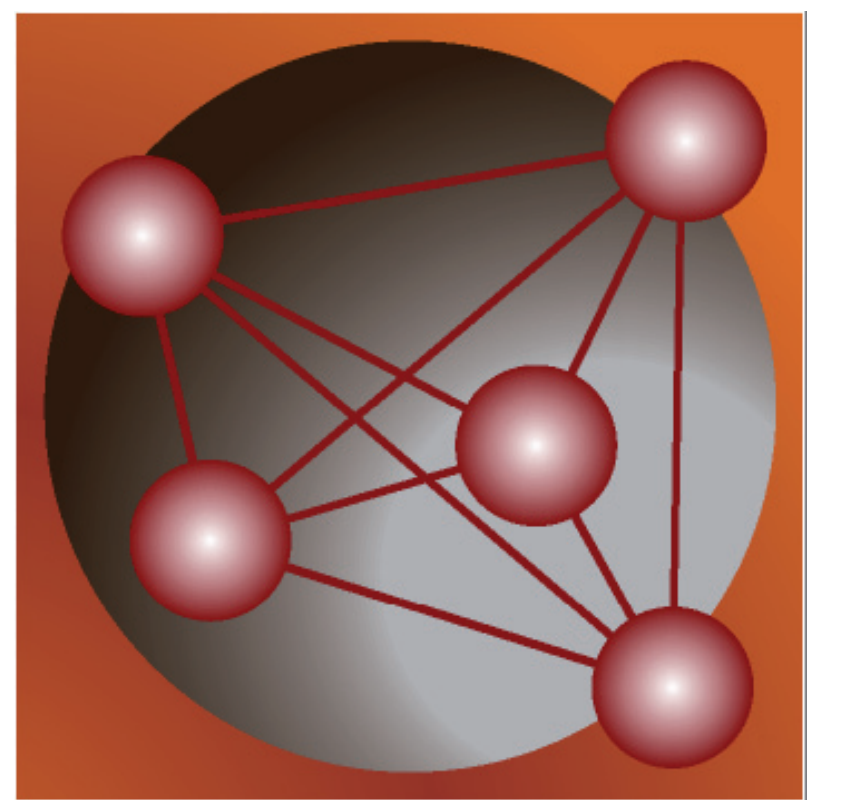
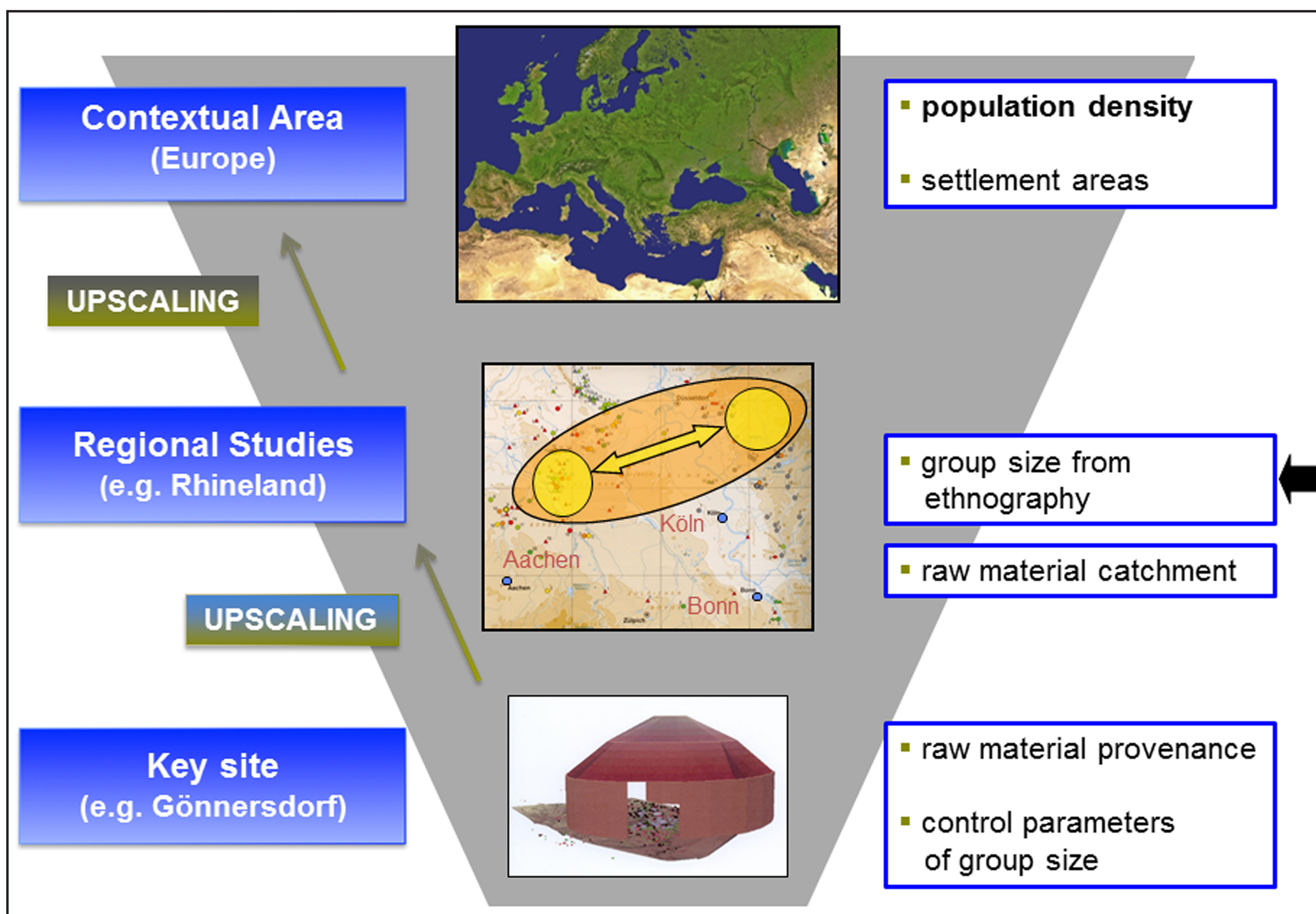
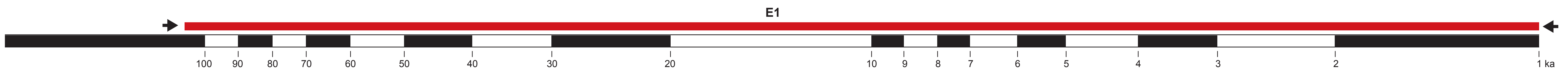


