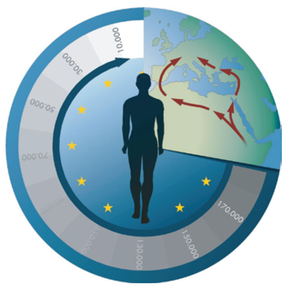
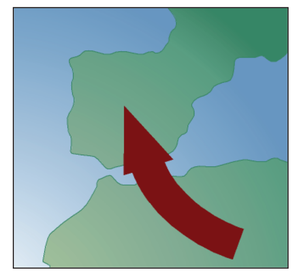


In-situ or reworked? Micromorphological evidence for mixing processes in shelter sequences of the Iberian Peninsula and Northern Morocco



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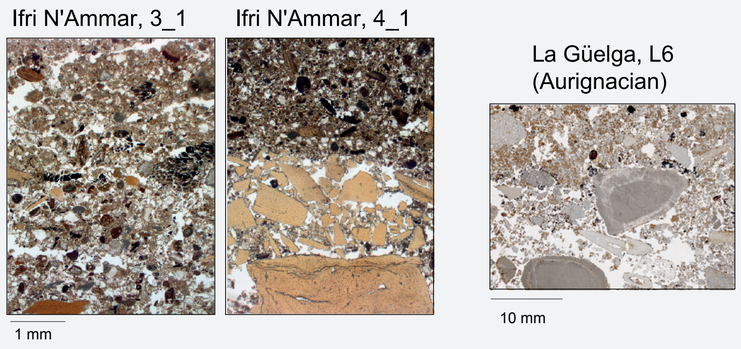
Introduction and objectives

Archaeological layers of palaeolithic rockshelteres often represent palimpsests. Their buildup involves phases of enhanced sediment accumulation during occupation and strongly reduced sediment accumulation during abandonment of the site. Partial sediment erosion by anthropogenic or natural processes may lead to loss of strata. Renewed occupation of a site may then take place on old surfaces related with the last, penultimate or even older occupations. Mixing of sediment and archaeological materials by bioturbation, cryoturbation, peloturbation or processes of mass movement along a slope results in formation of cumulative palimpsests (e.g., Bailey 2007). Humans cause mixing by differential trampling, raking out of fire residues and levelling of dwelling floors. All mixing processes cause difficulties in establishing chronological frameworks of sediment accumulation and occupation, and in reconstructing spatial organization within the site.

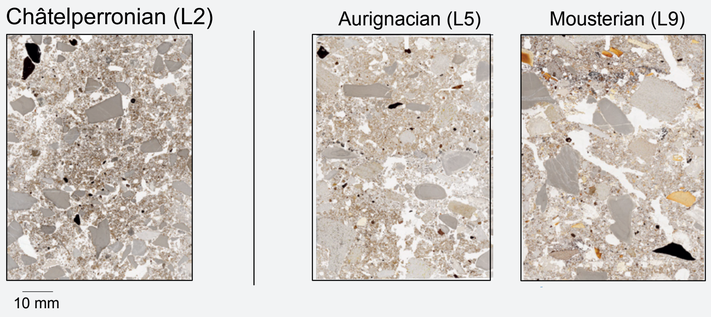
Micromorphology provides an important tool to identify stratified deposits and mixing processes. Hence it provides important information to identify (and if possible disentangle) palimpsests. In the framework of the CRC 806 „Our way to Europe“, we investigated several Middle Palaeolithic to Neolithic rock shelter sequences. We found sets of micromorphological features which indicate „in-situ“ archaeological layers while others give strong evidence for mixing and reworking.

