



Wood Species and Construction Functions in Early Bronze Age Mountain Dwellings

The case study of the Haille-de-Pout site, Cirque de Troumouse
(French Pyrenees)

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Géode
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Timber: The Backbone of Bronze Age Architecture

- Primary building material
- Structural use: walls, frameworks, roofs, partitions
- Poor preservation: a hidden architecture
- Known mainly through charcoal remains
- Reflects technical knowledge and environmental adaptation



Tracing Lost Wooden Architectures

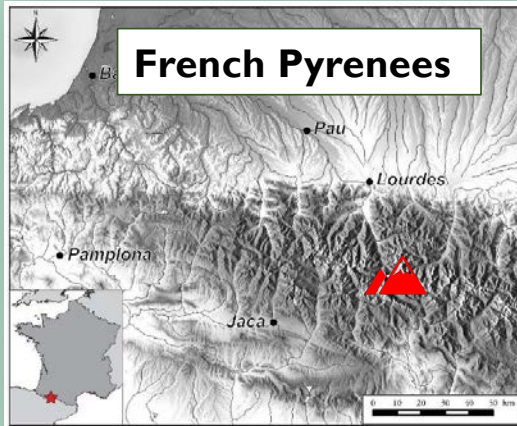
- Poor preservation of timber structures in Pyrenean high-mountain Bronze Age sites
- **Haille-de-Pout as an exceptional case**
- What woods were used? For which architectural functions? How selective were the choices?



