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Hydrology and Earth System Sciences Discussions

Interactive comment on "On selection of the optimal data time interval for real-time hydrological forecasting" *by* J. Liu and D. Han

Anonymous Referee #2

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This paper discusses the importance of the use of a suitable time step for real-time hydrological forecasting, and the selection of the optimal time step to use. This is an important point, but not one that is new. As the authors state in the abstract, this is known in the control engineering community. The authors claim however that this is ignored in operational applications oof hydrological forecasting. While this may be correct in some locations, I do not think that it is generally the case. The authors do not give references or evidence to support their position, so it is difficult to assess the accuracy of their statement. The idea that the model time step should be a little less than the time of concentration is well know in the hydrological community (which includes a number of control engineers), however it is generally ignored due to the limitations of the resolution of the available data. The problem of having a model time

step that is too short is also well know for discrete models. It should be noted that continuous time models (see for example papers by Peter Young) avoid this issue and do not suffer from the numerical issues of having a time step that is too fine.

As it stands, the paper doesn't contribute a new result to the field of hydrology, rather reinforces an existing well know result. I am not working in the field of operational hydrological forecasting so I cannot comment from experience, I find it hard to accept that this idea is not generally known by people working in this area.

Specific comments: 1) page 10830, line 25: I would suggest saying "the future is that higher sampling rates will become more widespread".

2) page 10833, line 5-7: For highly non-linear systems, then the model time step required may be even smaller due to the problem of solving a non-linear ODE numerically (see Kavetski and Clark papers). The requirement that the model time step is slightly less than the time of concentration really applies to all models, even linear ones.

3) page 10836, line 23-: $f_s>2B$ is a sufficient condition for a perfect reconstruction of the original signal only if there is no noise added in the sampling. If the signal has already been sampled at a higher frequency and is being rebinned to have f_s only just greater tha 2B, then yes. But if the analogue signal is being sampled at such a frequency, then the ability to reconstruct the original analogue signal depends on the noise added in the observations. Suggest adding "in the absence of observational noise" on line 26.

4) page 10853, line 19: "attention of hydrologists". Note that most hydrologists should already be aware of this, so in reality you are reminding them of this issue.

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