# E1: Population Dynamics: Demographic Changes of Hunter-Gatherer Populations during the Upper Pleistocene and Early Holocene in Europe - Method



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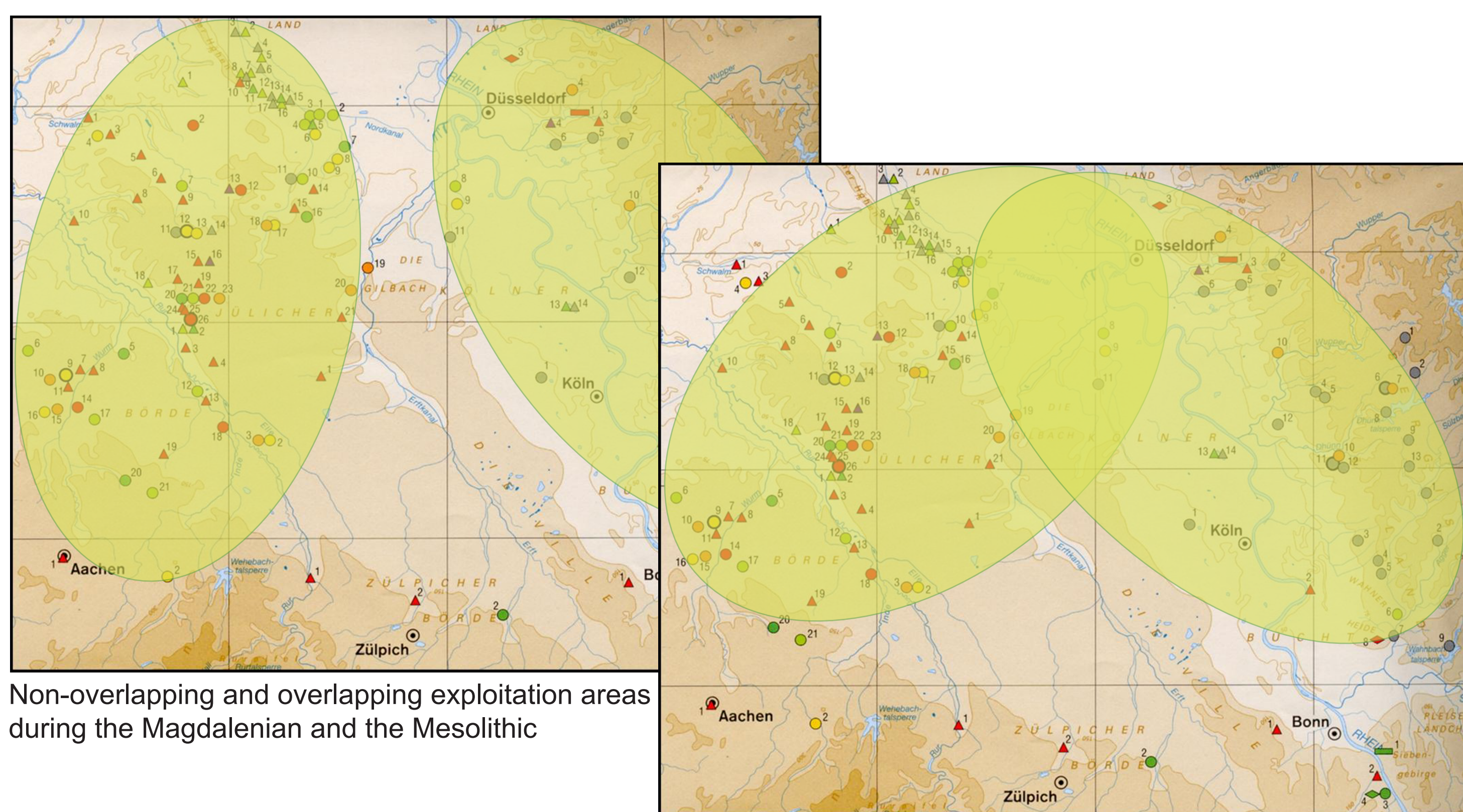
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Upscaling of point data for the estimation of population densities

## How can the number of people in a local group be inferred from the archaeological record?

Starting from ethnographic observations, the numbers of individuals (35-57) per regional group available for recent hunter-gatherers has to be adjusted with regard to the archaeological record. Here, well-investigated key regions with a high amount and fine resolution of data are of importance. Judging from the number and size of known sites and habitation structures within them, the ethnographic findings, which give a frame of reference, can be adapted to the specific archaeological period under investigation. Additionally, the results of the ecological modelling of the second phase will be used to refine the results.



Non-overlapping and overlapping exploitation areas during the Magdalenian and the Mesolithic

