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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

Anonymous Referee #1

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The paper deals with the effect of correlation between wind speed and atmospheric pressure on the air-sea CO_2 flux. This topic is very relevant as air sea flux depends on the product of CO_2 transfer velocity, k, and of the air-sea CO_2 partial pressure gradient: the former is very dependent on wind speed, U, and the latter depends on the atmospheric pressure, via the atmospheric CO_2 partial pressure. It is shown that this correlation leads to systematic bias on global air-sea flux (7–10% overestimate) if monthly averages of pressure fields are used instead of 6 hour fields. I recommend publication of this manuscript with minor revision.

Detailed comments:

General remark:

- replace mass flux by gas flux

Equation 2:

- Replace m by x

Method:

- give refernces for Taka02's climatological monthly SST (World Oceandatabase (1998))

- Equation 7 is tricky (although it is correct because monthly SST fields are used to compute SVP in all cases); it would be clearer to write pCO2air6h=x(P6h-SVT) and x=pCO2air_taka/(Ptaka-SVP) It is also necessary to define all the abreviations.

Results:

- Since Figure 2 is expected to be close to Fig. 2 of Takahashi (2002), it would be better to discuss the differences between the two figures instead of describing the large scale patterns of air-sea flux which have already been commented by Takahashi. Color scale of Figure 2 should also be changed to put zero on a well defined color (e.g. yellow)

- It seems that ice pixels have not been removed for the computation of the fluxes: they must be removed from Figure 2 and to compute flux estimates shown in Table 1.

- Top of page 333: differences between Takahashi's fluxes and fluxes computed here also come from different wind fields (NCEP/ECMWF)

- 11% must be replaced by 1%

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