

CAOURS 2010
SECT 2 C-18

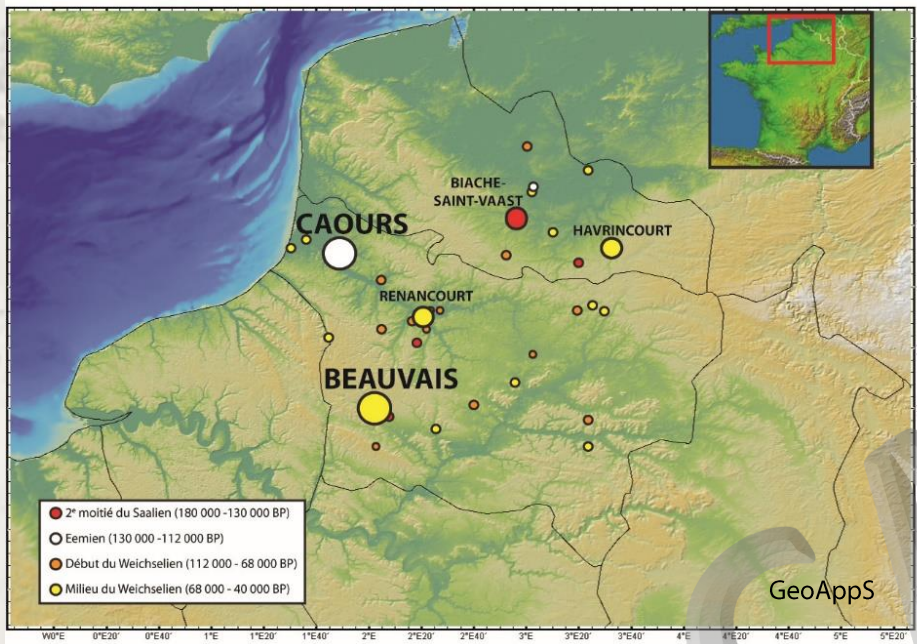
Intrasite spatial analysis based in a Geographic Information System and apply to extensive Middle Palaeolithic open-air sites in northern France. The example of Caours (Somme, France).

Gwénaëlle Moreau¹ and Jean-Luc Locht^{2,3}

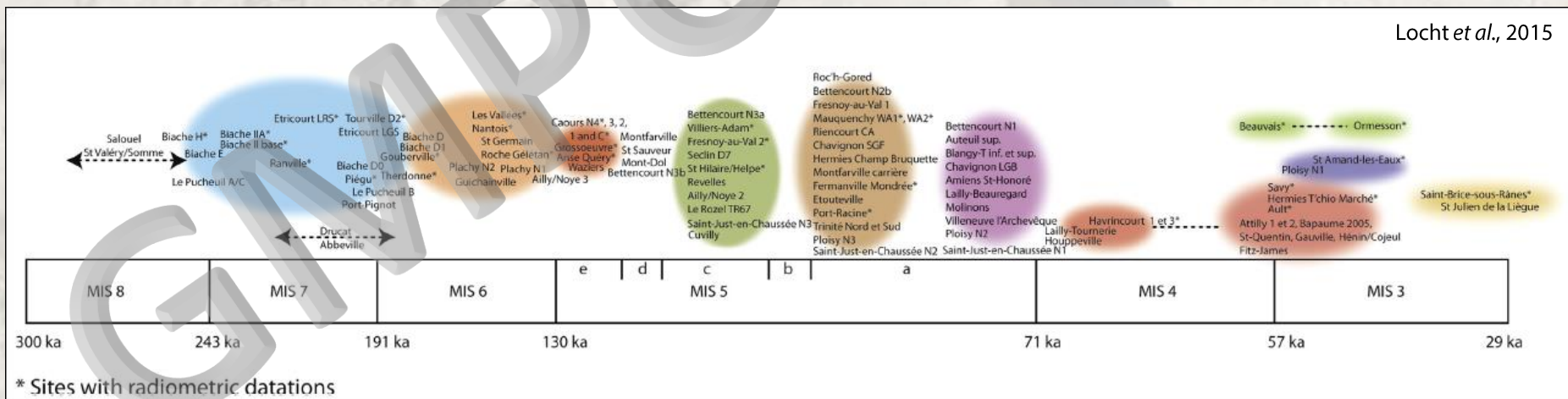
1: University of Liège (Ulg, Belgium), 2: Physical geography Laboratory (LGP, France),

3 : National Institute of Preventive Archaeological Research, (Inrap, France)

Middle Palaeolithic open air sites in northern France



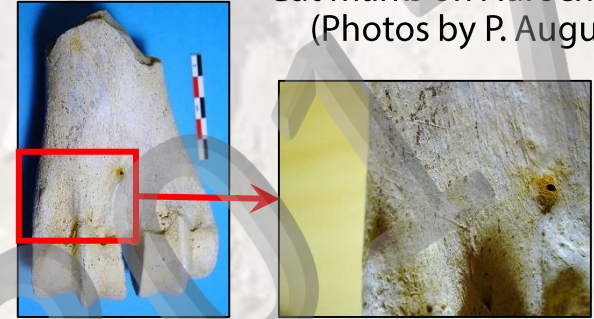
- Excellent Chronostratigraphic framework
- Different:
 - Biotopes
 - Cultures
 - Behaviours



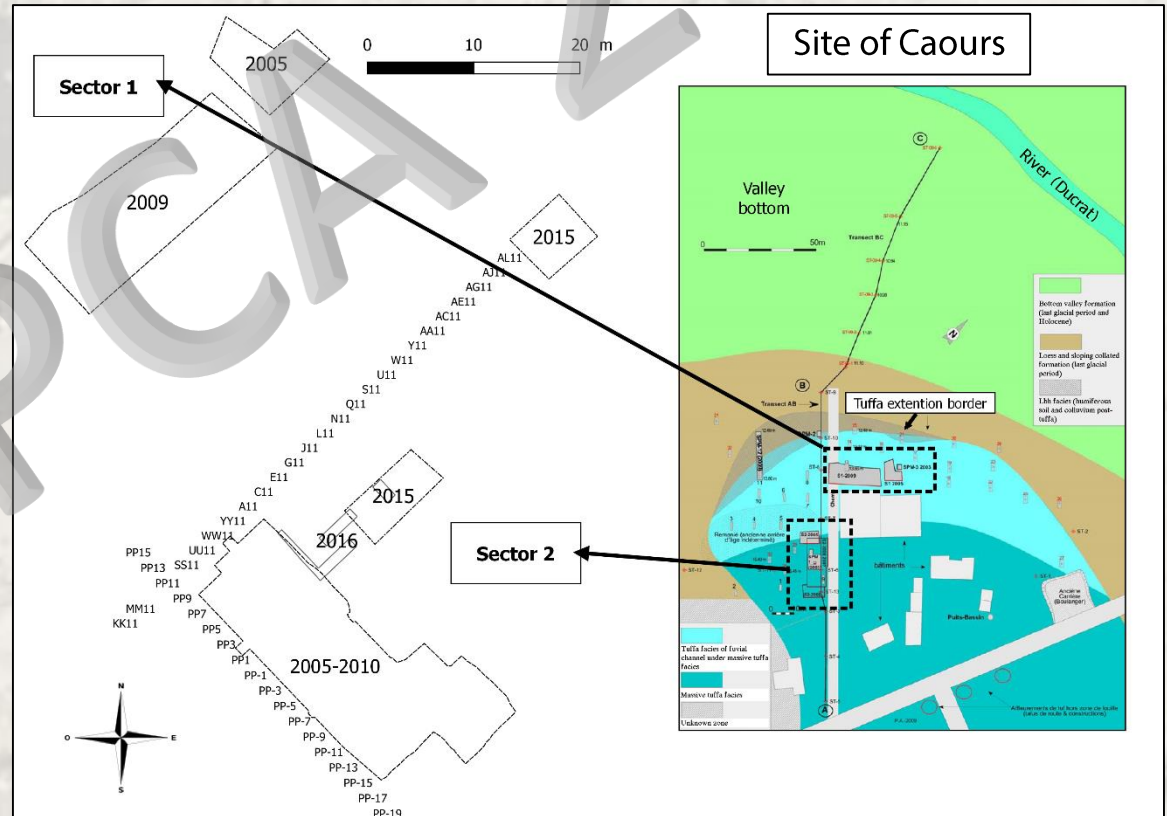
Middle Palaeolithic **open air sites** in northern France

