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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 #1

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This paper aims to assess the value of frequent water quality measurements (sub-daily) for water quality modeling. In my opinion this paper lacks clear objectives and methods that can fulfill these objectives. The manuscript is halfway between a monitoring and modeling study for a catchment (= what the authors did) and a general assessment of the value of high frequency water quality records in water quality modeling (= what the authors claim). This paper has to be rewritten with new objectives and restructured to be a valuable contribution. In its current state this paper lacks innovation as the observations have been published before and the goal and added value of the modeling

is not clear. Below I included some major and minor points

Major points

- Page 66, line22: Objectives: your current objective is "to assess the value of high frequency data in water quality models at larger scales". What you do is: you take 1 model (TOPCAT) and manually calibrate this model for 1 catchment (414 km2) using daily time steps. Then you visually compare the results with different frequencies of measured data and conclude that only with high frequency observations short-term spikes in the data can be observed and thus modelled. This seems rather obvious and I'm not convinced that you couldn't have derived this conclusion without the modeling effort (since the measurements were published before). In my opinion to fulfill your current objective you would need a whole set of models which you would each calibrate to a set of catchments of different scales using some kind of objective function that would allow you to assess the value of higher and lower frequency data in the calibration/validation. Thus I strongly recommend that you rewrite your objectives so that it fits your methods and then as a consequence rewrite your paper around these new objectives.

- Structure of introduction is not clear: remove sub headings 1.1 and 1.2; Make the objectives jump out and formulate them clear and in such a way that your methods fit your objectives. Does the section about the MIR modeling approach add anything to the story? There are 2 paragraphs describing high frequency data (first and section 1.2). The point of page 67 lines 1-13 is not clear at all. What do you want to explain with these 2 examples, and why are they placed after the objectives?

- You want to assess the value of high frequency measurements, but you visually compare model results with data. I see no values (for example improvements of model calibration results using different datasets) at all. Just figures 7 and 8. Most of your discussions and conclusions describe the processes and simulation quality of your model, which were not in your objectives.

- 15 (paragraphs of) conclusions are too much to answer 1 question. Stick to your main points.

Minor comments

Title:

- “at the large catchment scale” is not informative. A catchment of 414 km2 , which is the size of the case study, is not particularly large.

- on → for

Abstract:

- line 2: remove “and”

- Line 5 you only assess 1 model (albeit compared with different datasets): how can you say you assess the capability of process based models in general?

- Line 6: larger catchment scales (100-500km2): You apply your model to just 1 scale: 414 km2: why pretend in this sentence that you apply multiple models to multiple scales: you apply 1 model to 1 scale.

- Line 13: “the use of a process based model”

- Line 15 You don’t simulate high frequency data: you compare your daily simulation to high frequency data. I don’t understand the “thus”.

Introduction

- Line 25 remove “exacting”

- Page 63, line 4: flow samples? measurements/observations

- Line 12: to which datasets you refer?

- Line 12: I prefer not to read all the names of the models, just their references are enough.

- Page 64: remove: set of

- I do not understand your distinction between physically-based and process-based. Do the process based models incorporate only purely empirical relationships? And if this is the case, do your physically based models not do this as well (darcy’s law for example). I would refrain from these unclear model typifications.

Methods

- Page 67, line2: you only use 1 model! How can you say you investigated the ability of models in general to simulate high frequency data?

- Page 68 ,line28 mg/year is not a concentration

Results

Page 77, line 15: calibrated using samples? Do you mean you set the value based on low flow samples. Please say so.

Figures

- Caption of figure 3 is incomprehensible

- Fig 8. Caption. How did you test and what did you test?

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