



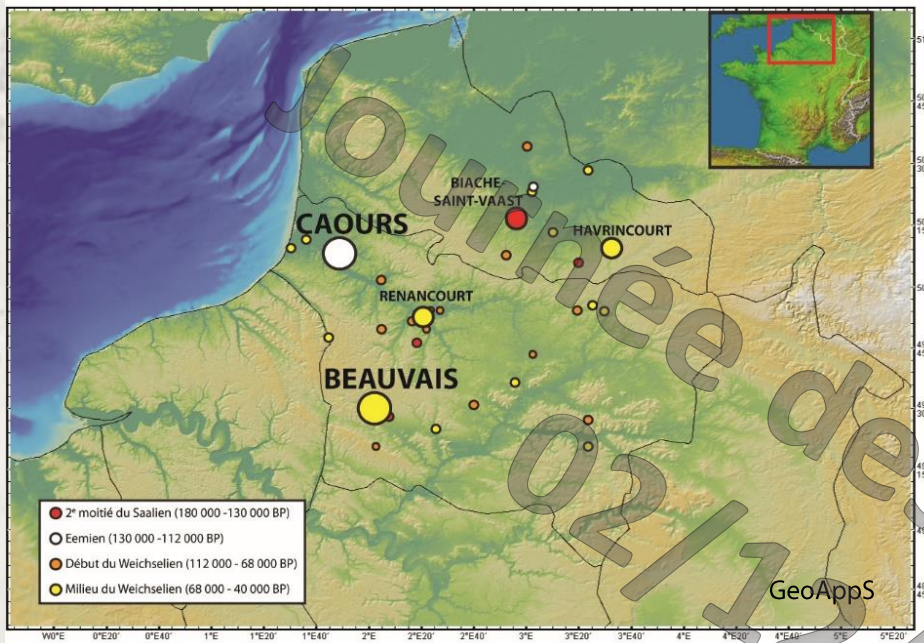
CAOURS 2010

Intrasite spatial analysis based in a Geographic Information System and apply to extensive Middle Palaeolithic open-air sites in northern France. The example of Caours (Somme, France).

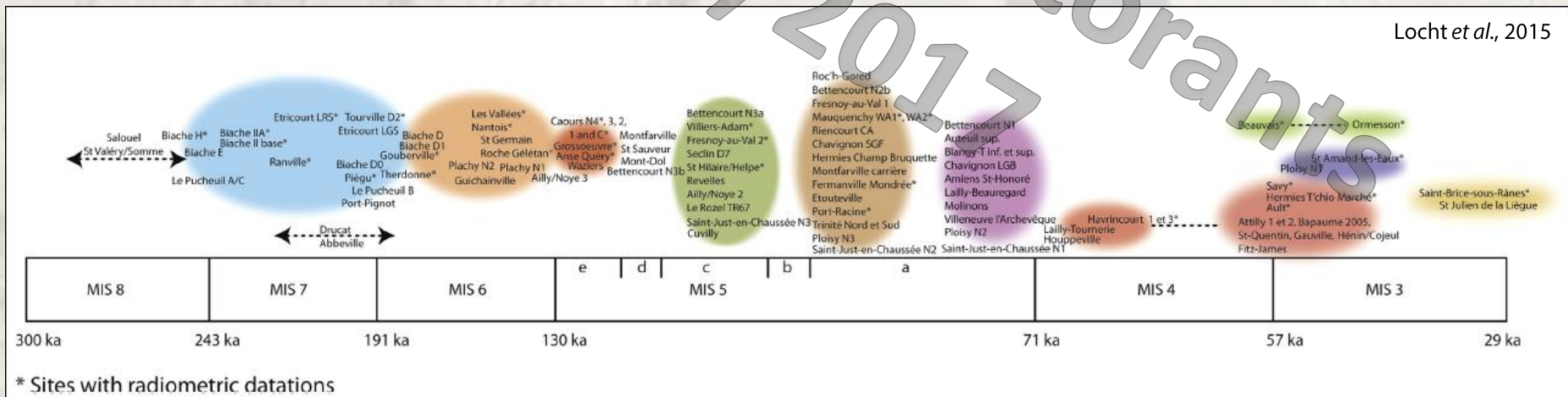
Gwénaëlle Moreau

*University of Liège (Ulg, Belgium)*

# Middle Palaeolithic open air sites in northern France



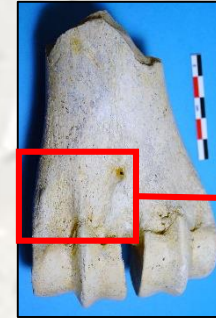
- Excellent Chronostratigraphic framework
- Different:
  - Biotopes
  - Cultures
  - Behaviours



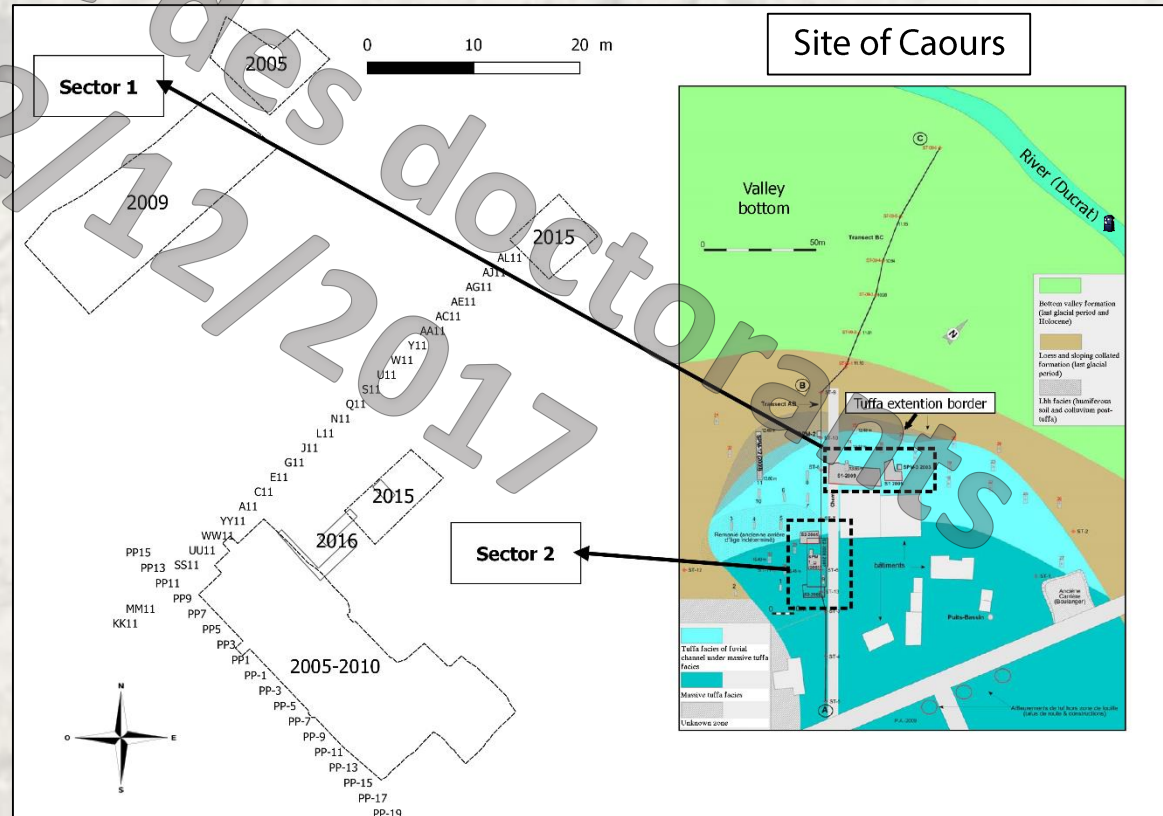
# Middle Palaeolithic **open air sites** in northern France

- Exceptional preservation, superficies and faunal remains abundance:
  - Sedimentation : calcareous, fine, quick
  - No alteration of layers

