Hydrol. Earth Syst. Sci. Discuss., 10, C5282–C5286, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C5282/2013/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Modelling and monitoring nutrient pollution at the large catchment scale: the implications of sampling regimes on model performance" *by* R. Adams et al.

Anonymous Referee #3

Received and published: 30 September 2013

General assessment

The authors aim to address an important issue such as dealing with new available high-frequency datasets that are now becoming fairly widespread. On one side, these new data are able to reveal little-known processes; on the other side, they can improve our ability to model chemicals transport. In the paper, however, these two aspects seem to be sometimes confused. The reader would expect more discussion on the implications of using different sampling regimes rather than a huge description of model details.

The objectives of the work are thus not fully clear nor coherently addressed, resulting in a paper that apparently adds little new contributions to existing knowledge.

Major points

- Page 66, lines 22-23: The authors claim that "The key aim of this paper is to assess the value of high frequency data in water quality models at larger scales". However, the benefits of using high frequency (and expensive) data sets are not critically discussed. An interesting comparison between different sampling regimes is described in words (page 81 lines 1-4), but for some reason it is "not shown for brevity". So the paper lacks of a rigorous and clear comparison between the skills involved by different sampling regimes. To this aim, a possible order to present the analyses might be: 1) show a time series (discharge, solutes..) or a duration curve of low frequency (LF) data; 2) show the same analysis over the same period using high frequency (HF) data. Then compare them and discuss the implications in terms of monitoring ability, policy improvements, etc.. ; 3) run your model using just LF data for the calibration and compare it to both LF and HF measurements ; 4) run the same (or similar) model and calibrate it with HF data and see whether results are improved or not. An accurate discussion of points 2) and 4) can show the net improvement arising from high frequency data, and hence properly address the pursued issue. A somewhat similar analysis is presented in the paper in section 4.5. However, it is not clear why the authors tested just one high frequency simulation on different resampled data instead of doing the opposite: feeding the model with sampled (weekly and monthly) data and comparing it to the "true" high frequency dataset, to see what is progressively missing.

- Page 72, line 23 "Flow duration curves were also used. . . ": The reasons for one may want to use flow duration curves to assess model performance should be discussed. Duration curves provide a very different type of information with respect to plotted time series, so the authors should emphasize what their focus is on. What is more important for their study and why? Also, the authors should explain the significance of comparing duration curves of the two datasets over different periods (e.g. figure 3). It is not

surprising that the two are so different.

- Page 87, lines 22-26: The authors claim that “The TOPCAT model performed adequately at simulating nitrate and SRP in both LTD and HFD datasets”. However the SBHR model is only able to reproduce the overall seasonal trend (as also written by the authors at page 84, lines 24-25), which was already caught by the SBW model. Therefore, the use of high frequency data is not justified by modelling results. In my opinion, this is a central point that needs further discussion.

Minor comments

- Page 69, line 27: Evapotranspiration (ET) seems to be very important in the Frome catchment, as more than 50% of annual rainfall does not pass through the catchment outlet. Therefore, the algorithm should be explicitly described. This is further important because the model has a good capability in catching seasonal trends, that are largely influenced by ET dynamics.

- Page 72, line 5: How is SPLIT defined? I guess it is in [0,1] but this is not written anywhere.

- Page 76, line 25 (and figure 4): in addition to the duration curve, it would be nice to see model performance also in a time series plots.

- Page 78, line 8: the name of the section (Discussion) is not always appropriate. A considerable part of the section just shows more in details the analyses and modelling results. A discussion section should contain more critical debate and let important research questions arise.

- Page 86, lines 4-7 “... modelled and observed concentrations look quite similar...”: this is not true. Moreover the y-axis in figure 8 (central panel) should be rescaled because it does not allow proper visual inspection of the results.

- Page 86, lines 19-22: this sentence should be placed somewhere else.

- Page 86, line 23: the Conclusions section contains too many points. Moreover some of the conclusions should be first better discussed (see below) and could be moved to the discussion section.

- Page 89, line 1: this has important implications that should be awarded more discussion and space.

- Page 89, lines 7-12: this is a hypothesis which needs to be better discussed, therefore it should not be among the conclusions.

Figures

Results often involve different time intervals which are not always immediate to identify, in particular for the duration curves. The use of some timeline panel, where the specific (with respect to the total observed or simulated period) time interval of the plot is highlighted, might make it easier to collocate each plot into the global results framework.

#3: the figure can be misleading in that it is not immediate that the duration curves are obtained over different periods. I also suggest the use of letters (a), (b) etc... within the plot to avoid the use of (TL), (TR), etc.. in the figure caption.

#4: it might be meaningful to add a time series of modelled VS observed discharge. Then, the tail of modelled series seems to go below zero. Why?

6# and 7#: in the former you refer to plots by means of “top”, “middle” and “bottom” panel, while in the latter you call them a, b and c (without displaying the letters in the corresponding plot). Please use a unique system for both the figures.

8#: please display the letters a, b, c in the plots. I also suggest to rescale the y-axis of middle panel.

Technical corrections

Please note I am not native English speaker, so I am only checking what it seems to

be a typing or technical error.

Page 63, line 23: please define P

Page 64, line 12: “contain” instead of “contains”

Page 65, line 10: “is” instead of “are”

Page 66, line 13: processing?

Page 67, lines 23-26: it seems there is something wrong with this sentence

Page 71, line 6: please define TON

Page 71, lines 17-20: it seems there is something wrong with this sentence

Page 73, line 10: please define PP

Page 78, line 24: there is an extra (i) and the sentence is partially in italic

Page 81, line 19 and Page 82 line 9: why do you use italic?

Page 83, line 22: what are “Fig. 5a and b (lower panes)”?

Page 87, line 3: I guess it is “buy” instead of “but”

Page 87, lines 4-6: it seems there is something wrong with this sentence

Page 87, line 20: maybe a comma (,) instead of a full stop (.).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 10161, 2013.