

***Interactive comment on “Estimating the storage of anthropogenic carbon in the subtropical Indian Ocean: a comparison of five different approaches” by M. Álvarez et al.***

**Anonymous Referee #2**

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This manuscript compares estimate of anthropogenic carbon (CANT ) in the subtropical Indian Ocean along 32S using four data-base methods (DeltaC\*, TrOCA, TTD and C0\_IPSL) and a simulation from an OCCAM model, and produces a new estimate for the inventory that is lower than that from the widely-used DeltaC\* method (e.g. Sabine et al. 2004). Estimating Cant in the ocean is very important and, as this manuscript documents, there remains considerable uncertainty in data-based estimates, especially in the Southern Ocean.

The topic of this manuscript is within the scope of BG, and the manuscript presents new results with substantial conclusions (in particular that the Sabine et al (2004) estimates

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likely underestimate southern ocean Cant). Overall the paper is well-written, and I think it is accepted for publication with only minor revisions (as outlined below).

### Major Comments

1. The Vazques-Rodriguez et al. (2008) paper needs to be discussed a lot more than it is. Are the results presented here consistent with this study? Can some of the statements/conclusions be generalized by combining this and the Vazques-Rodriguez et al. study? As results are presented they should be compared with those in Vazques-Rodriguez et al., and there needs to be an effort to generalize this study using the Vazques-Rodriguez et al. study in the last paragraph of the conclusions. I think there is general agreement between the two studies in term of southern ocean Cant, and this should be used to generalize the conclusions.

### Minor Comments

1. In the abstract and intro the LoMonaco et al method is referred to as "C\_ISPL" but then in tables and figures it switches to "LM05". A consistent acronym should be used, and I would recommend C\_ISPL.
2. pg 733, line 18: Waugh et al (2006) can be added to this discussion.
3. pg 747, line 5: "no Cant is expected" I would say it is the exact opposite. If CCI4 is detected then you would expect Cant.
4. pg 747, line 17: I don't understand the use of "nucleus".
5. pg 747, line 26: Waugh et al (2006) should be referenced as they discusses and shows (their figure 5a,b) the discontinuity in Cant from DeltaC\*.
6. pg 748, line 10 and pg 749, line 12: Why "Surprisingly" and "Curiously"? I don't think either are surprising or curious. Why would you not expect these things?
7. Section 8.3: When you end each paragraph saying what the best estimate for the inventory is I think you need to say how determined, e.g., "based on the inventories

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from the XX and YY methods".

8. Figure 7. Why show difference from Cant(DeltaC\*) when this is the method you appear to trust the least? If you plot difference from one of the other methods you will see small differences except for DeltaC\*.

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