

***Interactive comment on “Natural versus anthropogenic genesis of mardels (closed depressions) on the Gutland plateau (Luxembourg); archaeometrical and palynological evidence of Roman clay excavation from mardels” by J. M. van Mourik et al.***

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General comments:

Van Mourik and co-authors investigate the origin of mardels (closed depressions) in Luxembourg. They date the deposits with palynological correlation and markers and use soil and ceramic XRF data to infer that the Roman-period occupants of Bois Biischtert (and likely elsewhere) enhanced pre-existing mardels by clay quarrying. I found

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the premise of this study and its objectives interesting. The paper itself, however, is poorly written and structured and this made it challenging to evaluate the research's merits and flaws. Because of this, I would argue that the manuscript fails to meet the principal evaluation criteria of SOIL. As such, I recommend major revision followed by re-evaluation by the topical editor and, if warranted, a second round of peer review.

The below list of specific comments is not comprehensive, but includes numerous, representative problems or concerns. After compiling my notes, I read the reviews submitted by referees Huckleberry and Shelley. Both of these reviews bring up valid points and make many constructive suggestions. Shelley's comments regarding the omission of background on Roman archaeology and the need to describe the ceramics studied are important. Although the authors state (p. 21, line 13) that their ceramics are potsherds (i.e., not bricks, as Shelley was wondering), the fact that they are analyzing pottery should be stated much earlier in the paper. I have to agree with Huckleberry that the data—at least as presented—may not sufficiently support the conclusions. I wonder if this work might be better suited to a publication format geared toward preliminary findings and research in progress.

### Specific Comments:

1. Consider a more succinct title, preferably without a colon or semi-colon.
2. In the abstract, intro, and perhaps title, mention that the Luxembourger Gutland is in western Europe. SOIL is an international journal and you should not assume your readers have geographic familiarity with the area or with Roman archaeology. Also, revise to make clear what info in the abstract is background and what info is your findings. Add a sentence or two to the abstract summarizing the implications and importance of your findings.
3. Overall, the structural organization of the manuscript needs revamping. Many of the paragraphs are poorly organized, consisting of disjointed, choppy, poorly connected sentences. In places, the prose is convoluted and gaps in logic were evident. The

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overuse of 1–2 sentence paragraphs contributes to this. The excessive use of bulleted lists in the discussion section is distracting.

4. Some issues seem to stem from issues with English fluency and/or translation.
5. The abbreviation CD is not defined. I assume this is “closed depressions”? Use of this abbreviation probably isn’t warranted.
6. The number of figures (14) is probably excessive and not justified. Perhaps some should be culled or provided as supplementary information.
7. Why aren’t geologic map unit abbreviations (e.g., li2, km1, etc.) indicated on Figure 1? If you don’t use them on the figure, they probably should be removed from the text.
8. Although the pollen-based dating of your cores is not particularly robust, it seems reasonable. That said, your inference of a post-Roman age for the mardels would be stronger if confirmed by a few radiocarbon dates from mardel deposits other than at Dauwelsmuer. Is all organic material in your study mardel deposits truly compromised by reservoir effects? Why didn’t you do macro analysis on all the mardel study sites, as this might have resulted in <sup>14</sup>C-dateable material as it did at Dauwelsmuer? Alternately, could you have radiocarbon-dated pollen or used optically simulated luminescence (OSL) dating?
9. Mardel Dauwelsmuer location should be shown on Figure 1.
10. P. 10, line 24, reference should be to Table 1, not Table 2.
11. What is the significance of the colors used in Figure 4?
12. In Section 3.1, I question your usage of the term “formation”. It seems like “stratum” might be more appropriate in this context.
13. In Table 2, the soil texture percentages do not add up to 100%. Why is only one soil sample per profile analyzed? What horizons were analyzed? Why aren’t representative soil profile descriptions provided?

14. Are the four ceramic sherds you analyzed truly representative of the full range of Roman pottery at site Bois Biischtert? How did you select this sample? More justification of your sampling strategy is needed, especially because of the small number sampled.

15. Some methods are mixed in with the results, such as p. 15 lines 26-27 and p. 16 lines 1-2.

16. The graph axes are erroneously labeled on Figure 11.

17. P. 17, line 17: do you mean synsedimentary? If so, include definition to clarify.

18. In your introduction, clarify whether any previous studies have used similar methods to address mardel genesis (it appears they haven't, but you should state this explicitly). Also, have prior Roman pottery sourcing studies been done? If so, what were the relevant findings?

19. The discussion included in section 4.1 fails to clearly demonstrate an anthropogenic origin. You are implying that the age of the mardel deposits is consistent with an anthropogenic origin, but correlation does not necessarily indicate causation. I think my confusion here indicates minimally that your logic and conclusions in this section are not clear or explicit. Alternatively, perhaps part of the problem is the first paragraph of section 4.1—I wonder if it should be moved to the beginning of section 4.3?

20. Section 4.2 states, "The results show a reliable matching of the properties of the Roman potsherds. . .with the clay samples. . ." This section lacks an adequate discussion of the evidence for this conclusion. It also lacks reference to relevant figures/tables.

21. You conclude that the archaeometric (XRF) similarity of the Roman sherds with the clay samples from the Steinmegelkeuper mardels and surrounding soils indicates that the mardels have an anthropogenic origin. This argument as presented seems weak.

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Couldn't clay have been collected on a smaller scale from small, scattered soil pits without the mardels necessarily having a human origin? Is there other corroborating evidence that supports your inference? Please clarify and strengthen your argument for this conclusion.

22. What are the implications and importance of your findings? These belong in the conclusions (and perhaps the discussion), as well as the abstract.

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