

S16 GIS, a new trowel for archaeologists? The challenges of using GIS in preventive archaeology

# The role of GIS in geomorphological and archaeological studies of Palaeolithic occupations: applications to preventive excavations of the Canal-Seine Nord Europe

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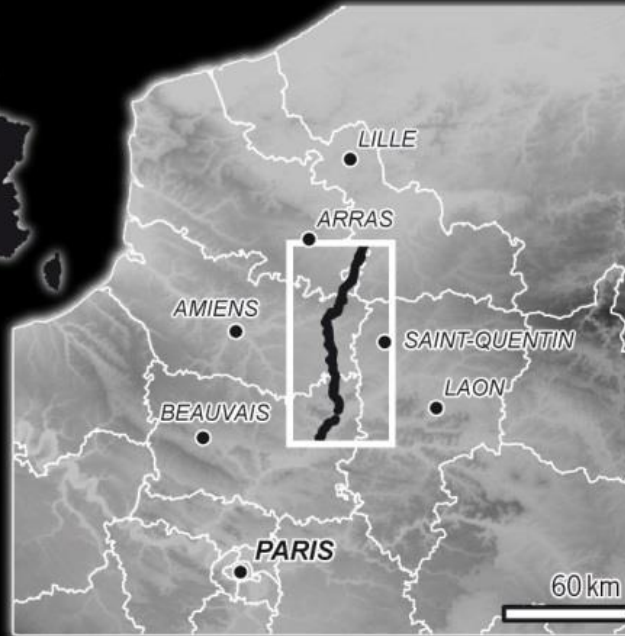
Jean-Luc Locht – Inrap, archaeologist, UMR 8591 CNRS

# INTRODUCTION

## CONTEXT

### The Canal Seine-Nord Europe project

- Archaeological explorations since 2008
- About 2 500 Hectares and more than 100 km long
- More than 40 diagnosis and more than 40 excavations
- More than 150 archaeologists, specialists and partners
- Technical team with topographers, geophysician, GIS specialist and computer graphics designers
- All periods represented : Paleolithic, Neolithic, Mesolithic, Bronze ages, Iron ages, Antiquity, Medieval ages, remains of the First World War



Sauchy-Lestrée, Marqion (62)  
©D. Gliksman

# INTRODUCTION

## PALAEOLITHIC CONTEXT

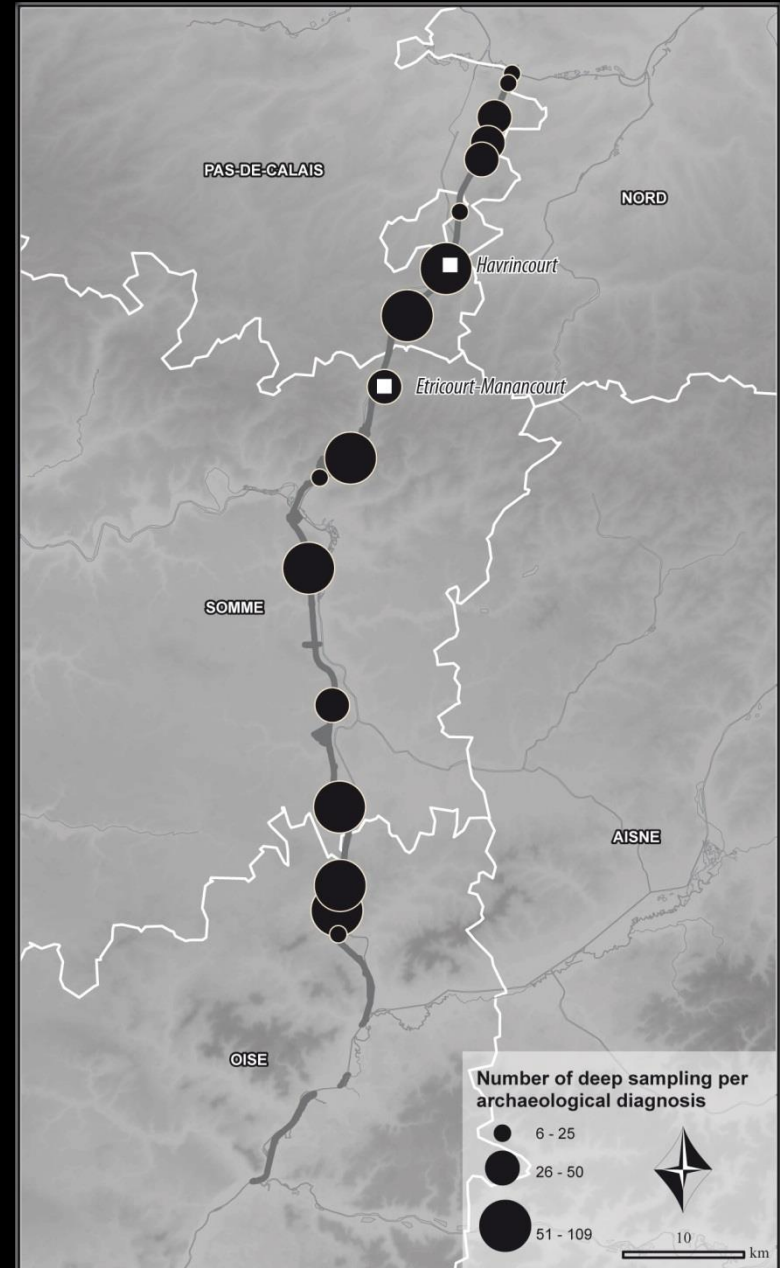
### Palaeolithic exploration – An unusual method

- ⇒ A specific sedimentary context – Lithic industries preserved under loess sediment
- ⇒ Deep pits – About 900 since 2008
- ⇒ 3 excavations :  
Havrincourt (2010 and 2011 – Middle and Upper Palaeolithic)  
Etricourt-Manancourt (2012 – Lower and Middle Palaeolithic)



© Inrap

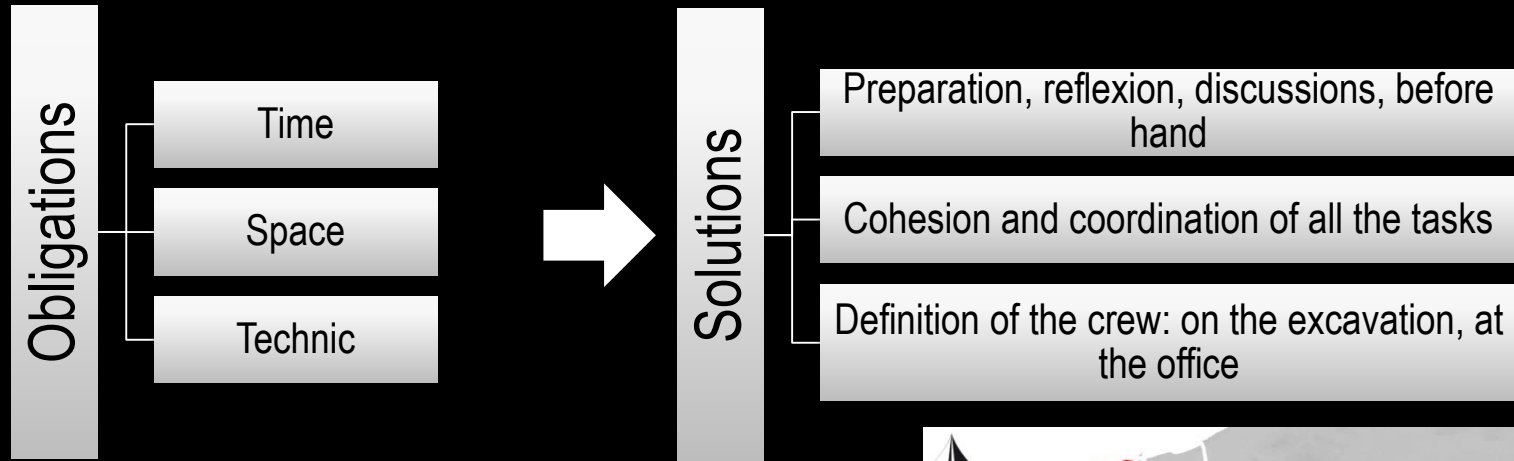
Etricourt-Manancourt (80) – ©D. Glicksman



