Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2017-12-RC1, 2017

Hydrology and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "The Potamochemical symphony: new progresses in the high frequency acquisition of stream chemical data" *by* Paul Floury et al.

Anonymous Referee #1

Received and published: 23 February 2017

General comments

This proof-of-concept paper presents a new system of water chemistry monitoring (that the authors have termed 'River Lab') that offers both higher frequency monitoring and higher analytical precision than existing approaches. The authors describe this as a technical breakthrough that opens a new era of investigation into the hydrochemical signal of rivers. I agree that this is an exciting development and that we do need, generally in earth sciences, higher temporal and spatial monitoring for new catchment functioning insights (something that the Plynlimon dataset, that the authors refer to, showed superbly well). So I think this River Lab system is heading us in the right direction.

Printer-friendly version

Discussion paper

First, I think the title is rather good! I must admit to not knowing, when I first read this, that potamology is the study of rivers, but now that I do, I have a) learnt something, and b) been impressed with a cool title. The paper in general was really nice to read. It is well-written, clear and accessible throughout. The introduction was especially well-written and had a good progression through explaining to the reader what the norm is in stream chemistry monitoring, and why it is important to do better. It is also well-referenced. The figures are largely of good quality (although with a couple of minor exceptions noted below).

Overall, I think it is a good paper. I have only one 'major' comment: Regarding the offsets between the two sets of data (RL and Lab) shown in Figure 4, they seem rather large. You should further discuss the implications of this. They are systematic for most of the species. As you state on line 261 and throughout the paper, the RL data is more precise than the lab data (this is good, and you demonstrate this with data), but are the RL data more accurate than the lab data or vice versa? How could you determine this? You don't discuss accuracy at all. What is the use of a precise instrument if its accuracy is not so good! How does the existence of these offsets propagate into data analysis and process understanding? Surely we should care about the absolute magnitudes as well as the variations in amplitude. Or are the variations in amplitude most important?

I have quite a few, more minor comments, and these are listed below.

Minor comments

Line 24 Extra "a" in the sentence

Line 32 Is drought actually 'boring', hydrologically-speaking? I don't think so! Maybe rephrase to 'low flows' or something similar.

Abstract Combine into one paragraph

Line 48 Need to include the page number in Kirchner et al 2004, where that quote was taken from

Line 41-42 Your references need to be in some order... ie alphabetical or chronological... (this comment applies throughout the manuscript)

Line 53 “such as a single storm events” singular or plural?

Line 60-63 Would be great to read here example(s) of discoveries that Neal et al (2012)’s monitoring made... what didn’t we know before that this study demonstrated was possible to know with high frequency chemistry monitoring?

Line 62-63 Why are “act of discovery” and “manual approaches” in quotation marks? Are they quotes from Neal et al (2012)? If so, say so. Otherwise, they don’t seem to need quotation marks... (ie. not jargon)

Line 76 Does “Temporal” need to be capitalised?

Line 77 Is there a website / papers you could refer to on the CRITEX program?

Line 85 “Unsuspected” seems strange. Perhaps “unexpected”?

Line 98 I guess the 45 km2 refers to the Avenelles sub-catchment, rather than the Orgeval watershed, but this is ambiguous from the sentence structure.

Line 99 Should be “on average”

Line 105 Are these spring flash flood events from snowmelt? It would be good to see a figure of streamflow and precipitation inputs for a typical year or years.

Line 112 Give full names of IPGP and IRSTEA

Line 139 “the chosen analysis time is 30 minutes”. Why is this the ‘chosen’ frequency? Is this the fastest the cationic and anionic measurements can be made? From my understanding of the paragraph starting at line 115, the probes in the primary circuit could operate on a 1-2 minute basis. So is 30 (or 40) minutes or the complete analysis (including anionic and cationic) an arbitrary decision or is this the highest frequency this set-up can manage? Would sampling at a higher frequency be desirable? Please

elaborate on this.

Line 143 Is there a word missing here?

Section 3 I would like to see more comparison with normal laboratory design and protocols in Section 3. Eg. is the calibration and cleaning frequency in keeping with lab practices?

Line 155-162 Very cool!

Line 190 Perhaps better to say "<" rather than "better than", or give a range of %

Line 191 Earlier you refer to Table 1 as "Table 1" and now you refer to it as "Tab. 1". Be consistent.

Line 201 "Fig S1 2". I can only see a Fig SI 1 in the supplementary document. Have you mis-referenced this?

Section 4.3 Could you apply autocorrelation analysis to your long time series (from the field) to check these cross-contamination errors under low vs high flow conditions?

Line 234 "In the case"... change to "in this case".

Line 249 Why did you only pick two dates at low summer flow? Why not for a high flow day? It would be good to see such a test at high flow periods too. Would we expect to see the same reproducibility for high flow?

Figure 4 Font size and type are not consistent between the different sub-plots. Correct this.

Line 297 Would the temperature of a laboratory not have similarly well-maintained temperature? In my (admittedly, somewhat limited direct) experience, they normally do.

Line 329 I think you can remove the parantheses here "(an apparently 'boring' hydrological period)"

Line 330-331 Did you actually sample all species, so that you have the equivalent data in Fig5+6 for all species (not just calcium and sulphate)? Do the fluctuations in those species show the same relationship with discharge? I would suggest including those data in the supplementary information. Using the average, Std D, skewness and kurtosis is great as a comparison tool, but how about some metric for how well the different sampling frequencies reveal the fluctuations in relationship to the streamflow hydrograph? How did you decide that average, Std D, skewness and kurtosis are the best comparison tools?

Figure 6 Include a hydrogaph on here, like you did with Figure 5. Does it have the same diurnal variation as the sulphate shows?

Line 348-349 revealing a diurnal structure [in sulphate]? Did the other species also exhibit the same diurnal structure? What do you mean by "specific to each element"?

Figure 7 This is a nice figure with LOTS of information contained within it. It's quite hard to imagine how these time series might look (the equivalent of Fig5+6). So again, this would support including the other species information in the supplementary information.

Line 397-398 "artificially degraded the signals by adding a normally distributed noise" Nice idea!

Figure 8 Could you make these into line plots (i.e. connect your dots) so that we can see the noise chronologically? And also include the vertical lines (like in Figure 5) from the peak discharge down through the plots.

Figure 9 Again, make these into line plots? Also add a hydrograph.

Line 474 Is this a paraphrase or a direct quote?

Line 475-477 Nice punchline. But (and I apologize for being really pedantic here), the quote is to 'hear' the notes, not to play them. The stream is playing the notes. Your RL is therefore. . . a really sophisticated hearing aid. . .???! (Maybe a better simile needed).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2017-12, 2017.

Printer-friendly version

Discussion paper