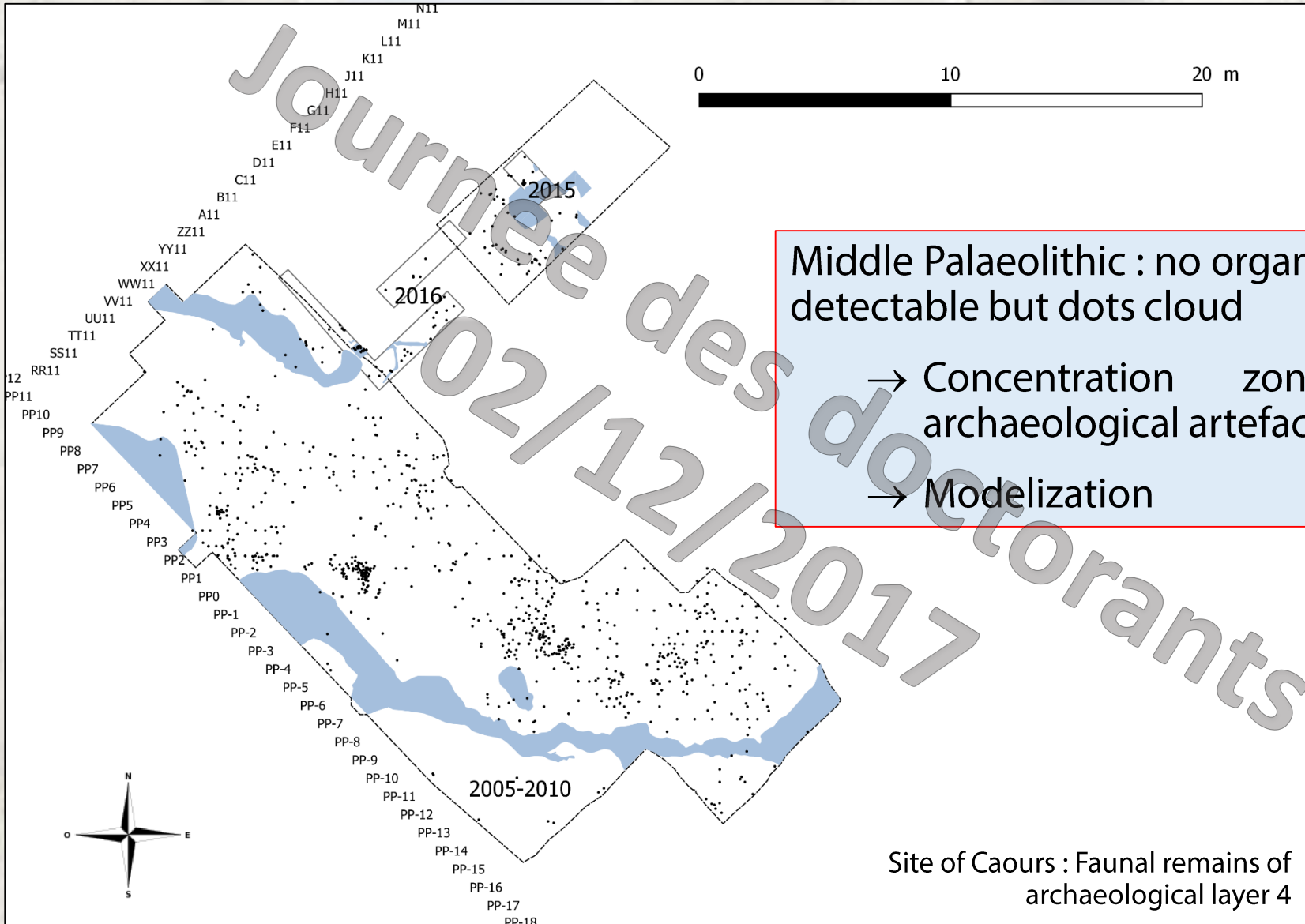
Cut marks on Aurochs bone  
(Photos: P. Auguste)



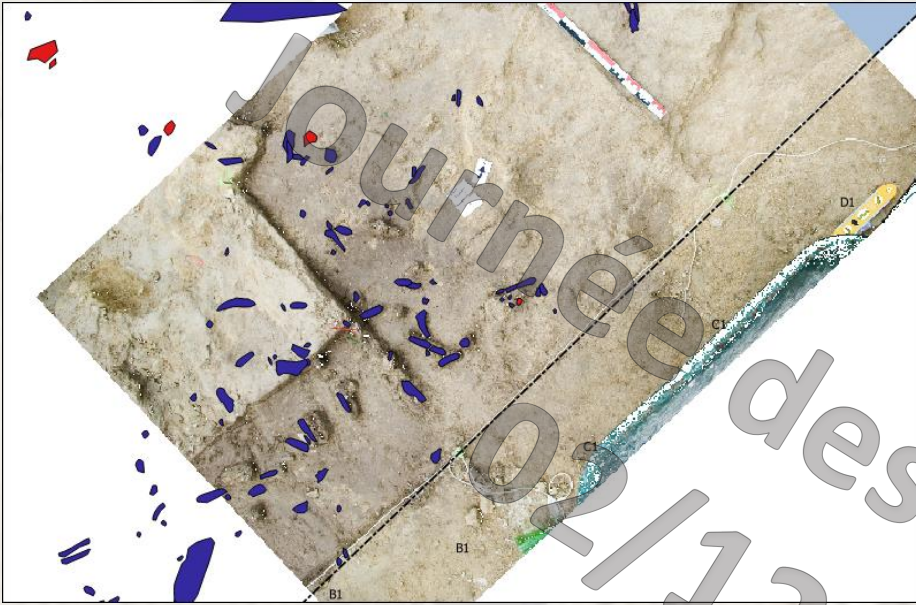
Aurochs mandible and fractured bones (Photos: J.L. Lochet)