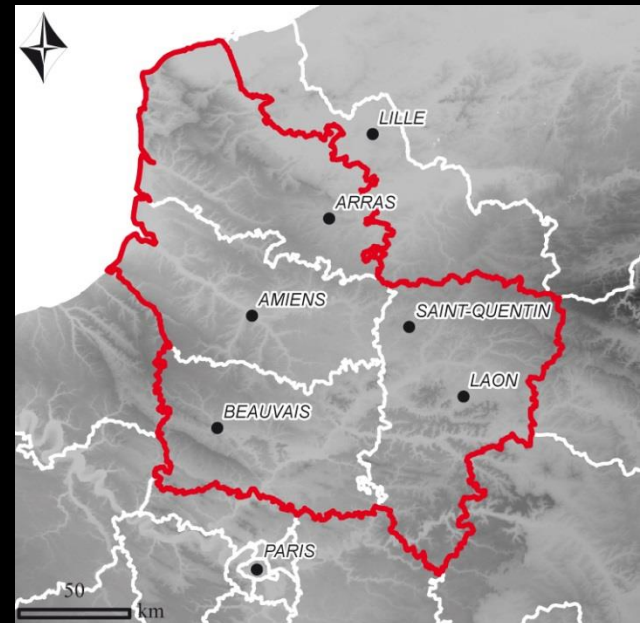
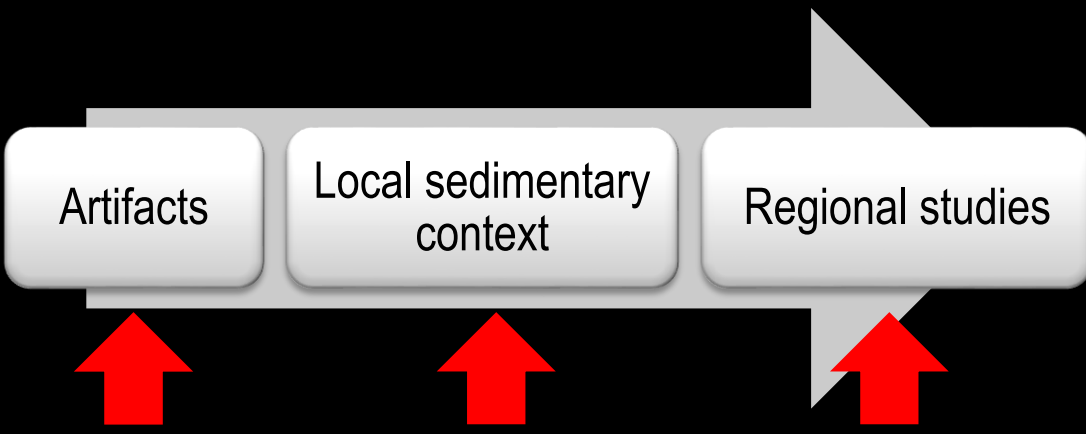
# INTRODUCTION

## GIS and Palaeolithic sites

- How can we use GIS among all the process, excavations and post-studies, in paleolithic context?



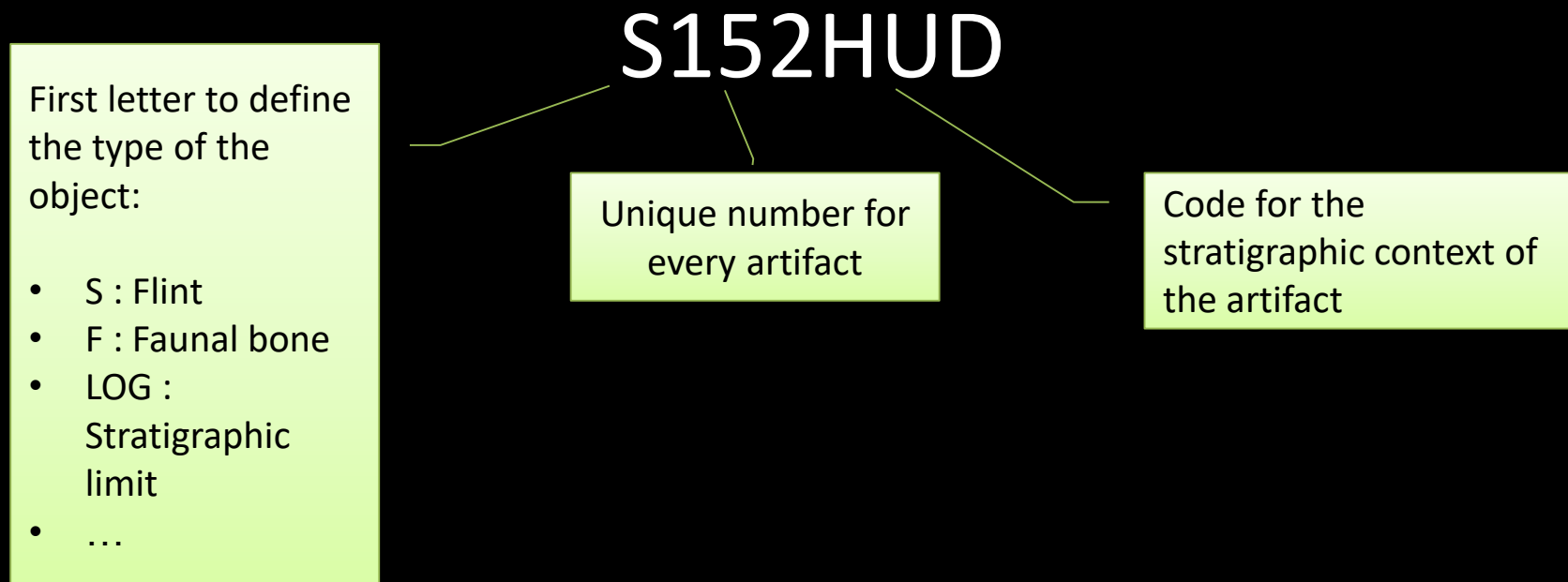
- Three scales of study:



# Recording datas

## Adaptation of classical recording methods

- ⇒ GPS (differential calculation) and a theodolite for 3 dimensions localisations
- ⇒ Simple methods to be used by non-professional topographer (archaeologists)
- ⇒ Topographic record at the same time of excavate
- ⇒ Data transmission everyday and calculation to be viewed in maps
- ⇒ Coded annotations of every records to allow first questioning on datas



