Atmos. Chem. Phys. Discuss., 5, S344–S346, 2005
www.atmos-chem-phys.org/acpd/5/S344/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Systematic errors in global air-sea CO_2 flux caused by temporal averaging of sea-level pressure" *by* H. Kettle and C. J. Merchant

H. Kettle and C. J. Merchant

Received and published: 7 April 2005

Response to comments made by referee 1 By H Kettle

1. General remark: replace mass flux by gas flux

I would rather leave it as mass flux as I think 'gas flux' is ambiguous and the flux units are mass/time.

2. Equation 2: replace m by x - Have done this.

3. Method: give references for Taka02's climatological monthly SST (World Ocean database 1998) - I have now added this in the 'Data' section with a web address

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4. Clarify Eq 7 - Before the equation I have added:

We then calculate the change in pCO_{2air} caused by 6 hourly changes in pressure, from the change in air pressure of dry air ((P_{6h}-SVP)-(P_{Taka}-SVP)) multiplied by the molar fraction of CO_2 in air (x in equation 2), such that:

$$pCO_{2air6h} = pCO_{2airTaka} + x(P_{6h} - P_{Taka}) \quad (1)$$

where the subscripts Taka and 6h refer to Taka02 data and 6 hourly data respectively.

5. Describe differences in the plots in fig 2 and change colour scale so that zero is on a well defined colour.

I have added: The plots show that using the 2 different gas transfer parameterisations does not affect the general pattern of flux but just the magnitude.

I have tried to change the colorscale so that zero is clearer but the only way I can find to do this is to make the colorscale wider ie the max value of the colorscale is higher than the max value in the plot. This means there is less contrast in the plot so I think it is better to leave it as it is.

6. Show ice pixels in fig 2 and remove them in flux calculations for Table 1

Ice pixels had already been removed for calculating fluxes so Table 1 is correct. I have now shown them in fig2 to avoid confusion.

7. Mention differences between Takahashi's fluxes and my fluxes are also affected by different wind fields

Yes - good point - I have added this to the text: We can directly compare our 1995 net fluxes computed with climatological pCO_{2air} with those of Takahashi et al. (2002) since the only differences are the wind speed datasets (NCEP/NCAR compared with ECMWF) and the computation of the gas transfer velocity, k.

8. 11% must be replaced by 1%.

ACPD

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When I came to send the very final version of the paper in, after it had been accepted I noticed there was a typo in Table 1 with one of the flux values (which would have given 1% flux error as the referee mentioned). This was corrected but I think the referee's comments apply to the previous version. Anyway, Table 1 is now correct and it should be 11%.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 325, 2005.