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Biogeosciences
Discussions

Interactive comment on "Organic matter dynamics and stable isotopes for tracing sources of suspended sediment" *by* Y. Schindler Wildhaber et al.

Anonymous Referee #1

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<General comments> The reported study investigated spatio-temporal variations in the concentrations and stable isotope ratios of C and N in both suspended and infiltrated sediment and traced potential sources of sediment using sediment stable isotope and C/N ratios in the River Enziwigger watershed in Switzerland during a brown trout spawning season. Although similar approaches have been used in many other watersheds, the results on isotope tracers are unique because they were linked to hydrologic conditions to examine effects of rainfall and snowmelt on organic mater export from various sources. In addition, the mixing model tool (IsoSource) was very successfully used and the approach of showing potential source distribution rather than single values could attract a lot of attention among 'isotope trackers'. I would therefore

recommend this manuscript for publication in Biogeosciences. Below I provide some suggestions for the authors to improve the manuscript with delivering its key messages and editorial details.

<Specific comments> 1. Implications of major findings Both the abstract and conclusions sections end without explicitly mentioning implications of the major findings. For example, you mentioned that increasing winter temperatures and precipitation lead to a higher contribution of SS from arable land. Does this mean that any future warming trends in the study region could increase soil erosion and C export? Highlight implications of your findings. 2. Title needs to be more specific in terms of emphasizing major study findings and providing information about the study approach and site. Think about other options. At least, the current version should read "Dynamics of organic matter in sediment and source tracing. . .. . ..in XXXX" 3. Terminology The consistency of using terms and abbreviations should be checked through the manuscript. - C/N atomic ratios, C/N ratios, C/Na - "Factions" in fractions of organic matter are confusing. I would recommend "concentrations" when they are used for quantification purpose. - Organic matter or carbon in sediment is usually termed as POM or POC. 4. Statistical analysis From what you described in the methods and results (Tables 1, 3; P460 L13-14, 20-21), it is unclear how you compared differences among three sites. In my view, ANOVA and multi comparison tests would be the most efficient way in showing differences in the cases of two tables. Clarify how you did in the text and indicate any significance in the tables. 5. Structure of Results & Discussion Sections 3.1 – 3.4 could be more efficiently structured. For example, the four sections could be combined so that you could avoid repeated descriptions and the readers easily compare the patterns appeared for different monitoring parameters. 6. Differential mechanisms for DOC and POC export P462 L118: You need to distinguish DOC leaching by the well known 'hydrologic flushing' from POC export by surface soil erosion. Refer to the following papers and describe differences in hydrologic mechanisms driving DOC vs POC export. - Hornberger GM, Bencala KE, McKnight DM. 1994. Hydrological controls on dissolved organic carbon during snowmelt in the Snake River near Montezuma,

Colorado. Biogeochemistry 25: 147-165. - Inamdar SP, Christopher SF, Mitchell MJ. 2004. Export mechanisms for dissolved organic carbon and nitrate during summer storm events in a glaciated forested catchment in New York, USA. Hydrological Processes 18: 2651-2661. 7. Rainfall-induced increases in nitrate leaching P463 L6-19: Your finding on increasing nitrate conc with rising discharge contrasts with other findings showing dilution-induced decreases. You could briefly mention about the uniqueness of your system (not supply limited during rainfall events) by comparing with other studies (e.g., Wagner et al. 2008. Stream nitrate and DOC dynamics during three spring storms across land uses in glaciated landscapes of the Midwest. Journal of Hydrology 362: 177-190)

<Technical corrections> 8. Abstract L3: by "affecting" health and fitness 9. Abstract L2-6: The backgrounds were described in too much detail, at least the third sentence. 10. Abstract L9: Add briefly site information. 11. P455 L7: "the frequency and intensity" of heavy rain events? 12. P455 Ll8: Are the redds the common term used in your field? 13. P456 L9: "Sediment tracer-based methods with natural tracers" is redundant and a bit weird expression. 14. P456 L11-12: "reliable" tracers 15. P456 L17: "potential" SS origin sounds better. 16. P456 L19-20: This sentence is difficult to understand. Do you mean ".....potential sources that are greater than the number of isotope tracers by one"? 17. P457 L7: a total watershed "area" of 18. P457 L8: hydro-power "facilities" or "plants" 19. P457 L10: modified through what? 20. P457 L18:, Napf, "where" 21. P458 L5: By "the coarse rest" you mean "remaining coarse sediment"? 22. P458 L11: Describe the location of "interstitial water samples". 23. P458 L17-18: each "sampling" spot 24. P461 L7: Corg "concentrations" in IS.... 25. P461 L13: What's the difference between "Corg and particulate organic carbon"? 26. P462 L1: "assessed DOC values" sounds weird, did you mean "measured DOC concentrations"? 27. P463 L9: A nitrate "concentration" 28. P464 L20-21: remove "thus"; in the same range as "those for soil samples" 29. P465 L23: enriched "in" 13C 30. P466 L17: "soils" of forests..... 31. P467 L9: "were connected with" could be replaced simply with "showed" 32. P468 L3: "exfiltrating" is the common term?

Otherwise, use easy words like "discharging" or "draining" 33. P469 L8-9. You could provide your opinion on the ultimate source of this riverbed sediment. Considering different isotope ratios, this bed sediment appear quite different from forest soils. 34. Fig. 2 captions: "mean values of all samples" from all three sites?

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/9/C47/2012/bgd-9-C47-2012-supplement.pdf

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