

## ***Interactive comment on “Inter-annual variability of the carbon dioxide oceanic sink south of Tasmania” by A. V. Borges et al.***

### **Anonymous Referee #3**

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Review of "Inter-annual variability of the carbon dioxide oceanic sink south of Tasmania" by A.V. Borges, B. Tilbrook, N. Metzl, A. Lenton, and B. Delille

This is a very useful paper addressing with a great amount of measured data the role of inter-annual variability. The paper is well written.

#### **General**

The authors show monthly SST and pCO<sub>2</sub> anomalies and give an explanation using a varying SAM. What I miss is an answer to the question whether changes in SAM can possibly lead to hydrographic changes at such short (monthly) time scales. Since the explanation with the aid of SAM is so prominent in the paper, this question should be discussed thoroughly as well.

## Suggestion

There is a long-term trend of the SAM, mainly in the austral summer. If the SAM plays such a dominant role in causing anomalies, the authors may look for an increasing trend in the occurrence of anomalies towards 2003.

p3643

Data of pCO<sub>2</sub> are referenced to the year 1997. This presumes that the ocean follows the rise of atmospheric pCO<sub>2</sub> exactly. Is there any evidence that this is allowed in this region? This question is even more important as anomalies are considered on a seasonal scale. Even if the ocean follows the atmosphere, this will not occur evenly distributed over the whole year. In the season in which the wind speed is highest (probably autumn), most CO<sub>2</sub> will be taken up by the ocean. This will lead to skewed anomalies. By the way, the fact that the sink might increase during periods of anomalous SST by itself is a contradiction in terminis that the ocean follows the atmosphere. I think the authors should explain this much better and clear the issue because it is basic for the whole paper.

p3644, 116-22

The climatological trends for pCO<sub>2</sub> are not similar for all regions, as written in the manuscript. In the CS the seasonal cycle of pCO<sub>2</sub> is very different. Is there an explanation for that?

p3646-3647 SAM

I think the discussion about SAM is not clear enough. Are the authors talking of seasonal changes in SAM or is it lower frequency variations that may be associated with SAM? A figure with the SAM trend to refer to would certainly be very illuminating here. This should also show whether the SAM trends and the anomalies match.

p3652, 116-18

**BGD**

4, S1929–S1931, 2007

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I think this conclusion should be toned down. The paper did not explicitly address this question.

Technical comments

p3641, l28 analyses

p3641, l10-11 ... studies show that warm ...

p3646, l13-17 This sentence is illogical, i.e. it is an anacoluthon.

p3651, l22 hypotheses

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Interactive comment on Biogeosciences Discuss., 4, 3639, 2007.

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4, S1929–S1931, 2007

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