gravettian



The Flexibile Hunter-Gatherer



The Specialized Hunter-Gatherer

Simulation Models

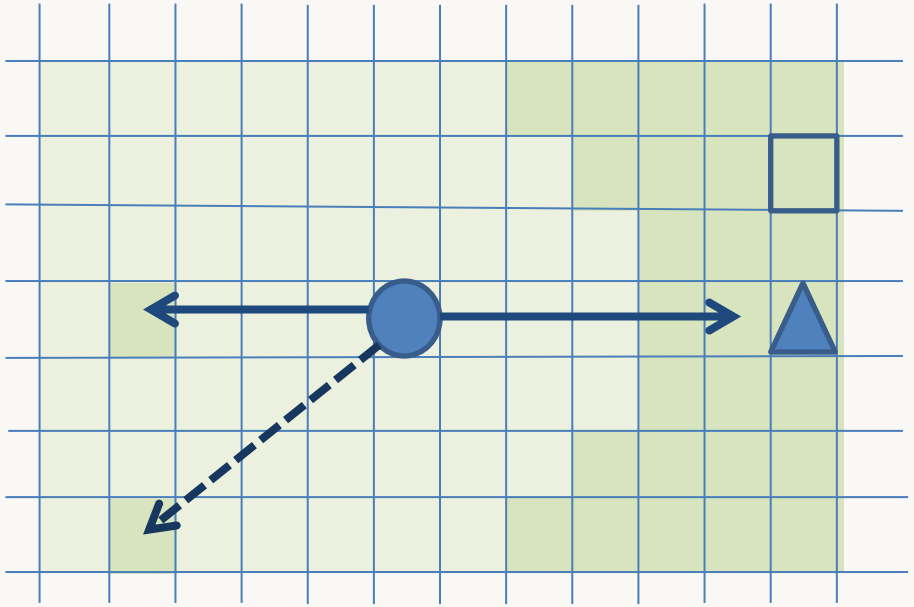
Flexibility versus Specialization

Agent-Based Modeling

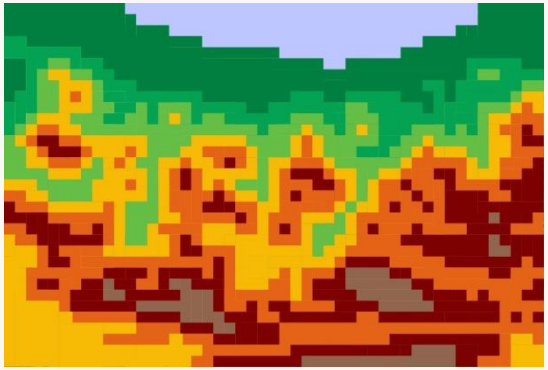
- Simulating the behavior of ‘independent’ entities
- Assumption: system dynamics **emerge** due to the interaction of agents
- Spatially and temporally explicit
- Spatial environment modeled by patch agents with own properties
- Heterogeneous agents with different behavioral strategies
- Modeling of dynamic social networks

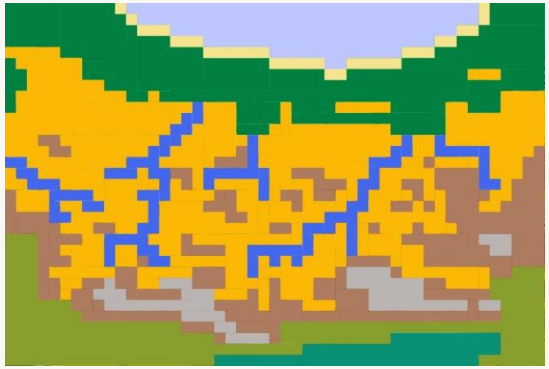
General Assumptions

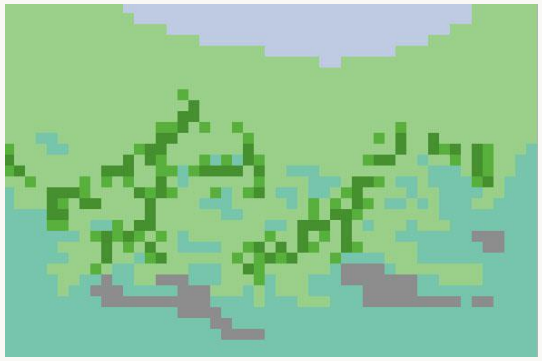
- Agents representing hunter-gatherer Individuals
- Primary goal of hunter-gatherers is to ensure regular food intake
- Physical and natural Environment is represented by a 2-dimensional grid of ‘patches
- Patches provide seasonal and climate-dependent resources