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

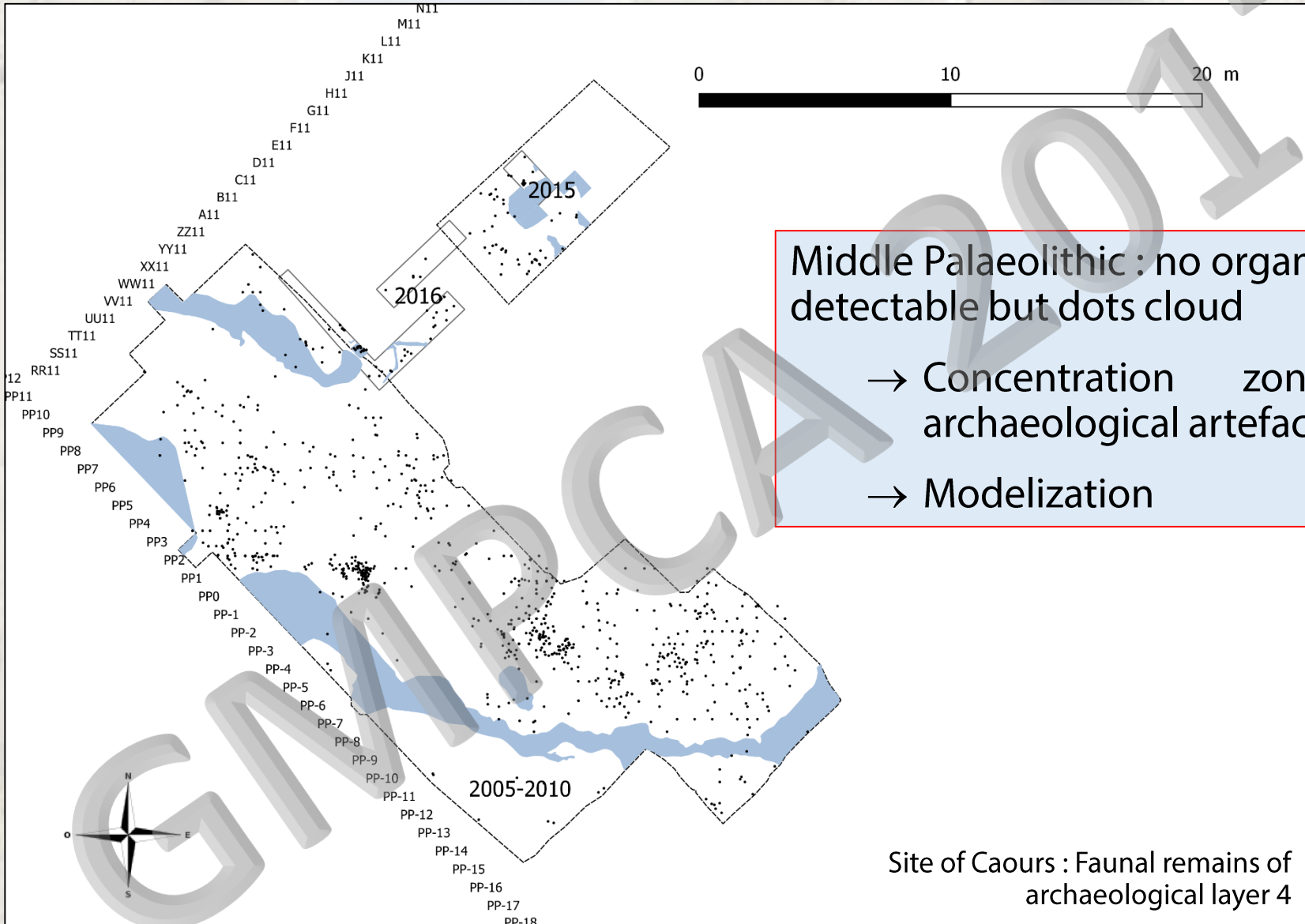
Cut marks on Aurochs bone
(Photos by P. Auguste)



Aurochs mandible and fractured bones (Photos by J.L. Loch)



