

# ***Interactive comment on “Comparison of high frequency, in-situ water quality analysers and sensors with conventional water sample collection and laboratory analyses: phosphorus and nitrogen species” by Steven J. Granger et al.***

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Received and published: 16 April 2018

Re Specific comment: 1) Information on storage/filtering effects can be brought into the discussion in the revised manuscript. It is important to note however that this was a 'real' comparison and was meant to simulate what actually happens in reality. There are always issues in data quality with whatever approach is taken to collect information on water quality parameters.

The issue of 10 µgP/l resolution was also flagged by Reviewer 1 and it is something

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we will report on in the revised manuscript.

Re Specific comment 2) This is something that could be done in future studies; however, it was not the aim of this study, which was to compare the two approaches in a realistic field setting i.e. manual sampling/lab analysis v in situ automated equipment. To address this comment, we will flag up the possibility of doing further work in the future.

It would be very difficult to compare LOQ on the two differing approaches in the way this reviewer implies as we feel that as their modes of operation are different, a standardised assessment of LOQ would in most cases not be possible. End users of the in situ equipment are all using the LOQ provided by the manufacturer, so again, our experiment captures what is happening in reality.

As with point 1, additional comment/discussion on sample storage in relation to LOQ will be included in the revised manuscript. However it is worth noting that in reality, when such studies are undertaken, all 'manual' samples are subject to this issue, and it is not a consistent issue, as by the time samples are presented to the laboratory, invariably some samples will be older than others just by the nature of the temporal sampling.

Re Specific comment 3) Similarly to point 2, this is something that could have been done differently, but the comparison was a 'real' field test study. The nature of whether field based analyses are calibrated is one of the important differences in the use of such equipment. Field based monitors ARE regularly serviced and calibrated, some (i.e. Phosphax) even run occasional in situ checks (this information can be included/made clearer in the revised manuscript). But this is completely different to laboratory analyses which are calibrated (over a ranged of values) and QC'd every time the lab bench equipment is used. It is one of the trade-offs made when considering whether to go for data rich in situ monitors, or manual/auto-sampler samples which are more expensive, time consuming, labour intensive, and time delayed, but yield more reliable analytically

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data. This is why we chose to compare field in situ kit TO the laboratory data and not vice versa – i.e. we are wanting to test what actually happens in reality with end users. We will acknowledge in the revised paper that both approaches have their weaknesses; a challenge faced by all researchers in this field.

Re Specific comment 4) More data is always better. However, we don't believe that our analysis of one storm event at three sites is invalid. The statistical analysis reported in the paper has been provided and validated by a statistician. Again, the reporting of only 5 genuine pairs is the reality of this approach and the challenge faced by field researchers. Manually collected genuine sample pairs will always be much lower in number when compared to in situ equipment, which in turn rarely correspond temporally to auto-sampler samples. We have tried to reflect this trade-off in the manuscript. It is why we specifically included the 5 genuine sample pairs as part of the discussion in the draft paper.

Re detailed comments. Many of the more 'detailed' comments are similar to those raised in the general comments of Reviewer 1 and we will address them accordingly when we address Reviewer 1 in the revised paper

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2017-684>, 2018.

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