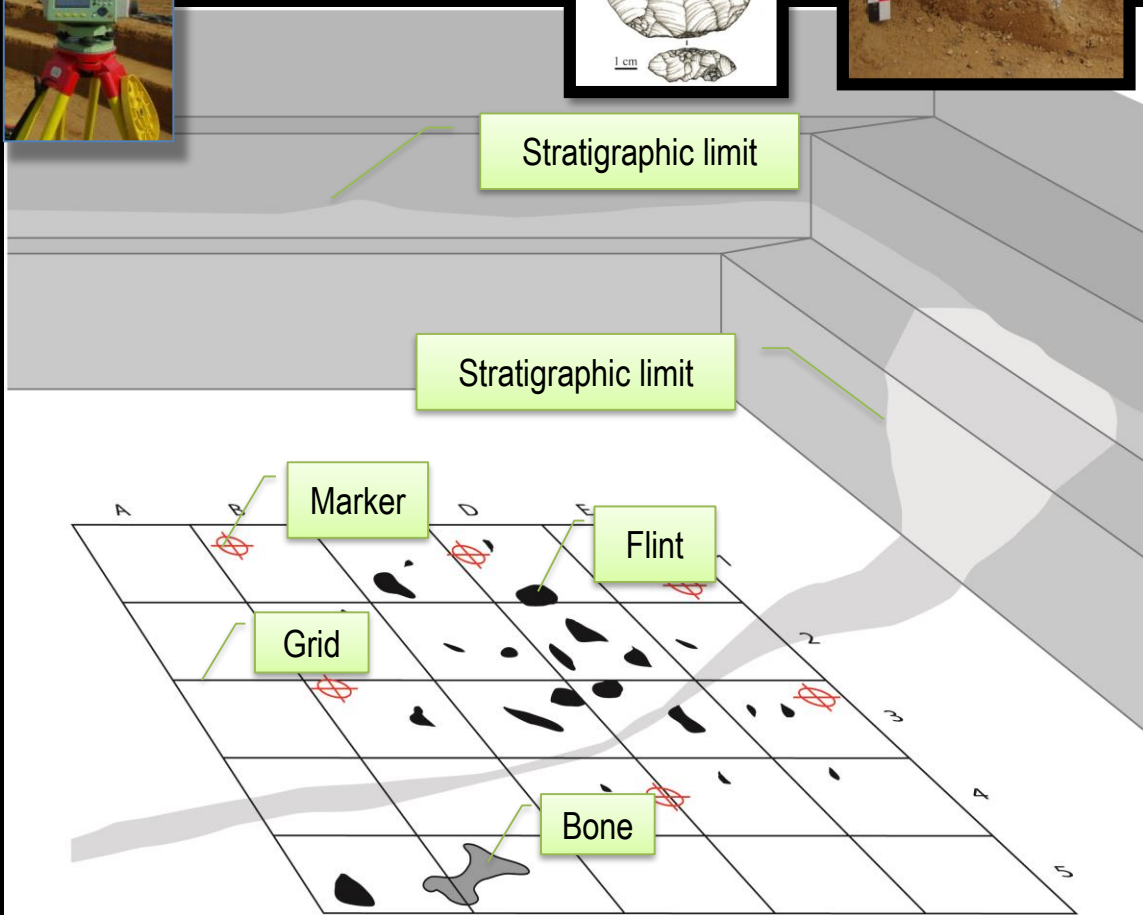
- ⇒ Simple maps are produced using the informations recorded to help archaeologist on the excavation

# Recording datas

## Palaeolithic artifacts



©B. Clarys



# Palaeolithic artifacts



**N° 1247** Code terrain **S1053A** MATRICULE TOPOGRAPHIQUE 2795

**Provenance**  
 Secteur 2  
 Locus 1  
 Remontage N° 26  
 Objet N° 75

**Données générales**  
 Altitude (NGF) 87.81  
 Niveau A  
 Niveau géologique  
 Catégorie Eclat  
 Autre  
 Eclat de moins de 3 cm 15-20 mm 20-30 mm  
 Etat Fragment  
 Talon  
 Matière première silex  
 Outils  
 Ordre dans le remontage 8  
 Brûlé

**Données de tracéologie**  
 Etude tracéologique  
 Type d'étude  
 Traces d'utilisation  
 Interprétation fonctionnelle  
 Remarques  
 Patine brillante  
 Emoussé  
 Patine blanche  
 Esquilement naturel  
 Ecrasement  
 Esquilement / Fracture accidentelle  
 Stries

**Données métriques**  
 Longueur (mm)  
 Largeur (mm)  
 Epaisseur (mm)  
 Masse (g)

**Remontage N° : 26**  
 Nombre de pièces : 92  
**Silex inclus dans le remontage**

Numéri	Identifiant terra	Altitude
1247	S1053A	87.81
1265	S1033A	87.88
943	S1341A	87.56
944	S1340A	87.56

**Objet N° : 75**  
 Nombre de pièces : 4  
**Silex inclus dans l'objet**

Numéri	Identifia	Altitude
1247	S1053A	87.81
1077	S1228A	87.76
1096	S1209A	87.85

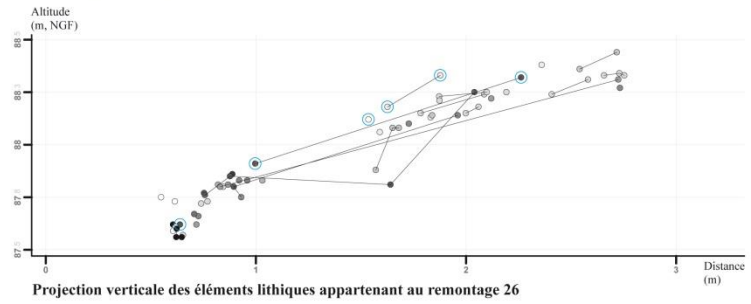
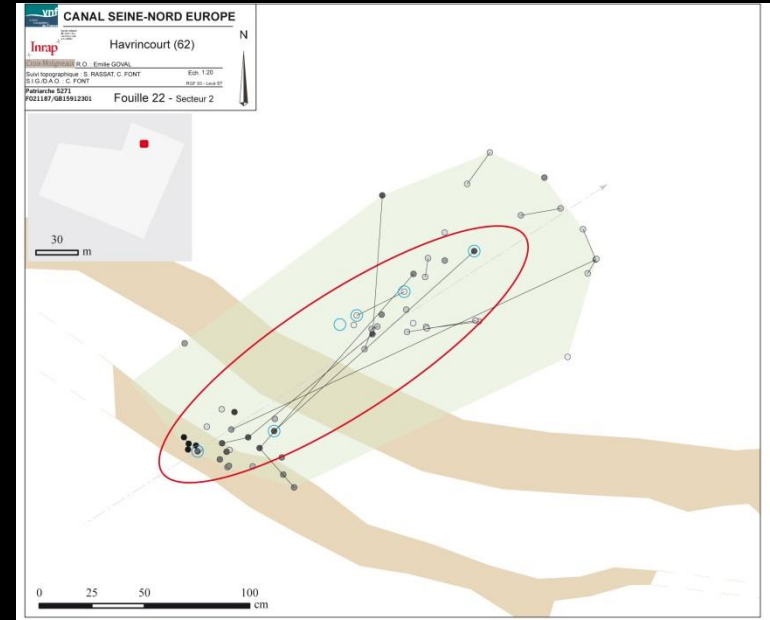
**Remarque générale**