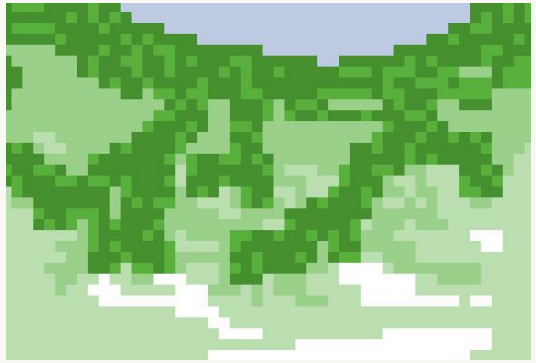


The Environmental Model

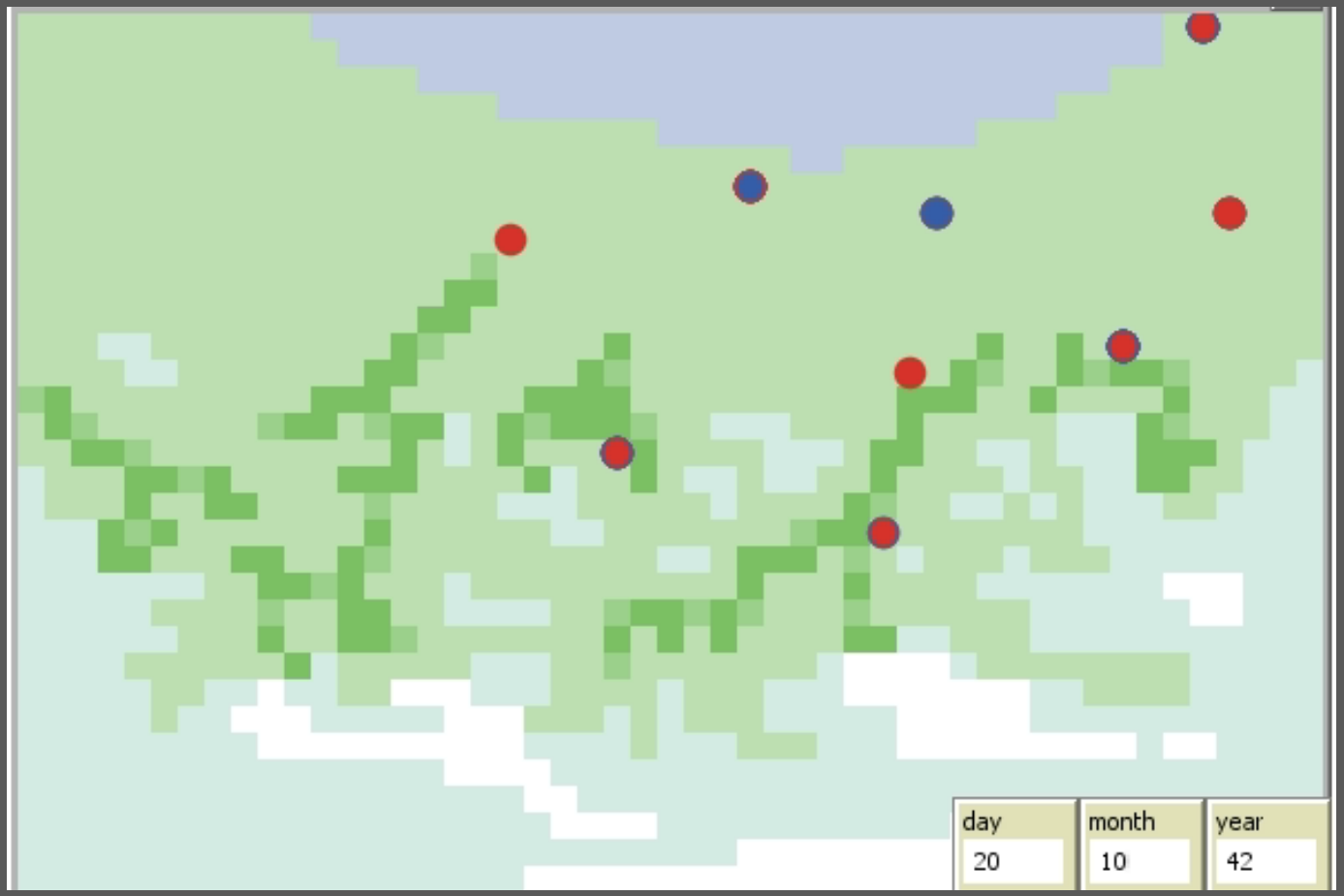