Charred wooden structure – Haille-de-Pout ©Saint-Sever

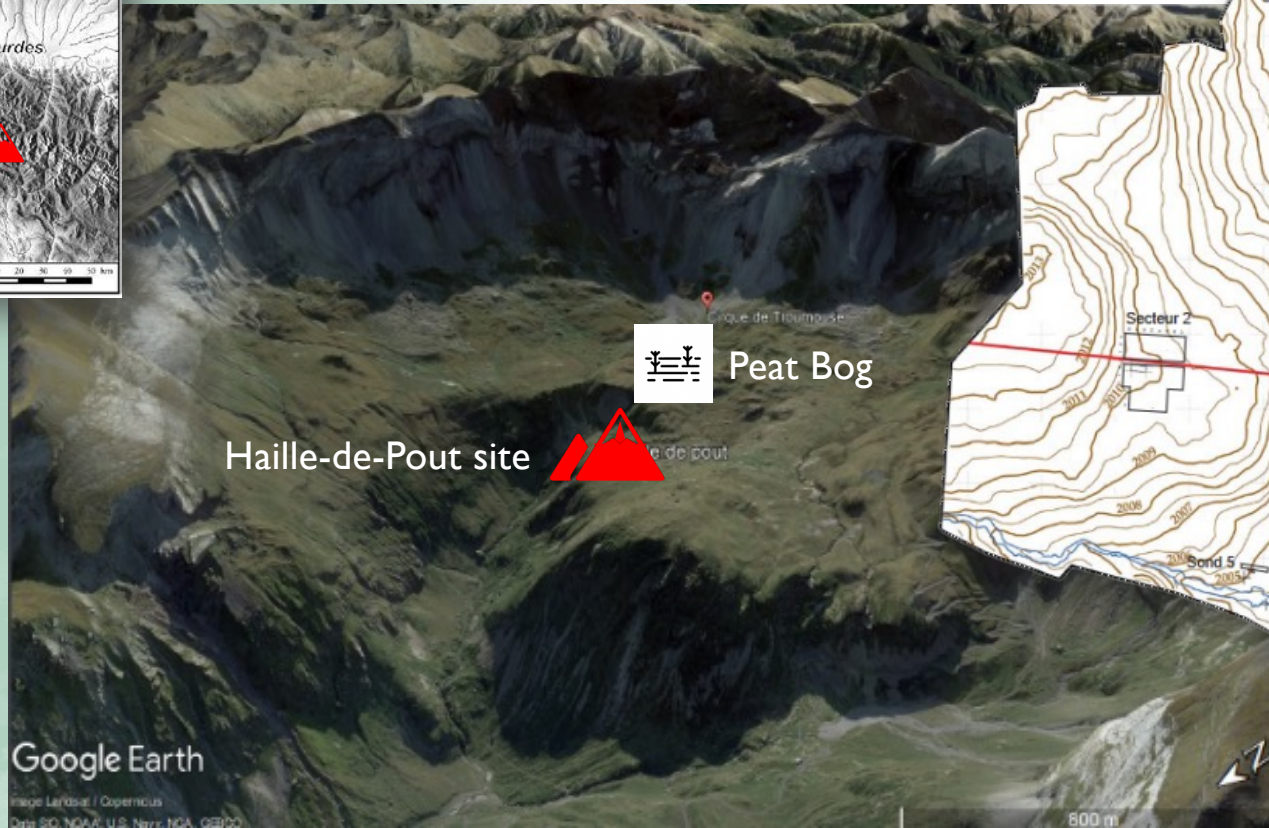


A High-Altitude Bronze Age Settlement



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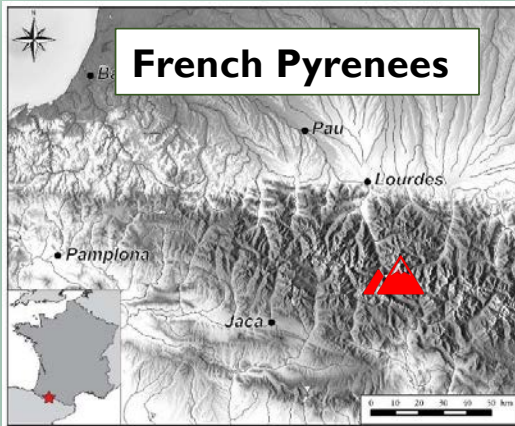
2000 m asl in the *Cirque de Troumouse* (Gèdre, Gavarnie)



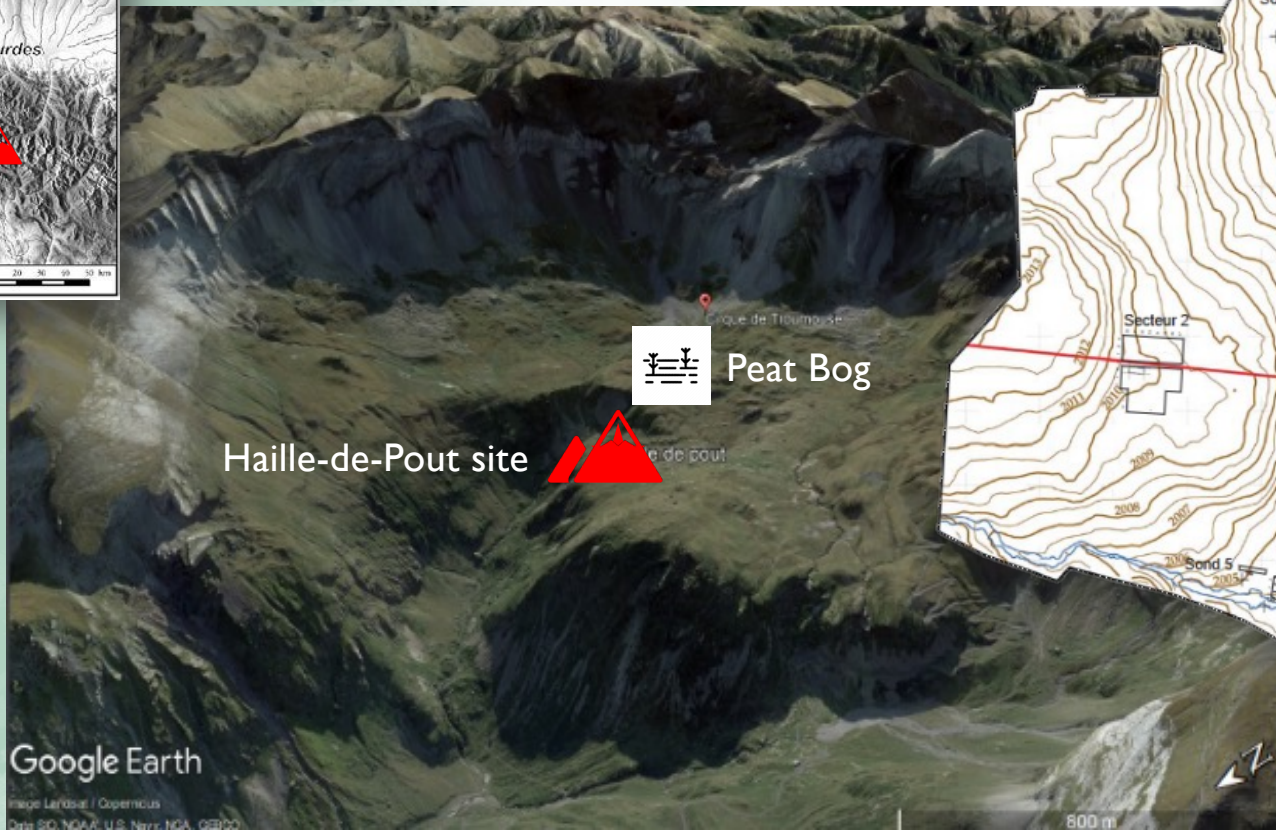
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A High-Altitude Bronze Age Settlement