# Middle Palaeolithic open air sites in northern France



## Activity area : different **spatial** data



Screenshot: Computer Assisted Drawing

➤ Dots cloud VS Polygons

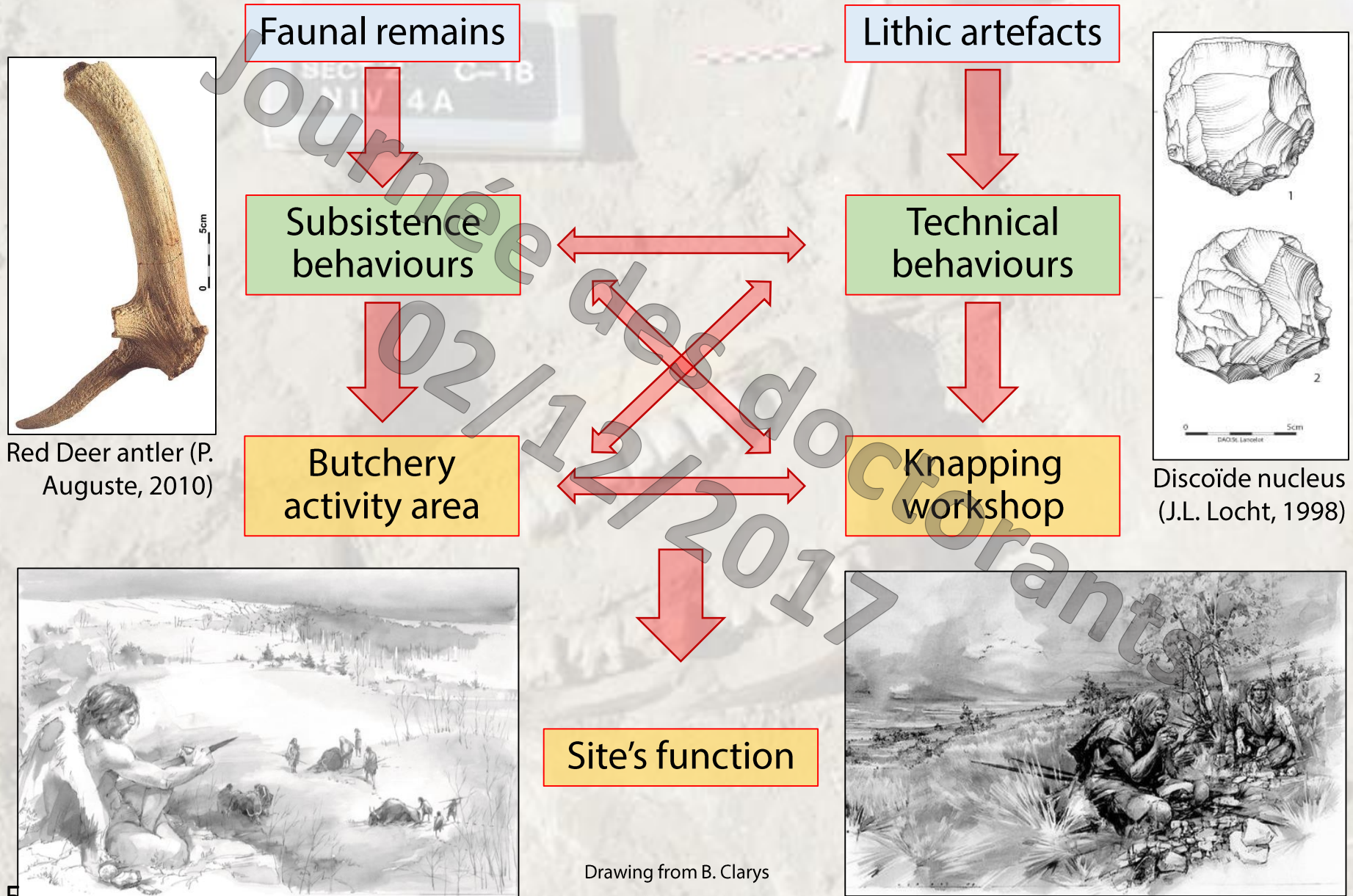
➤ Absolute coordinates or not

➤ Quantity and density :  
problem of fragmentation  
and combustion

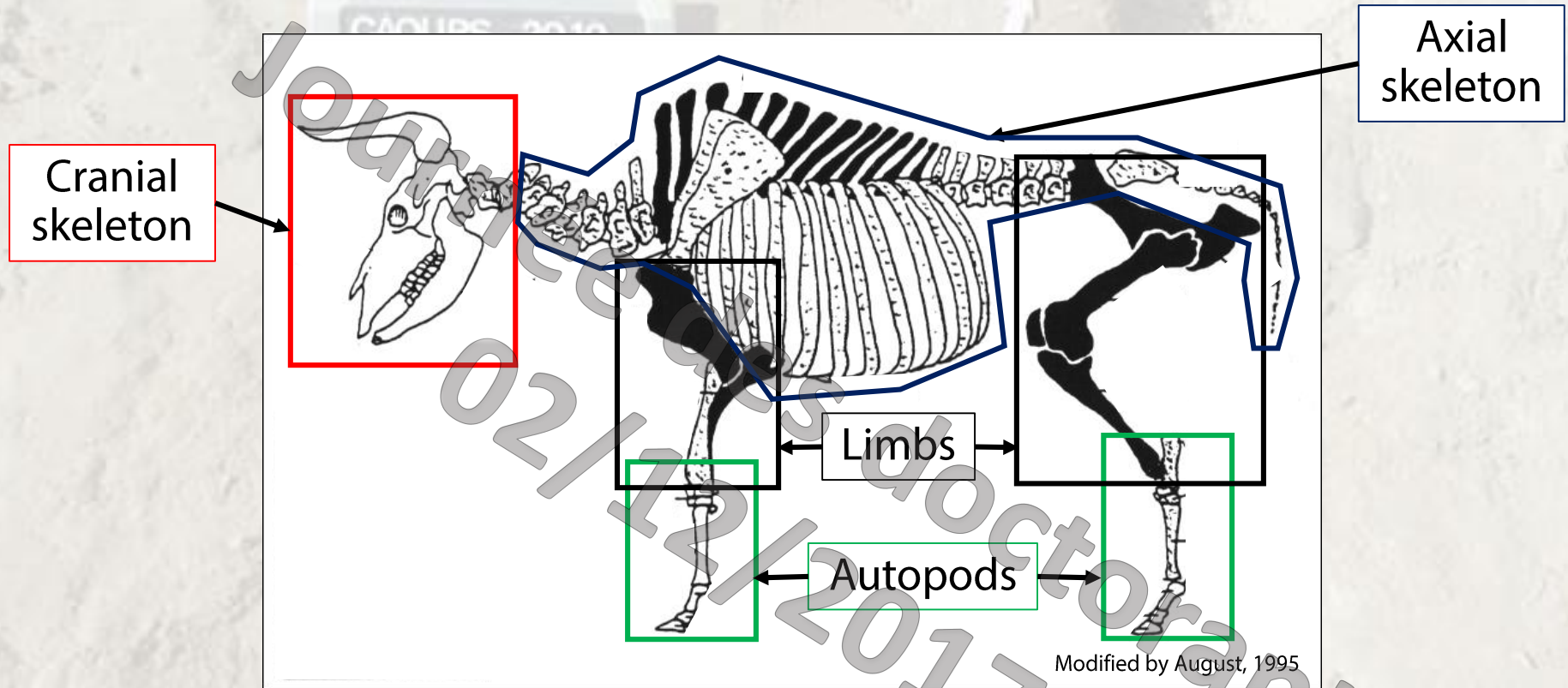


Bones combustion experiment  
(Hérisson et al., 2013)

