

Interactive comment on “Spatial and temporal variations in the sea surface $p\text{CO}_2$ and air-sea CO_2 flux in the equatorial Pacific: model sensitivity to gas exchange and biological formulations” by X. J. Wang

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Received and published: 17 August 2010

I did try to address the referee 1's concern of relative small difference in net community production (NCP). For example, I tried different choices of surface layer, as referee 2 suggested. But, I did not find a better choice, probably because of the negative NCP values in the subsurface. So I simply used this study to demonstrate that ocean carbon models might be sensitive to the choice of biological/ecosystem model. Models are often used for sensitivity studies like this one, in fact there have been many modeling studies using such approach, e.g., Popova and Anderson (2002). However, I agree and

C2360

believe that models can and should be used for process studies, and models should be calibrated and validated by observations. Over the past several years, we have utilized many satellite and in situ datasets for model calibration and validation (e.g., Wang et al., 2008; Wang et al., 2009).

In light of referee's comments on NCP and DIC, I have undertaken further analyses, and found a better way to interpret the differences in carbon fields between the two models, which include vertical distributions of NCP, DIC and total organic carbon (TOC). Thus, I have added a few new figures in the revised manuscript.

In summary, this manuscript has been undertaking a major revision, aimed at better interpreting and presenting the model results. I appreciate the referees' constructive comments, and have considered each of the comments/suggestions carefully during the revision.

Interactive comment on Biogeosciences Discuss., 7, 3879, 2010.

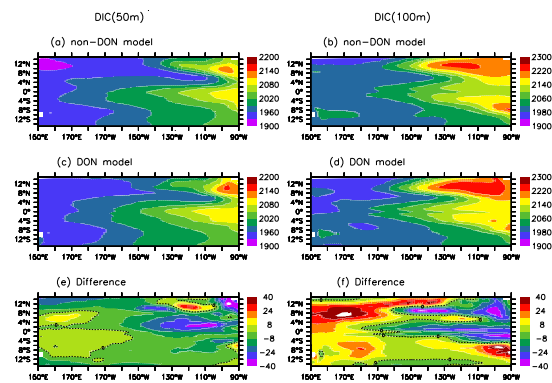


Fig. 1. Comparisons of modeled DIC at 50 m and 100 m. The non-DON model produces much higher DIC concentration at 100 m in the western warm pool.

C2362

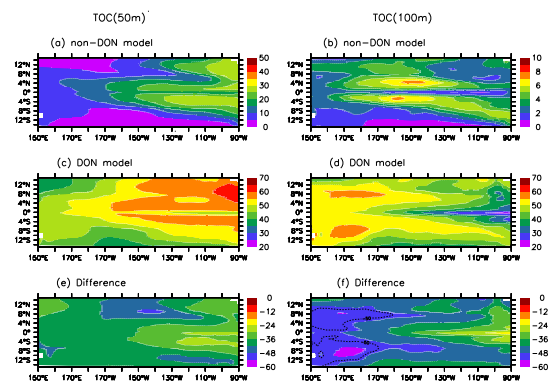


Fig. 2. Comparisons of modeled TOC at 50 m and 100 m. The non-DON model significantly under-estimates TOC in the upper water column.

C2363