

Interactive comment on “The impact of diurnal variability in sea surface temperature on the atlantic air-sea CO₂ flux” by H. Kettle et al.

H. Kettle et al.

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First of all I would like to thank you for taking the time to review this paper and provide helpful comments. I have no issues with the comments made and have addressed them as follows:

1. The correct reference has been inserted.
2. Thank you for drawing my attention to the new MLD climatology. I have downloaded the one by C de Boyer Montegut et al. and compared it with the one I have used. I am only interested in the times and places where MLD is shallow (as this is where diurnal warming is likely to happen) and the 2 datasets are fairly similar. Now I know about this dataset I will definitely use it in further studies but to rerun the current analysis will take a couple of weeks (computing the heat fluxes is an iterative procedure that is very

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time consuming) and I doubt there will be major differences. If the reviewer feels very strongly about this I will reconsider but I will need a time extension.

3. I have made requested change

4. I have inserted the correct reference (Jahne et al 1987)

(no number 5)

6. I have made requested change and added the reference (Weiss and Price 1980)

7. I have changed this statement to make it clearer (basically diurnal warming increases outgassing and if this is in an uptake region then it is seen as a reduction in uptake).

8. I have changed the title to make it clear it is not the whole Atlantic and I have added the Takahashi net flux value into the abstract to give the results some context. I have also added a paragraph in the Discussion section along these lines. I am not sure this study allows us to speculate on the global contribution of diurnal warming on CO₂ flux, it is dependent on the amount of diurnal warming that occurs in different regions. A global study using modelled dSSTs may be the subject of a future study.

9. Eqs 27 and 28 are used to correct the Takahashi pCO_{2w} data to the relevant water temperatures for this study (the foundation temperature). However, we do not use this for the diurnal warming effect. Instead we use the method of McGillis et al (2004) and Hare et al (2004) i.e. the diurnal effect is in the CO₂ concentration at the ocean skin and CO_{2w} is measured below the diurnal mixed layer. I have rewritten some of the Introduction and Methods sections to make this a lot clearer.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 15825, 2008.

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