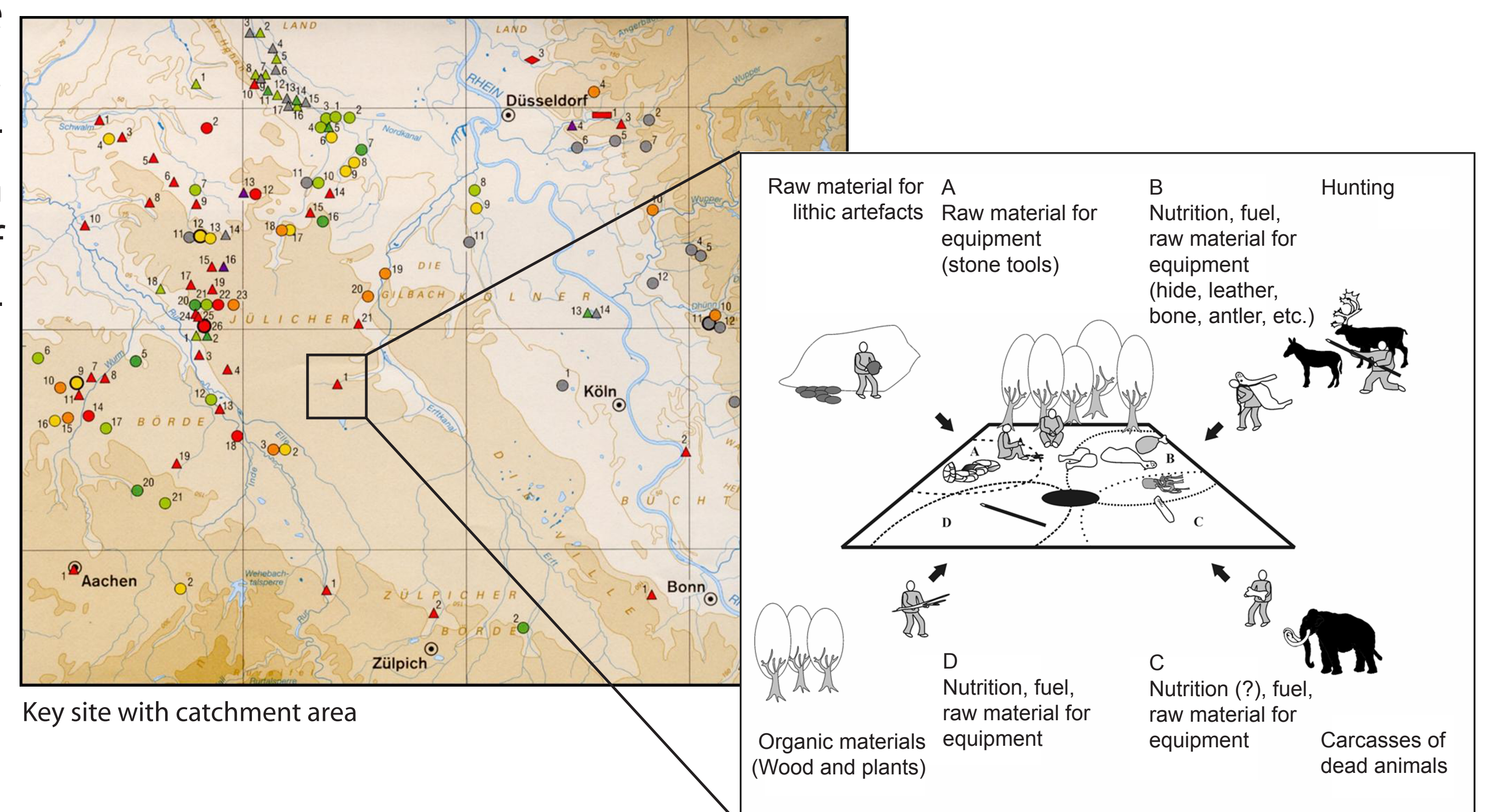
## Do regional exploitation areas overlap?

The question whether or not exploitation areas of regional groups overlap one another has direct implications on the estimation of population densities. Territoriality probably changed throughout the Palaeolithic, depending on the availability of resources. The existence of predictable and clustered resources is understood as fostering social inequality as well as a marked territoriality ("social boundary defence"). Rather unpredictable and dispersed resources, on the contrary, would lead to less distinct territories. Therefore, mutually exclusive territories are assumed for Magdalenian hunter-gatherers, whereas for Mesolithic groups territorial overlap of annual foraging areas is to be expected. As a first approximation, an overlap of one third is allowed.

## Method - state of the art and future development

During the first phase, a method to estimate population densities of hunter-gatherers was developed. Here, data obtained at **key sites** and in **key regions** is transferred to the spatial scale of **contextual areas**. At the scale of key sites, raw material catchments allow to derive annual foraging areas. At the scale of contextual areas, a combination of GIS-methods is used to delimit settlement areas with high site densities. **Upscaling**: Dividing the size of settlement areas by the average size of raw material catchments permits to estimate the number of local groups. **Ethnography**: From Binford's global data collection of hunter-gatherers, the number of people per local group (GROUP 2) is taken from such cases, where meat of terrestrial animals accounts for 60% or more of people's energy needs. The subsequently calculated margin between upper and lower quartile is used as valid range for the local **group size** used in our estimations.

