Biogeosciences Discussions

Interactive comment on "A mechanistic account of increasing seasonal variations in the rate of ocean uptake of anthropogenic carbon" *by* T. Gorgues et al.

Anonymous Referee #1

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Overview: Gorgues and co-authors use a global biogeochemical model to evaluate the impact of seasonal processes on trends in the atmosphere – ocean pCO2 gradient. They find that in the subtropics, increased DICant is convoluted with the seasonal cycle in SST to drive an apparent decreasing gradient (i.e. decreased carbon sink). This is despite the fact that the annual gradient is not a decreasing one, but instead an increasing one. This has important implications for observations that may have a summertime bias.

General Comment: This manuscript is well written, offers timely and important results, and high-quality figures. It should be published with only minor revisions.

The analysis might be strengthened by an alternative choice of methodology for Figure 4. If the authors kept everything constant and only varied the one parameter (e.g. LeQuere et al. 2003, McKinley et al. 2004), then they could see the impact of only DIC, only ALK, etc. Instead, they show with MALK that seasonality in ALK is NOT important. The result would be stronger evidence for their conclusions – for example line 16 on page 753. They do make their point with the figures they show. At a minimum, some explanation for this choice is needed.

Specific comment:

1. Reference Shuster et al. (2009) in DSR II. It is essentially an update of Shuster and Watson 2007. Also Watson et al. (2009) in Science.

2. Figure captions. Add the word "modeled" to clarify.

3. Figure 3 is too small in the PDF version. The four panels of Figure 4 are OK. Can Figure 3 be split into two pieces like this?

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