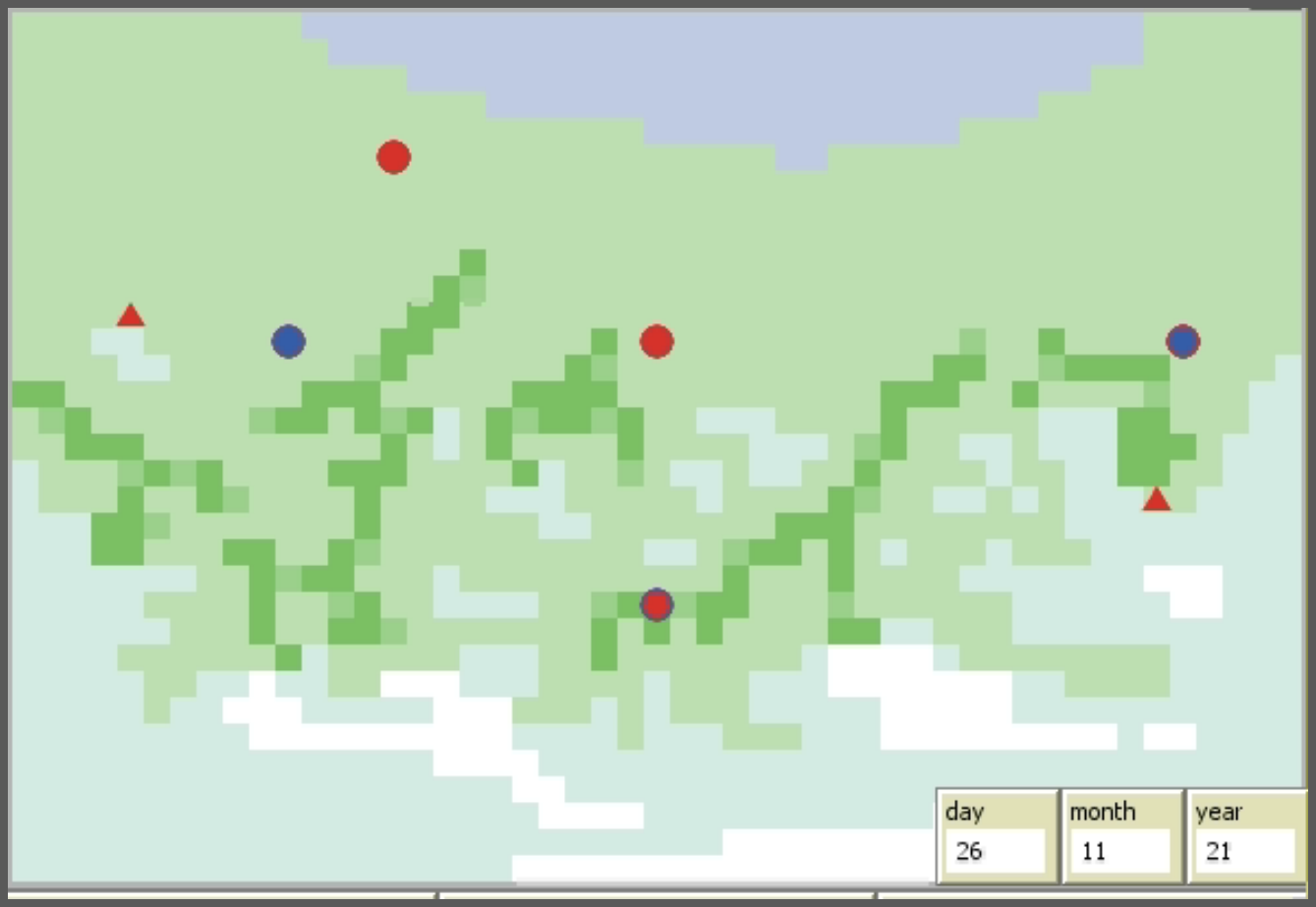




The Opportunistic Type

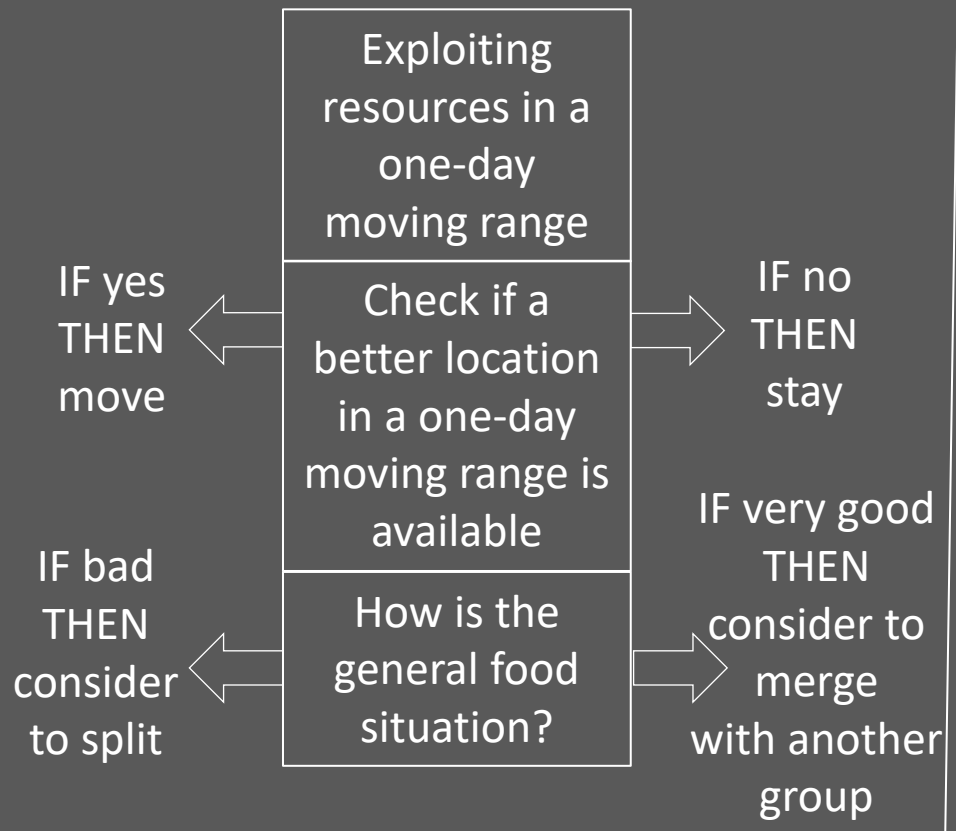


