Ocean Sci. Discuss., 12, C1525–C1534, 2016
www.ocean-sci-discuss.net/12/C1525/2016/
© Author(s) 2016. This work is distributed under
the Creative Commons Attribute 3.0 License.

Ocean Science Discussions
Open Access
EGU

Interactive comment on "Effect of gas-transfer-velocity parameterization choice on CO₂ air–sea fluxes in the North Atlantic and European Arctic" *by* I. Wróbel and J. Piskozub

I. Wróbel and J. Piskozub

iwrobel@iopan.gda.pl

Received and published: 27 January 2016

We thank both reviewers for so many very helpful comments and appreciate for constructive feedback on the paper, which has helped to improve the manuscript. All their comments have been addressed and changes have been included the revised version the manuscript (see below).

Because some of the comments overlap, we would like to start with responding to the two most important topics rose in both reviews: the purpose of the paper and the

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

toolset used.

The purpose of the paper is to constrain the uncertainty resulting from the choice of the gas transfer velocity (k) parameterization in the case of the North Atlantic. This is a region best covered with measurements and one with stronger winds than average over the world ocean. We started the study convinced the relative uncertainty will be larger than elsewhere. However it turned out it is smaller. This is a previously unpublished finding, important not only for the ocean carbon budget but especially to the gas transfer velocity community. The North Atlantic is a place where multiple experiments aiming at containing the k parameterization were performed. Knowing (thanks to our results) that typical North Atlantic winds are the environment least suited for choosing between parameterizations of different wind speed power should be taken into account when planning future experiments of this kind. The feedback we had presenting early results at several meetings (EGU and SOLAS conferences, a SOCAT workshop and a grant meeting involving most of the key European researchers in the field). The feedback was very encouraging. It is the feedback which made us include some of the text the reviewers had comments on (like the Arctic seasonality which was treated by us as a curiosity until we heard feedback at the PICO session at EGU). The discussion we had at the meetings, in one case so much we thanked its author with a citation (see also below). Also the manuscript revision showed to us that the gap in literature (lack of papers which show comparisons of resulting fluxes for multiple parameterizations, especially the recent ones) makes the manuscript even more relevant.

The other subject raised in many comments is the FluxEngine toolset. It has been developed by researchers we cooperate with but during a previous project we were not a part of. A paper describing the toolset has been recently published in peer reviewed literature (Shutler et al. 2016, doi:10.1175/JTECH-D-14-00204.1, available also free of charge on ResearchGate). The manuscript has been available to us when we were working on this study but otherwise we worked as end-users. Therefore we reply (below) to questions about FluxEngine according to our best knowledge. However,

OSD
12, C1525–C1534, 2016

because we have not yet seen the actual source code (it will be open sourced in near future), we know only as much as stated in the documentation (online in the tool and in the paper). In fact, the decision not to bombard the toolset authors with email questions was one of the additional aims of the study, the first one performed by persons other than its authors. We wanted to check whether the toolset is “user ready”. We have to add that it did work and therefore we plan to use FluxEngine in our next projects, including ones involving fluxes that are not yet included (this should be easier after it becomes open sourced).

Responses to the detail comments are given in the attached pdf.

Example of new verions for some figures also follow below.

Please also note the supplement to this comment:
http://www.ocean-sci-discuss.net/12/C1525/2016/osd-12-C1525-2016-supplement.pdf

---

Interactive comment on Ocean Sci. Discuss., 12, 2591, 2015.