4 occupation phases between late 3rd and early 2nd millennia BCE



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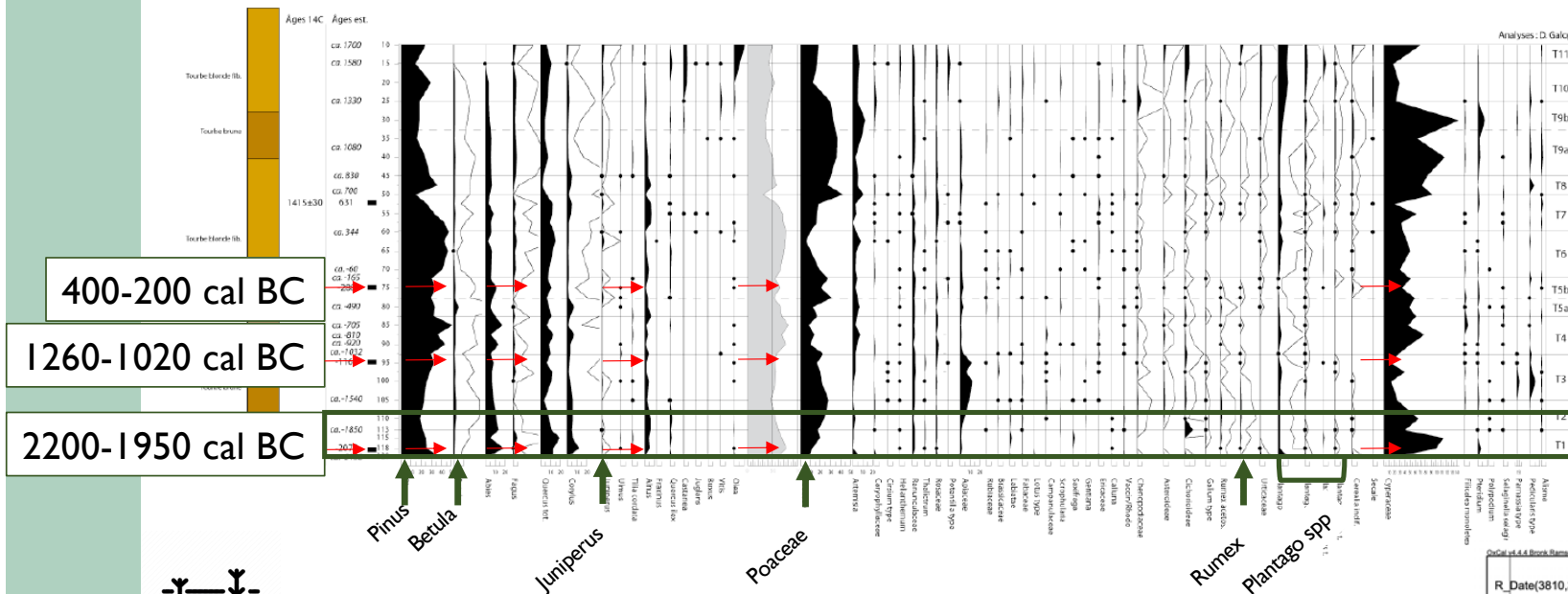


A High-Altitude Bronze Age Settlement



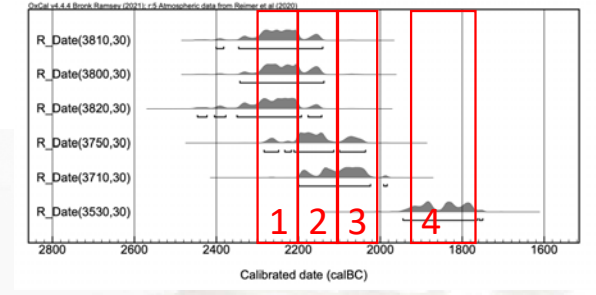
Site Function: pastoralism suggested by pollen data and possible mineral resource exploitation

TROUMOUSE 2 (Hautes-Pyrénées) - 2120m



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Haille-de-Pout Occupations Phases