The Specialized Type

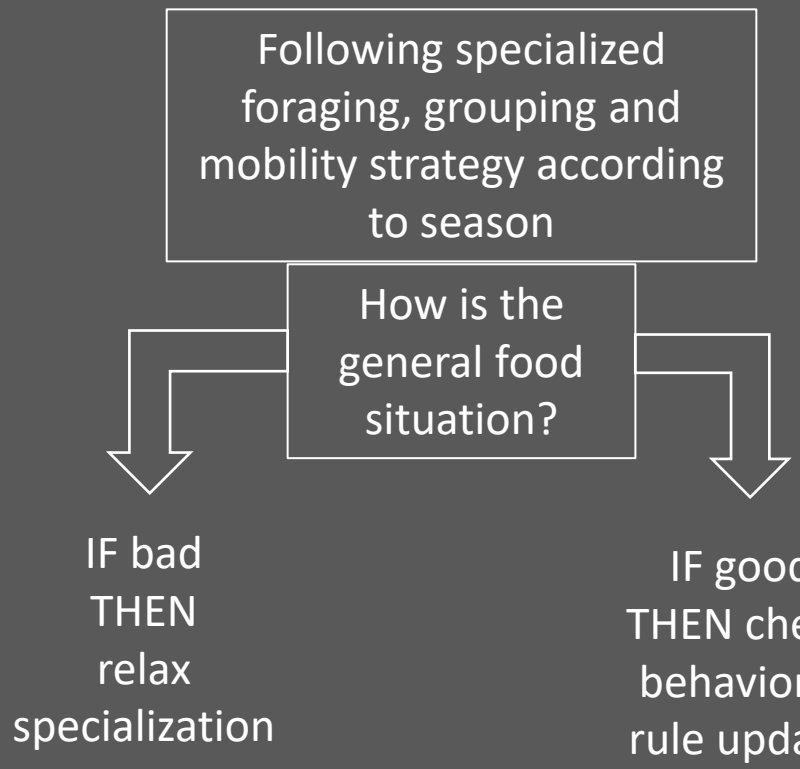


Differences