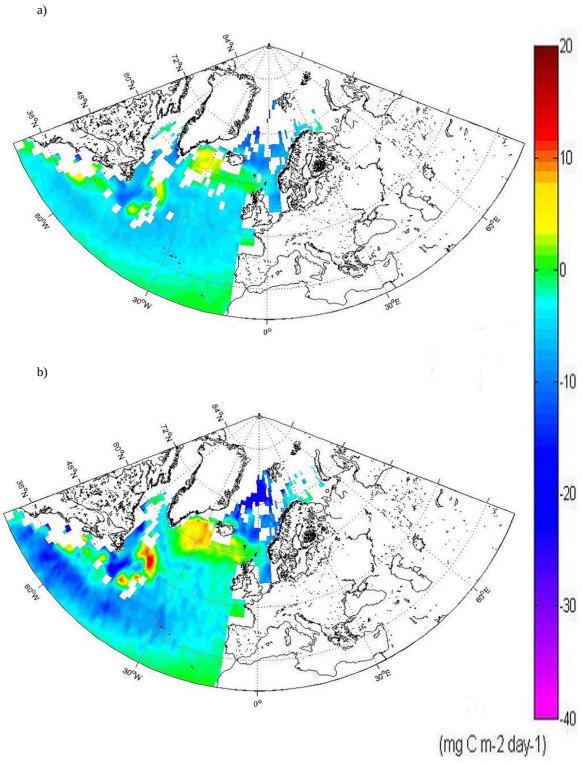

Fig. 1. Example new Fig. 1

OSD
12, C1525–C1534, 2016

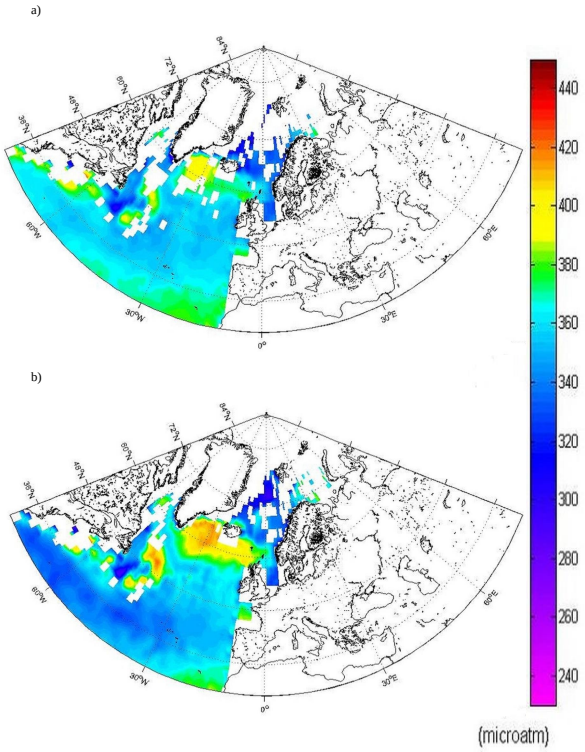

Fig. 2. Example new Fig. 2

OSD
12, C1525–C1534, 2016

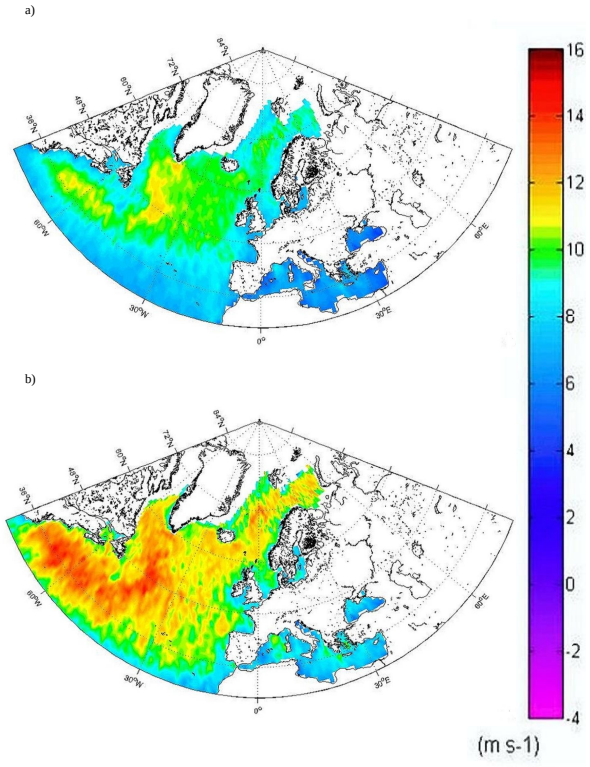

Fig. 3. Example new Fig. 3

OSD
12, C1525–C1534, 2016

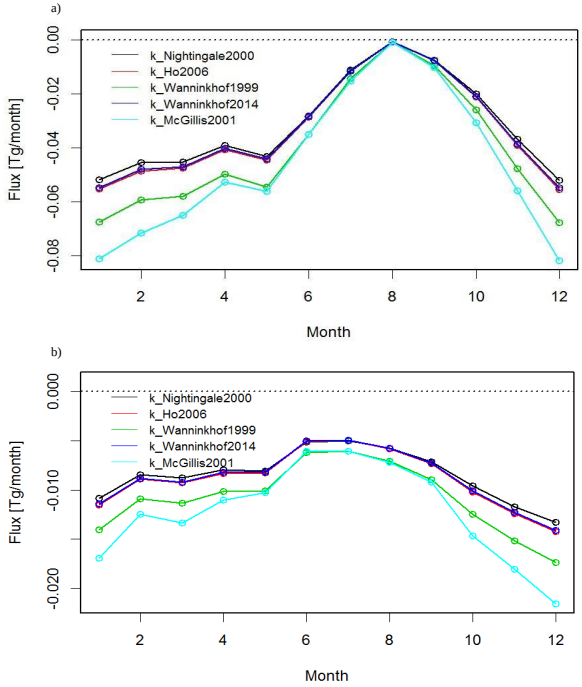

Figure 5. Monthly values air-sea fluxes of CO_2 (g C m^{-2} day^{-1}) for the five parameterizations (eq. 4-8) in a) North Atlantic, b) European Arctic.

