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Biogeosciences
Discussions

Interactive comment on "Atmospheric deposition as a source of carbon and nutrients to barren, alpine soils of the Colorado Rocky Mountains" *by* N. Mladenov et al.

Anonymous Referee #1

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Mladenov et al. comments

This is an interesting paper that quantifies the input of Aeolian organic matter and other biogeochemicals to alpine environment in central Colorado. The authors make a solid case that these environments are experiencing rapid environmental change. A well-developed rationale presented is an increase in N export in streamflow and how these changes will affect nutrient loss from terrestrial systems and nutrient content in aquatic ecosystems

In this study the authors propose that deposition may be a source of nutrients or a source of carbon, which limits microbial activity in newly exposed/ developing soils and

quite possibly (although specified in the text) drives soil weathering – this would be an important area to build upon. This is especially true given the net efflux on Ca from the watershed – does it come from newly exposed mineral surfaces or powered by organic C in deposition

Vegetation productivity and respiration estimates are available for nearby Niwot ridge and should be added on or about page 2398 line 20 where you assume that these areas are carbon neutral. This does not negate your story and the importance of deposition to the remainder of the watershed; especially those non-vegetated areas

Overall, this paper makes a nice contribution to our understanding of the biogeochemistry of high mountain catchments. Although not the focus of this paper, the potential importance of organic deposition to soil development in these regions is an interesting aspect to this reader.

Minor comments:

Abstract – please clarify that the autotrophs you refer to are microbial

Use common units – it is confusing to jump between – cm – m – mm precipitation – kg – kg/ha

Can you clarify how were POM compounds analyzed? On filters? Please add that to the methods so others can build on this work

Can you be more clear that you are looking at water soluble and water insoluble compounds less than 0.7um?

In the back trajectory analyses do you assume most deposition occurs during storms? What about dry deposition between precipitation events? I wasn't clear on the distinction here – is this analysis only for fresh precipitation samples?

Page 2390 line 15 – it is more correct to say that there was no relationship, rather than the relationship was insignificant

GLV is a windy place – can you determine what fraction of deposition is local (sourcing and deposition within the catchment) vs. what is a net input to the watershed?

It would be helpful to present the C:N:P ratios (Redfield) you discuss more explicitly. Also, the ratio of base cations would be great for mineral weathering folks if you have the data

Page 2394 line 15 – difficult to “determine” rather than to “tell”

Page 2395 lines 17-18 please expand on what similar to Saharan dust means for this location

Figure 2 – I don’t think the temporal lake data add to your story given the issue and unknowns you raise re lake productivity

Figure 3 and 4 – should these be column graphs as you are comparing categories now and not times series 9althoughthe categories are seasons)

Figure 5 – I suggest that you change your axes – the independent variables in these scatter plots are wet dep volume and 18O which are used in the text to infer timing and source of DOC and Ca. As plotted DOC and Ca are treated as the independent variables that predict wet dep and 18O

Figure 10 – the spatial distribution of landscape types does not add to this figure – the take home point is the carbon balance, yet my eyes and perhaps other readers are drawn to the colors that represent landscapes

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Interactive comment on Biogeosciences Discuss., 9, 2375, 2012.