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How old is the Montmaurin-La Niche hominin mandible in the Middle Pleistocene? A state of the question.

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The hominin mandible

The hominin mandible known as La Niche (LN) has been famous since its discovery by R. Cammas, on 18 June 1949, in a small cavity uncovered by the exploitation of a quarry in the **Montmaurin** limestone massif, south-west of **Toulouse** and in the context of the **Pyrenean piedmont**. H.-V. Vallois and G. Billy had highlighted the archaic characters of this fossil [1] which we have re-examined [2,3] showing that the mandible combines **archaic features** such as a marked *planum alveolare*, downward located *fossae digastrica*, a sub-parallel mylohyoid line, a deep pterygoid fossa or a regular gonion profile with **some neandertal traits** like a well-marked *fovea anterior* and a mid-trigonid crest on M1, M2, M3. As a result, it seems that **the LN mandible is not fully neandertal**.

Chronological assessment

On the basis of the faunal remains and lithic tools collected, R. Cammas [4] argued an *in situ* position of this material and a stratigraphy of the infilling composed by 3 main levels (B-C1-C3), with **the mandible and three other human remains from the deepest level (C3)**. Later, based on **biochronology of the mammals**, an attribution to **marine isotopic stage 7** (i.e. between 250 and 190 ka) was proposed [5].

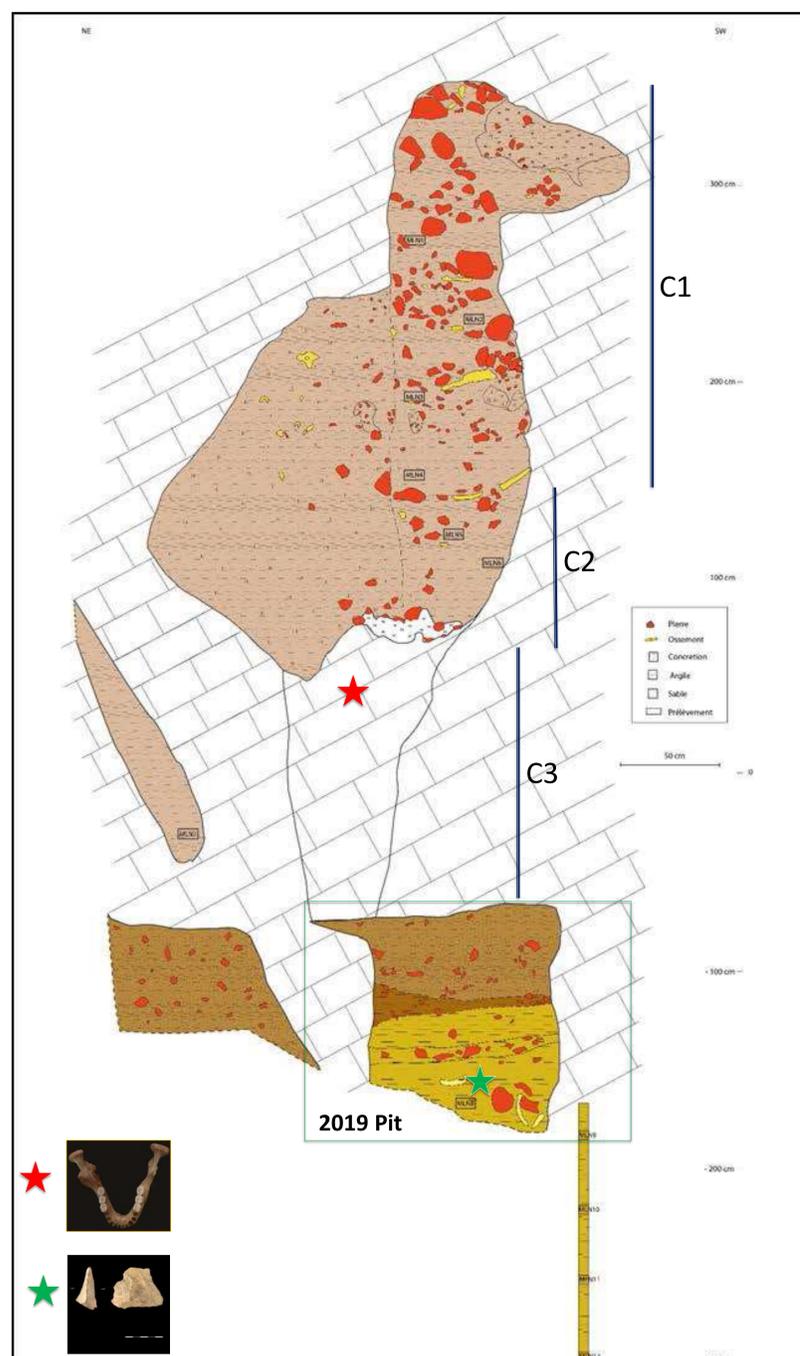
However, the history of the deposits is complex and the possibility of archaeological material in a **secondary position** is not excluded. It could indeed be the result of the extraction of elements from the upper karst level situated at 40m high overlying the LN chimney 12m.