# Activity area : different archaeological data



# Activity area : different **archaeozoological** data



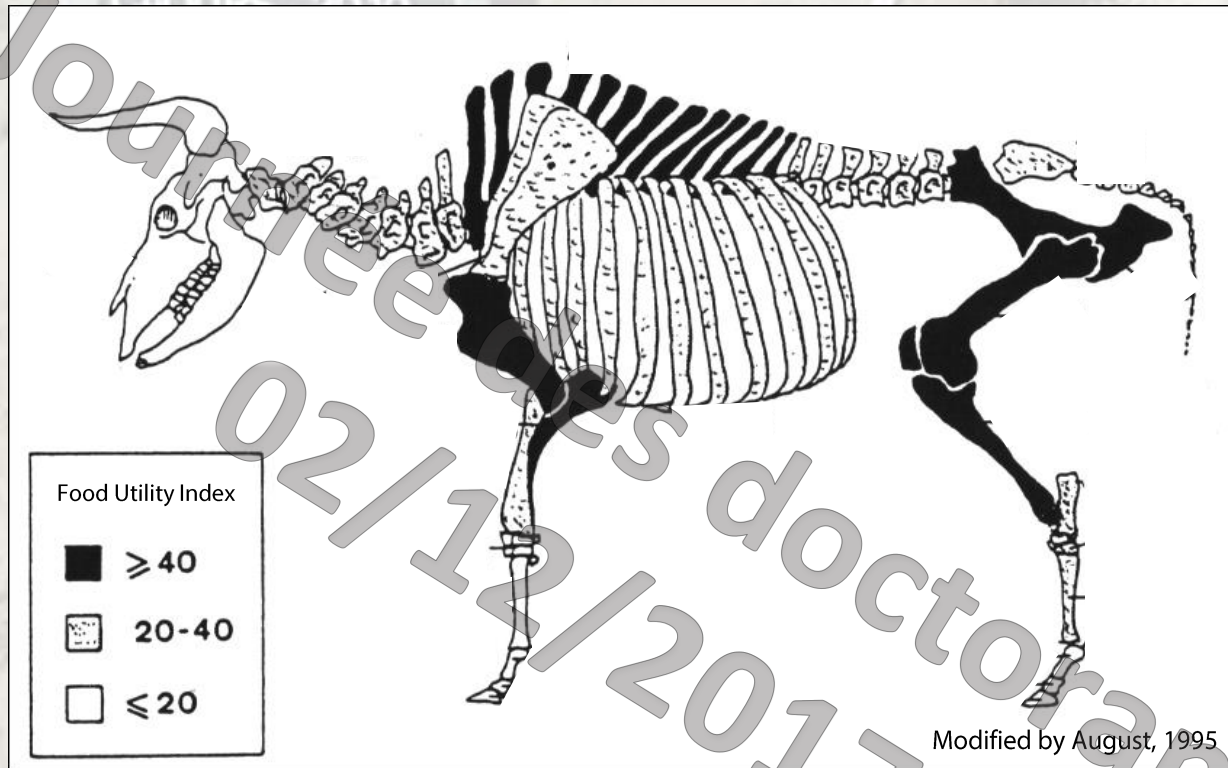
➤ Interpretative framework

➤ 6 anatomical groups



Specific butchery activity area

# Activity area : different **archaeozoological** data



➤ Interpretative framework

➤ 3 groups by Food Utility Index



Specific butchery activity area

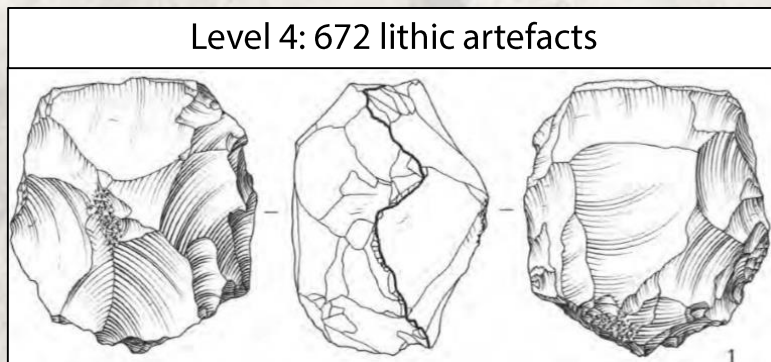
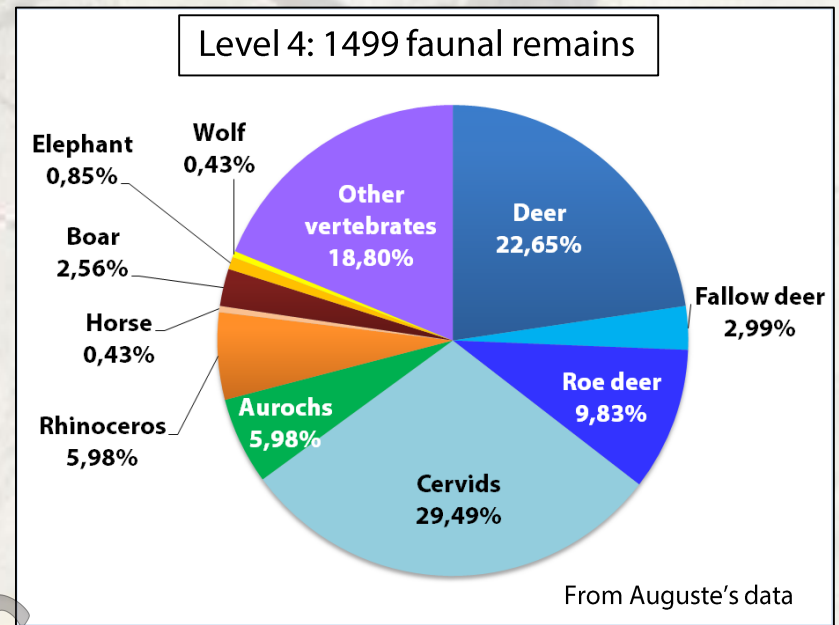


# The site of **Caours** (level 4)

- Excavation area: **680 m<sup>2</sup>**
- **4** archaeological levels

- Three main species → **Red Deer, Roe deer, Aurochs**
- **Burned** bones

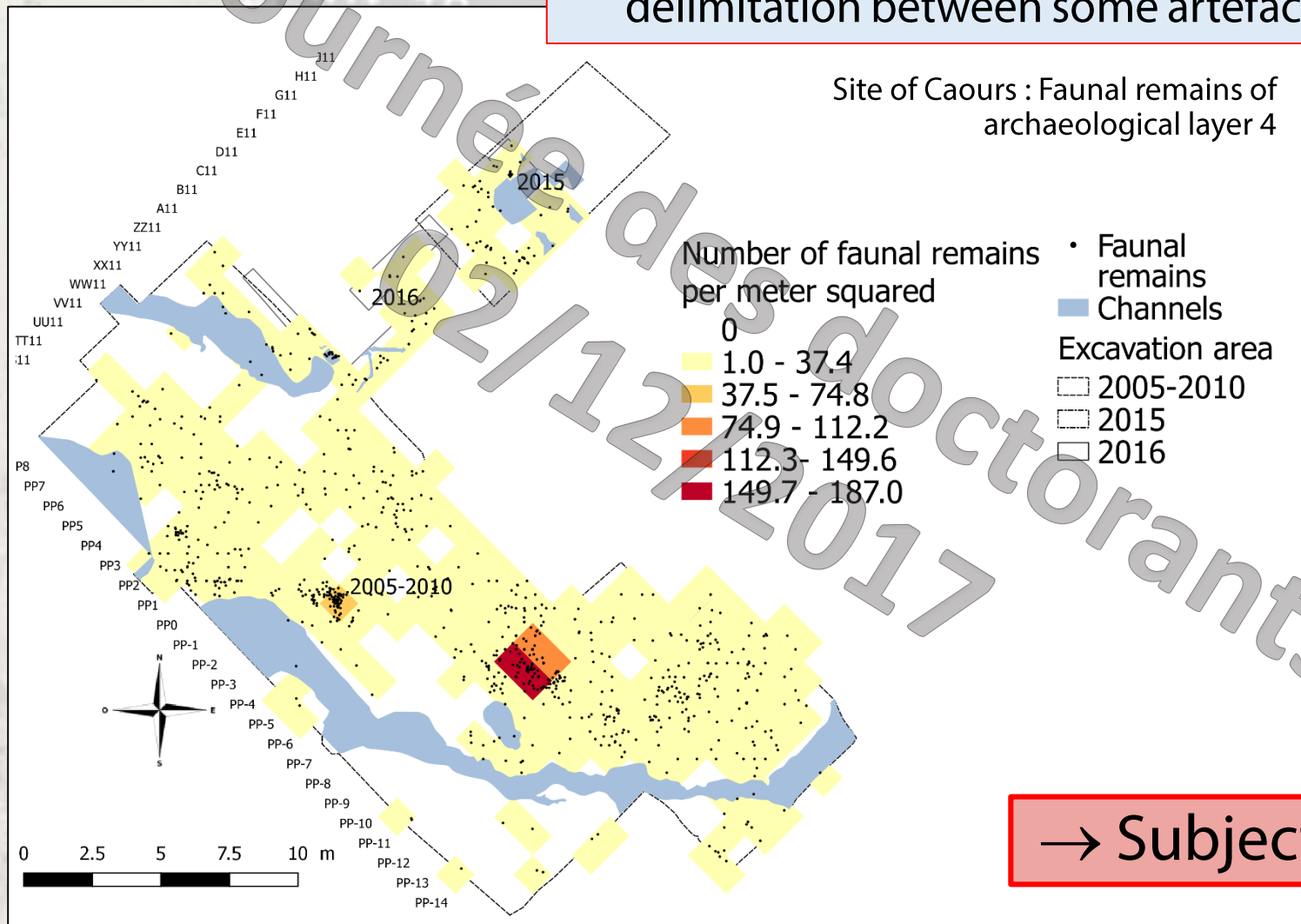
- Five lithic series associated with fauna
- **Discoid** knapping
- Unretouched tools (J.L. Loch)



Photos from P. Auguste

# Activity area : Mesh analysis

- Effective per mesh
- Arbitrary subdivision → arbitrary spatial delimitation between some artefacts



# Activity area : K-mean Clustering

## Method:

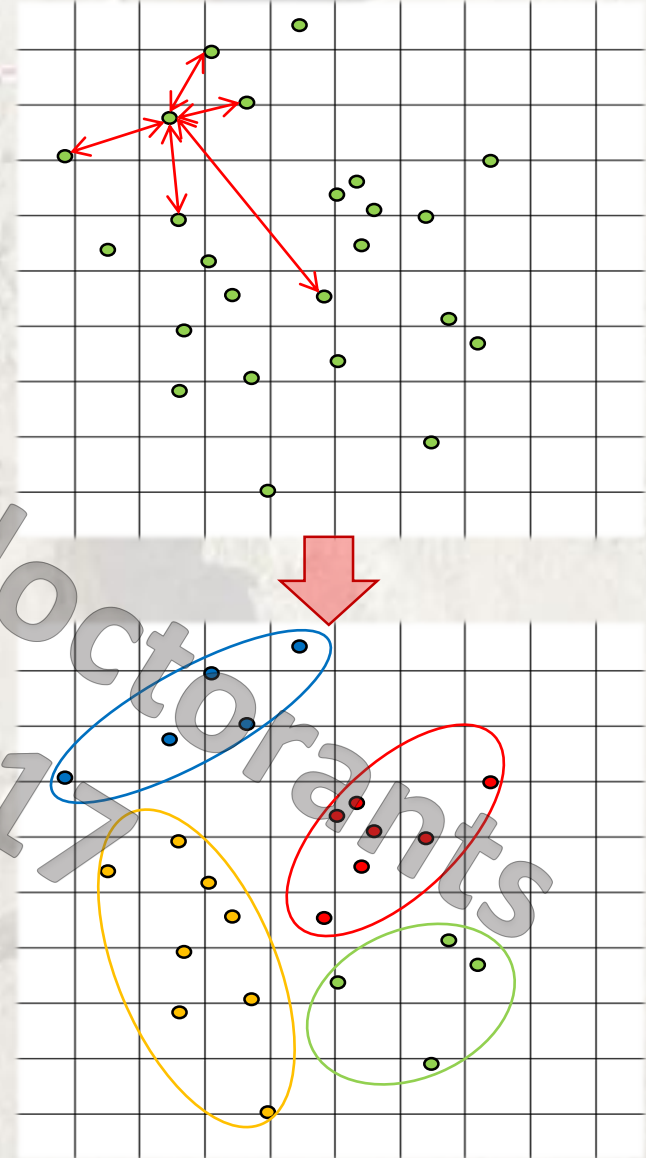
- Classification of raw data per distance between artefacts