Middle Palaeolithic open air sites in northern France

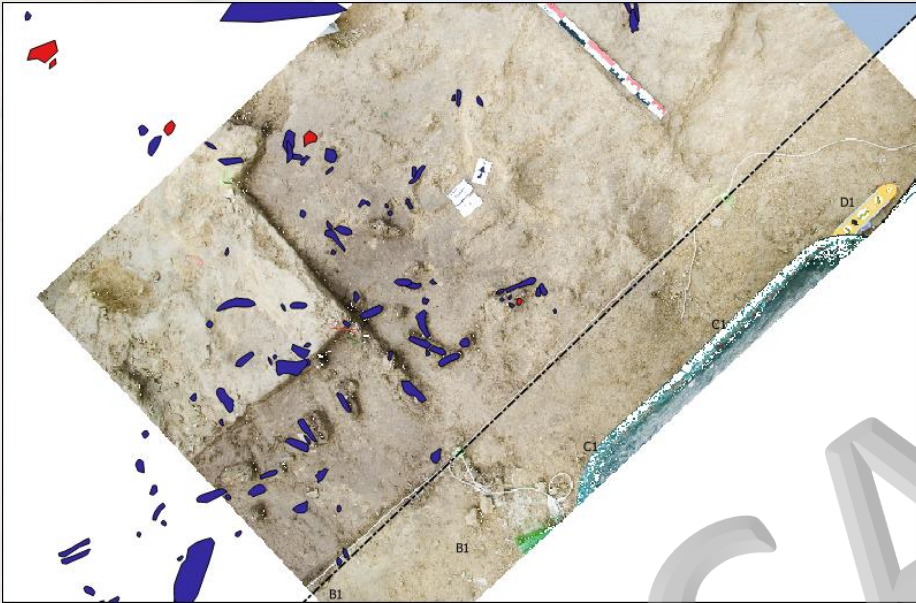


Middle Palaeolithic : no organisation detectable but dots cloud

- Concentration zone of archaeological artefact
- Modelization

Site of Caours : Faunal remains of archaeological layer 4

Activity area : different **spatial** data



Screenshot: Computer Assisted Drawing

➤ Quantity and density :
problem of fragmentation
and combustion

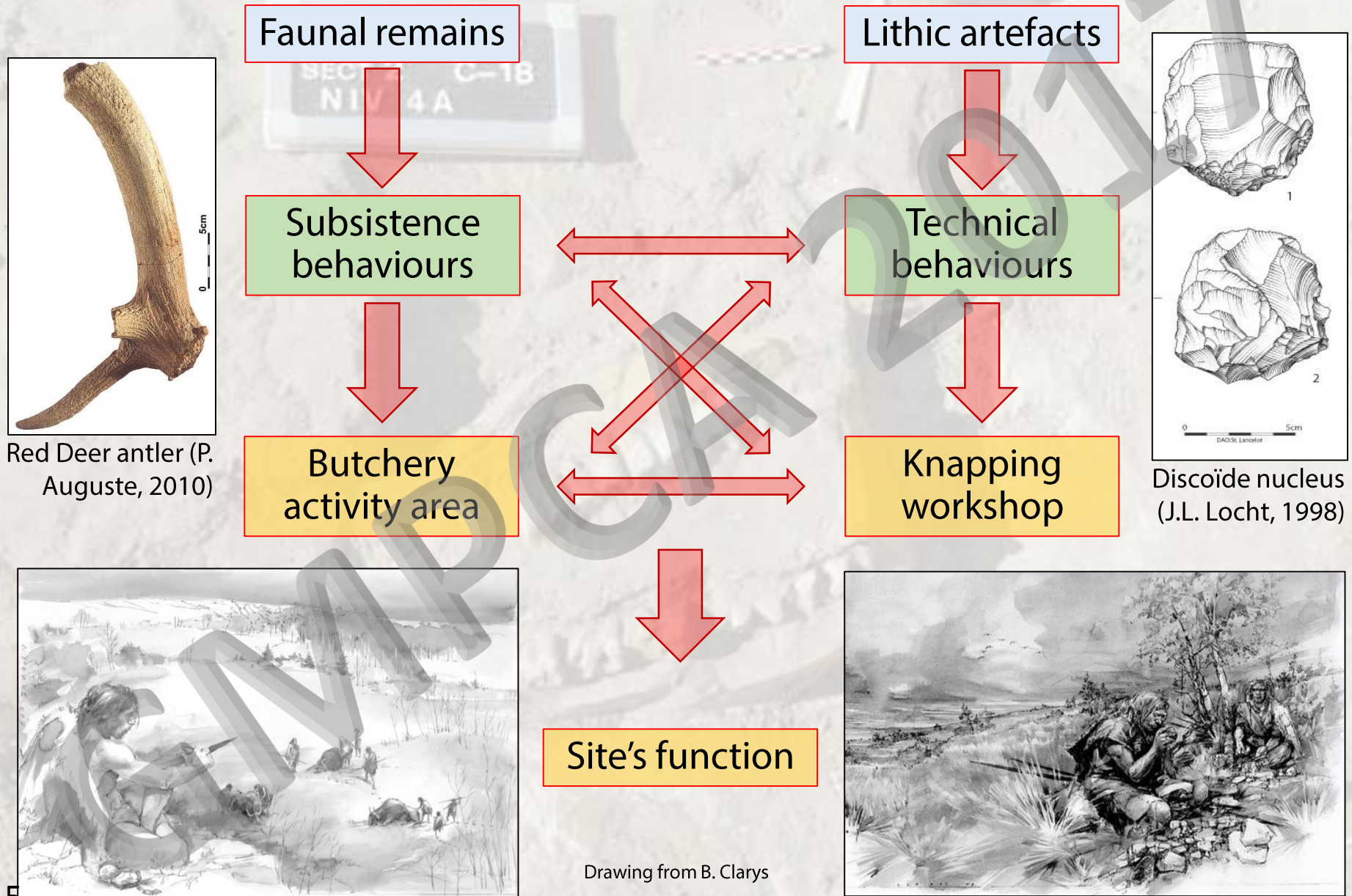
➤ Dots cloud VS Polygons

➤ Absolute coordinates or not

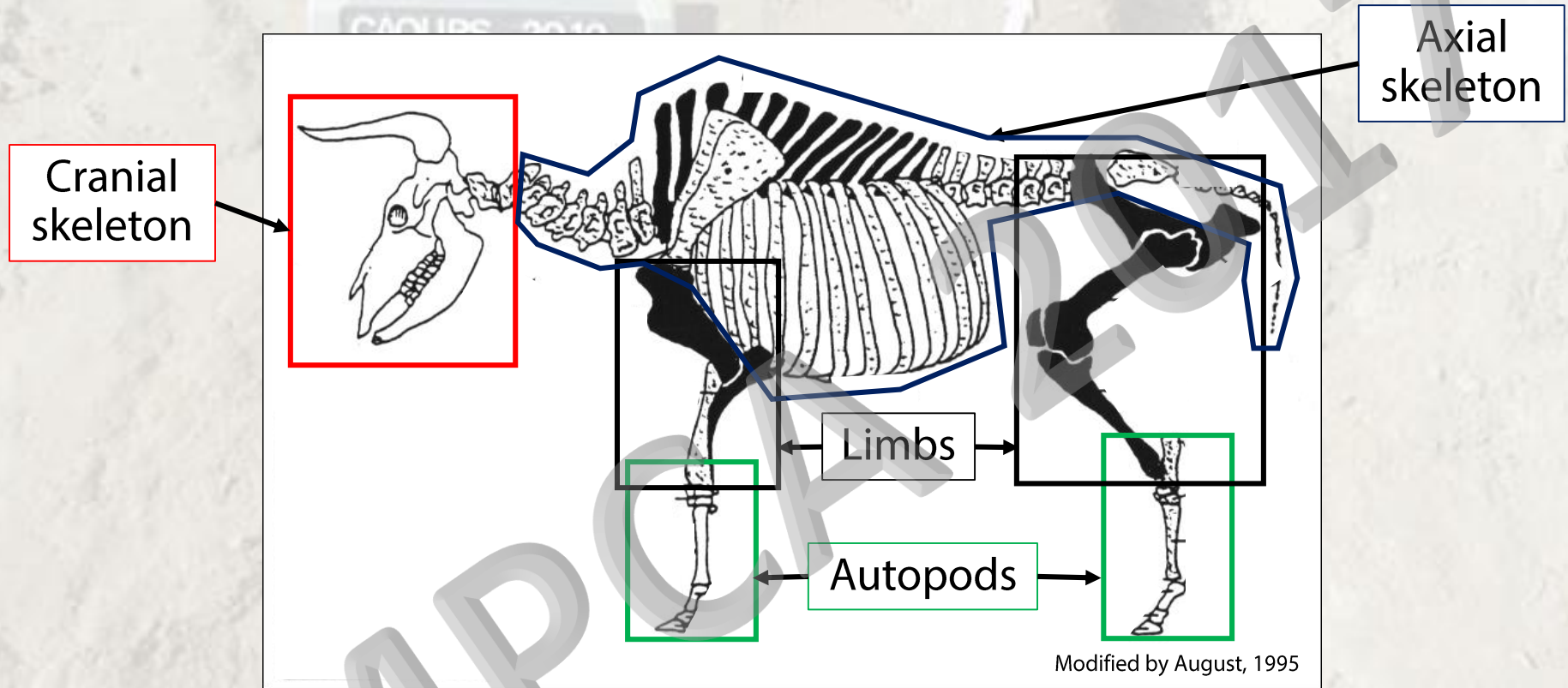


Bones combustion experiment
(Hérisson et al., 2013)