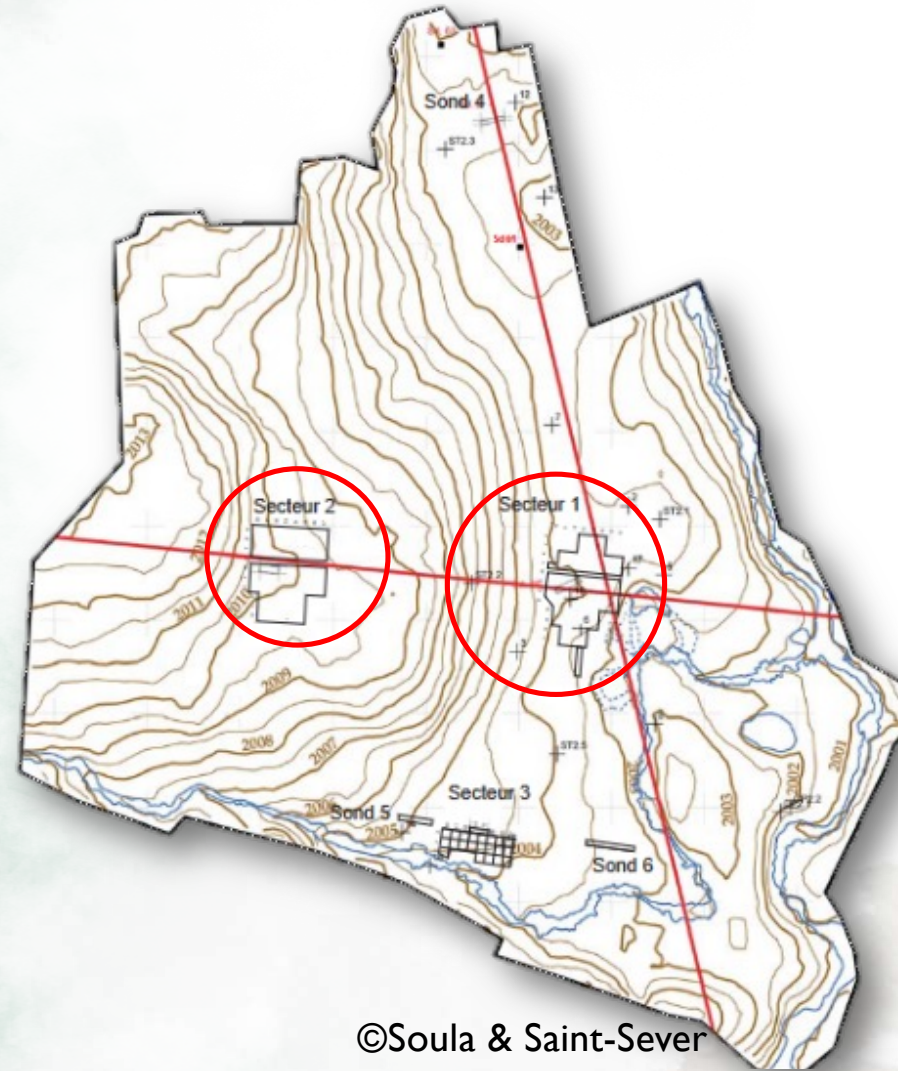
Troumouse 2 (Hautes-Pyrénées) 2120 m asl (Analyses Galop, 2007)

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Unearthing Burned Timber Structures

- 3 superimposed dwellings destroyed by fire in Sector 1 & 2
- Charcoal and bark layers from burned wooden superstructures
- Postholes and stone-built substructures
- Systematic spatial recording and sampling