## Results:

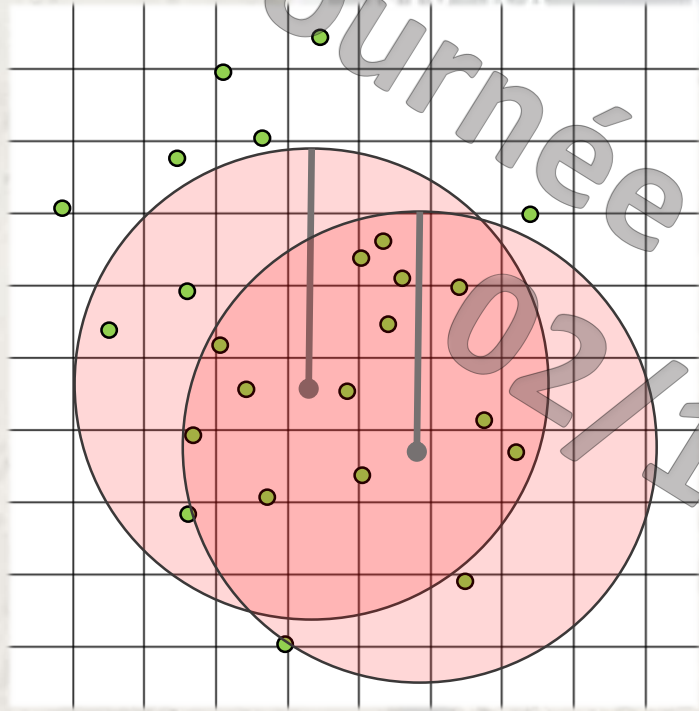
- Spatial organisation as concentration zones
- Number of concentration zones (Cluster)

## Limits:

- Can't define the perimeter of concentration zones and their density



# Activity area : Kernel Density Estimation



- Raster cell
- Artefact
- Bandwidth

## Method:

- Modelization: calculate a density map based on artefacts density and distance between artefacts

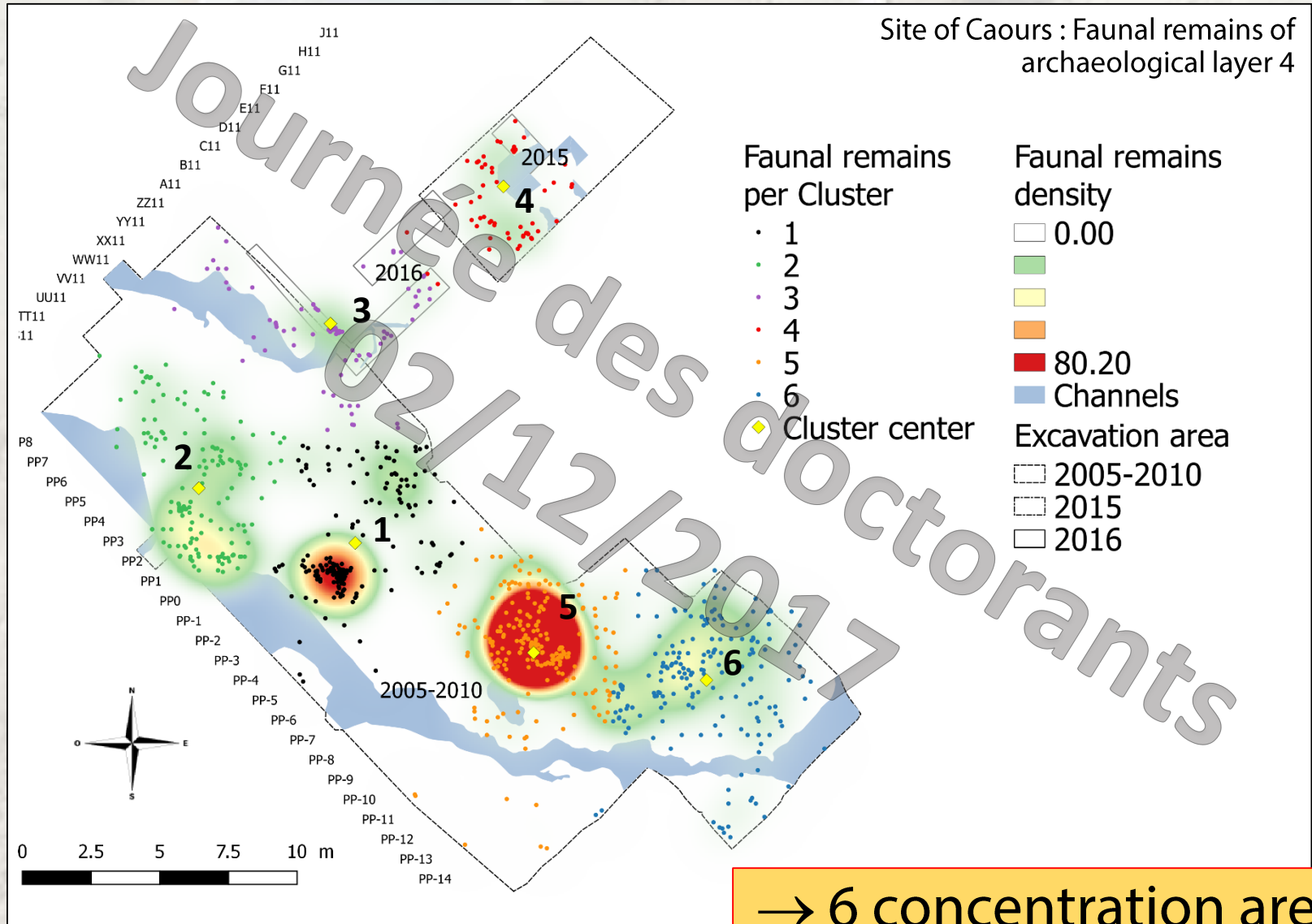
## Results:

- Model of distribution of concentration zones
- Density of concentration zones

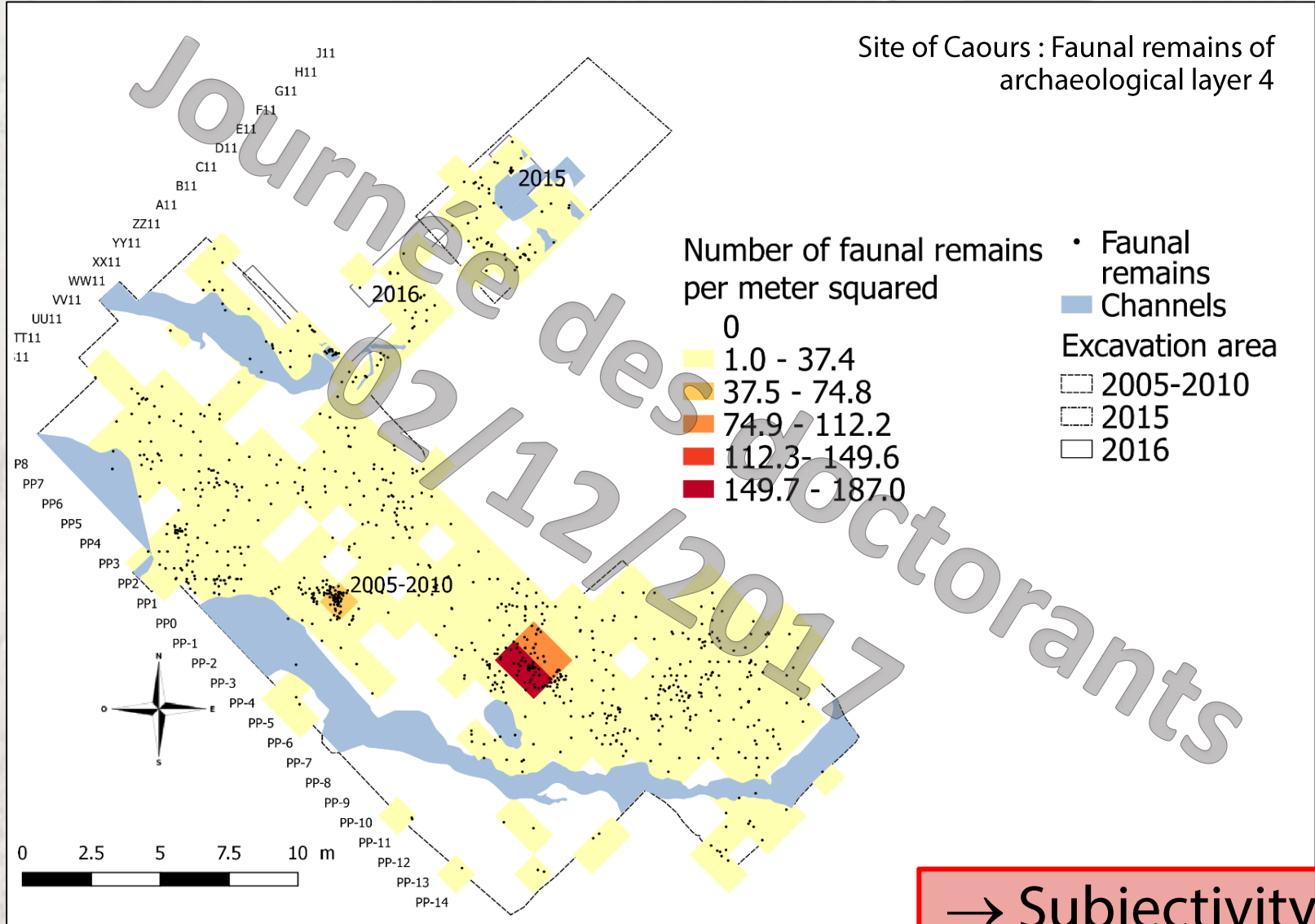
## Limits:

