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Interactive comment on "Air-sea CO_2 flux in the Pacific Ocean for the period 1990–2009" *by* M. Ishii et al.

Anonymous Referee #2

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The manuscript entitled "Air-sea CO2 flux in the Pacific Ocean for the period 1990–2009" submitted by Ishii et al. compares current estimates of air-sea CO2 fluxes which were obtained using a variety of methods as part of the international RECCAP effort. The main objectives of the paper, as stated in the introduction, are to provide a best estimate of air-sea CO2 fluxes in the Pacific Ocean based on various approaches, and to discuss the associated uncertainty in order to guide future research. Such analysis is fully relevant for publication.

The manuscript starts with an overview on the current knowledge about air-sea CO2 fluxes variability and drivers in the Pacific Ocean. Then the different approaches are described briefly and their results are compared in terms of the mean CO2 flux, as well as the seasonal and interannual variability, obtained in three large domains of the

Pacific Ocean, not including the Southern region south of 44.5°S. The manuscript ends with a discussion about the uncertainty associated with the choice of wind product, and gives a 'best estimate' of air-sea CO2 fluxes in the three domains, therefore answering to the main objectives of the paper. In addition, the manuscript is well written and structured. In my opinion it is suitable for publication after minor revisions.

SPECIFIC COMMENTS

- Section 2.3 : The description of air-sea CO2 fluxes in the South Pacific is very short, as opposed to the other regions. This gives the impression that we know nothing about air-sea CO2 fluxes in this region, other than suspecting it is a sink for atmospheric CO2 based on the few data available. Is that correct ?

- p12164 – lines 9-10 : Refer to Figs.1 and 2.

- Section 5.3 : The seasonal variability of air-sea CO2 fluxes in the South Pacific is presented in Fig.9, but it is not discussed in the text.

- p12176 – lines 22-28 : Could the fixed boundary at 44.5°S be responsible for the larger difference between models in the South Pacific extra-tropics than in the North Pacific extra-tropics ? The boundary issue is discussed with regards to observations, but it should also be considered for OBGCMs as the position of the frontal zone (large CO2 sink) may differ greatly from one model to the other.

- p12182 – lines 11-20 : I don't understand the justification for calculating a "best estimate" using only 2 of the approaches. How is that consistent with the study by Lenton et al. (2013) who calculated the median of all methods ?

- p12183 – line 2 : OBGCMs rather than OBGCs.

Interactive comment on Biogeosciences Discuss., 10, 12155, 2013.