Remontage N° 26

Ordre dans le remontage 8

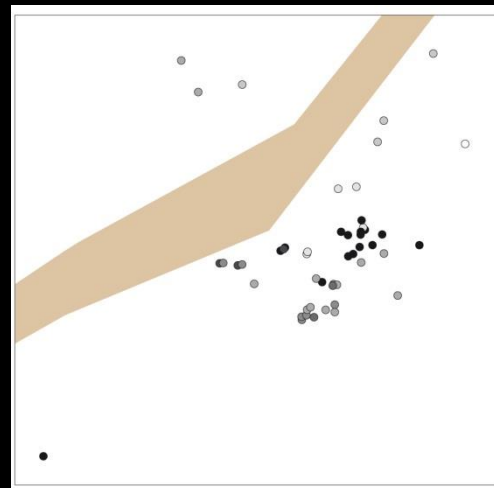
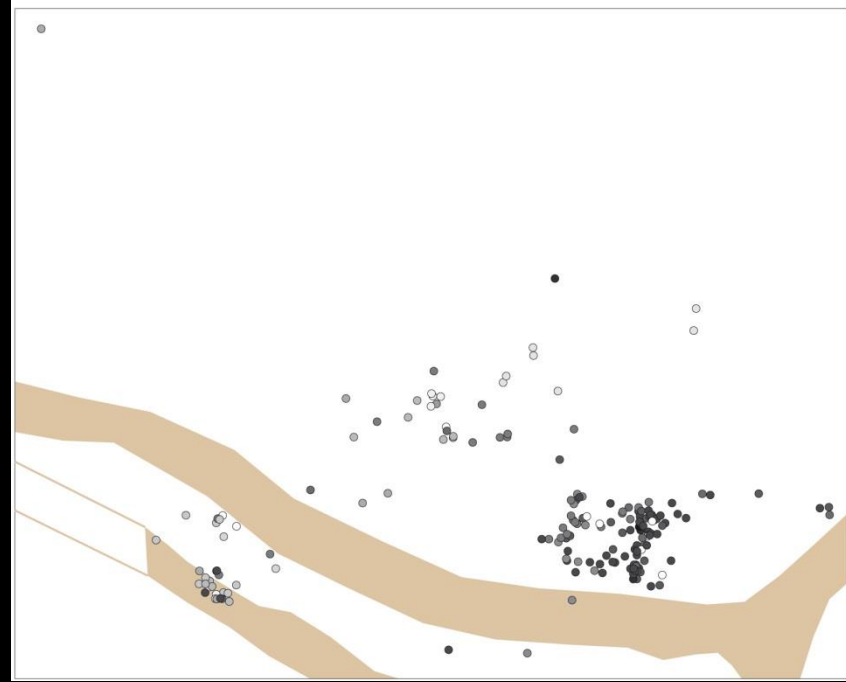
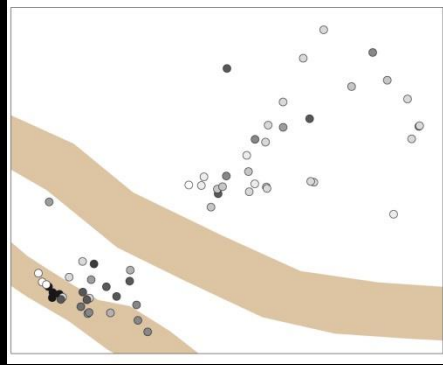
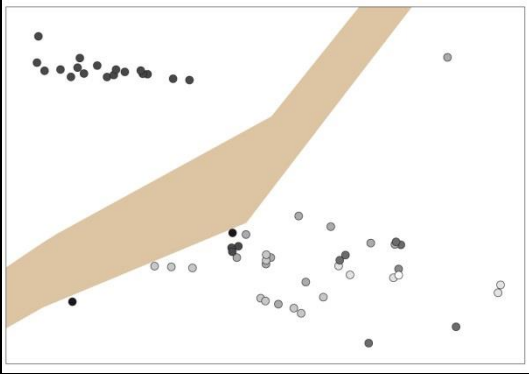
**Remontage N° : 26**  
 Nombre de pièces : 92  
**Silex inclus dans le remontage**

Numéri	Identifiant terra	Altitude
1247	S1053A	87.81
1265	S1033A	87.88
943	S1341A	87.56
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# Palaeolithic artifacts

Artifacts



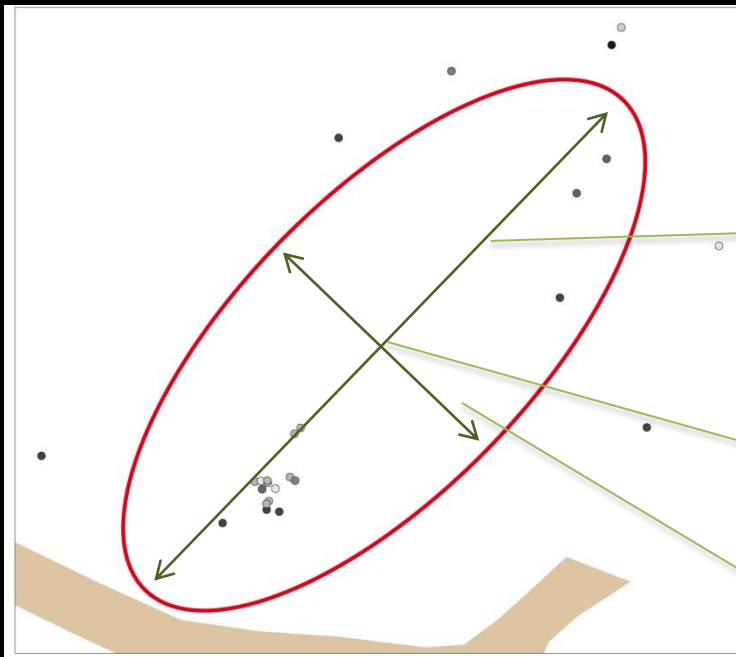
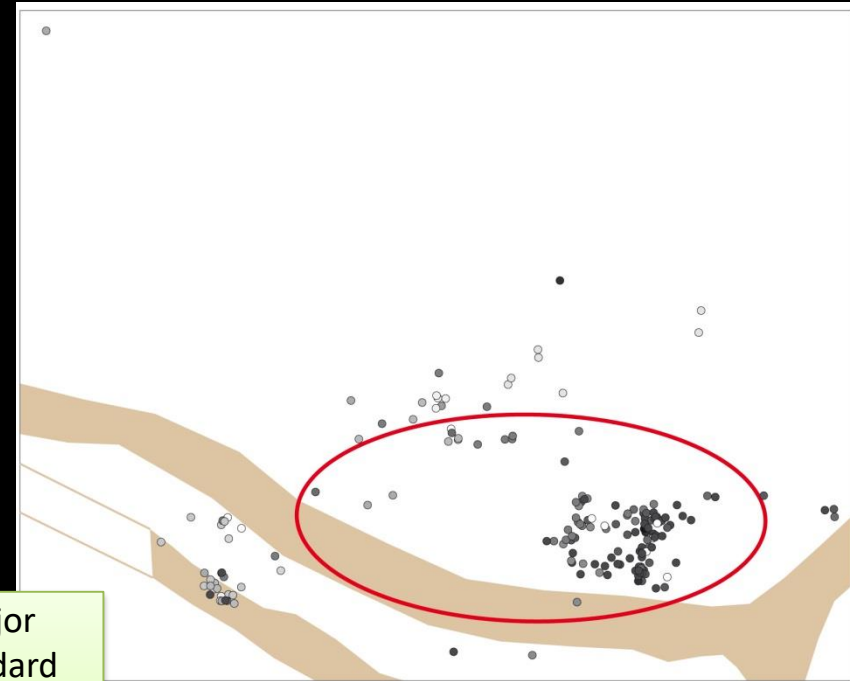
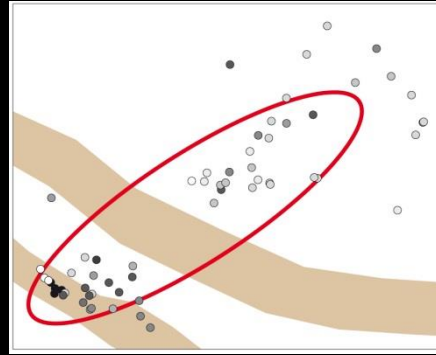
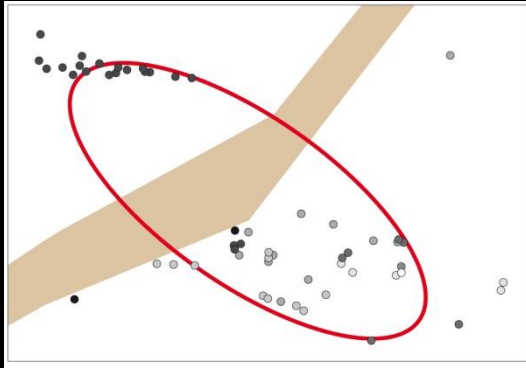
1 m