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Charred woven plant remains



Posthole



Charcoal, stone and, rubefied earth



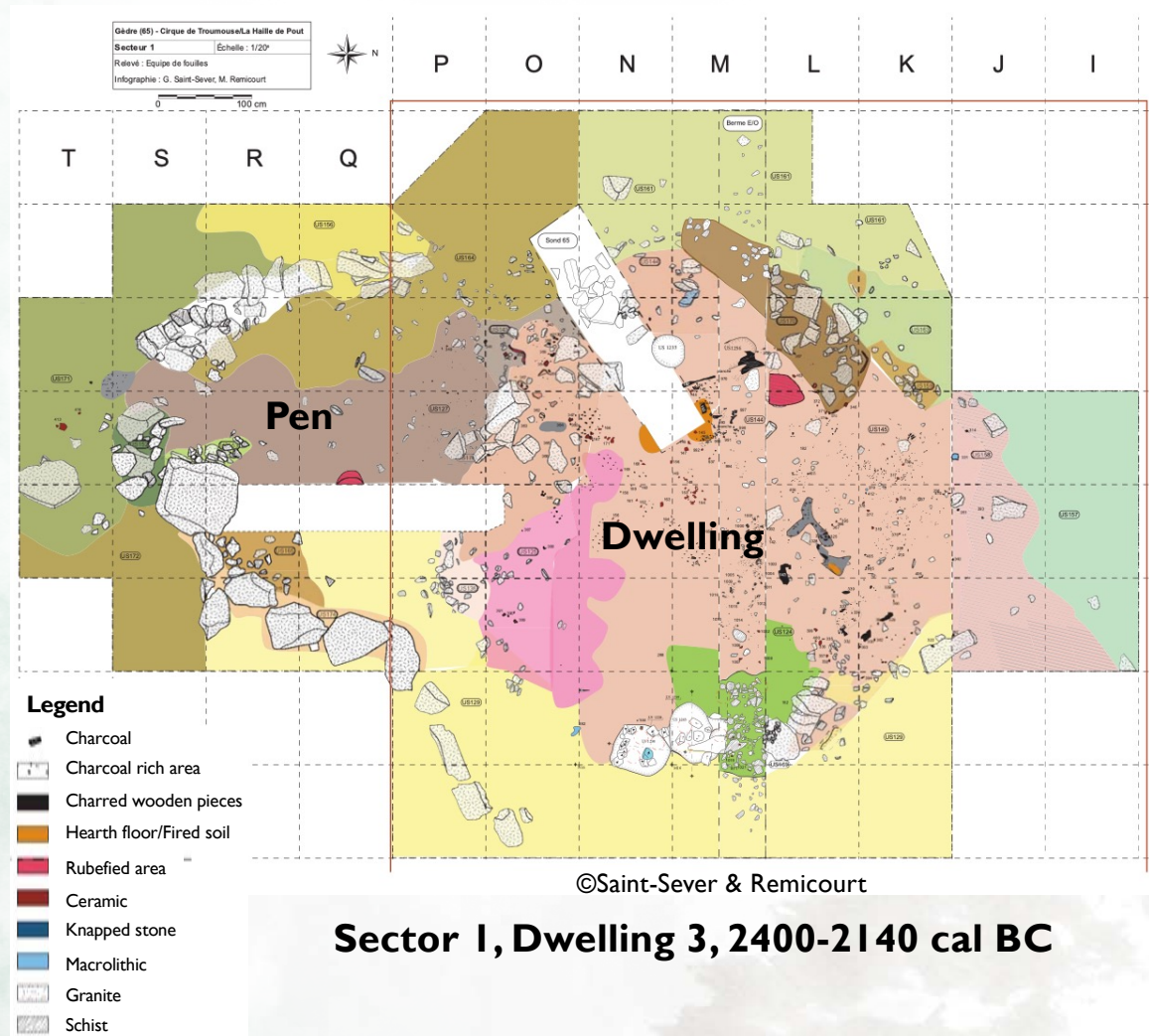
Bark





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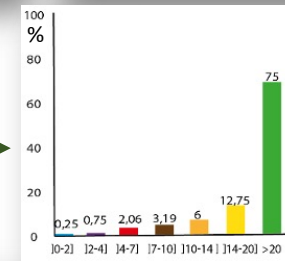
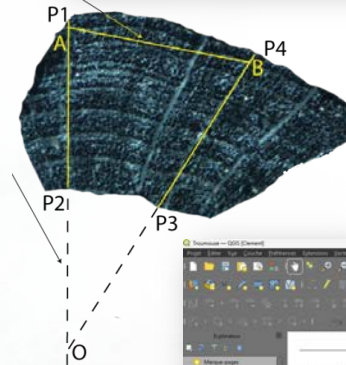
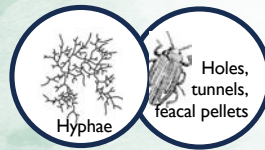
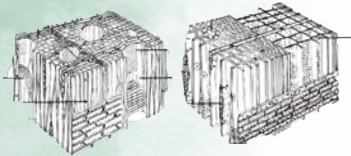