‚Opportunistic'/Flexible HG

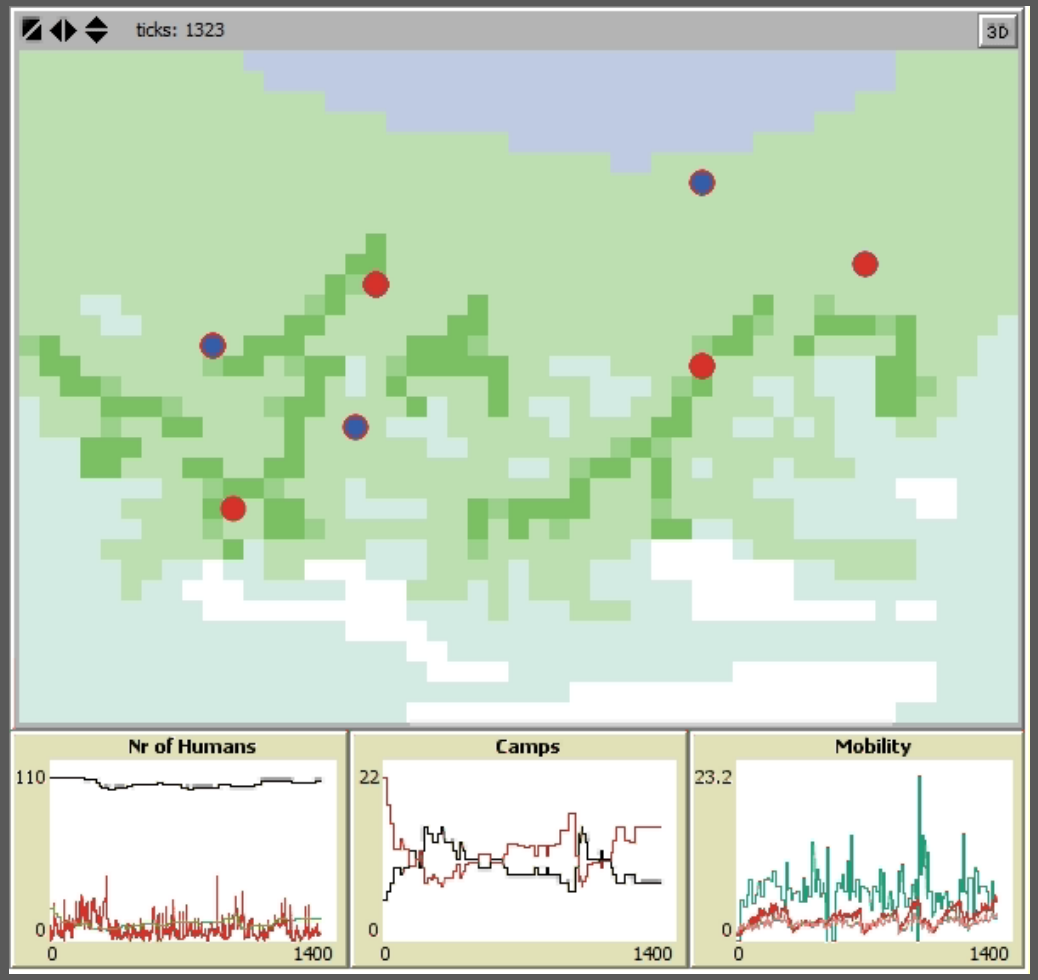


Specialized Hunter-Gatherer