Havrincourt (62) – ©D. Glicksman



# Palaeolithic artifacts

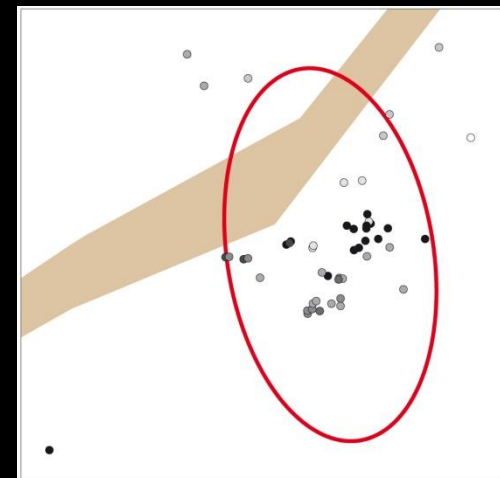
Artifacts



Major  
Standard  
deviation  
and  
direction

Mean value

Minor  
Standard  
deviation  
and  
direction

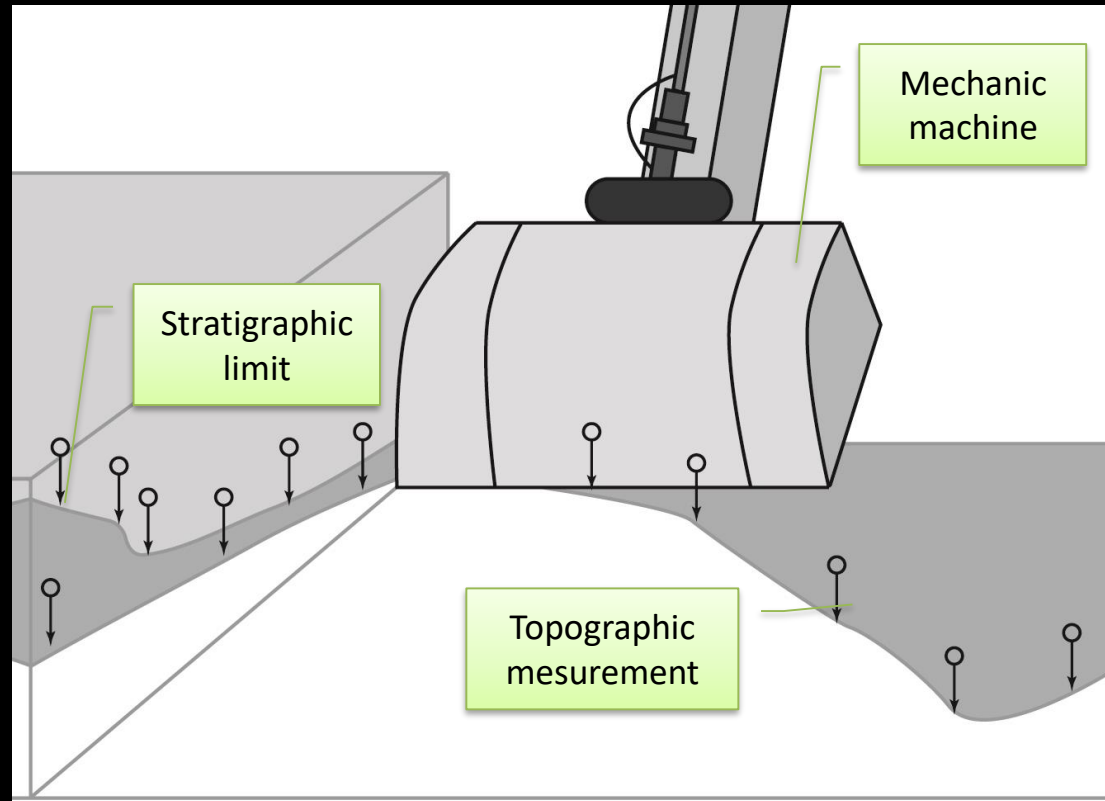


1 m

## Stratigraphic context of archaeological remains



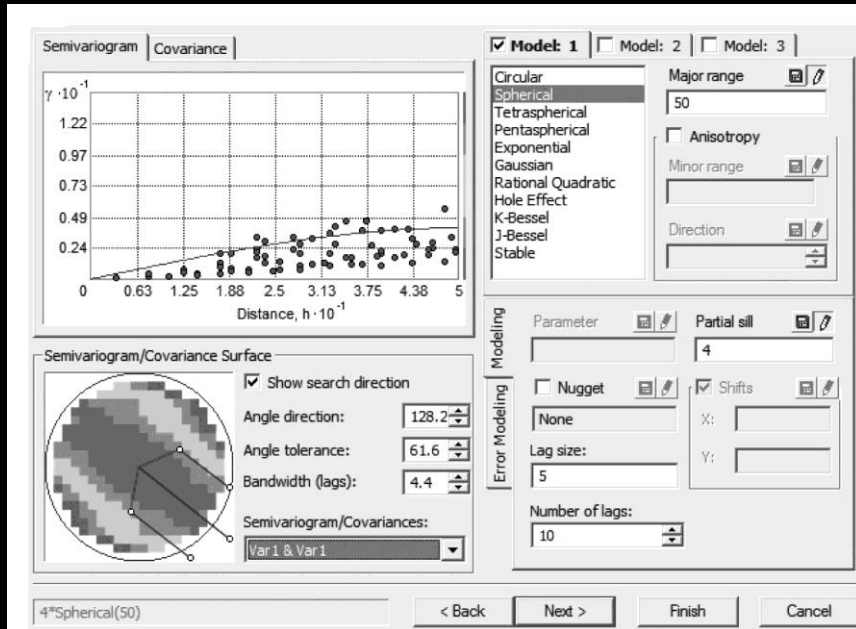
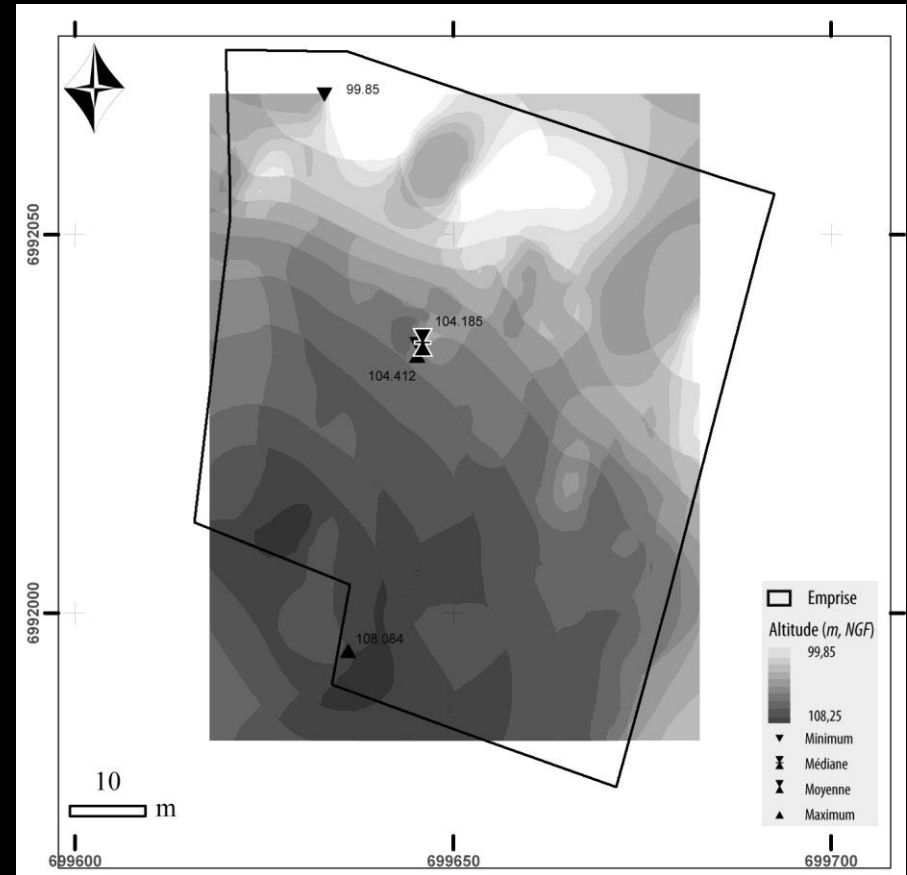
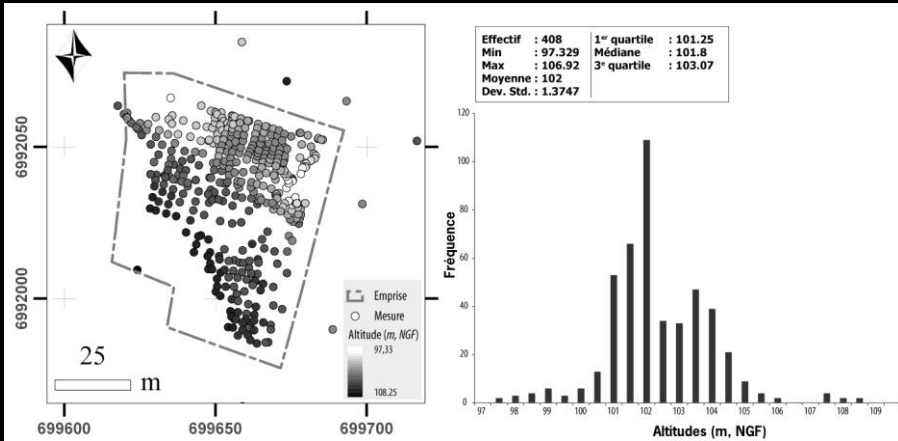
During the excavation, topographic measurements are taken on the top and on the basis of stratigraphic layers



