

Interactive comment on “On the water thermal response to the passage of cold fronts: initial results for Itumbiara reservoir (Brazil)” by E. H. Alcântara et al.

Anonymous Referee #2

Received and published: 15 February 2011

General Comments:

This paper analyzes the influence of a cold front passage over a tropical hydroelectric reservoir on the meteorological variables, near-surface heat flux and the thermal structure of the water column. For this purpose the authors used the data from an Integrated System for Environmental Monitoring station. The paper is relevant because the new data collected and the tentative to investigate the effect of a cold front on the thermal stratification of a tropical hydroelectric reservoir in Brazil. However, some doubts must be clarified before the paper can be accepted.

C5091

Specific comments:

1. The main comment is related to the influence of the cold front passage on meteorological variables (section 3.2). The authors mentioned that “during the passage of the cold front the atmospheric pressure and the air temperature decrease; in the other hand the wind shows a little increase and also the relative humidity”. Firstly, it seems that the criterion they used to determine the passage of the cold front is only based on satellite images. It may lead to false conclusions. They should also observe the behaviour of the meteorological variables. As mentioned by the authors the passage of cold fronts are normally associated with a drop in surface air temperature and atmospheric pressure which are accompanied by wind intensification. Other well-known characteristic is an increase in the relative humidity earlier to the passage of the cold front and a change in wind direction, not mentioned by the authors. From Fig. 7, it can be seen that the air temperature and atmospheric pressure start to decrease earlier than the cold front passage indicated by the authors in that figure. Also, the change in wind direction occurs earlier than the cold front passage indicated by the authors. There is a misunderstanding in the cold front passage: in Figs. 7, 8, 11 and 12 the cold front passage occurs later compared with Fig. 9. I think that the correct occurrence is that in Fig. 9. Since the discussion of the influence of the cold front passage on meteorological variables seems to be not correct as whole the comments and conclusions in the other parts of the paper may be different. This must be clarified in the revised version.

2. The authors mentioned that “during the winter months cold fronts can reach the Southeast Brazilian coast each six days and during the summer between eleven and fourteen days in the average” (section 1). In the winter this is true, but during the summer it is wrong. Recent studies (not yet published) using Climanalise data from CPTEC show that in summer cold fronts can reach the Southeast Brazil almost each six days also. The authors mentioned the reference Stech and Lorenzetti (1992), which correspond to winter cold fronts. They must obtain more information about the

C5092

frequency of cold fronts in the Southeast Brazil.

3. The authors mentioned some characteristics of the climate in the region of the Itumbiara reservoir (section 2.1). They must indicate the source for these data information.

4. In section 2.4 the authors mentioned that the terms in Equation 1 are defined as positive when directed into the water. However, in Equations 2, 4 and 5 the fluxes are positive when directed from the water to the air. So, in Equation 1 the net heat flux, i. e., the difference between the shortwave radiation and the other fluxes (longwave radiation, sensible and latent heat flux) is positive when directed to the water.

5. Section 3.3: the authors must verify if the comments on the influence of the cold front passage on meteorological variables mentioned above may influence the results and discussions.

6. Section 3.3: The authors mentioned that “the increasing in the longwave radiation after the passage of the cold front is due to the cloud cover formation”. They used Equation 2 for the calculation of the longwave radiation flux. Where in this equation the effect of clouds is taken into account?

7. The English language must be improved. There are many grammar errors and some sentences make no sense.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 9437, 2010.