- Not a proof of the existence of the spatial organisation
- Research bandwidth to fixe

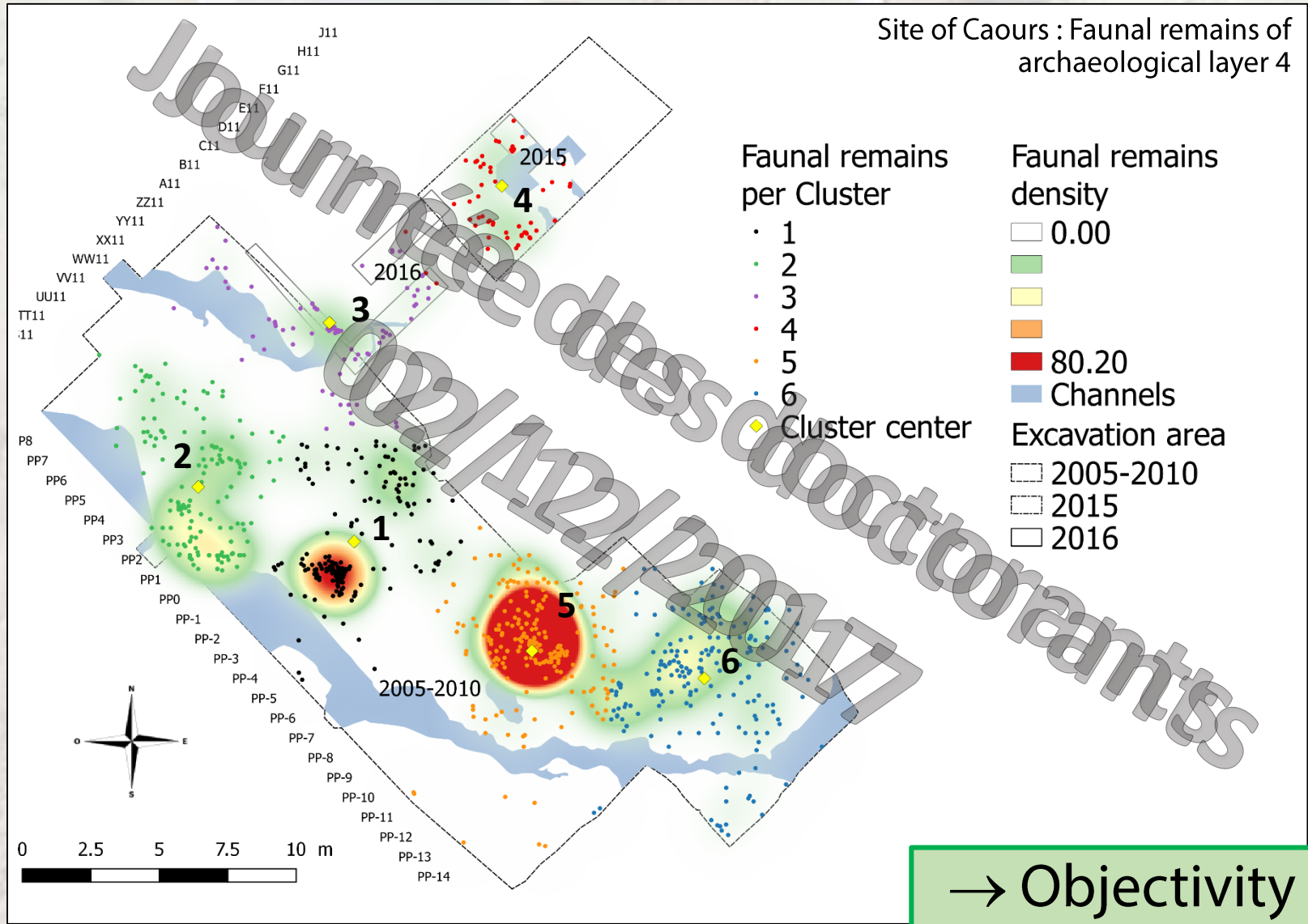
# Activity area : Kernel Density Estimation combine with K-mean Clustering



