

## ***Interactive comment on “Dynamical and biogeochemical control on the decadal variability of ocean carbon fluxes” by R. Séférian et al.***

### **Anonymous Referee #1**

Received and published: 5 February 2013

This is a well-written and scientifically sound manuscript that significantly adds to our understanding of internal variability in ocean carbon fluxes on interannual and decadal timescales. I fully support its publication in Biogeosciences, provided that the following minor comments are addressed.

Minor comments:

p 1348, Line 17: Remove “But” at the start of the sentence

p 1350, Line 13: replace “has been an” with “have been”

p 1351, Line 9: replace “mean” with “way”

p 1353, Line 23: replace “shows” with “show”

C831

p 1353, Line 24: replace “compares” with “compare”; replace “term” with “terms”

p. 1354, Lines 3-5: please describe how the drifts were removed

Table 1 caption: change “solely one drivers” to “solely one driver”

p. 1354, Lines 15-16: replace two instances of “in average” with “on average”

p 1354, Line 15: remove the negative sign in front of “40 g C m<sup>-2</sup> yr<sup>-1</sup>”; you have already mentioned that it is a sink, and a negative sink implies a source.

P 1354, Line 20: replace the comma “,” with the word “do”

P 1354, Line 25: remove “now”; replace “global” with “globally integrated”

Figure 2a: are you plotting annual mean, globally integrated fluxes here? If so, state this in the caption.

P 1356, line 26: replace “amounts” with “account”

Figure 4 caption, second-to-last sentence: change “components” to “component”

Figure 4: label the x-axis

P 1359, line 11: change “correlation” to “correlations”

P 1359, line 17: change both instances of “definition” to “definitions”

P 1363, line 13: insert “the” before “long-term”; change “profile” to “profiles”

P 1363, line 19: change “profile” to “profiles”; remove “a” before “strong”; replace “gradient” with “gradients”

P 1363, line 23: add “The” before “statistical”

Figure 10: what are the vertical lines in plots j, k, and l?

P 1365, line 18: change “others” to “other”

C832

P 1366, line 13: insert “do” before “modes”

P 1366, line 17-18: change “as others variables” with “and other variables”

p 1366, lines 23-27: consider citing (Lovenduski et al., 2013), who examine wind-driven, multi-decadal variability in the Southern Ocean and emphasize the importance of eddies in the transport of natural carbon

p. 1367, line 3: what is meant by “delta or biases correction methods”? Please clarify

p. 1367, line 9: remove “then”

p 1367, lines 13-15: why is the Lenton et al (2009) a possible alternative? Please clarify

p 1367, line 17: “useful” is misspelled; replace “that” with “this”

References cited: Lovenduski, N.S., Long, M.C., Gent, P.R., and Lindsay, K: Multi-decadal trends in the advection and mixing of natural carbon in the Southern Ocean, *Geophys. Res. Lett.*, 40, doi:10.1029/2012GL054483.

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