Activity area : different **archaeological** data



Activity area : different **archaeozoological** data

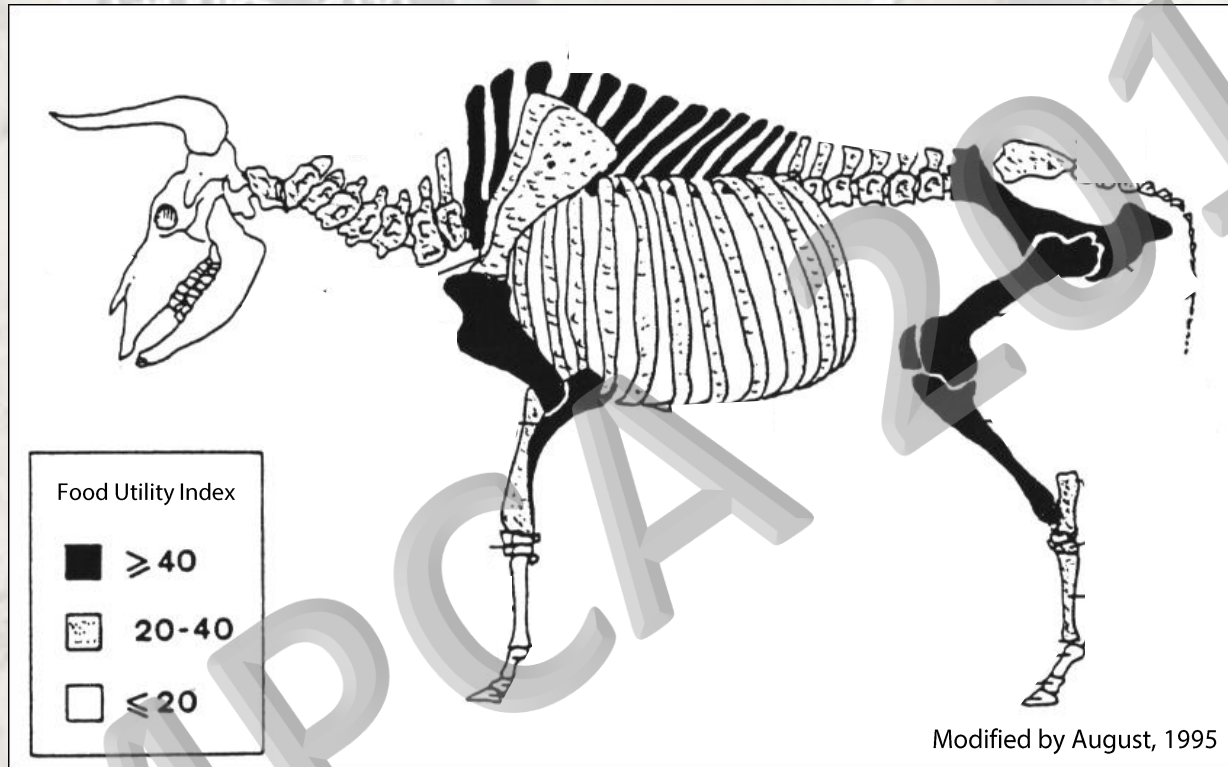


- Interpretative framework
- 6 anatomical groups



Specific butchery activity area

Activity area : different **archaeozoological** data



➤ Interpretative framework

➤ 3 groups by Food Utility Index

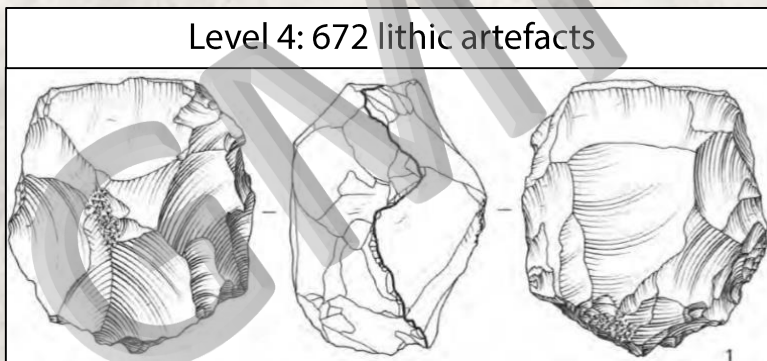
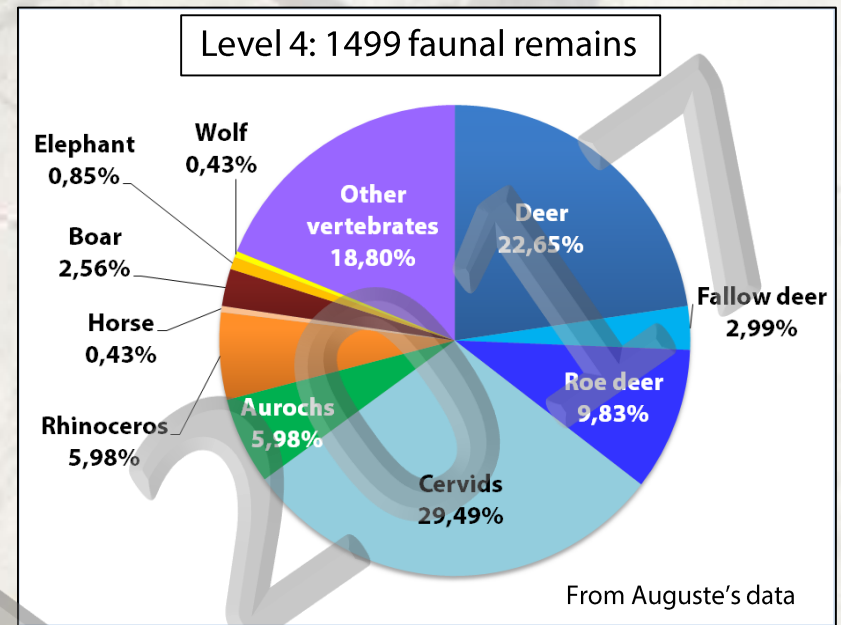
Specific butchery activity area

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

- Excavation area: **680 m²**
- **4** archaeological levels

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

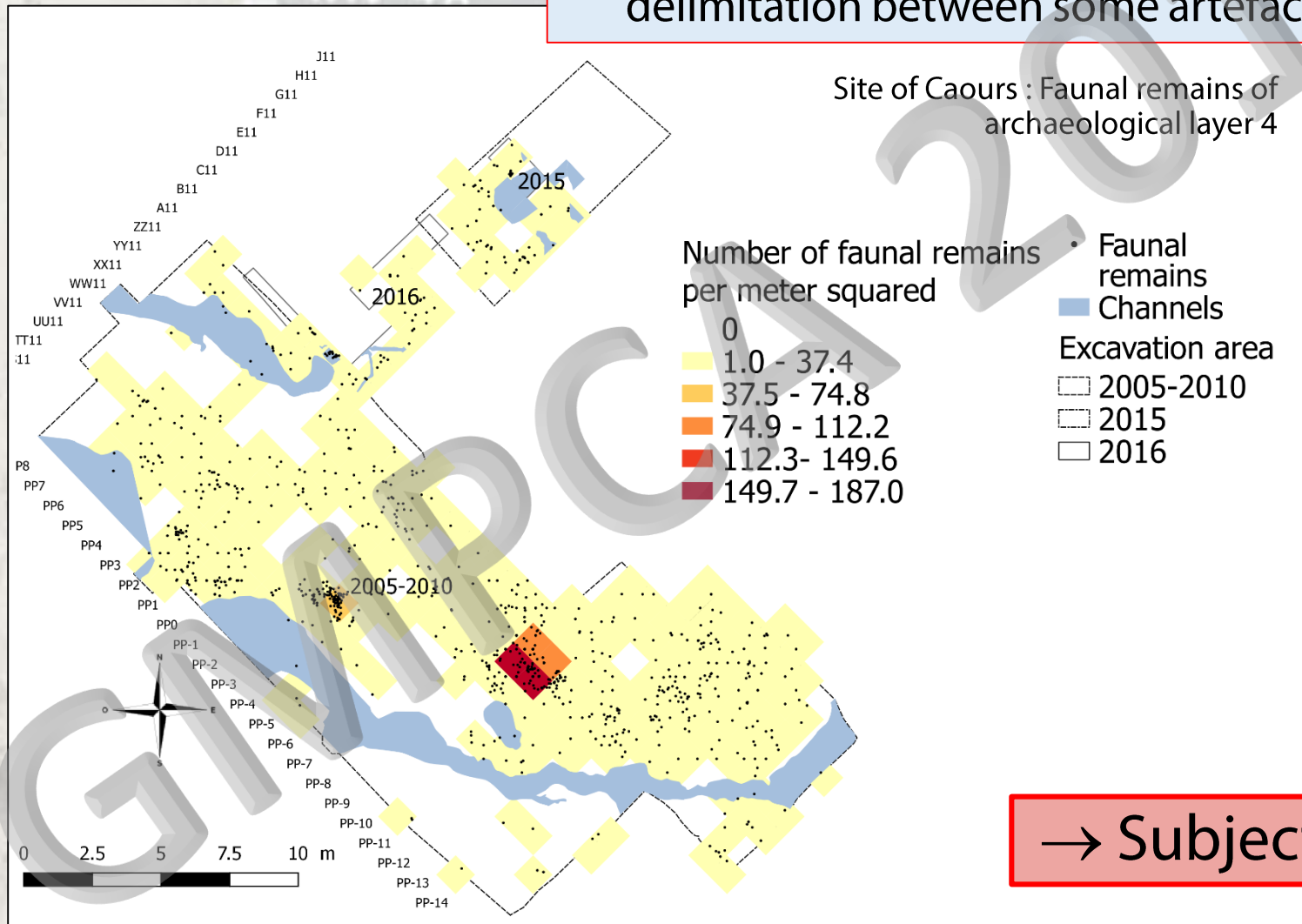
- Five lithic series associated with fauna
- **Discoid** knapping
- Unretouched tools (J.L. Loch)



