Hydrol. Earth Syst. Sci. Discuss., 10, C4620–C4624, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C4620/2013/

Hydrology and Earth System Sciences
Open Access
Discussions

HESSD
10, C4620–C4624, 2013

Interactive Comment

Interactive comment on "Modeling the effects of cold front passages on the heat fluxes and thermal structure of a tropical hydroelectric reservoir" *by* M. P. Curtarelli et al.

M. P. Curtarelli et al.

mpedroso.curtarelli@gmail.com

Received and published: 3 September 2013

Dear referee,

thanks for reviewing our manuscript. We found the comments helpful, and believe the revised manuscript will represent a significant improvement over the initial submission. We will try to follow all recommendations and suggestions given by the other reviewers and the editor. The following are the comments and responses to your questions:

Minor Comments:

1. Abstract Try to be more concise in your points. Sentences are too long and some-

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

times convoluted. The use of more commas "," could help.

The abstract will be reformulated. We will try to be more concise.

2. Introduction P8468 L.21-22. Revise sentence P8469 L9-11. I think it is important not only to establish geographical differences (ie: North Vs South America) but also climate differences (ie: Tropical Vs Template).

We will try to explore the climate differences in the "Introduction" section.

3. Methods The authors claim that they used a correction for atmospheric stability, not included in methods.

We will describe in more detail the method used to corrections for atmospheric stability.

4. P8478 L13. How were selected the two sections? It is the wind or other meteorological data really different? What is the effect of having spatial wind variability (if it is the case...)? I think that is a key point if you want to highlight the effects of spatial heterogeneity in the heat fluxes from your results. Is the spatial heterogeneity in the heat fluxes created by the spatial heterogeneity of the forcings? Hydrodynamics? Bathymetry (i.e: shallow Vs deeper zones)?...

The patterns observed in the meteorological variables are similar on the two sections (Fig 3). However, some variables exhibit differences in its intensity. The wind speed, for example, is generally higher in the transition zone than near the dam. On the other hand, the drop in the air temperature is more pronounced near the dam than in the transition zone. We will explore more these differences in order to highlight the effects of spatial heterogeneity in the heat fluxes from our results.

5. Results and discussion: In my opinion, the authors spend more time describing the data (what it is important) than describing the "real" results. There is a lack of results and discussion in which the authors should focus and part of the description can be shortened (ie: P8479 L14: "The shortwave radiation peak occurred at approximately noon" It is really necessary to say that?)

HESSD
10, C4620–C4624, 2013

We will split the “Results and discussion” section. In the “Results” section the results obtained with the hydrodynamic model will be more explored. In the “Discussion” section we will try to better compare our finding with other studies.

6. Sometimes it is not clear is the author is referring to model or field data results. For example, is the water column temperature used in the Ln obtained from the field data or model data?

We will revise the manuscript in order to clarify this point. In this specific case, the water column temperature used to compute the Ln was obtained from the model.

7. P8482. L21: What is the reason of the tilted thermocline? Wind forcing? Passage of basin-scale internal waves? Was something stationary?

In this case, the thermocline was tilted due to the wind forcing.

8. P8483. L8: Some information about the river inflow temperature Vs reservoir temperature, inflow rate and residence time may help the reader to understand the contribution of the inflow into the stability of the water column.

We will compute the densimetric Froude number for the river inflows (Rueda & MacIntyre 2009) in order to help the reader to understand the contribution of the inflow into the stability of the water column.

9. P8483 L26 to P8485 L2: belongs to methods. Analysis of Ln: 1)A logarithmic scale in the figure will help in the presentation of the results. It is not clear when Ln is close to 0 or if there are gaps in the data. 2). Is Ln based in hourly wind data? Note that a simple gust will not generate “upwelling”, the duration of the wind event is crucial. Some authors average the Ln (or wind) based in the time required for a constant wind event to generate the maximum tilt of the thermocline that equals to the 1/4 of the period of the V1 basin-scale internal wave. 3)How were calculated the Ln for the different zones (near dam and transition)? The Stability (St) should be calculated for the whole lake. Text doesn’t make any reference.

HESSD

10, C4620–C4624, 2013

We will change this part of the text to the “Methods” section. 1) We will change the scale of Figure 7a-b to a logarithmic scale. 2) The Ln showed in the Figure 7 is based on hourly wind data. We will average the wind data based in the time required for a constant wind event to generate the maximum tilt of the thermocline that equals to the 1/4 of the period of the V1 basin-scale internal wave. 3) The Ln was calculated based on the model outputs. We used two densities profiles, one located near the dam e another in the transition zone, to compute the Ln for different zones. The St was calculated for the whole lake. We will describe in more details how the St was calculated.

10. Figure 4(c): 1) Making a contour plot with just 3 loggers and 20m of water column is a bit “reckless”. I don’t think you are going to capture the water column structure with just 3 loggers (when stratified). Instead, maybe it is interesting to show the temporal series of temperature. 2) Furthermore, the deepest logger at S2 shows higher temperature values than those at the top (ie: from day 138 and on). How can you explain such an inverse stratification? Were the loggers well calibrated? I don’t see other physical explanation, cooling wasn’t that intense to generate such a feature (would have mixed faster) and author stated that the river inflow was colder than the water reservoir and plunged. So how it comes that the temperature in the bottom was warmer at S2? Could a river underflow (warmer but rich in sediments and then denser) generate such feature?

1) We agree with this suggestion. We will change the figure 4 to the temporal series of temperature (modeled and observed). 2) We will analyze the data of the logger located at 20 m depth. If any calibration problem is detected we will discard this data from the analysis.

11. Try to be consistent in your units. You use day of year in some figures but date in others.

We will revise all the units in the manuscript.

References

Rueda, F. J. and MacIntyre, S. (2009) Flow paths and spatial heterogeneity of stream inflow in a small multibasin lake. Limnol. Oceanogr., 54, 2041-57.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 8467, 2013.