Trying to solve the problem

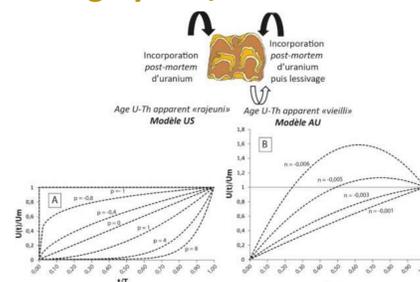
To answer the question, we aim at **reconstructing the history of the infilling** and to date the archeological material by different methods. As part of an ongoing multi-disciplinary project, we carried out **a pit at LN**, through the spoil from the old excavations, to reach the clay level *in situ*, about 1.40 m below the level of the mandible. This level has been dated by the **cosmogenic nuclide method applied on a quartzite flake**. In addition, dates were obtained for levels C3 and C1 using **ESR/U-series on herbivorous teeth**. In parallel, the geological processes that could explain the history of this infilling were clarified by **analysis of the clay minerals**.



Superior (top) and lateral (bottom) views of the mandible



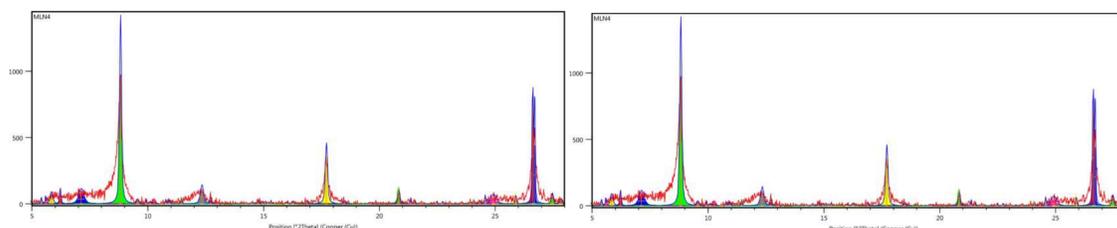
Dating by ESR/U-series



Results on 2 equid teeth from **C1** and **C3** levels gave: **147 ±8 ka** and **151 ±6 ka**

Dating by cosmogenic nuclides

Analysis of the clay minerals



By the clay minerals pattern, **the infilling of LN seems closer to the one from La Terrasse (LT)**, situated 12 m just above in the upper karstic level. The LT site has yielded a lithic assemblage comprising handaxes and faunal list including *E. mosbachensis*.

Conclusion

The results of the radiometric dating suggest a very wide time interval, between 150 ka for the upper levels (C3-C1) and 760 ka for the base of the 2019 Pit. The filling history of the LN karstic chimney seems complex and the study of the clay minerals shows a similar composition between LN and the LT site. A drawdown from LT, situated 12 m above LN, is conceivable but the sequence of events remains to be specified.

References

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