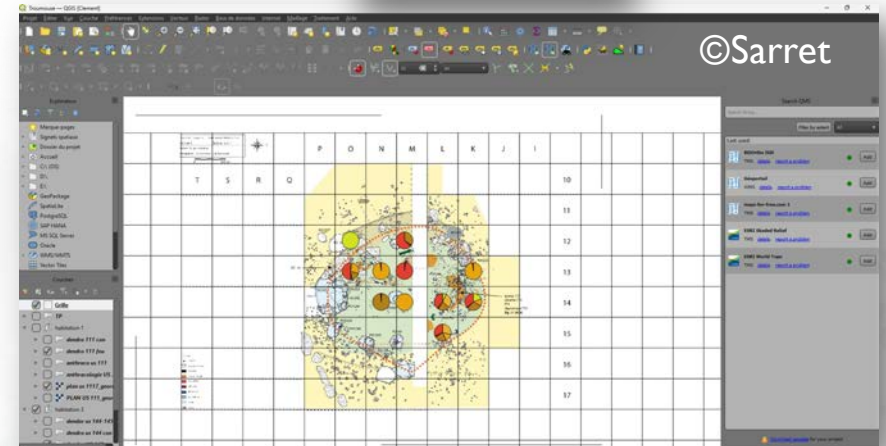
Analytical Approach

Combining anthracology and dendro-anthracology

- Species identification
- Detection of traces of saproxylic/xylophagous organisms
- Diameter reconstruction (AnthracoloJ, AD Model-DENDRAC)
- Spatial analysis (QGIS)



Reconstruction of Diameter classes

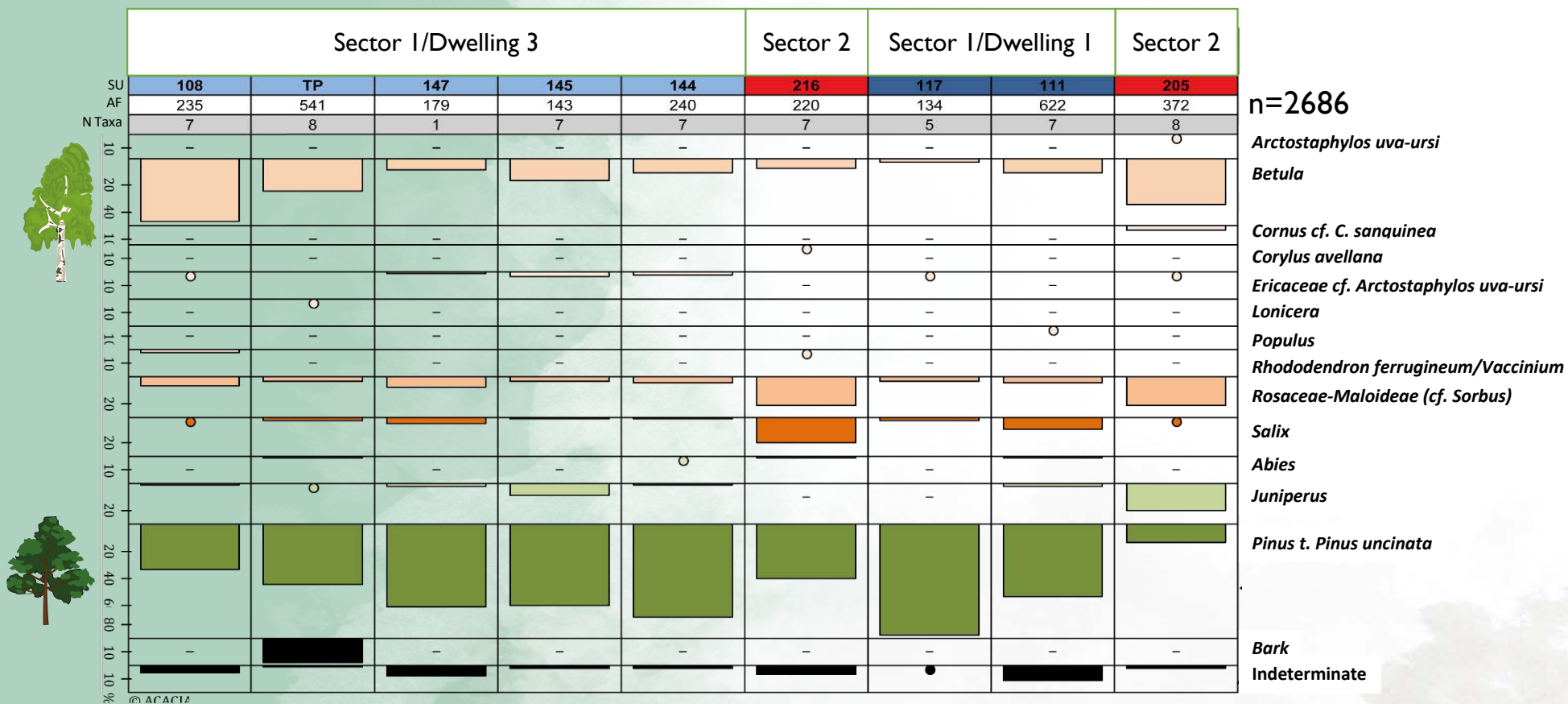




What Species were Used?