# Activity area : Mesh analysis

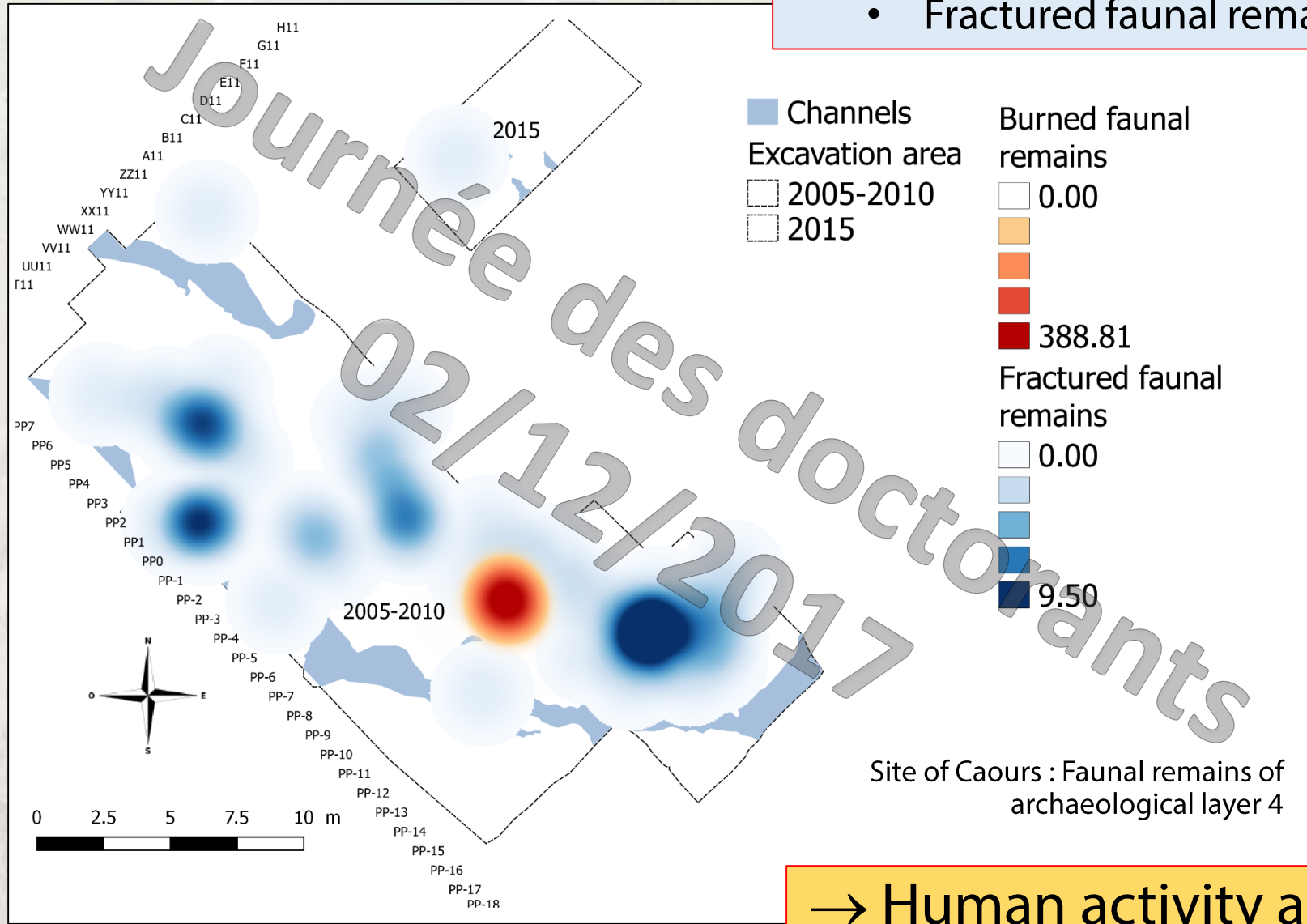


# Activity area : Kernel Density Estimation combine with K-mean Clustering



# Specific activity area

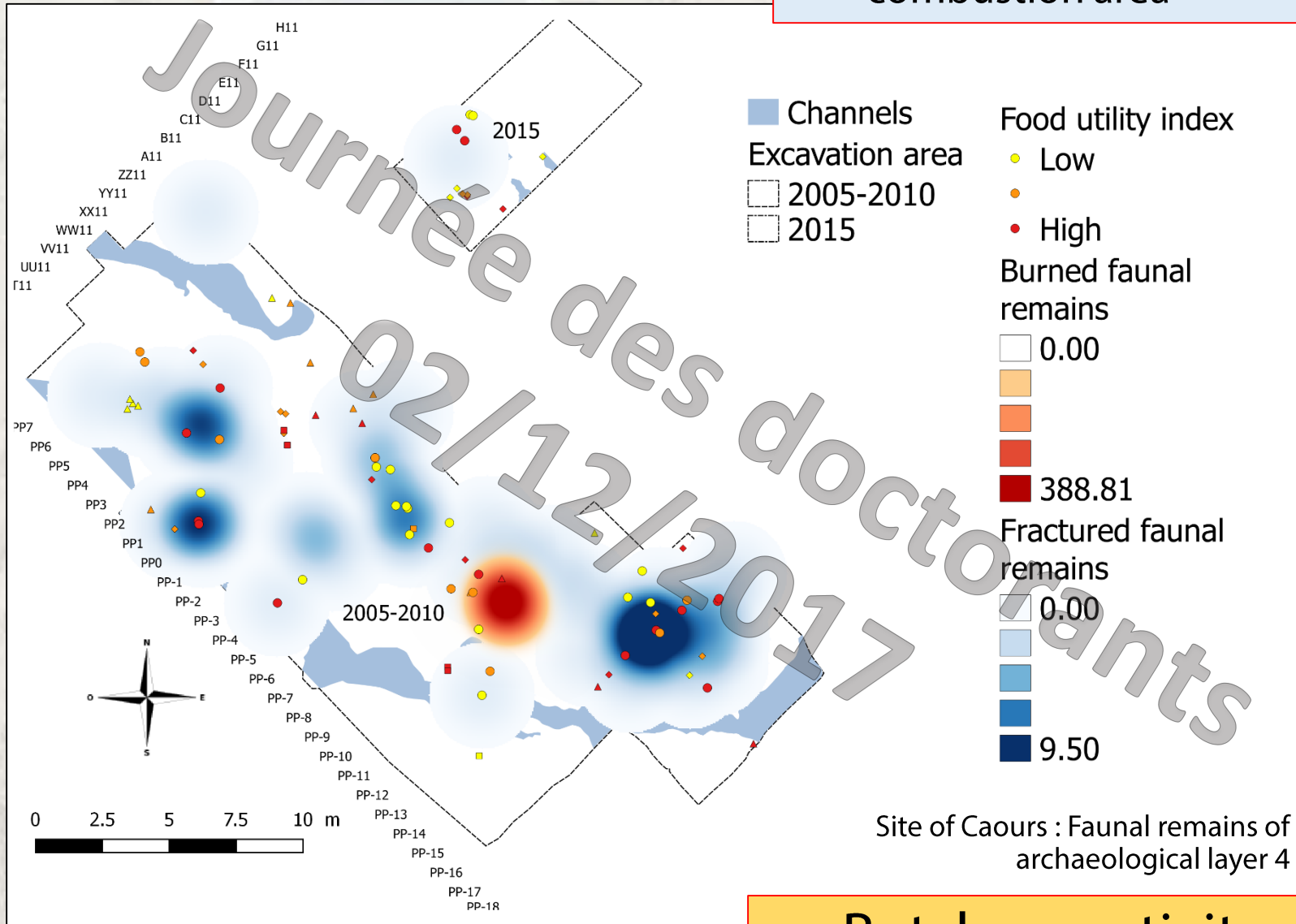
- Concentration zone of :
  - Burned faunal remains
  - Fractured faunal remains





# Specific activity area

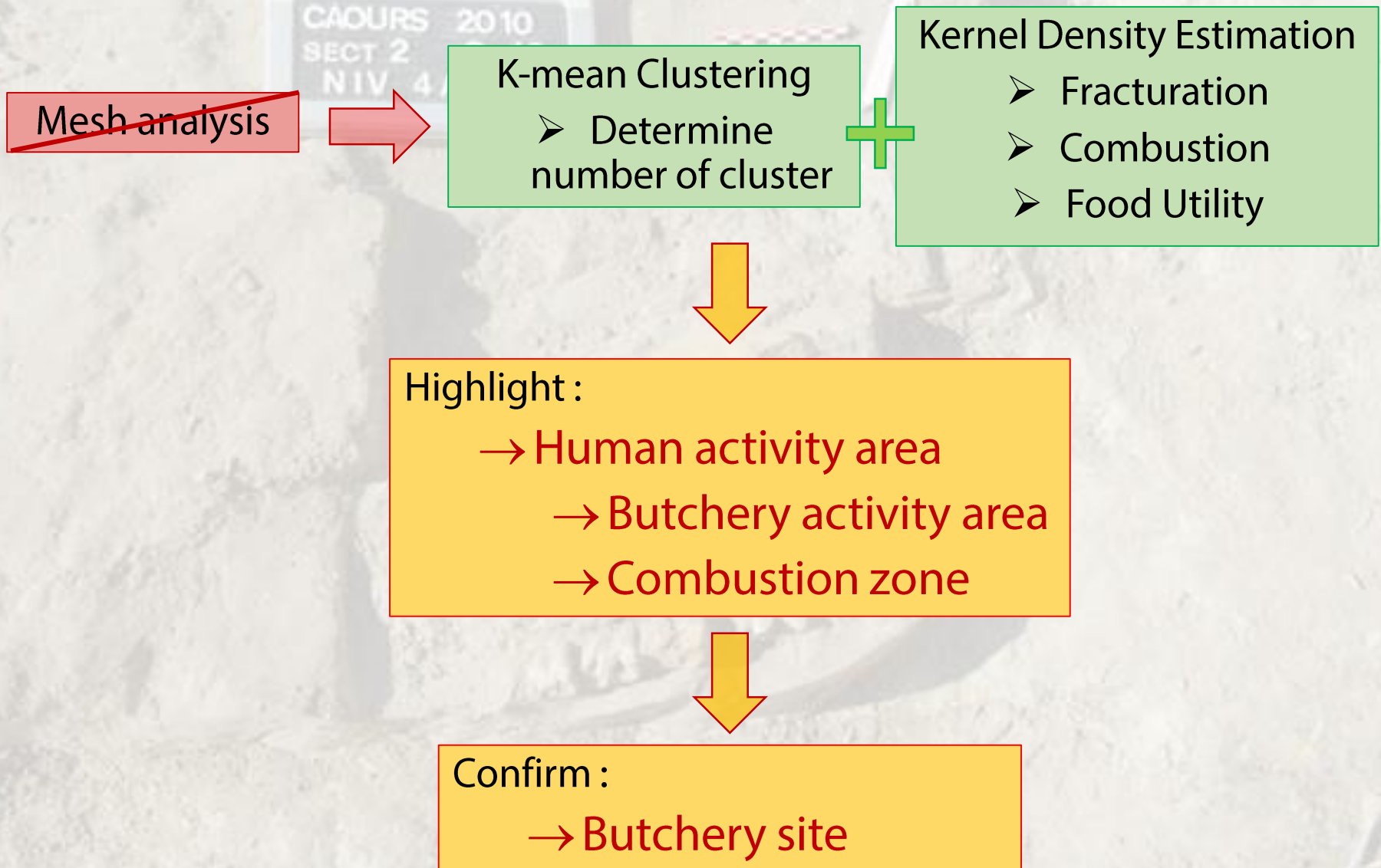
➤ Remains with high food utility near fracturation and combustion area



