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Hydrology and Earth System Sciences
Discussions

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.

Anonymous Referee #5

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This paper describes the changes in the thermal structure of a Brasilian reservoir and in the heat fluxes during a period of time where cold fronts were present. The paper, in general, is well written but has serious deficiencies. I think, however, that the authors have the means and capacity to remediate such deficiencies, so I strongly recommend the authors to make a severe revision of the manuscript. I also strongly encourage the authors to split the sections of Results and Discussion.

My main concerns have been already well presented by other reviewers (ie: reviewer 4) and Editor (Prof Matt Hipsey) comments, so I recommend the authors to follow their recommendations. Since the main deficiencies have already been discussed, I

will focus this revision in other "smaller" points, aimed to improve the quality of the manuscript.

Abstract Try to be more concise in your points. Sentences are too long and sometimes convoluted. The use of more commas "," could help.

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).

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

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 (ie: shallow Vs deeper zones)?...

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?)

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?

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

P8483. L8: Some information about the river inflow temperature Vs reservoir tempera-

ture, inflow rate and residence time may help the reader to understand the contribution of the inflow into the stability of the water column.

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 $\frac{1}{4}$ 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.

Figure 4(c): 1)Making a contourplot 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?

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

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