Dominant: Mountain pine (*Pinus uncinata* type), birch (*Betula*)

Minor species: juniper (*Juniperus*), willow (*Salix*), Rosaceae, Maloideae, Ericaceae shrubs

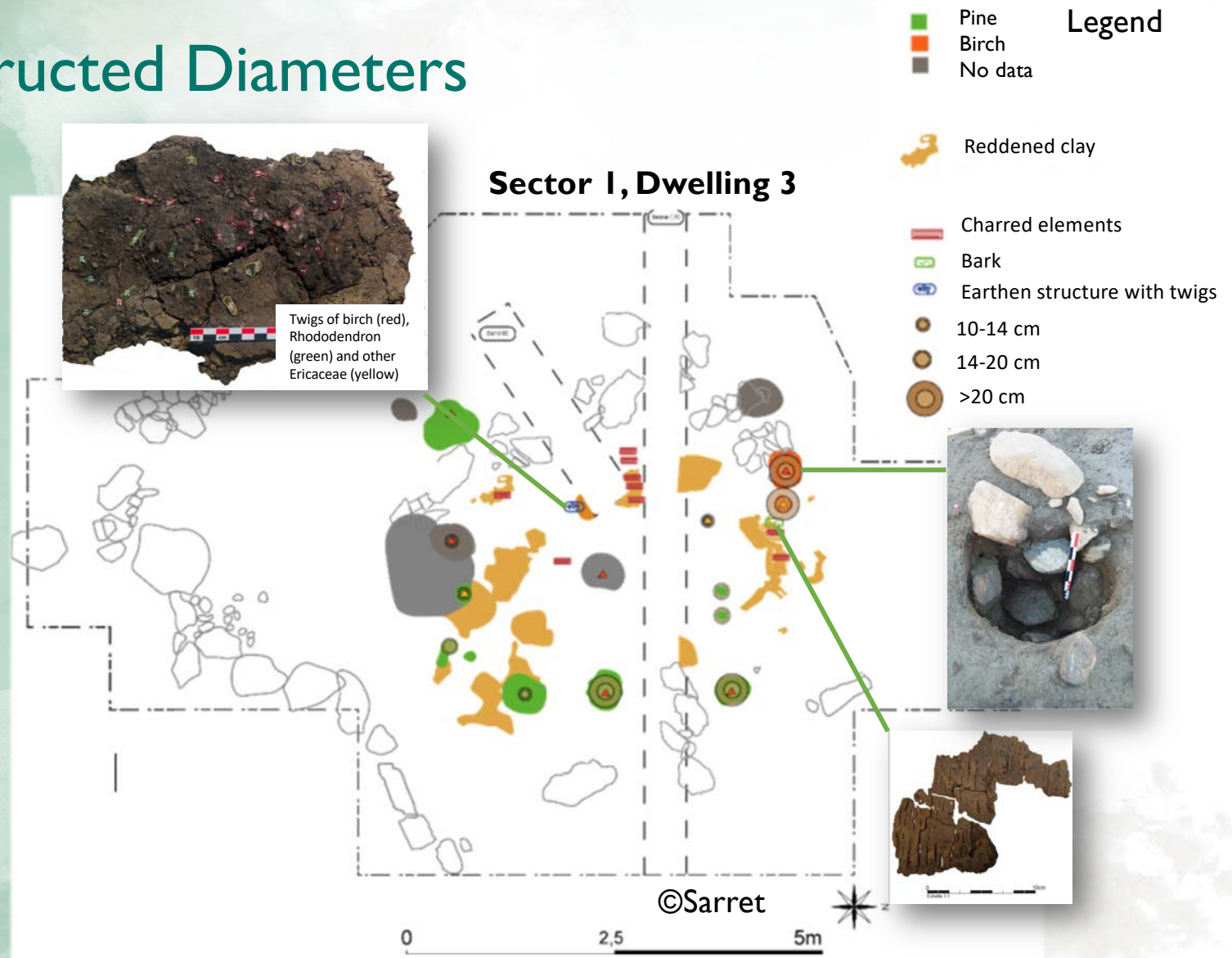




Reconstructed Diameters

Wood calibres and architectural roles

- Large diameters → structural framework (pine posts, stakes, wall elements -planks)
- Medium/small diameters → wattle structures, partitions
- Bark → likely used for roofing/lining (birch bark)





