

***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**

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Received and published: 16 July 2009

We greatly appreciate the comments of reviewers Rasmussen and Nobles. This was a difficult manuscript to write because of the enormous UDSA-NRCS data base we were assessing. We finally opted to focus on field-based morphological properties with the exception of Fed and Feo. Another manuscript from a micromorphological viewpoint and other physical/chemical laboratory assessments would provide additional insights. The one common recommendation between the two reviewers is that we add a figure/cartoon illustrating the different iron redoximorphic features discussed in the text.

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That this would help the general reader better follow the manuscript not so familiar with these terms and features. We are happy to do so.

Rasmussen

Specific Comments:

P3640, L14 Upon further reflection we will begin the final paragraph with a reminder (Purpose) of the need to better understand wet and seasonally wet features of this important soil order previously understudied in this regard complicated by its unique properties relative to other soils. And then list the current objectives beneath this. If we are misreading this reviewer comment, we would like to hear more.

P3641 L25-30 Agreed.

P3642 L1-5 Good point. One of the things we assumed but should not have.

P3643 L11 Agreed.

P3644 L10 Another good point. Something we again assumed and should not have.

P3644 I24 We cannot provide any further information on crayfish with confidence. We were surprised at any correlation at all, and are not experts in this field of study. We referenced Hasiotis, an expert of crayfish traces, as best we could. We will add a statement that more work is needed on the relationship of these important features in vertisols, and in relation to climate. Section 4.4 P3645 L19-30 We struggled with this question because it is often the case that Feo and Fed are expressed as a ratio; and it is often done taxonomically for soil orders such as Andisols and Spodosols, but less commonly for wet soils or Vertisols. In the literature Feo is related tied to organic carbon content (as a complex). One could, by comparing the adjacent panels get a general idea of the proportion of Feo vs Fed and frankly we were trying to reduce the number of figures we were producing. But this reviewer makes an excellent observation that we failed to discuss. We will add a statement that Fed does in fact increase at a more rapid rate than Feo as rainfall increases. This may seem at odds with Feo supposedly

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being related more to wetness conditions as a short-order iron oxide, but apparently the increase in rainfall, and the periodic intervals of leaching, provide an environment for the formation of greater amounts of Fed. It may be that one needs to study Vertisols in depressional positions to find Feo increasing at the same rate, or perhaps greater, than Fed.

P3646 L9 The answer is yes. We will add this statement. Again, we assumed it was clear to the reader without having directly stated it.

P3647 L9 Agreed. For the second point, the confusion stems from the fact that the shallowest depth at which piezometer data was obtained was 25 cm, yet alpha alpha was tested at 25 cm PLUS the surface. We need to make this clear in our summary statement at the end of the paragraph. We will go back to the original data of Griffin (1991) to see if it is possible to reconstruct the percentage of time the surface was saturated.

P3647 L16 Another good point. Yes, boundary is most often used to estimate whether a redox feature is relict (abrupt and clear boundary, defined as nondiffuse in the paper) vs contemporaneous (diffuse boundary, defined as diffuse in this paper). We will also explain in more detail the boundary thickness in mm used to define these qualitative terms. It is safe to say that all concretionary and nodular segregations related to iron are considered relict. Concluding Paragraph We struggled with how far to stretch our interpretations beyond the two series we had field monitoring data from, not wanting to take it too far. But we will reread and edit this paragraph carefully taking all of these points into consideration to make it as clear as possible. Regarding a concluding conceptual model, we actually started a couple of different ones and gave up because to do it correctly would have taken an inordinate amount of space and explanation. It is a good point though and we are disappointed we were never able to construct something suitable for this publication.

Nobles

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Section 4 Agreed, per the previous reviewer

Subsection 4.2 P3644 L12-13 We see your point as we reread this paragraph. We remember this being difficult to explain because of all of the nuances with these particular features. We will read again with fresh eyes and closely cross check our statements with the appropriate figures to insure the greatest clarity of explanation.

Section 4, Hydropedological Formation of Vertisols Initially we had a number of figures and correlations with pH and organic carbon that included even more correlations with Feo. We finally eliminated them to make the manuscript more manageable, thus we discuss these properties where appropriate in the text. We could however, add pH and organic carbon to Table 2 since these are the two soils that were hydrologically monitored and discussed in greater detail.

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

HESSD

6, C1554–C1557, 2009

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