

Interactive comment on “Influences of tidal energy advection on the surface energy balance in a mangrove forest” by J. G. Barr et al.

Anonymous Referee #1

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General comments

The manuscript aims to add measurements and calculations of energy transported by tidal water movements to the energy balance of a mangrove forest. I believe that this is one of the first attempts in this task, of clear interest to the readers of Biogeosciences. The manuscript is generally well written, focused and easy to follow.

My main concerns are related to the extent of the study and to the lack of clarity in some parts of the methodology. The study is restricted to a very short time (10 days), which raise concerns about the generality of the author's findings in the specific site itself. Moreover, this time limitation has not been discussed by the authors.

The calculations of the cross-sectional area and width of the tidal creek are not clearly

C5158

explained and a bit obscure, despite their importance in determining the tidal import and export of energy. Besides, the fact that the authors reveal the application of non referenced “user specified information of the channel geometry” does not add to clarity.

I believe that the time lag between ΔH and the heat fluxes is crucial and should be central in the discussion of this experiment, even to highlight the study limitations, but the authors seem to simply solve the issue presenting a figure with cumulative fluxes (Fig. 10). Some more discussion about this issue would add to the message of the paper.

Specific comments

Pag 11742 Line 8: what about the winter? if the study is limited to the summertime, change the manuscript title accordingly

Pag 11743 Line 20: 10 days is a very short time to perform such experiment: please highlights the limitations due to this extent of time

Pag 11744 Did you perform any rotation in the flux data processing?

Pag 11744 line 27: Was only the estuary to be out of the footprint? How many and which of the instrumented locations were inside the footprint? What implication does this have on your results?

Pag 11745 Line 12: why did you divide the study site into 4 sectors if there are only 3 instrumented locations?

Pag 11746 Line 3: did you correct G for heat storage in the 10 cm above the instrument?

Explain better how you estimated the cross-sectional area, A, and of the creek width, w, which is crucial for a correct estimate of ΔH at Pag 11746 Line 13 and Pag 11747 Line 7, respectively.

Pag 11748 Line 11: I'm a bit puzzled by this last sentence. If “recharge was not used

C5159

in determining import and export of enthalpy since the analysis required mass balance closure”, how did u estimate ΔH for flood tides?

Pag 11748 Estimate an error to the calculation of ΔH

Paragraph 4.1 has hardly any discussion in it. Moreover the discussion chapter considers very few published papers, so it is hard to place this paper in the context of the broader literature.

Pag 11749 Line 26: the fact that “discharge of water exiting the creek during ebb tides was substantially dampened and in some cases not observed” raises concerns on the calculation of the ebb tides ΔH . Please explain

Pag 11750 Line 28: please discuss the reasons for this afternoon shift from sink to source

Pag 11751 Line 26: discuss the lag time between ΔH and the other fluxes of energy and what it means for your measurements .

Technical corrections

Pag 11740 Line 9: add “10-day” after “intensive”

Pag 11740 Line 11: here and later in the manuscript, add USA when appropriate.

Pag 11740 Line 18: add a comma in the sentence starting with “Including”

Pag 11741 Line 14: explain why it’s possible to neglect energy stored in the biomass

Pag 11741 Line 15: Maybe “fluxes of sensible and latent heat” is better

Pag 11741 Line 25: “dryland” is a somewhat ambiguous term

Pag 11742 Line 10: add reference here

Pag 11742 Line 10: replace “cool” with “cooler”

Pag 11742 Line 14: are you using soil and sediments as synonymous? Please clarify

C5160

Pag 11743 Line 11: or *Laguncularia racemosa*?

Pag 11743 Line 18: please specify if the peat is buried by the 1 m sediments

Pag 11744 Line 4: RS-50 or R3-50?

Pag 11744 Line 13: please specify the thermistor-hygristor probe manufacturer

Pag 11744 Line 14: the producing factory is in the Netherlands

Pag 11744 Line 15: HFT 3.1 or HFT 3-L?

Pag 11744 Line 20: add reference

Pag 11744 Line 25: what about amount of water moving in and out the system?

Pag 11744 Line 26: what about flood tides?

Pag 11745 Line 7: but your analysis considers shorter time frames than a day or more. Please develop

Pag 11745 Line 12: please justify why you forced the regression through the origin.

Pag 11746 Line 13: “Point measurements of velocity were converted to depth- and width-averaged velocity”. How was this done?

Pag 11746 Line 15: with which frequency did you compute A?

Pag 11746 Line 15: Add “(discharge)” after “Recharge”

Pag 11747 Line 1: the unity of ΔH is Joule. Please verify and correct

Pag 11747 Line 4: the density of water is (ρ) not p

Pag 11747 Line 4: add reference to equation 4, 5 and 6.

Pag 11747 Line 7: replace (C) with ($^{\circ}\text{C}$)

Pag 11748 Line 3: explain difference between eq 6 and 7

C5161

Pag 11749 Line 4 and 6: why did you change the time periods in this comparison between fluxes?

Pag 11750 Line 8: explain the high values of ΔH before 8:30

Pag 11750 Line 11: it's not clear to which period you are referring to

Pag 11751 Line 12: since you did not perform measurements in October and November, replace "indicates" with "suggests" and "changed" with "would change"

Pag 11751 Line 30: discuss also the drop in r^2 .

Pag 11752 Line 29: it's not clear what implications Gu et al. (2007) findings have for your paper

Pag 11755 Line 6: check the journal name shortening

Pag 11756: indicate in Fig. 1 where Florida Bay is.

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