

## ***Interactive comment on “Hydrological connectivity as indicated by transport of diatoms through the riparian–stream system” by N. Martínez-Carreras et al.***

**Anonymous Referee #1**

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The manuscript presents new information on diatoms as possible hydrological tracers. From that point of view it can be attractive to the readers and I recommend its publications. I have the following comments: 1. The formulations at many places (e.g. page 2393, l. 16-20, l. 20-23; page 2411, l. 23-25; page 2412, l. 6-12 ) point out that isotopic and chemical tracers have their uncertainties or that they can not identify the hydrological connectivity. While it is true, it does not mean that isotopes and water chemistry do not provide useful information. I do not understand the reason of stressing the limitations of isotopes and water chemistry (which are well known). Each technique has its advantages and disadvantages and it holds also for isotopes, water

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chemistry and diatoms. The application of all these techniques in hydrology should be complementary rather than competitive. While isotopes and water chemistry can not provide information on hydrological connectivity, diatoms can not identify water sources, quantify hydrograph components or provide the information on transit times the way isotopes and water chemistry do. In fact, both isotopes and water chemistry were used to provide useful information also in this manuscript. Uncertainties with isotopes and water chemistry are not the reasons while we need to use the diatoms. On the contrary, all tracers can help to improve our understanding of hydrological cycle. Therefore, I recommend to skip formulations stressing the fact that isotopes and water chemistry have limitations. The objective of this manuscript is to explore the potential of diatoms as an emerging tracer, not to remind of the uncertainties of other techniques. 2. Abstract line 20 “(n=11, 2010-2011)” should read “(n-11, 2011-2012)” because the study was conducted in water years 2011 and 2012. 3. Findings summarized in the abstract (which are useful) do not fully answer questions raised at the end of page 2394, especially questions 2 and 3. 4. Page 2395, l. 10 “. . .strong seasonality in baseflow exists. . .” – this is a little confusing, because when talking about baseflow, one would suppose that baseflow was determined using certain technique. Baseflow is a component of hydrograph (a very uncertain one with no universal accepted definition) rather than a characteristic of flow conditions (high-low flow). Therefore, I would rather speak about “seasonality of low flow” or “streamflow seasonality”. 5. Page 2396, end – it would be useful to characterize the wells a little, e.g. their position on the slope, total depths, depths of screen and aquifer type (I suppose they represent unconfined groundwater. . .of the same aquifer?). If the soils are not more than 1 m deep, it is interesting to know about the wells. Do they capture also the bedrock groundwater (I suppose the upper bedrock might be weathered, not completely impermeable). 6. Page 2397, l.20 – please use 2H/H instead of D/H (to be consistent with notation for oxygen and with line 23) 7. Page 2401, l. 17 – Fig. 2 shows water years 2011-2012, not 2010-2012; line 20 instead of “water year 2010-2011” I would write about “water year 2011”. While annual precipitation for water year 2011 is mentioned, the same

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information for water year 2012 is missing. It might be useful to mention it. 8. Page 2402, l. 4-5 "...the discharge response represented an ever increasing higher fraction of event rainfall" - How do you know it? If it was a result of some study, please give the reference, otherwise it may not be necessary to mention it in this part of the text. 9. Page 2403, l. 4-9. If event water contributions were 50%, 27% and 45%, I would not say that the peaks were formed "mainly" by event water. 10. Page 2404, l.11-12 "when the catchment was wet, there was a higher contribution of groundwater to streamflow than when the catchment antecedent condition was dry". It is an interesting finding which may not be incorrect. However, is it not in contradiction with statements on page 2403, l. 6 and 9? Pre-event water contributions were larger in June (dry conditions, event water contributions 27% and 45%) than in November (wet conditions, event water contribution 50% and 16%). While not all pre-event water is formed by groundwater, groundwater is certainly not an event water. 11. Page 2405, l. 10 I propose using "low flow" instead of "base flow" (see comment 4). 12. Page 2405, l. 16-10 - important seasonal changes were not observed. In my opinion Table 3 shows the seasonal differences for the streambed samples. Are they not significant? What is "n" in Table 3? If it is number of samples, is it possible to come to definite conclusion when the numbers of samples for different environments were different? 13. Page 2406, l. 2. "Almost no diatom samples were found in overland flow samples". This seems to be an interesting finding given that hillslopes had the highest mean % of terrestrial diatoms. It could be assumed that overland flow should mobilize them, although the overland flow occurred rarely. Do you think that the intensity of the overland flow was too small to mobilize the lively diatoms which have certain resistance? Could there be any other reason? 14. Page 2406, l. 18-20 - systematic increase in terrestrial and aerophytic diatoms. . .Fig. 8 does not show strong increase for some events, especially the largest ones. 15. Page 2407, l. 5 "low flow" instead of "base flow"? 16. Page 2409, l. 7 - no significant seasonal differences. . .see comment 11 (streambed diatoms seem to show the difference between summer and winter) 17. Page 2410, l. 11-12 - conclusion that "hydrological response in spring and summer is largely composed of event

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water" is not fully in agreement with Fig. 4 (see comment 8), similarly line 20 (the first peak was mainly event water) 18. Page 2412, l. 6-12. Since this text is not related to exploration of the usefulness of diatoms, I recommend deleting it. 19. Page 2413, l. 14-15 "...riparian zones appear to be the largest diatom reservoir. . ." Table 3 seems to indicate that also hillslopes are a large reservoir. Should it not be mentioned as well?

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