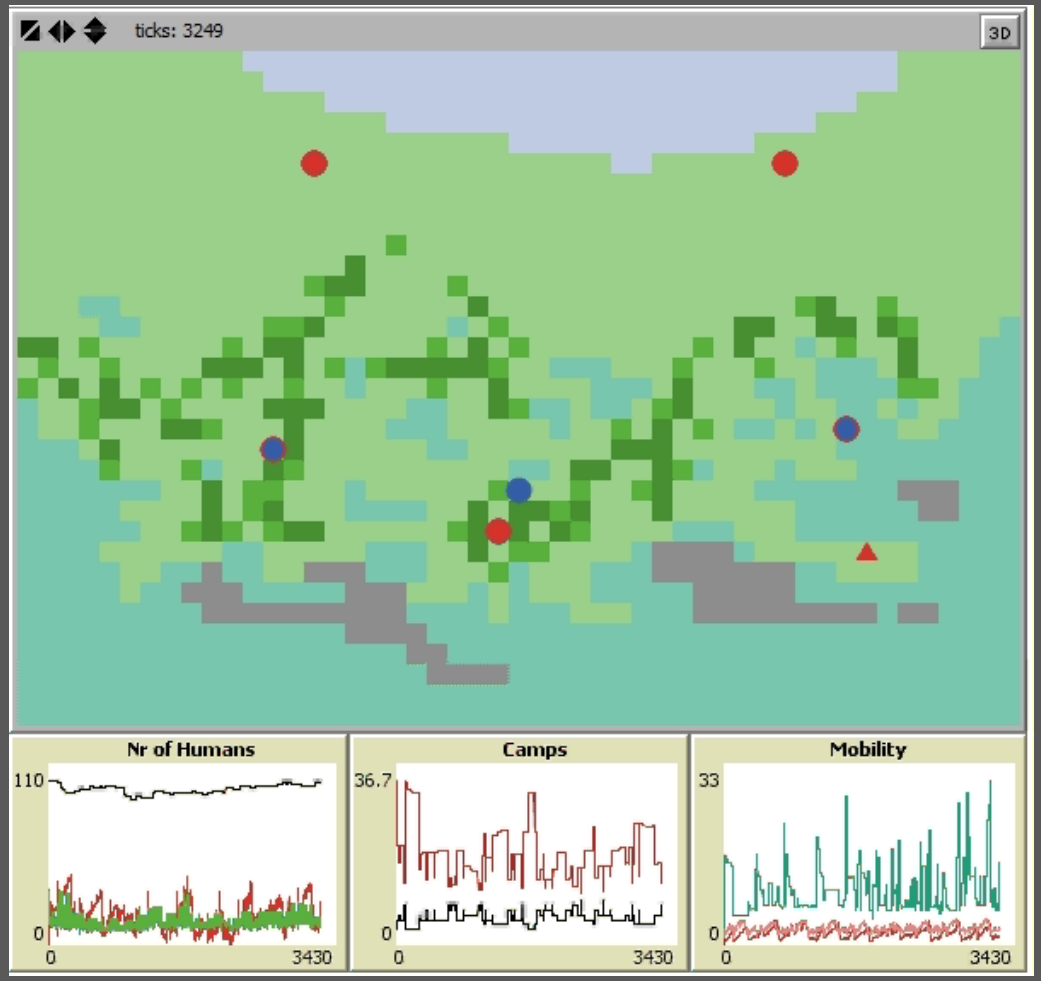
Scenario 1

The Opportunistic Type



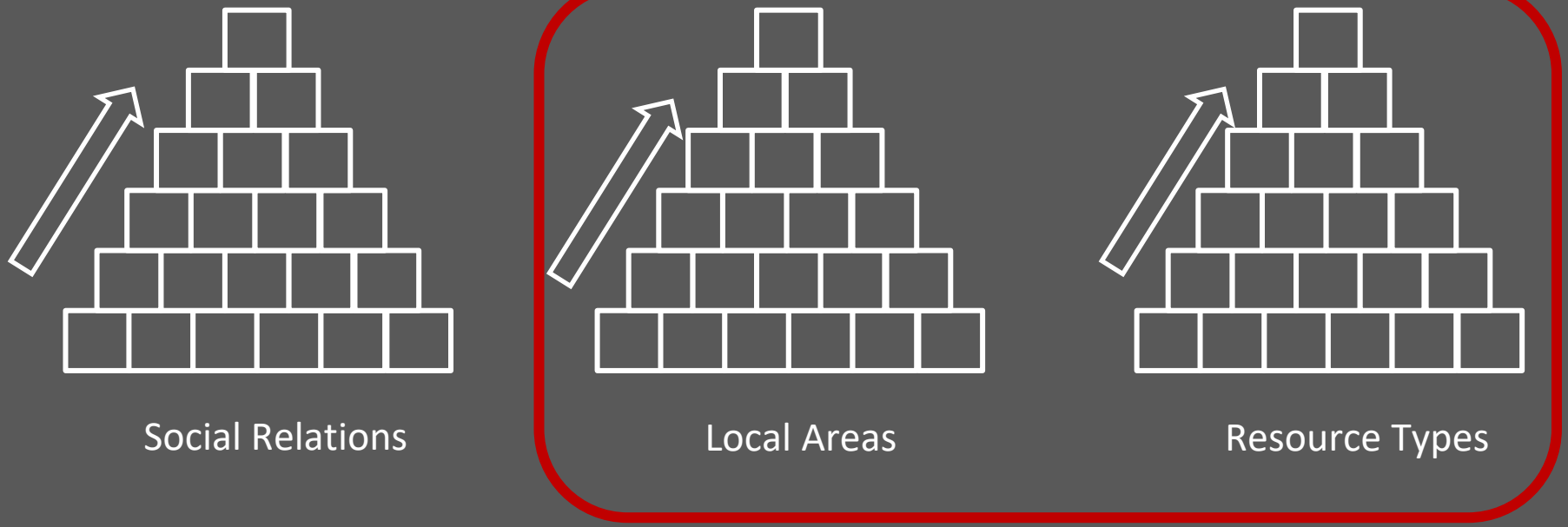
Scenario 2

The Specialized Type



The Process of Specialization

Specializations toward:



