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Biogeosciences Discussions

Interactive comment on "Net sea-air CO_2 flux uncertainties in the Bay of Biscay based on the choice of wind speed products and gas transfer parameterizations" *by* P. Otero et al.

Anonymous Referee #3

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This manuscript addresses the CO2 flux uncertainties in the Bay of Biscay, based on different wind speed products and transfer velocity parameteriztions (k).

The uncertainty in CO2 sea-air fluxes is an important issue. However, this ms studies the CO2 flux uncertainties only based on mean wind speed products and k. This is an incomplete uncertainty determination of the sea-air flux, as for example (1) the uncertainty of sea surface pCO2 measurements are not included, (2) the uncertainty due to interpolation of model winds speeds is not included, (3) an error propagation of the wind speed differences (Table 1) is not done, (4) no details of atmospheric pCO2 sources are given and hence not included, (5) wind speed products are separated

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into upwelling and downwelling periods (Table 1), yet is not carried through. Due to this incompleteness, and numerous publications detailing flux uncertainties based on k parameterization and wind speed products (e.g. Takahashi et al., 2009), this ms is not suitable for publication in Biogeosciences.

Some general points:

- Choice of time period of study: Why is the time period restricted to one year, i.e. September 2002 to September 2003?

- Choice of wind speed products: The already known issues with the chosen wind speed products should be outlined in greater detail (e.g. the general underestimation of wind speeds by NCEP-1). The new CCMP wind speed product (Atlas et al., 2011) has to be included.

- Description of delta pCO2 measurements, section 2.1: the section only describes (extremely briefly) the measurement of sea surface pCO2, without mentioning atmospheric pCO2 at all. This means that the measurements are not of delta pCO2, but sea surface pCO2 only. Where are the atmospheric pCO2 measurements coming from?

- Figure 3: the use of colour here is the wrong way around. So, either present these results in a Table (i.e. column for wind speed products and rows for k), or at least use colours so that all k-L&M are dark green, all k-N are red etc.; in this way, the k used for each of the 5 different results for each wind speed product are (by its colour) immediately identifyable.

- Interpolation of wind speed models to buoy locations, page 1000 and Figure 1: in the text (page 1000, lines 2 to 5), no description is given of the type of interpolation used; in the Figure caption, it is mentioned, that the interpolation is done "cubically". Much greater detail of the interpolation should be given.

Minor points:

- Abstract: The time period should be mentioned in the abstract.

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- Page 9994, line 22: The Global Carbon Project itself does not finance (and therefore does not do) measurements of delta pCO2. The actual projects financing such work should be mentioned here. If co-ordination is addressed here, then IOCCP should be mentioned.

- Page 9995, line 3 to 5: White caps and associated bubble formation is actaully considered a major process influencing the gas transfer, yet it is totally omitted here.

- Page 9997, section 2.1: no mention is made of "ECO" cruises, yet they are repeatedly referred to later on.

- Page 9998, line 2 to 4: "Records ..." Please clarify as it seems that data of high sigma were removed and THEN hight-adjusted.

- Page 10001, line 2: " ... in the English Channel -in the northern area of our region - ...". The English Channel is not IN the northern area of the study area of the ms.

- Page 10002, lines 221 to 24: These numbers should be put into a Table.

- English: this needs improving. Amongst others, * page 1000, lines 14 to 19: first it is stated that the Gascogne and Vilano buoys show highest WS during downwelling and upwelling, respectively (first sentence). Immediately following, it is stated "On the contrary, ...", that the same buoys show low WS measurements in the downwelling and upwelling seasons. It is indeed a contrast, as the second sentence contradicts the first sentence. This paragraph needs changing to better describe what is meant. * page 10001, line 1: "The mean bias of NCEP-2 respect to NCEP-1 was 1-1.6 m/s, ...". This is not understandable, and cannot be understood from data shwon in Table 1.

Interactive comment on Biogeosciences Discuss., 9, 9993, 2012.