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:

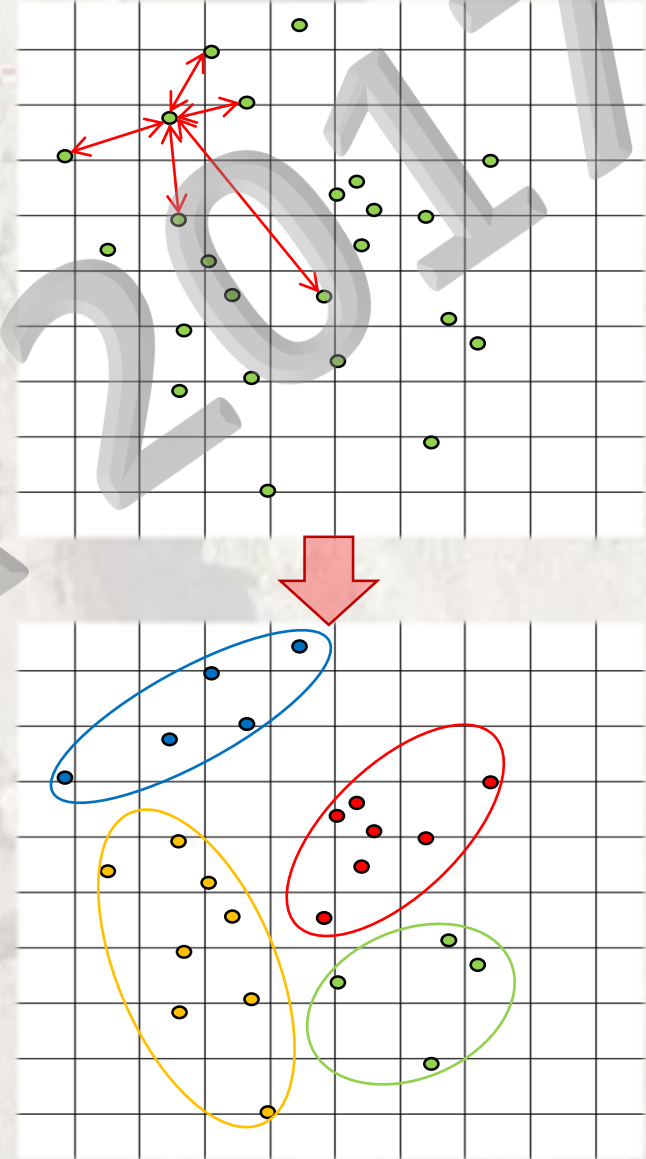
- Classification of raw data per distance between artefacts

Results:

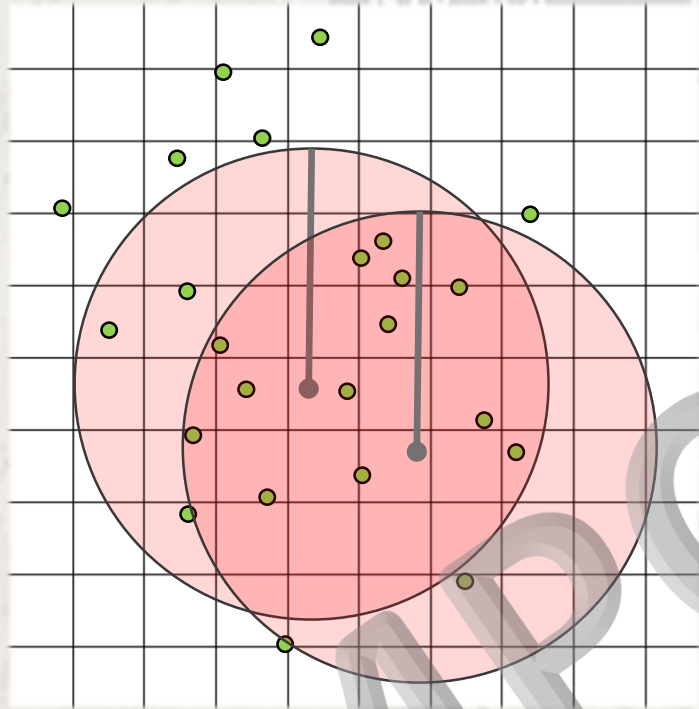
- Spatial organisation as concentration zones
- Number of concentration zones (Cluster)

Limits:

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



Activity area : Kernel Density Estimation



Method:

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

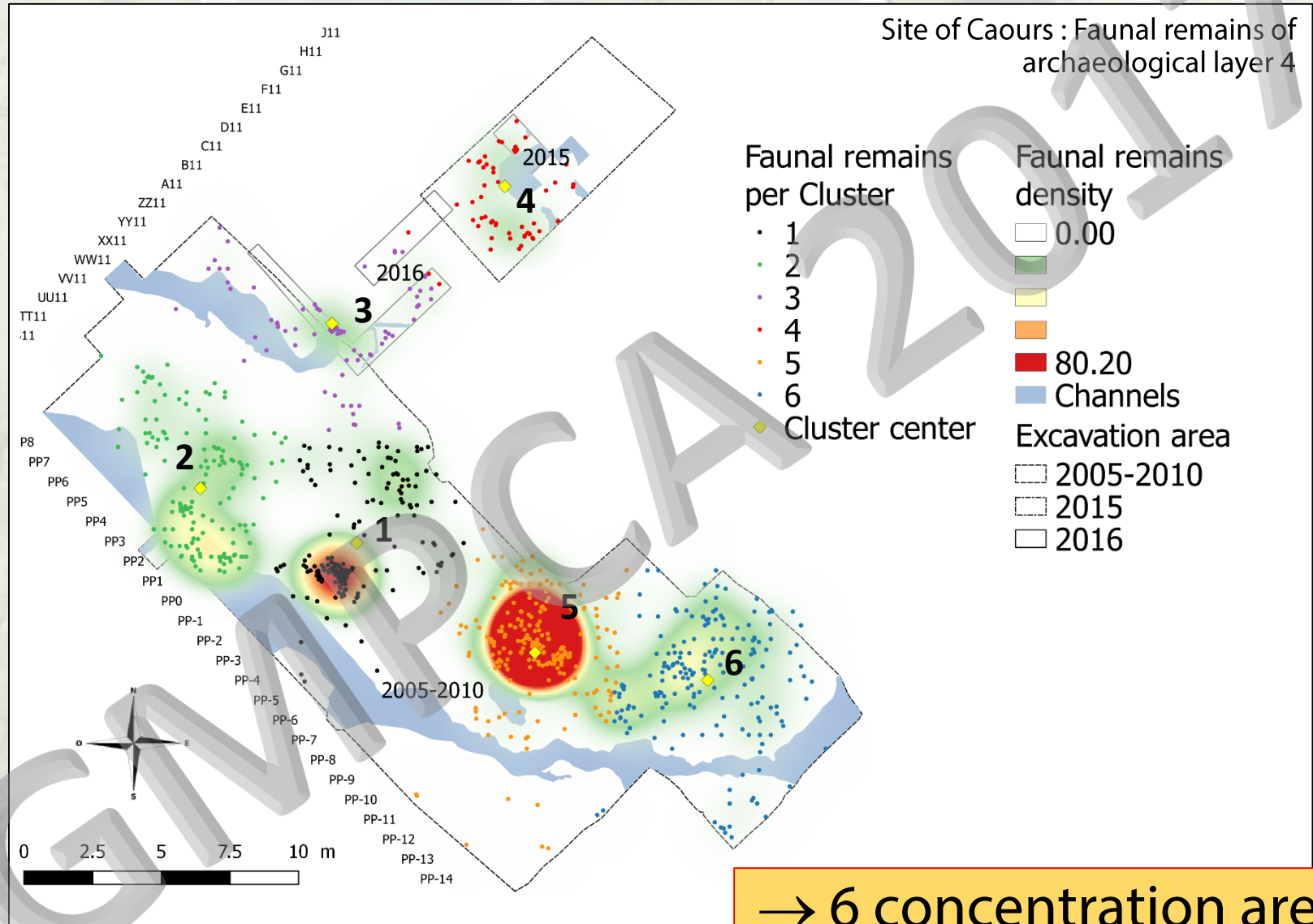
Results:

