Hydrol. Earth Syst. Sci. Discuss., 10, C546–C550, 2013
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Hydrology and Earth System Sciences Discussions

HESSD

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Interactive Comment

Interactive comment on "Variation in turbidity with precipitation and flow in a regulated river system – River Göta Älv, SW Sweden" *by* G. Göransson et al.

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Received and published: 27 March 2013

The comments provided by the referee are very constructive and helpful, and will greatly improve the paper. The referee's efforts will be acknowledged.

In the following a detailed rebuttal is presented where changes that will be made in the paper are discussed in the context of the review comments provided. If some suggested changes were not carried out, this is motivated in detail by the authors.

Turbidity -variability: The referee suggests including some evidence to support the statement that the daily variability in turbidity is small and will not have a large effect on daily values. That is absolutely possible and our suggestion is to include another figure showing daily mean and minute mean for a random chosen period and to include stdv, variance, min and max for two of the days in the period as well as for the whole period (Figure 1). From the example, one can see that the minute means' deviation from the daily mean is less than the variation for daily means over the whole period.

Turbidity - fouling on sensors: The referee had a question about the influence from fouling on the sensors to the turbidity values. The device is a HACH Surface scatter turbidimeter (stationary) and it measures on a free water surface with a continuous flow, and not through a cuvette or similar (which is quite common in field work). River water is pumped up through a tube and flows over an edge. The flowing water surface is illuminated and the reflection (scatter) is measured. Because of the free water surface and the continuously flow the risk of influence from any algal growth on the device is low. During summer, the water contains more humus and a thin layer of humus may be stuck on the tubes edge. If the referee finds it relevant, our suggestion is to include the above information in the revised manuscript. An illustration of the turbidimeter is shown in Figure 2.

ANOVA: The referee questions the performed factorial ANOVA and whether it is appropriate to use it when the variances within the groups are unequal. An analysis of variance is in generals done to see whether there are differences in mean values between data from different groups. This is not the type of analysis that is done here, but a factorial analysis. Here, a factor analysis is done between two factors' influence on a third, i.e. two-way factorial ANOVA, because we wanted to study the effect of two independent categorical variables on the dependent variable. We here do the assumption that flow (Q) and precipitation (P) are independent which they in reality are not. The reasoning is that the flow in the studied river is governed by the energy demand and the regulation in the lake Vänern more than it is governed by precipitation. In order to do so, the independent variables are categorized into factors instead of using real values: flow data with river flow 98-150 m3/s is given the number 1, flow data with river flow 151-200 m3/s is given the number 2, flow data with river flow 201-258 is given the

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number 3. The same is done for precipitation. The data is then organized in a table, like:

Q-class P-class Turb.value 1 1 3,9 1 1 6,9 1 2 6,6 1 2 3,7 1 3 11,9 1 3 5,7 2 1 7,6 2 1 6,2 2 2 7,1 2 2 7,4 2 3 10,2 2 3 5,2 3 1 7,4 3 1 9,2 3 2 4,8 3 2 14,9 3 3 5,5 3 3 13,2

The factorial analysis is then done by using statistical software. Although the grouping could have been done differently, we believe the results (figure 9 in the manuscript) prove the overall indications given as points under section 4.4. If the referee finds it appropriate, we will include the information above in the revised manuscript to explain the factorial ANOVA better.

Minor comments: P256 l 14 – change to “bases” P258 l26 – change to “coliform” P263 l23 – deletes “unbiased data” from the sentence as it here means that extremes are included which is already mentioned in the sentence. Figure 3 captions – deletes the “and” Figure 4 - we are not sure if the referee mean that flow should be exchanged to runoff instead. We do not have any good data on runoff an leaves the figure as it is. Figure 7 – we will split the figure into two; one showing autocorrelation for daily mean and one for monthly mean.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 255, 2013.

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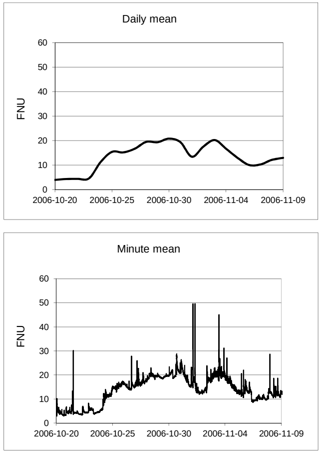

Ship traffic causes the strong peaks that are seen in the minute mean data

	Min	Max	Stdv	Variance
2006-10-20 (normal turbidity), minute mean	2.9	10.1	0.95	0.89
2006-11-03 (high turbidity), minute mean	17.4	45.0	1.83	3.35
2006-10-20—2006-11-09, daily mean	3.97	20.8	5.4	29.17

Fig. 1. Turbidity - variability

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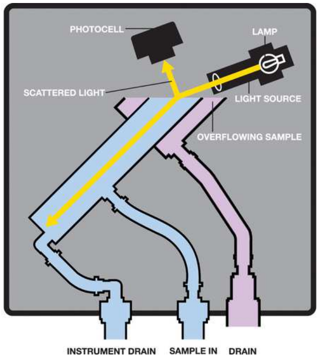

Schematic illustration of the turbidimeter.

Fig. 2. Turbidimeter

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