

Interactive comment on “Hydropedological assessment of a vertisol climosequence on the Gulf Coast Prairie Land Resource Area of Texas” by L. C. Nordt and S. G. Driese

H. Lin (Editor)

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Received and published: 30 September 2009

I enjoyed reading this manuscript as it summarizes well the complexity of redox features in Vertisols in relation to precipitation gradient in the Gulf Coast Prairie of Texas. The authors did a nice job of highlighting the challenges encountered in studying the unique Vertisols in the Introduction, and comprehensively interpreted the often difficult datasets from a well-designed climosequence study. The hydropedological interpretation of Vertisol formation and various related features is culminated in Fig. 11.

The authors have adequately addressed all the review comments received and have

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carefully revised the manuscript. The revision reads well and should be considered for publication after the authors further take into account the following suggestions. The authors are requested to submit a final manuscript after considering the following comments.

1. I wonder whether Fig. 11 could be further improved as suggested in the following (since it is a key figure of this paper):

a. Fig. 11 may be placed next to Fig. 2 so the two figures are combined together in a complementary fashion b. Is background color close to real soil color? Please indicate this in the caption c. Any possibility of adding a few zoom-in small photos to visually illustrate the key features, such as diffuse vs. nondiffuse soft Fe masses, pore lining, and Fe depletion, etc.? I personally feel this will enhance the practical use of the results obtained from this study and may also increase the citation of the paper once published. d. Could water table information be added? e. I suggest to make nondiffuse soft Fe masses in open circles, diffuse soft Fe masses in solid circles, crayfish burrows in solid to be better separated from nondiffuse Fe depletions which remain in open symbol

2. A new figure showing the general trends of the climosequence would be valuable, with MAP from 700 to 1400 mm as X-axis and various features of Vertisols as Y-axis (e.g., as MAP increases, soils become wetter and more saturation periods, Fed and Feo increase, more soft Fe masses with diffuse boundary and closer to surface, more crayfish borrows and closer to surface). This will facilitate the readers' understanding of the complex and sometime confusing comparisons made in the paper. Such a figure could be made for both microlow and microhigh. Alternatively, a summarized sentence stating these overall trends would be good to have in the Abstract and the Conclusion sections.

3. Fig. 9: very interesting result! I suggest the authors look into the slope of the 4 Fed curves and see whether they are close to each and mean something? Also, the authors

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indicated that the Feo trend is difficult to explain. Here is my speculation: surface Feo is more controlled by climate (so a nice linear relationship), but for 100 cm, Feo may have a more local control from saturation, especially towards higher rainfall sites, so a curved relationship.

4. Fig. 10: Please indicate they are in microlow or microhigh. Also, need to indicate the time period (days) monitored and measurement frequency in either the caption or in the methods section describing the monitoring data. I believe the data of Fe pore lining and Fe soft mass could be removed from this figure as they don't show much.

5. Fig. 4 c-d: Does deeper depth to first soft Fe masses mean better drained (local drainage condition) or better leached (more precipitation)? Please clarify. Also, what does it mean that diffuse and nondiffuse soft Fe masses show no difference in these figures? Could they possibly imply that both present and past hydrology conditions constituted to a similar climosequence trend, or no much climate change occurred from recent past to now? Just a thought for further pondering because the authors discussed the importance of separating diffuse vs. nondiffuse boundaries of redox features in this paper.

6. In the conclusion, the authors pointed out the need for more systematical monitoring on Vertisol microlows and microhighs as well as 3D mapping of redox features. These are good points. Can the authors also point out how best to do these given their extensive experience and insights? Even briefly would be helpful to a broad readership.

7. In discussing Fig. 11 (p. 11, at the end of the 2nd paragraph in the revised manuscript), the authors stated that "Lateral shifting of soft iron masses from the microlow to microhigh during shrink-swell processes may have reworked the boundaries of these features from diffuse to nondiffuse." Was there any prove for this statement or was this just a speculation? Please clarify.

Additional minor editorial changes are suggested in the following:

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Abstract:

8. line 2: consider change “seasonal climates” to “seasonally wet climates”
9. line 5: consider change “problematic soils” to “unique soils”
10. line 7: spell out MAP
11. line 7 from bottom up: consider change “should classify” to “should be classified”
12. last line: “microlow bowls of 1-2 m” – was there any data to support this 1-2 m claim?

Introduction:

13. line 8: could “aquic” and “hydric” be defined upfront as many readers of HESS may not have clear idea about these terms (like what the authors have done with diffuse vs. nondiffuse and gray vs. gleyed)
14. near the end of the 1st paragraph: “where water is transported under positive pressure along macropores” – do you mean saturated flow? My experience told me that is not necessarily the case.
15. 1st sentence of the 3rd paragraph: consider modify “qualitative hydropedological model” to “hydropedological interpretation” or “hydropedological conceptual model.”

Settings and methods:

16. 1st paragraph: in the end of this paragraph, it would be good to summarize by stating that all the other soil-forming factors (temp, veg., topo, parent material, and age) were all similar across the climosequence except rainfall.
17. line 6: what is “co-linear surface”?
18. p. 4 line 10: there is an error here – 1st “nondiffuse” should be “diffuse”
19. p. 4 line 16: can a reference be added right after the sentence ending with “ferrous

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iron”?

Matrix color:

20. p. 4 last sentence: please explain what does this mean?

Others:

21. p. 8 Section numbering: change from 5 to 6 and the subsequent ones as well

22. p. 8 line 3 from bottom: delete “99TX 201-1”. A few other places in the manuscript, such use of specialized pedon numbering makes no sense to general readers, so could be removed as appropriate.

23. p. 10 around the middle portion: change Lin et al., 1995 to Lin and McInnes, 1995.

24. p. 12 line 8 in the 1st paragraph: change “from” to “form”

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 3637, 2009.

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