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

Limits:

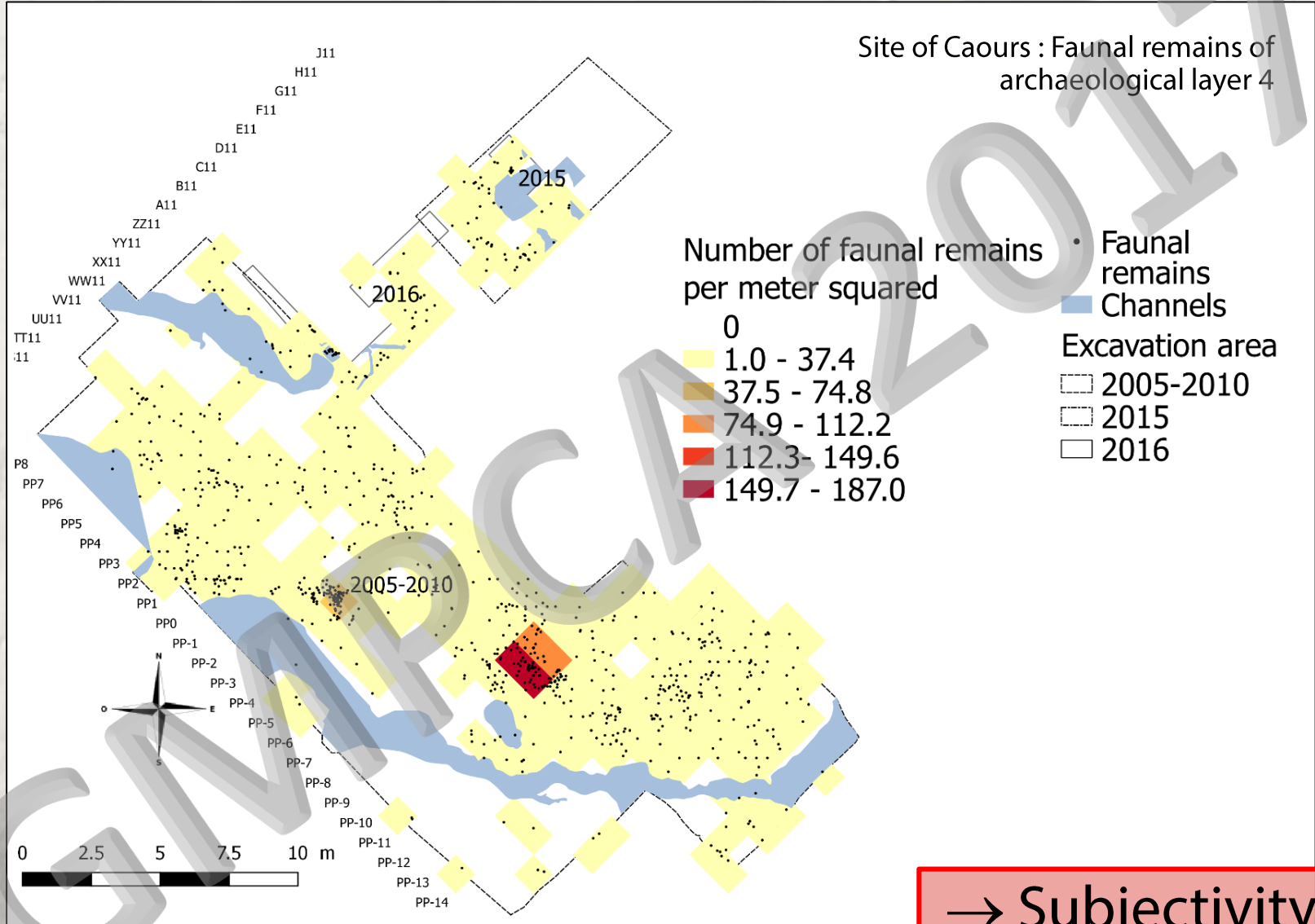
- Not a proof of the existence of the spatial organisation
- Research bandwidth to fixe

