

Interactive comment on “Forms of organic phosphorus in wetland soils” by A. W. Cheesman et al.

Anonymous Referee #1

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General comments: This is a well written paper with an interesting and seemingly unique dataset of P species across a range of 28 wetland soils. In this case ‘wetland’ is a wide definition of soils with restricted drainage including peatlands, mires, bogs and fens. The use of ^{31}P NMR provides the P speciation and other soil properties are used in an interpretative manner. The data are presented in a transparent manner with full data in supporting info tables and a generally full account of the chemical/spectroscopic analytical methods, which seem very robust. The paper provided an interesting read and I’m sure would be publishable given suitable responses to my data handling queries on the validity of using the determined site groupings to lead the outcomes of the paper.

Specific comments: My main issue with the paper concerns the way that the initial

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interpretation of the cluster analysis identifies groups that lead the whole outcomes of the paper. I am not familiar with that type of statistics used to confirm the groupings and, considering the importance of this in determining the rest of the paper, I would like to see a little more presentation of this. At present the abstract states (L19-20) 'Soil P composition was predicted by two key chemical properties: organic matter and pH', but then apparently the groups were defined early on by cluster analysis on factors, then lastly the P speciation data are examined in terms of these pre-defined groups. Thus it seems a little as if the groupings lead the process and the relation to the soil P compositions seems in a way 'retro-fitted' to these pre-determined groups. However, this is probably just a 'way of selling the story' issue in terms of the layout of the paper. If there could be more of a portrayal of (what I'm sure was in reality) an iterative process of site group selection and evaluation of the P compositions that would help. Could you confirm in the methods how this was done? It would be interesting also to learn something of the climate for the different sites as these have a global distribution. Could you give basic climate data in Supplementary Table 1 e.g. average rainfall, altitude and temperature?

Technical queries: L38. Erroneous '?' after the word 'fate'. L90-91. 'This was considered appropriate given their physical size...' This is unclear as to meaning. L94. It is unclear as to how the four surface cores are used in determining the data. Where they separate site replicates analysed separately, or bulked etc? Was this consistent for the different determinants e.g. reps used in NMR work? L97. '>2 mm removed' Was the sample sieved? L112. AEM not given in full initially. Maybe this could be in L110? L179-182. It was here that I first saw that the properties of OM and pH were selected by testing as the basis for the grouping and so considering the way the abstract was worded I questioned how, if you selected on the basis of these parameters to determine group how could you then conclude that these 2 parameters were predictors of P compositions (ie. Without favouring them through this pre-determination). L188-189. You give the values as means \pm 1SD. Does this apply to all analyses (even NMR)? L193-218. I agree that the parameters of OM and pH seem sensible as ma-

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ior controls on soil attributes like P compositions but I have a number of questions in mind as I read this section. Does the Ward's method given you an optimum number of groups? Looking at the data 5 groups (instead of 4) could be conceivable with current group B split into low (9-25% OM) and intermediate (48-69% OM). Otherwise there are groups with a huge range and I would expect very different processes (types of organic matter for example humic/non-humic) across the range 9-69% OM. Could a split have been made in contrast between the parameters of OM and total P (the latter instead of pH)? L266. This might be a naive question but could inorganic orthophosphate be considered biogenic? Is all inorganic ortho-P from rock weathering sources (directly or indirectly through fertiliser P). L317. 'LOI explain', should be 'explaining'. L357-358. In reading further the selection of groupings by pH seems to have a less strong basis. Only the 'residual P' (the undefined pool assumed from that determined by difference to be not extracted from the NaOH-EDTA extract compared with total P) really relates to pH differences. L428. Additional '(' before Cheesman to be removed. L441. I think this is 'unable' where presently it says 'able'?? L469. Incorrect spelling of 'magnitude'. Fig. 2. What is the vertical line for in the top part of the figure? Fig. 9. Error in axis legend on top plot 'or' should be 'of'.

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