*Hérissou et al., à paraître*

# Local sedimentary processes

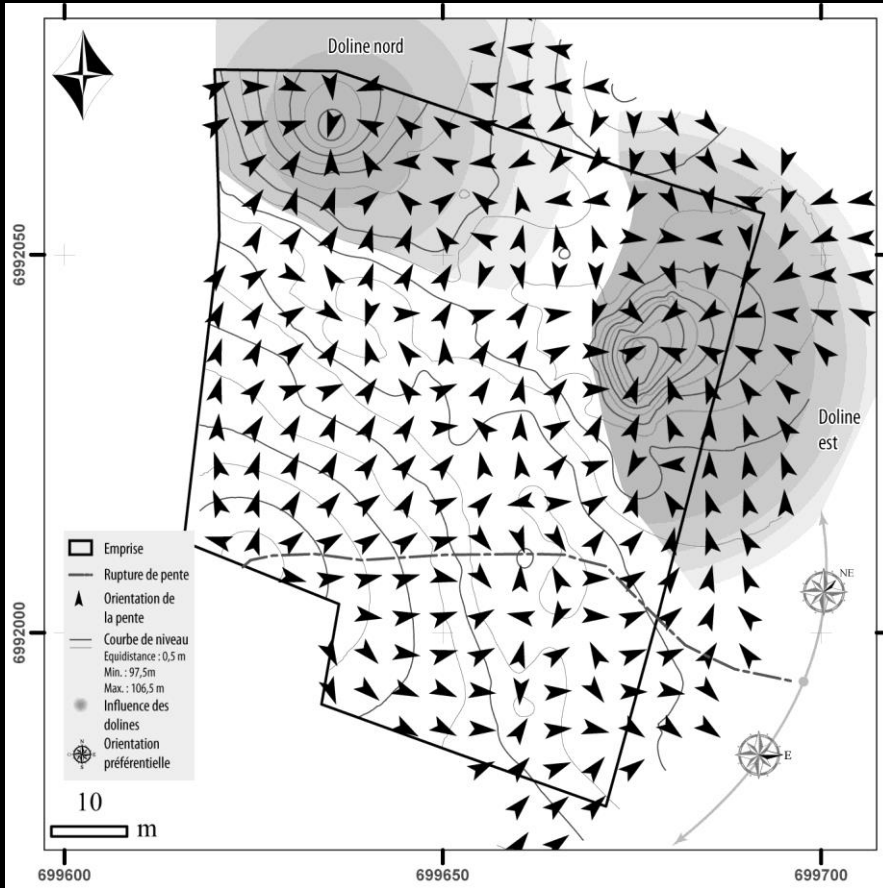
Geology



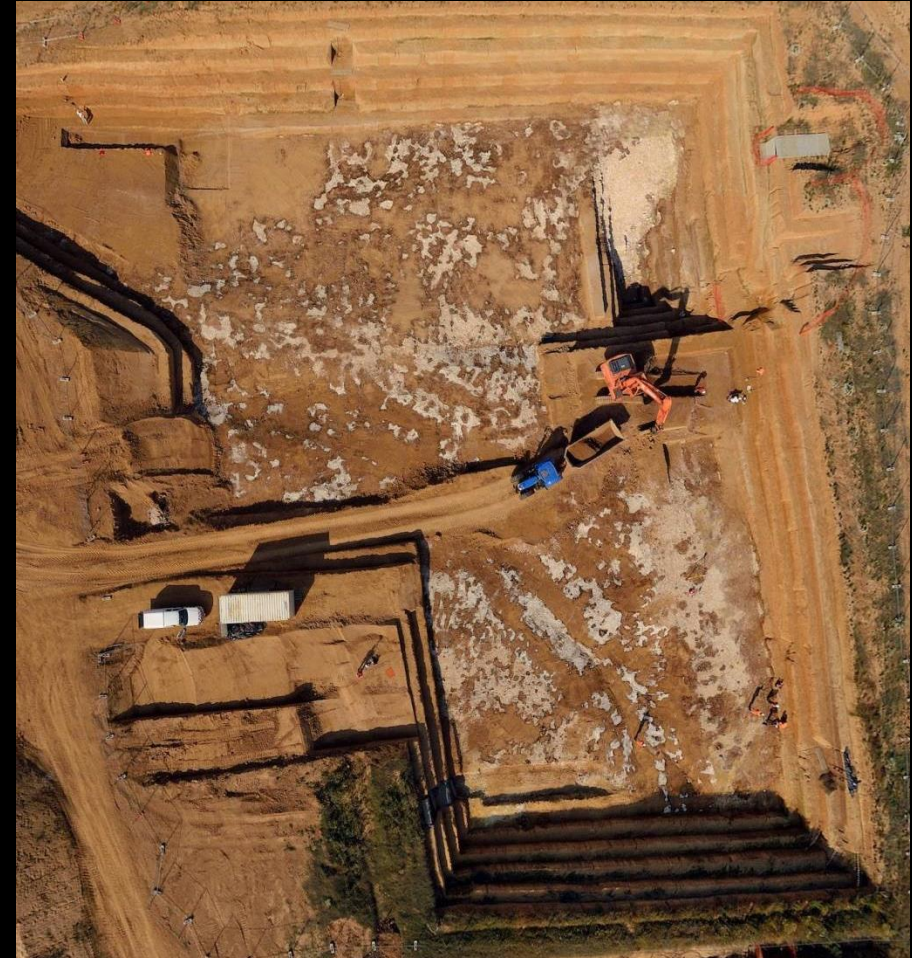
Hérissou et al., à paraître

# Local sedimentary processes

Geology

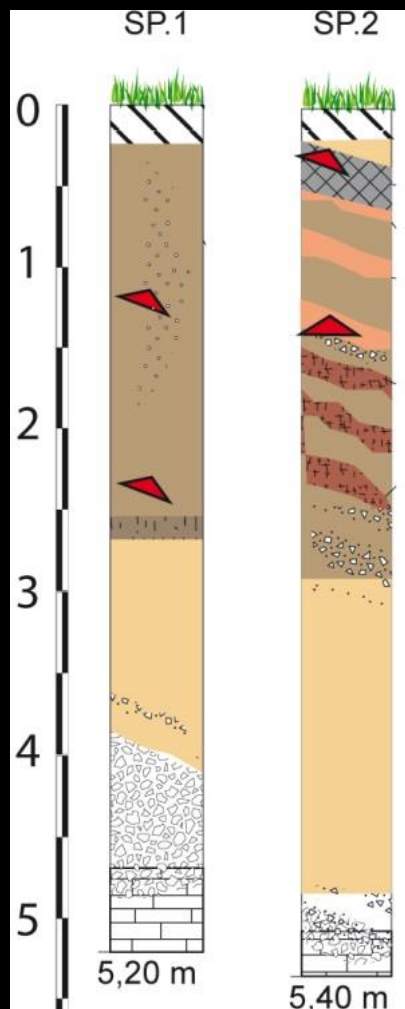


Hérissou et al., à paraître



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## Stratigraphic context of archaeological remains



UNITE STRATIGRAPHIQUE LISTE DES UNITES STRATIGRAPHIQUES

N°: 1

NAVIGATION - Unités stratigraphiques

Lithologie TV/Ap

Pédostratigraphie

Interprétation chronologique Holocène

Stade isotopique 1

Profondeur du toit (m) 0

Profondeur de la base (m) 0.35

Altitude supérieure (m) 48.000000001

Altitude inférieure (m) 47.650000006061

Datation absolue 0

Méthode de datation

Présence de silex taillé(s)

Nombre de pièces lithiques 0

Présence de faune

Présence de pergélisol

Remarques

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Nombre de pièces lithiques 0

Présence de faune

Présence de pergélisol

Remarques

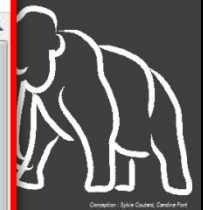
N°: (Nouv.)