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

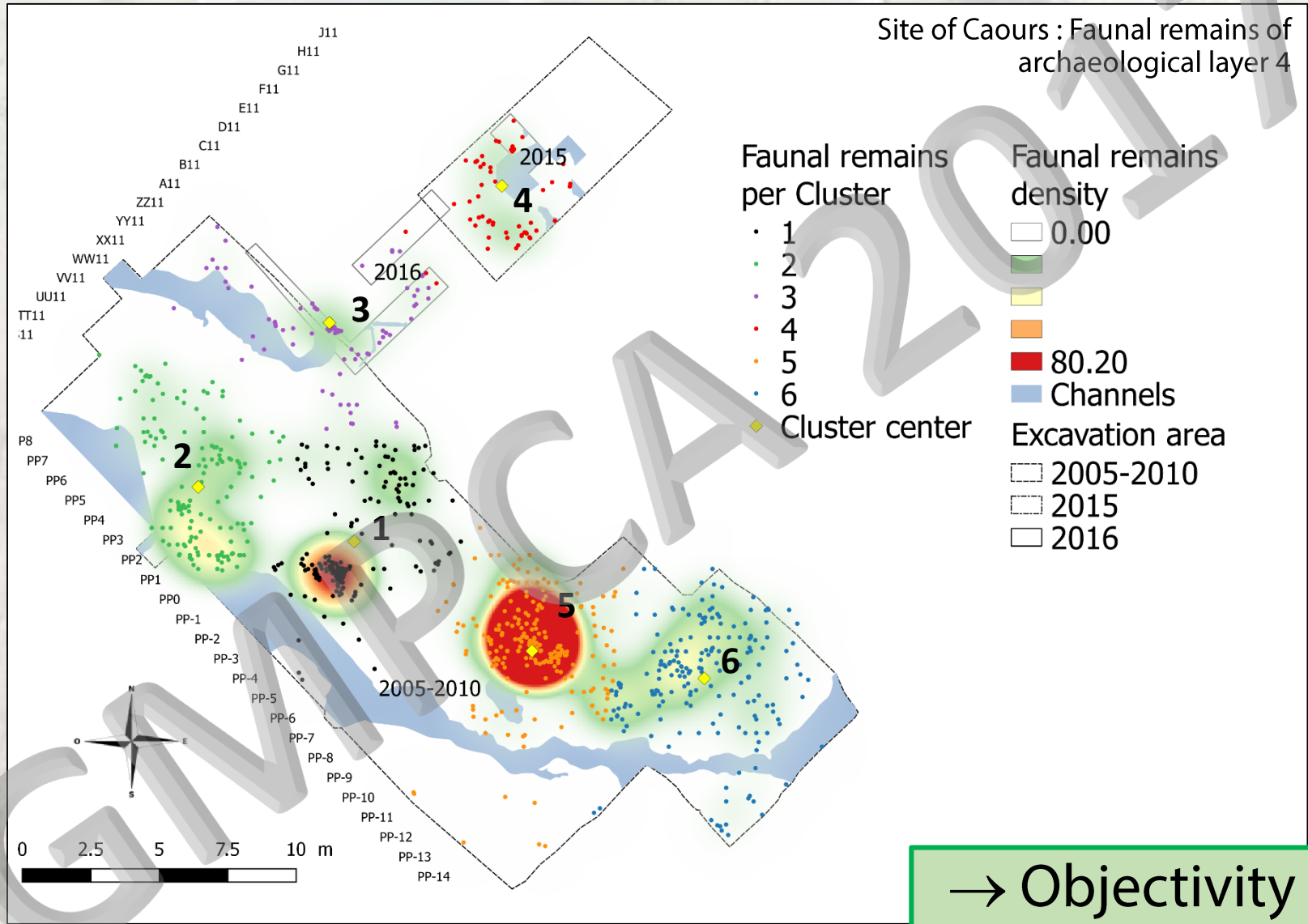


→ 6 concentration areas

Activity area : Mesh analysis

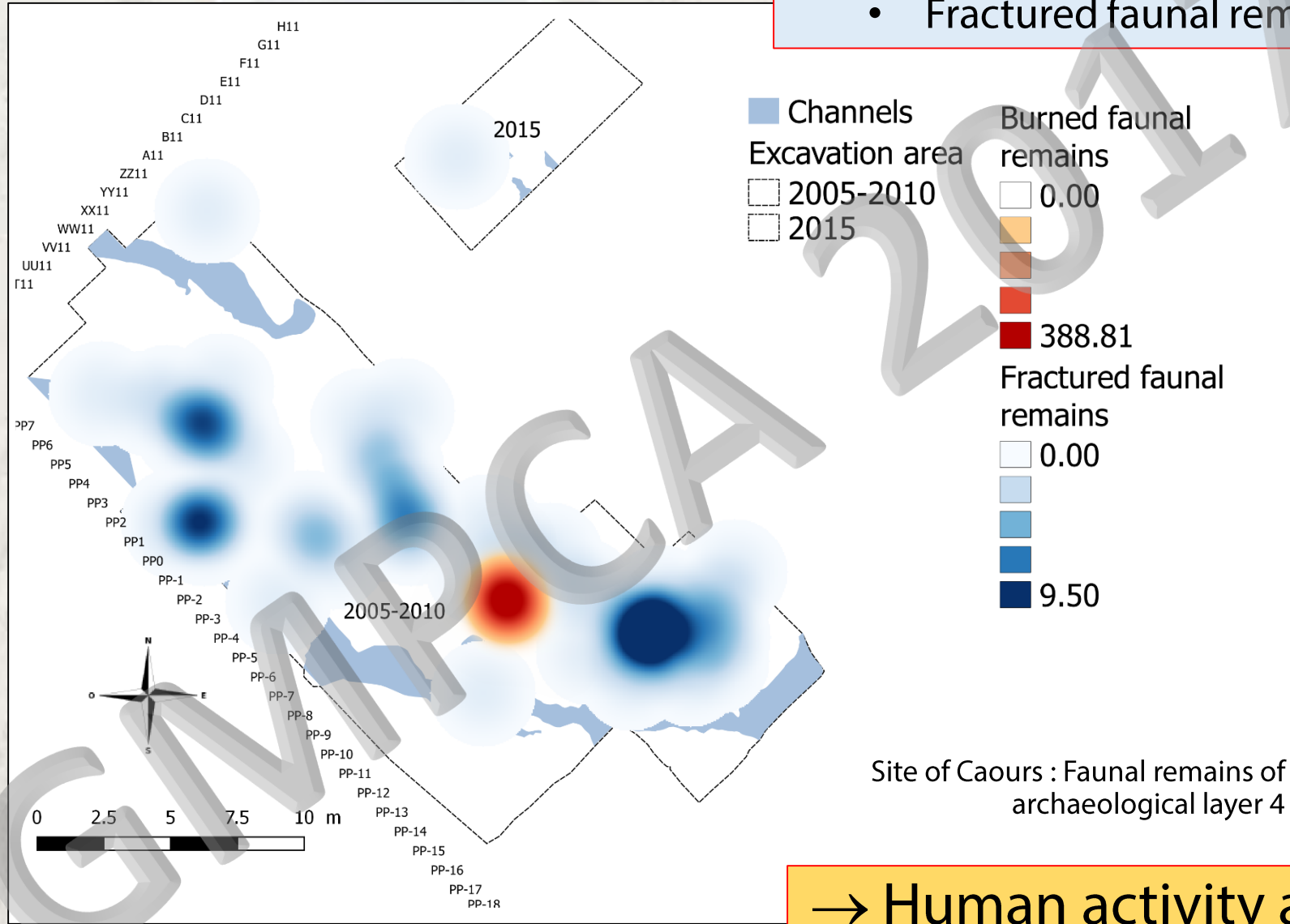


Activity area : Kernel Density Estimation combine with K-mean Clustering



Specific activity area

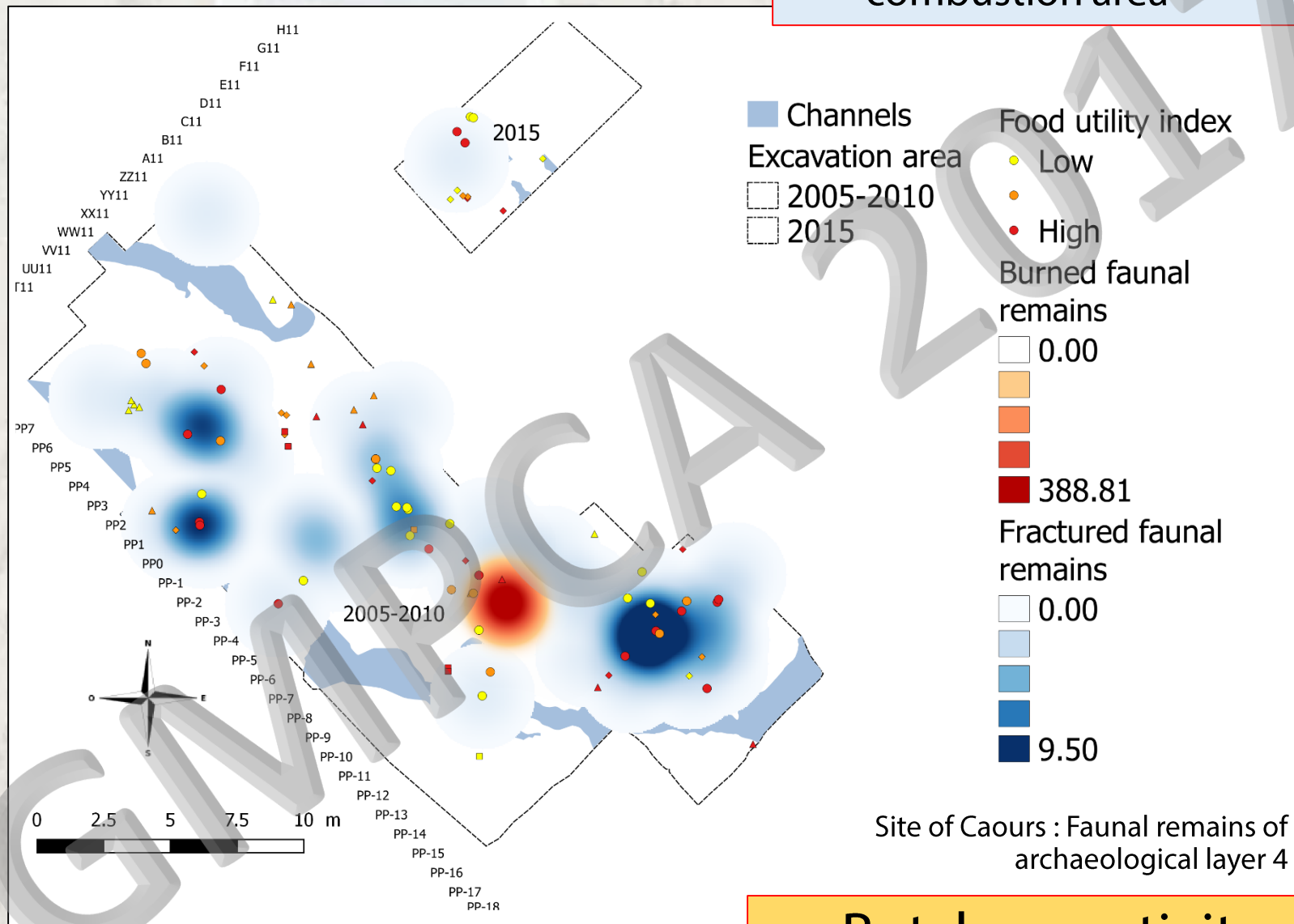
- Concentration zone of:
 - Burned faunal remains
 - Fractured faunal remains



