Interactive comment on “A model study on the sensitivity of surface ocean CO₂ pressure with respect to the CO₂ gas exchange rate” by P. Landschützer et al.

Anonymous Referee #3

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Review of: “A model study on the sensitivity of surface ocean CO₂ pressure with respect to the CO₂ gas exchange rate” by LanschÅ´stzer et al. 2011

The authors investigate the effect of an increased CO₂ gas exchange rate on the overall air-sea CO₂ fluxes as well as on the distribution of surface ocean pCO₂ in 3 sensitivity experiments designed to cover the North Atlantic, the Southern Ocean and the equatorial regions respectively. The study shows that global CO₂ uptake is not affected by the increase of the piston velocity while effects can be observed on regional scales.

Overall evaluation: I find this an interesting study with implications for a broad scope of readers. The experiments are well designed and the manuscript is well written. I recommend it for publication after some minor revisions.

Specific comments:
page 10801 / line 5 ... Is there a reason for prescribing pCO₂(atm.) instead of emissions?
page 10803 / line 12 “where flux differences exceeding ±2 molCm⁻² yr⁻¹ can be identified.” How can it be identified when the colorbar of Fig. 1 is only in the range of +/- 2 molC/m²/yr?
page 1087 / line 22 “potentially” ?
page 10808 / line 7 ... For the North Atlantic, a similar conclusion was drawn by Friedrich et al. [2006, GRL] who showed that interannual changes in piston velocity explain only ~25% of the interannual CO₂-flux variance whereas wind-stress is responsible for about twice as much.
page 10808 / line 11 “substantially” ?
page 10808 / line 20 Another study worth citing is Groeger and Mikolajewicz [2011, Ocean Modelling] on the CO₂ air-sea gas exchange rate at high ocean temperatures

Table 1 May I suggest to find more self-explanatory experiment names?

Figure 1+2, caption: “difference between the model standard run and the G02 scenario (top)...” Vice versa?

Figure 6 I find the panels very complicated to understand. Maybe there is a simpler
way to visualize the findings.

Interactive comment on Biogeosciences Discuss., 8, 10797, 2011.