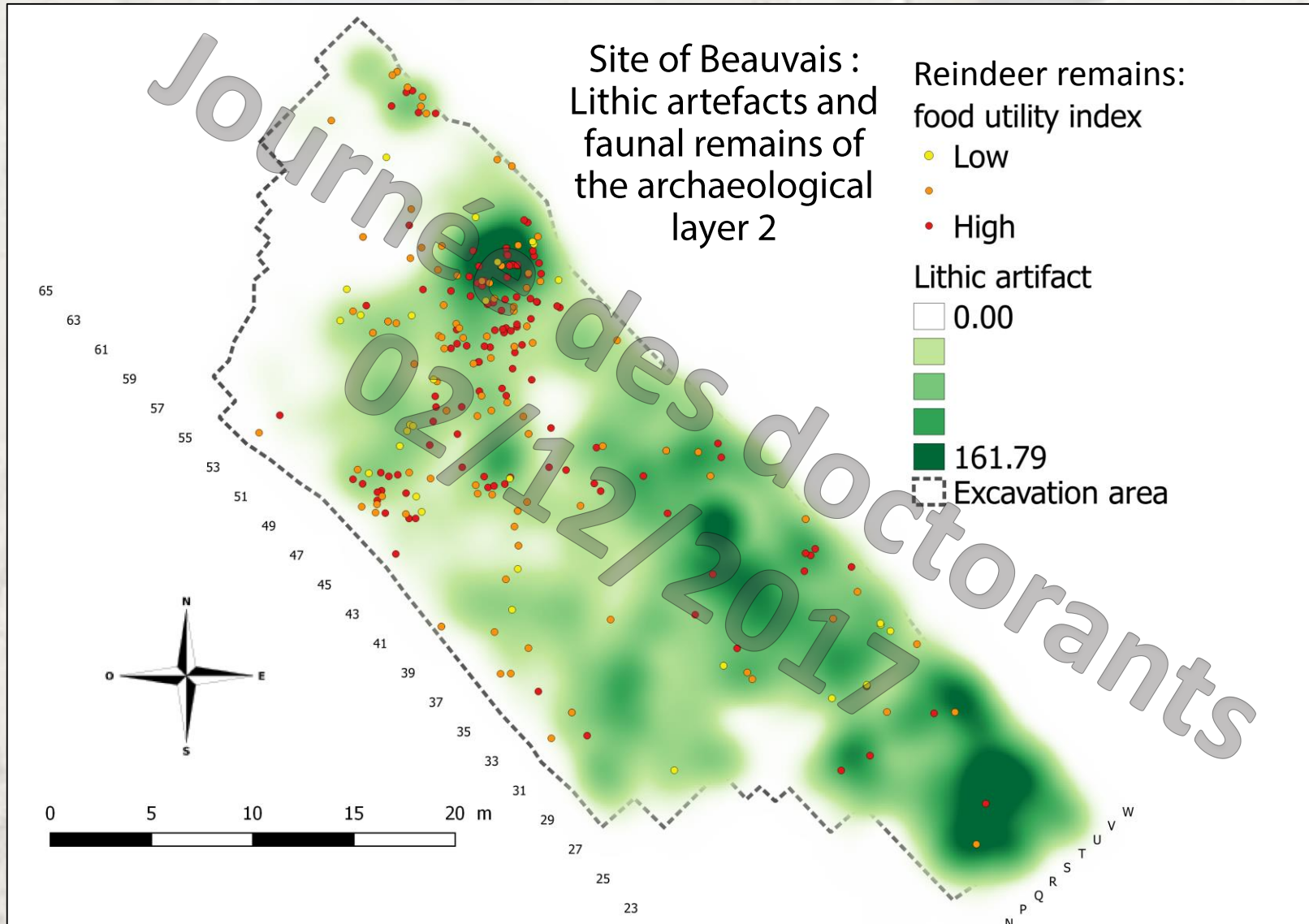
Site of Caours : Faunal remains of archaeological layer 4

➔ Butchery activity area

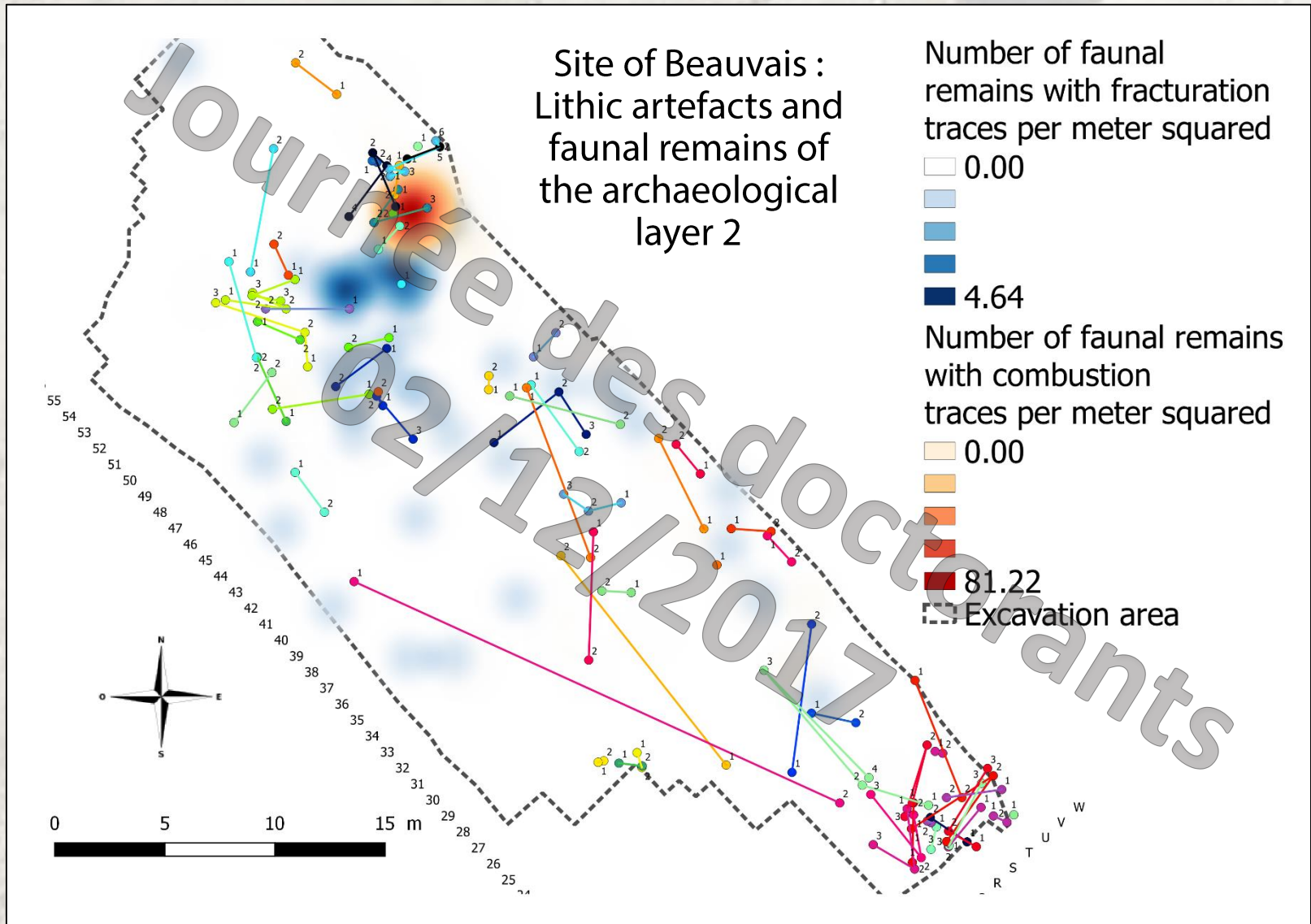
# Conclusion



# Next steps: distribution of lithic artefacts



# Next steps: lithic artefacts refitting



## Future work

System

Fragmentation  
Prey processing

Knapping workshop

Precise site function

Characterize Neanderthal  
groups

# Thank you for your attention



Thanks to Jean-Luc Loch, Marylène Patou-Mathis, Patrick Auguste et Noémie Sévêque for give us access to numerous data of this two sites.

Thanks to Jean-Paul Donnay, Yves Cornet, Caroline Fond et David Hérisson for their advices in the development of this spatial analysis protocol.