En place ?

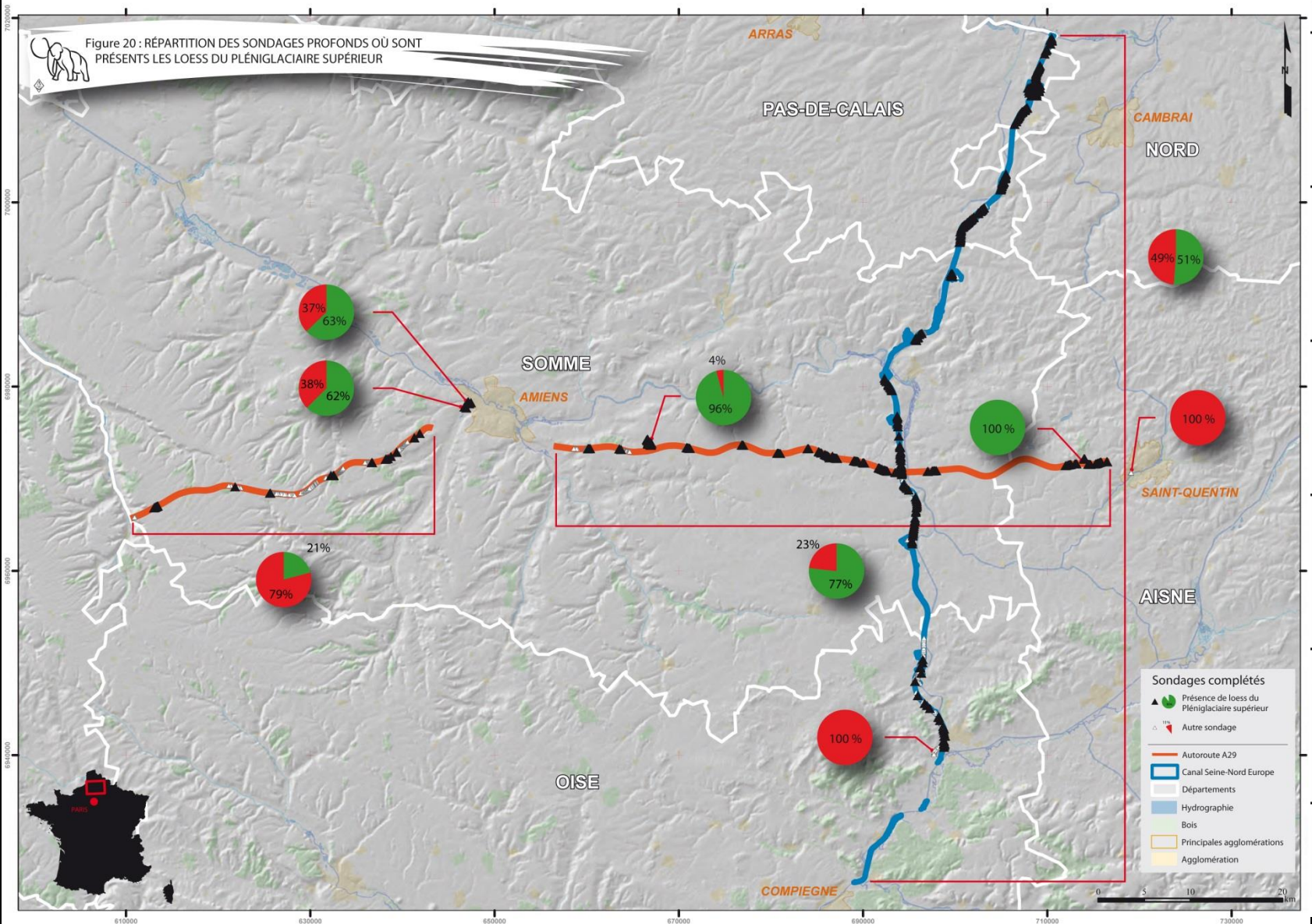
Chaîne opératoire

Entrée: 1 sur 1

Nouvelle unité stratigraphique



Rechercher



# Conclusion

- ⇒ GIS used during the excavation and the study phase
- ⇒ All scales of scientific research are referenced and correlated
- ⇒ **All the step of process, from the excavation to the study, must be carefully prepared with all the team in order to be able to answer all the scientific questioning**

- Goval E., Hérison D., Antoine P., Auguste P., Bahain J.-J., Claud E., Coutard S., Font C., Guerrin G., Hulin G., Jamet G., Moine O., Prilaux G., Schmidt E., Valladas H. (2013). *Des derniers Néandertaliens aux premiers Homo Sapiens : les occupations paléolithiques d'Havrincourt « Les Bosquets » (Pas-de-Calais)*, Rapport de fouille du Canal Seine-Nord Europe, Service Régional de l'Archéologie Pas-de-Calais, 432 p.
- Hérison D., Font C., Goval E., Coutard S., Loch J.-L. (à paraître). *Le Système d'Information Géographique : la reconstitution de la paléotopographie et des implantations humaines : Apport du SIG à l'étude géomorphologique et archéologique du gisement paléolithique d'Etrécourt-Manancourt (Somme, France)*, Revue International de Géomatique, 55 p.