Matching Species to Function: A Fine-Tuned Selection

Selective use of species by architectural function

- Full exploitation of local woody resources
- Rational choices matching species properties

Function

Load-bearing framework / planks

Wall lattices / wattle

Partitions with earth fill

Roofing/lining

Main species used

Pinus t. *P. uncinata* and birch

Birch, Rosaceae, Maloideae (cf. *Sorbus*)

Juniper (twigs and leaves), willow,
Ericaceae and birch twigs

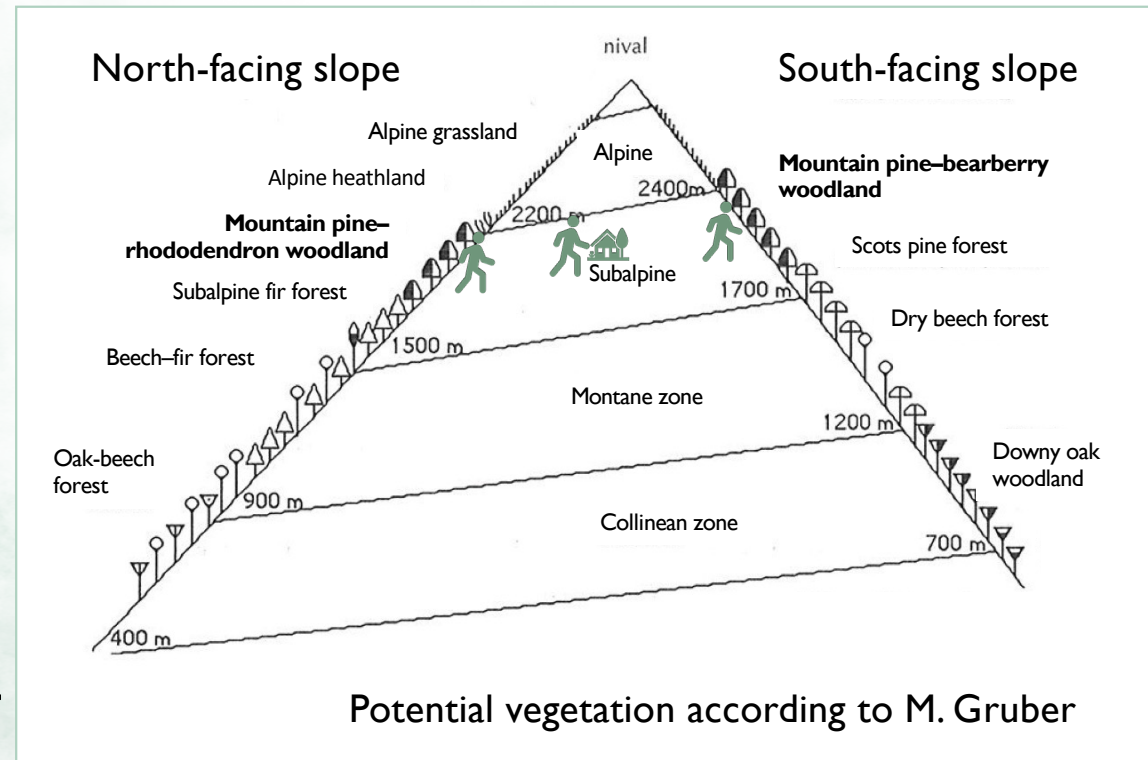
Birch bark



Adaptive Architecture: Knowing and Using the Local Environment

Adaptation and knowledge of the environment

- Selective and functional use of available plants
- Clear understanding of mechanical and technical properties
- Use of small shrubs and fibrous plants → composite construction techniques
- Highlights the flexibility and skill of Bronze Age groups





Perspectives: Towards an Archaeology of Perishable Materials

Towards a broader understanding

- Methodological advances for studying perishable architecture
- Comparative potential with other Pyrenean or Alpine Bronze Age sites
- Future analyses: further spatial modelling, experimental archaeology

Exemple of the project Exarc: <https://exarc.net/issue-2018-2/ea/construction-bronze-age-longhouse-model>



Conclusion: A Unique Insight into Bronze Age Mountain Dwellings

- Haille-de-Pout provides exceptional insight into Bronze Age high-mountain timber architecture
- The results demonstrate detailed plant knowledge and adaptive construction strategies
- Combines local resource exploitation and technical optimization





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- All the excavation volunteers
- TRACES Laboratory
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