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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "The monsoon effect on energy and carbon exchange processes over a highland lake in southwest of China" *by* Qun Du et al.

**Anonymous Referee #2**

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General comments

The paper presents interesting measurements of lake energy and CO2 fluxes from a high altitude monsoon site. The site location adds novelty to the study and further advances our understanding of regional differences and similarities in terms of lake-air interaction.

The comparison of temporal patterns during, after and before monsoon is novel and interesting to see. The reasoning and explanation of the behavior is physically sound

However, my main concerns is the analysis regarding the fluxes. In my opinion the correlation analysis does not add anything to our physical understanding of the forcing



mechanisms for the energy and CO2 fluxes. It is for instance well established that both U and the gradient controls H and E. This does not need further investigation. For CO2 the situation is slightly more complicated, but to say anything meaningful about the flux variation the CO2 concentration of the water would have to be measured. The gradient is thermodynamic forcing and the efficiency of the exchange is determined by the transfer velocity.

In term of H, the variation in U is very small so there is no surprise that the variation in sensible heat flux is due to variations in the temperature gradient. E is determined by both dq and U, here dq and U seem to be well correlated (you can calculate the correlation coefficient) which then explains your results.

My suggestion is, instead of the correlation analysis, compute the Stanton and Dalton numbers for the different cases, and analyze these results. You also need to add more references on the CO2 lake fluxes in the introduction/background and discuss your results in terms of these previous findings. Also, add background on e.g. transfer velocity, surface renewal etc. to at least conceptually put your results in this context.

In general, I also think that the figures showing results for all years should be combined into one single plot as they mostly are very similar. Are there any statistical significant difference between the years? Some measure of variation would also be interesting to include.

Specific comments

Page 4, Line 4: water level should be stated as water depth, not height above sea level as is stated now (?)

P4, L 10, how large is the annual precipitation, and in average how much during the different periods (pre, during, after monsoon)?

P4 L15: How are the booms oriented on which you placed the eddy covariance sensors? Did you consider any flow distortion effects from the platform (it is a quite solid

construction)?

P4, L 22: CS616 cannot be correct, this is a water content reflectometer

P4 L24 : Ts seem to be defines as skin temperature. How does this compare with the standard bulk water temperature at 0.5 m depth?

P 4, L26: Was the entire field of view located over water for the net radiation sensor? You can estimate this with the measurement height and the length of the boom. It appears from the photo in Fig 1 that the sensor might include also some parts of the platform which would affect your Ts values.

P4 L31, specify that it is cup anemometer.

P5 L 4: what do you mean by “also filtered”? AGC 40 is quite low limit, why not set a higher limit?

P5, L6, what is the averaging time?

P5, L8: if you are using block average you are not detrending. What do you mean by “circular correlation procedure”?

P5 L11: Add reference for the high frequency correction method. Was this a severe problem?

P5 L24: It would be useful with a wind rose to illustrate the prevailing wind direction.

P6 L4: how many data is included in the final data set? How are the data distributed over the different years? Is there any season that has significantly less data than the others?

P6 Section 3: This text is very compact, please separate into paragraphs.

P7, L6: Do you have any more supporting evidence that it is a sea/land breeze circulation? Any land site in the vincinity? Is there any previous studies on this for this site? A single surface observation is in my opinion not enough to support this, it is indicative



but not complete shown. As you state on line 11 that strong synoptic (?) west wind during night, this might be explanation for the night wind direction and not land breeze.

P9 L1, “resulted in a lower abledo” compared to what?

P9 L8 The Katsaros reference in the reference list is wrong, please use the correct one.

Sections 3.4 to 3.8 please see the general comments

Figure 8: No data for monsoon and post monsoon for 2014?

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