Signs of trampling

Compaction and curshing of bone

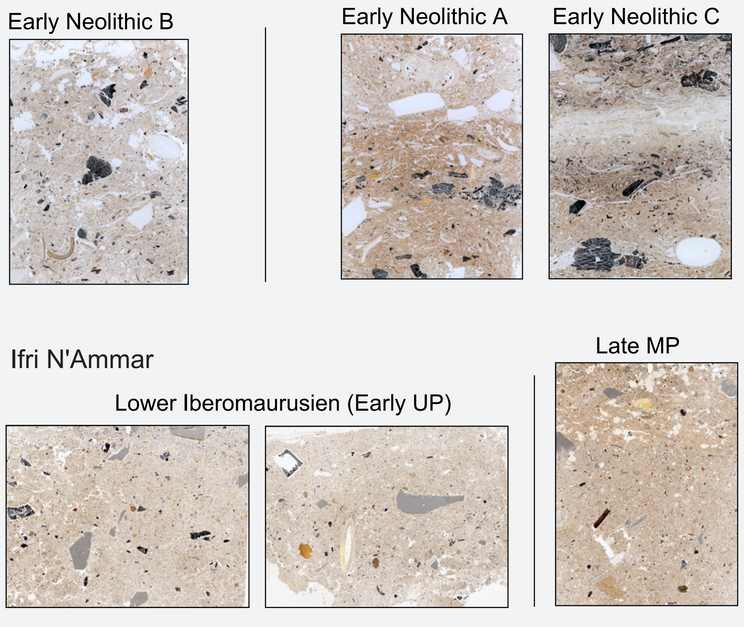


Reworked (L2) versus in-situ levels (L5, L9) at La Güelga

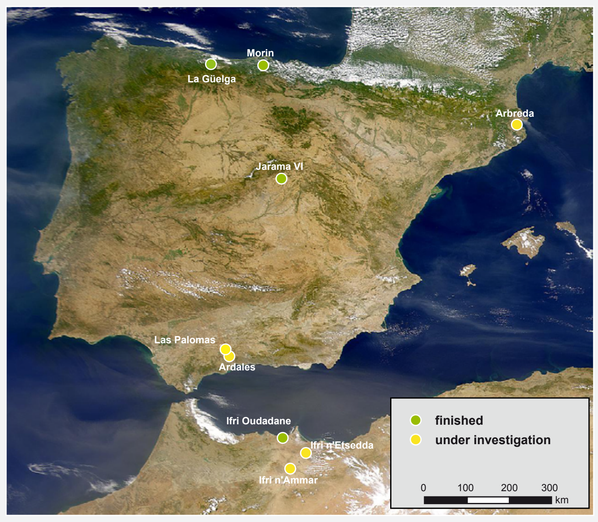


Mixed versus compacted and microstratified

Ifri Oudadane (Linstädter, Kehl 2012)



Palaeolithic cave sequences with micromorphological data



Microfeatures of in-situ preserved archaeological layers:

- Subhorizontal orientation of elongated rock fragments,
- Internal layering originating from natural deposition or differential trampling
- Increased degree of compaction
- Remnants of surface seals
- Signs of trampling, e.g. crushed bone
- In-situ layers are rich in archaeological materials (e.g., artifacts, bone, charcoal, shell etc.)
- These materials are unevenly distributed over the layer
- Granular microstructure (due to intensive decomposition of organic debris by meso- and microfauna?)
- Postdepostional pedofeatures such as clay coatings are preserved (post-depostional reworking can be excluded)

Microfeatures of reworked deposits:

- Rolled aggregates and concretions
- Low degree of and spatially homogenuous compaction
- No features characteristic of former surfaces, such as surface seals, concentration of bone fragments, trampling
- No internal layering
- Chaotic or vertical arrangement of elongated fragments
- Microstructure related to soil formation
- The levels are often poor in archaeological materials, which are randomly distributed

Discussion and conclusion

In the studied sequences, microstratified layers are comparatively rare, and their lateral extent is rather small. Nevertheless, the mere presence of microstratified parts indicate that single occupation events are preserved. However, tracing these events laterally over the profile is a challenge in all studied microstratified deposits. Physical dating of palaeolithic layers, such as at the sequence of Las Palomas, yields large standard errors, independent of the presence or absence of microstrata. Not least because of poor age control, we suggest to consider these layers as (microstrratified) cumulative palimpsests. Disentangling these may be possible for their microlaminated parts.

