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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical Note: False low turbidity readings during high suspendedsediment concentrations" *by* Nicholas Voichick et al.

Anonymous Referee #2

Received and published: 28 November 2017

This paper deals with false low turbidity readings, using an optical probe, which occur at a turbidity level well above the nominal range of the probe. It is a very specific issue and it is the first time I read about these false readings. The subject of this study is relevant with themes of the HESS journal. The findings are based on field measurements on the Colorado River and lab experiments. I suggest accepting this technical note for publication after the following clarifications.

In my opinion, few points should be clarify in the abstract (and more generally in the paper): Are the conclusions valid for all type of optical probes and with different sorts of suspended matter? Because for instance nephelometers are affected by grain size.

Should we expect the same conclusions with nephelometer and turbidimeter, or between forward-scattering, side-scattering and back-scattering (in the case of Nephelometry)?

Concerning the purposes of monitoring turbidity, I would add two other points: 1) "to study sediment transport in river and catchment erosion", and 2) "to manage water reservoir (silting and emptying)". Some references relative to the five purposes may be added (possibly in the introduction section).

I think it could be useful to give some tips for detecting these false low turbidity readings. If another surrogate measurement of turbidity is not available, could these low false turbidity measurements be detected? Note that values of silt and clay concentration to obtain false low turbidity readings are around ten times higher than maximum concentration measurable by the instrument tested in this study. This paper could also be useful to underline the importance of the instrument choice, notably about the nominal range of the probe.

In the second paragraph of the introduction, the authors should add a definition of nephelometric (determination of light-scattering).

In the third paragraph of the introduction, the authors should mention the type of data that is used in figure 2 and in ASTM International (2011) to deduce the different responses. A reference to figure 5 should be given in line 26 of the introduction to provide an example (or a citation should be added).

In section 2.2, the authors should present briefly the experimental setup: equipment used with dimensions (in particular relative to the conditions required to use properly the probe).

In section 3.1, I suggest to use the station names presented in figure 3 (in the second sentence). In the third sentence, "at or above" is confusing to me. I understood that false low turbidity values are observed only above probe maximum recording level

(never “at” maximum).

Considering section 3.2, apparently only one experiment has been conducted. Few words about the uncertainties and/or the reproducibility could be welcome (in relation with the two different probes). The threshold value of 38,000 mg/L observed in the experiment should be also compared with the range 17,000 mg/L to 27,000 mg/L from the field.

In section 4, as “false low turbidity occurred during approximately 70 percent of the suspended-sediment load of the flooding event”, it should be mentioned that for the Colorado River it seems to be necessary to use another probe with higher saturation level.

In figure 4, few axis ticks are missing.

In figure 5, for clarity, I suggest to extend the graph to 30th of September to see the end of the plateau and the decreasing turbidity following the event.

Finally, I noticed that, although the authors used the same model of instrument for lab and field measurement, the saturation occurred at 1700 FNU and around 1500 FNU respectively. However, it might not have an influence on the conclusions of the study.

Here, I cite two papers that might be helpful to understand the complexity of turbidity measurement: Kitchener, B. G., Wainwright, J., & Parsons, A. J. (2017). A review of the principles of turbidity measurement. Progress in Physical Geography, 41(5), 620-642. Ziegler, A. C. (2002, April). Issues related to use of turbidity measurements as a surrogate for suspended sediment. In Turbidity and other sediment surrogates workshop (Vol. 1).

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