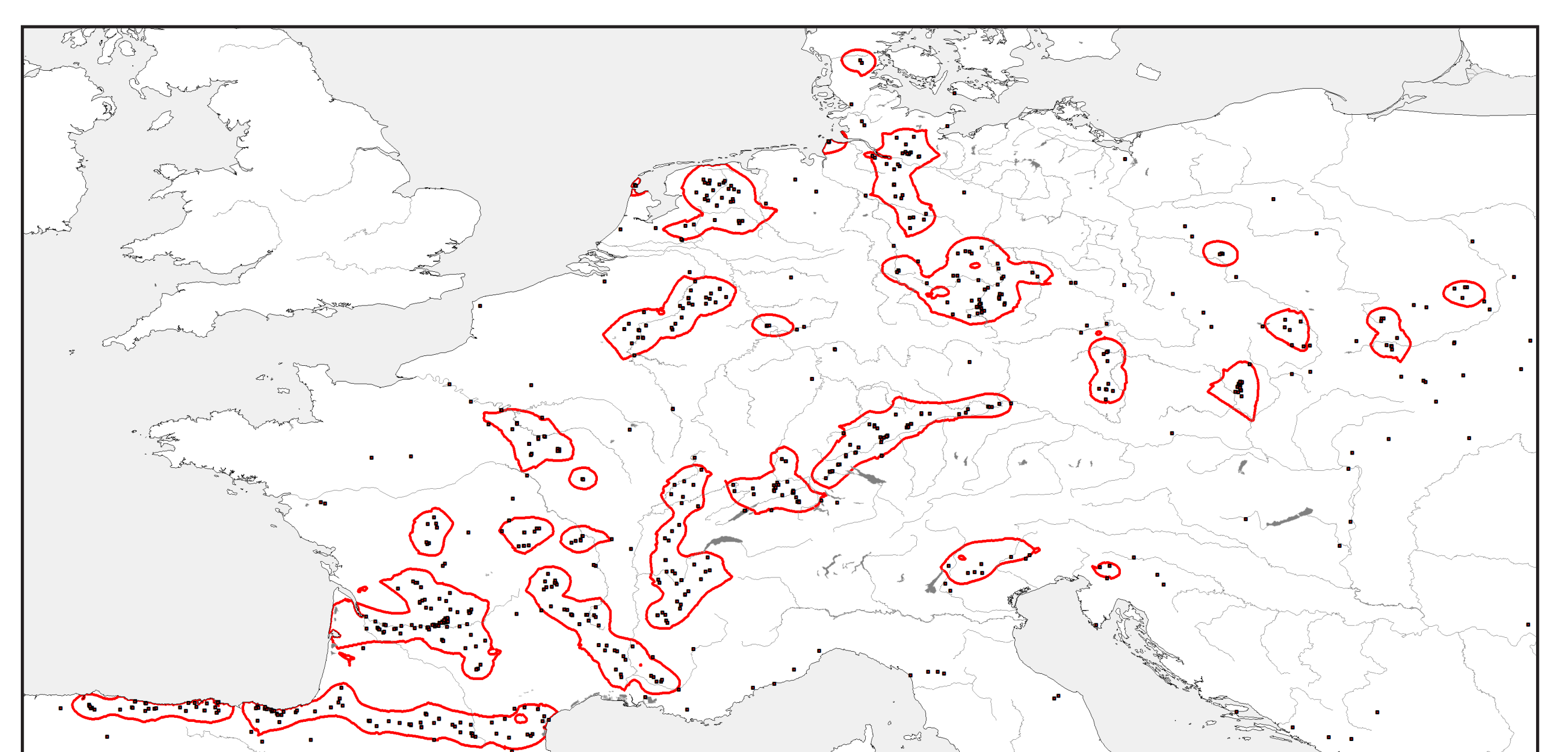
In the second phase, confidence intervals have to be calculated and, if necessary, calibration procedures geared to the requirements of the specific periods will be developed. Spatial and diachronic comparisons of the results will allow to identify sources, trajectories and sinks of diffusion processes and thus to describe and explain human dispersal and migratory events. Furthermore, a comparison with results from the climatic and ecological modelling projects will enable us to investigate human-environment interaction and to discuss pull- and push-factors of migratory events.



Key site with catchment area

## How robust are our results?

There are different ways to assess the validity of our results. At the scale of key sites, for instance, different selections of ethnographic cases allow to evaluate the effects of different group sizes. At the scale of contextual areas, it can be demonstrated that the increase of archaeological knowledge within 10 years produces only gradual changes in the size estimations of settlement areas. Therefore, we are confident that our estimations are reasonable approximations. Nevertheless, an increasing amount of data and a refinement of the method will certainly lead to more accurate estimations.



Optimal isoline (23 km) for the Late Magdalenian