References

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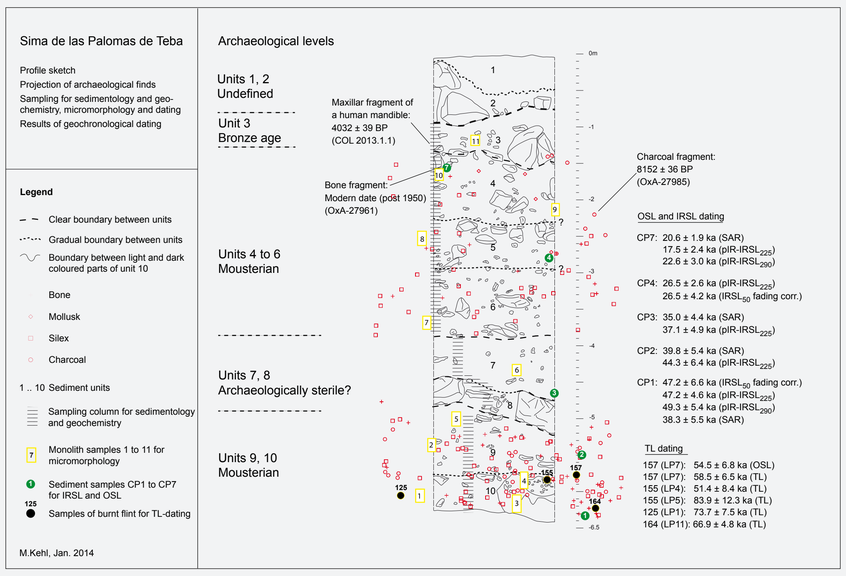
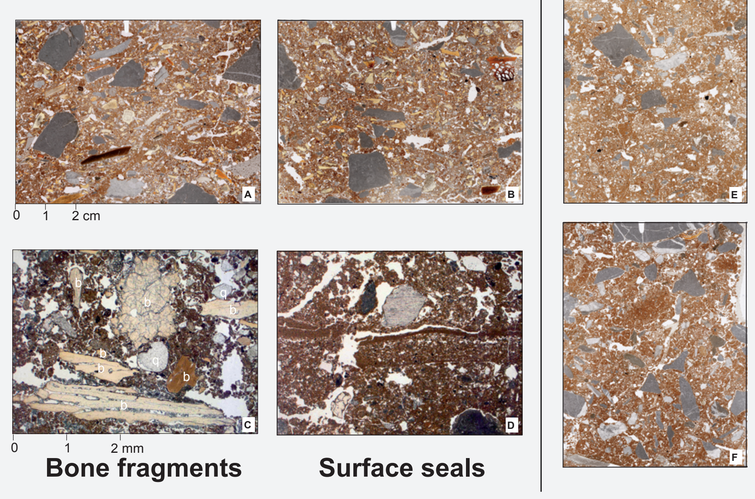
Case study Sima de Las Palomas de Teba

Two occupations with Middle Palaeolithic inventories
In-situ and reworked?



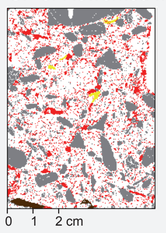
CP 8/9, from units 5 and 4: reworked !

CP 3.1/3.2 from unit 10: in-situ!

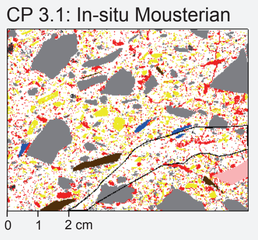


Abundance of archaeological materials

CP 8: Reworked Mousterian



CP 3.1: In-situ Mousterian



Components	CP 8 Area (mm²)	CP 8 (%)	CP 8 Count	CP 3.1 Area (mm²)	CP 3.1 (%)	CP 3.1 Count
Limestone	1172.6	64.8	9 044	1013.6	47.1	7 179
Quartzite	-	-	-	49.5	2.3	2
Flint	-	-	-	23.9	1.1	4
Burnt Bone	34.0	1.9	3	72.2	3.3	7
Bone	20.6	1.1	4	471.5	21.9	7 897
Opaque particles	25.6	1.4	2 874	30.4	1.4	1 748
Voids	558.2	30.8	13 675	492.9	22.9	11 573
Total	1811	100	25 600	2154	100	26 662

Limestone
Quartzite
Flint
Burnt bone
Bone
Opaque particles
Pores

Layers whithout any sign of microstatification are cumulative palimpsests sensu stricto. Mixing can have occurred during accumulation of the layer by anthropogenic activity, as appears to be the case in the Lower Solutrean layers of Ifri N'Ammar or in Neolithic deposits of Ifri Oudadane, or later by lateral translocation leaving behind reworked layers (e.g., units 4 to 6 at Las Palomas or L2 at La Güelga). The temporal resolution of reworked layers is expected to be low and their internal organization, if any, not related to the time of occupation. Trying to disentangle these kind of palimpsests is not straightforward or even meaningless.

The examples show that micromorphology provides significant indications for processes of mixing and reworking in the studied cave sequences.

In-situ microlayers with clay coatings and weakly developed platy microstructure, Cueva Morín