→ Human activity area

Specific activity area

➤ Remains with high food utility near fracturation and combustion area



→ Butchery activity area

Conclusion

~~Mesh analysis~~



K-mean Clustering
➤ Determine number of cluster



Kernel Density Estimation

- Fracturation
- Combustion
- Food Utility



Highlight :

→ Human activity area

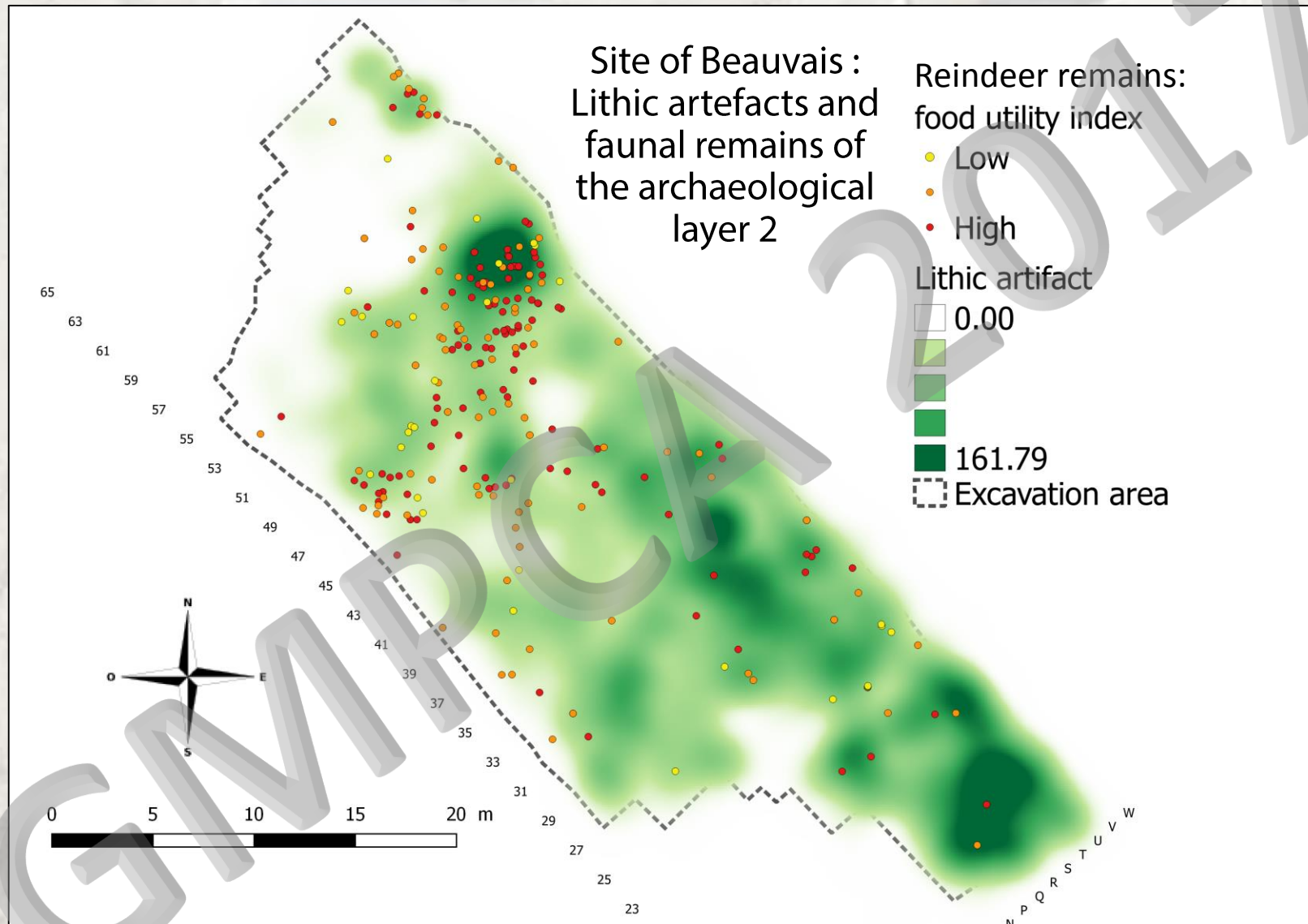
→ Butchery activity area



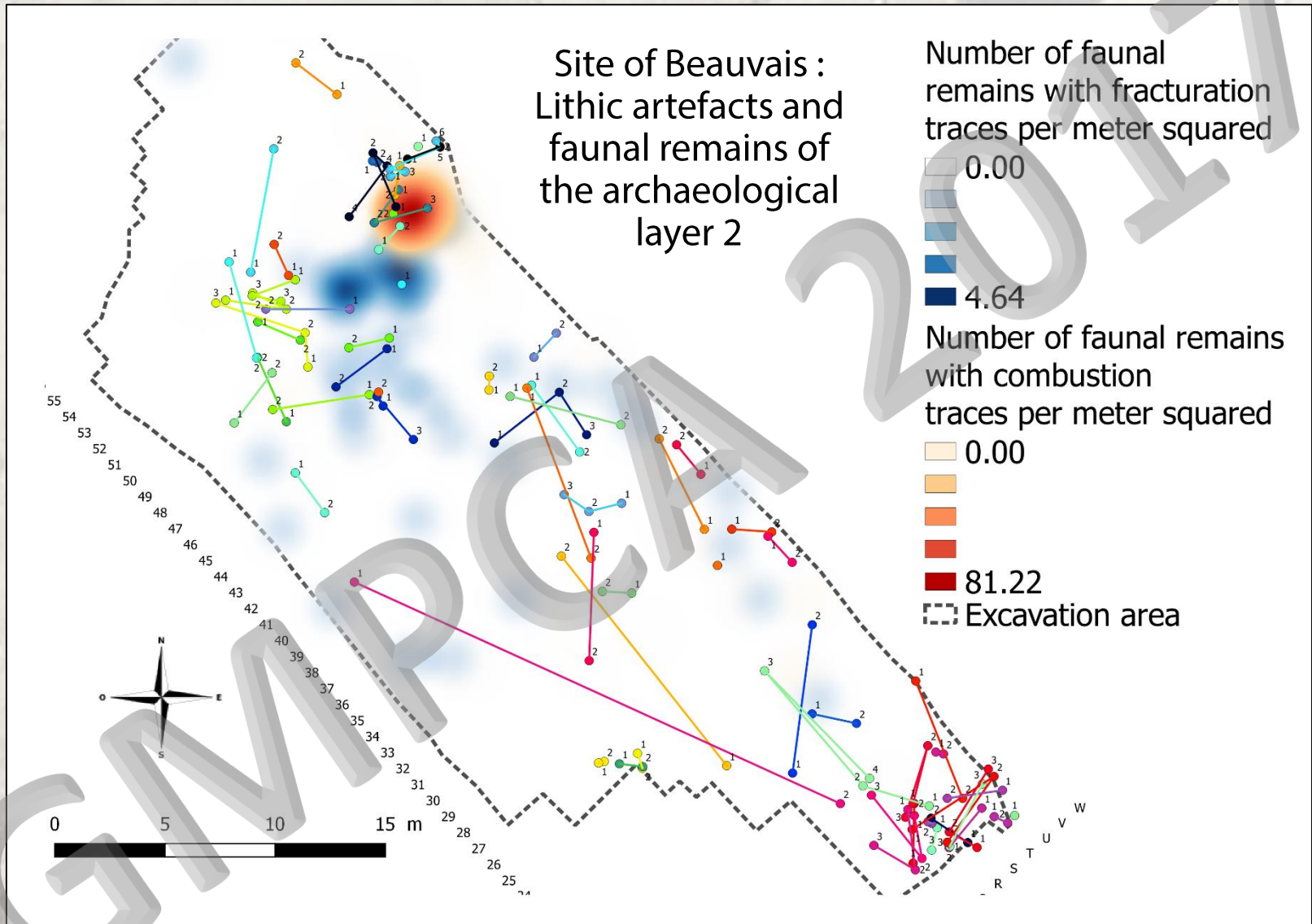
Confirm :

→ Butchery site

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.