Implications

Concerning the Theoretical Model

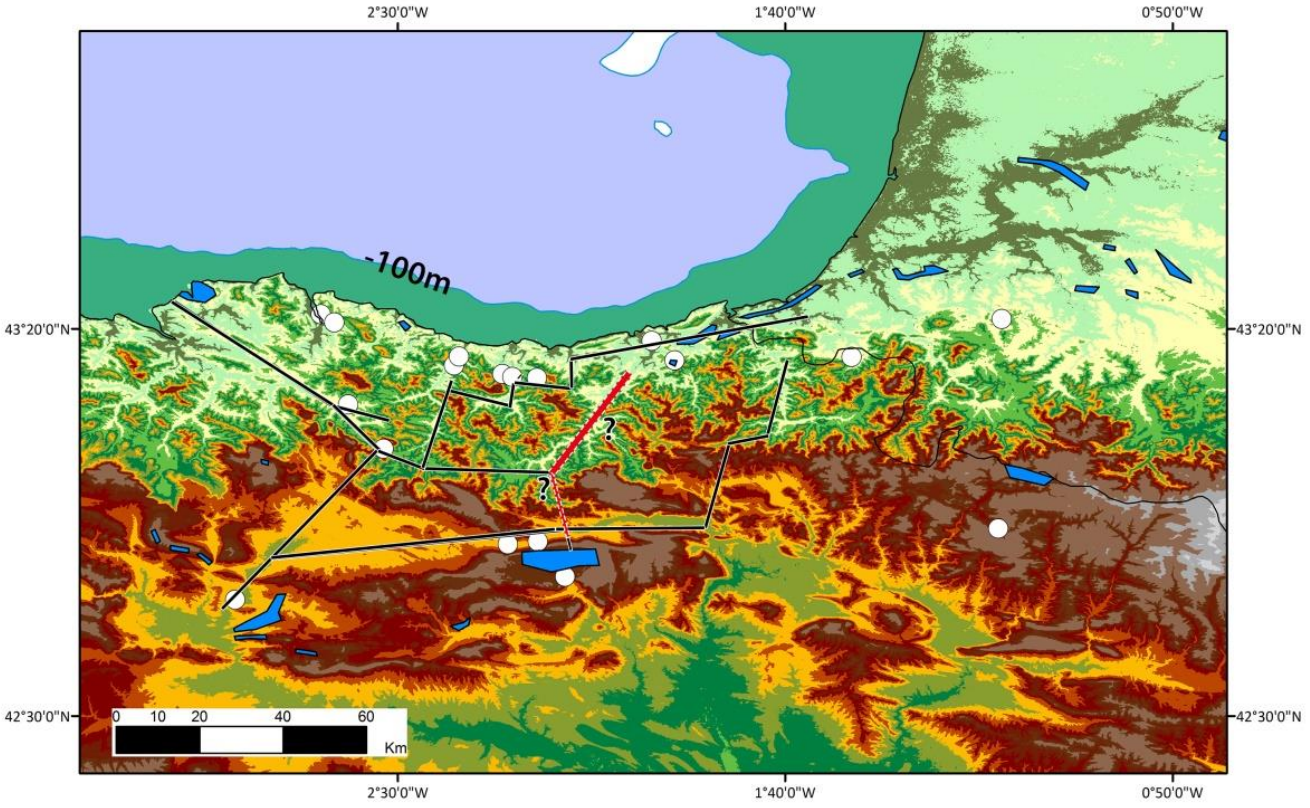
- The Adaptive Cycle Model in general appears to be plausible in relation to behavioural system approach
- Even simple simulation models addressing one dimension of connectivity demonstrate the emergence of unilinear and dynamic processes

Implications

Regarding Western Pyrenees Gravettian

- The bad news: very different scenarios are actually possible and current data could reflect adaptive cycles
- The good news: Simulation models reveal probabilities for specific land-use strategies. Example: East-West movements of nomadic small group hunter-gatherers versus South-North movements of specialized river valley occupants

Outlook


2°30'0"W
1°40'0"W
0°50'0"W
43°20'0"N
42°30'0"N
-100m
?
?
0 10 20 40 60
Km
Primary flint outcrops (after Tarinno et al. 2015)
Gravettian sites within the region

Outlook


Gravettian HG
Mobility (Basque)
Version 1.0
June 2015
Map 264x132 km
Patch: 3x3 km
setup
go
day
1
month
7
year
1
Nr of Humans
1870
0
0
10
Environment
EnvironScen
3
EnvironQuality
50
On
Off
ResourceView
Frequency
10
0
0
10
Humans
PopSize
200
GroupSize
50
BehavSystem
1
ticks: 0
3D

„Essentially, all models are wrong, but some are useful.“

George E. P. Box
(1919-2013)

Thank You

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