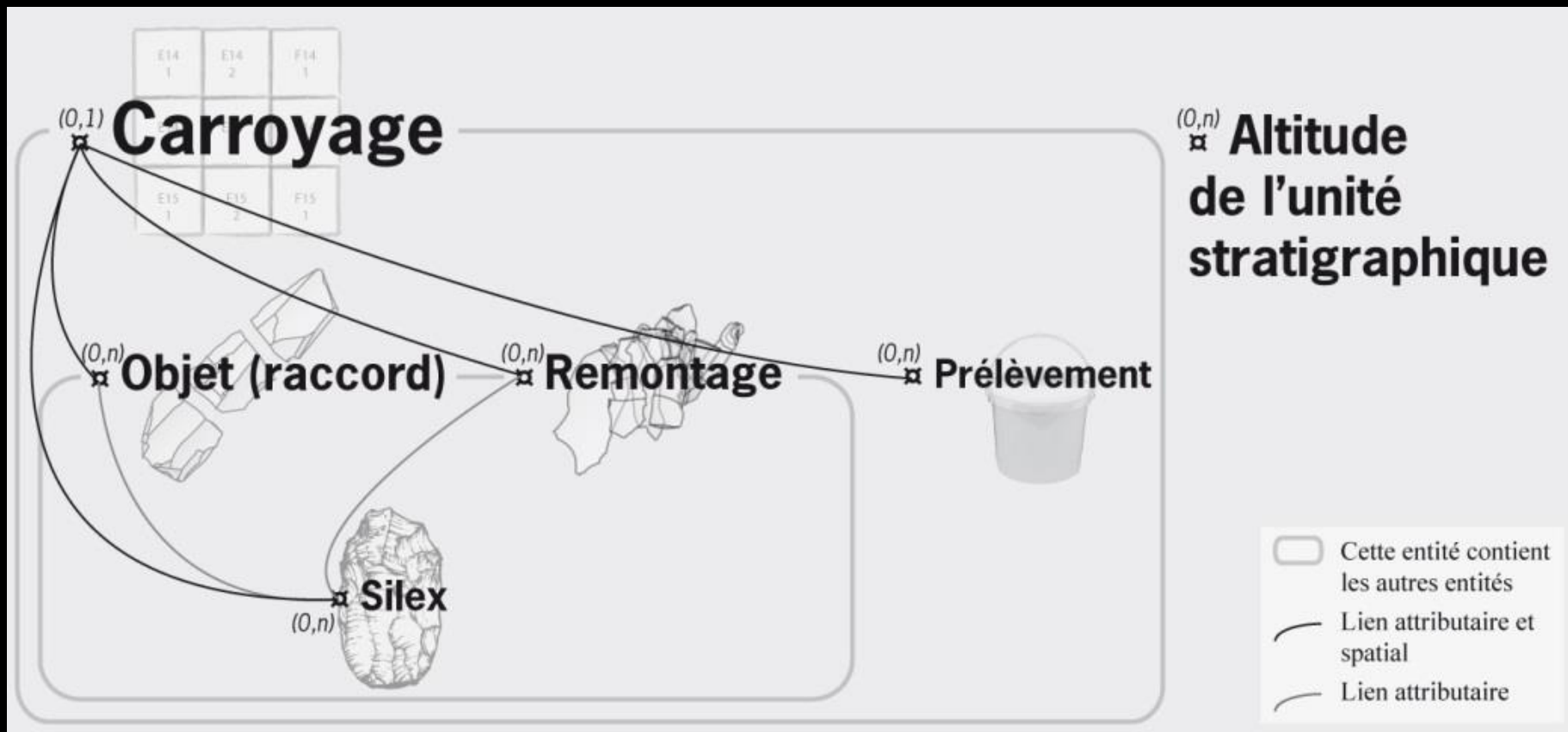
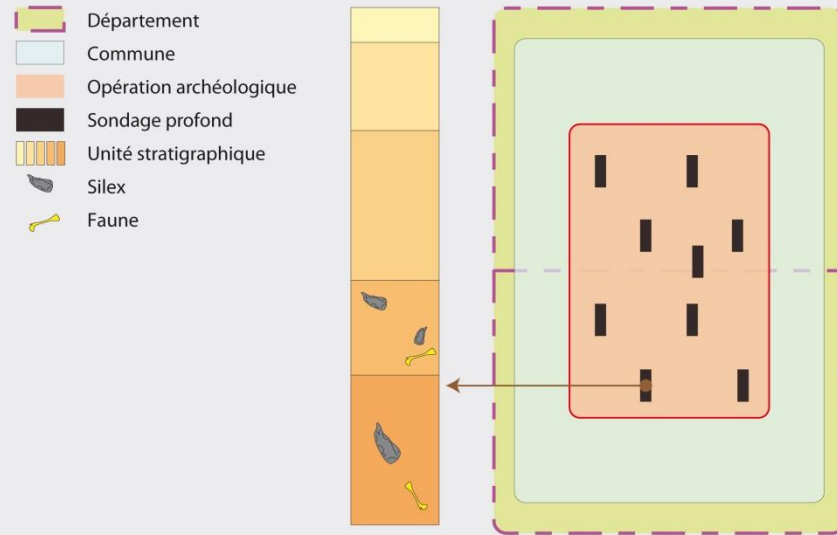
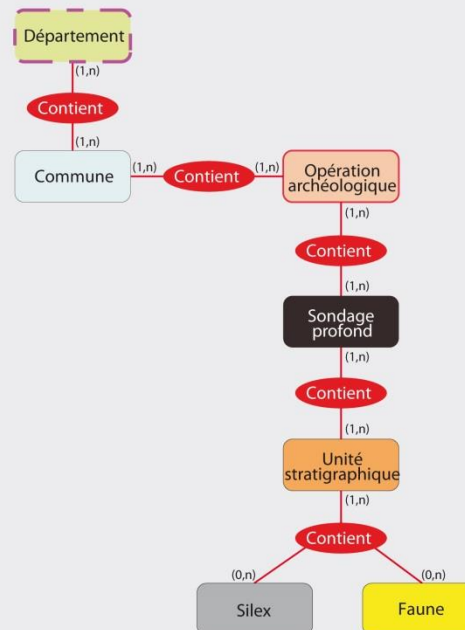




Figure 1 : structure schématique d'une opération archéologique de sondages profonds



Modèle conceptuel de la base de donnée (type Merise)



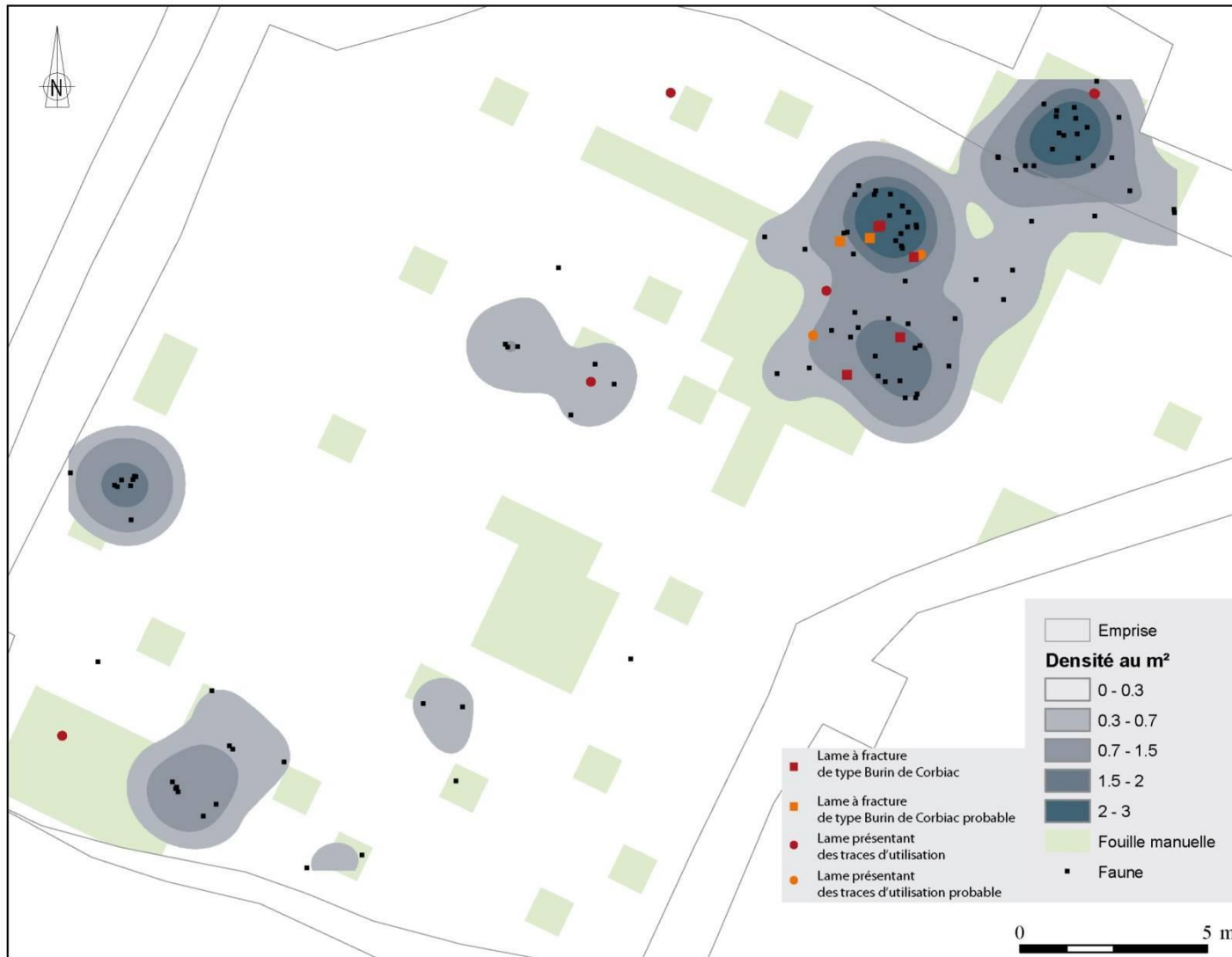


Figure 27 : Renancourt - répartition spatiale de l'ensemble des restes de faune associés aux résultats de l'étude tracéologique