Fig. 4. Example new Fig. 5

OSD
12, C1525–C1534, 2016

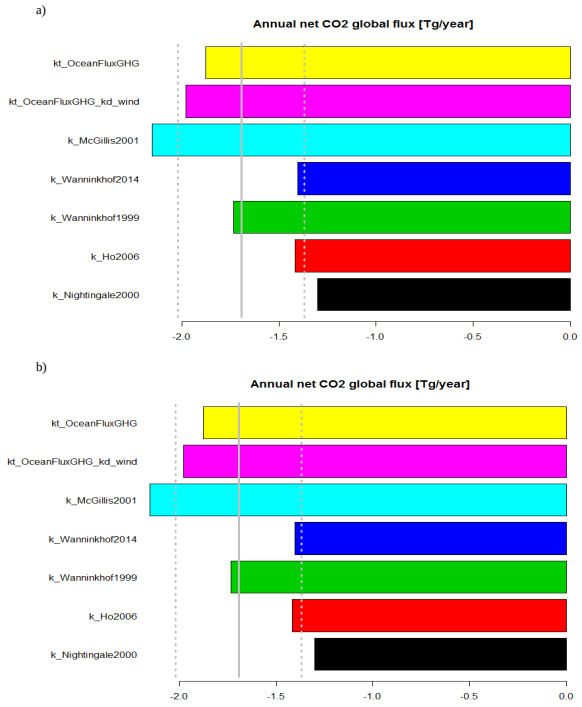

Fig. 5. Example new. Fig. 6

OSD
12, C1525–C1534, 2016

CC BY

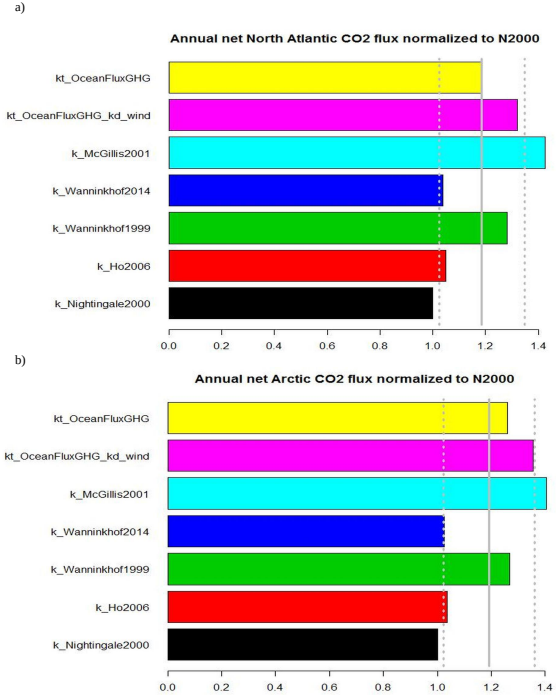

Figure 7. Annual air-sea fluxes of CO_2 (g C m^{-2} day^{-1}) for the five (eq. 4-8) parameterizations as well as for backscatter (default) and wind driven OceanFluxGHG parameterization normalized to flux values of Nightingale et al. (2000) *k* parameterization.

Fig. 6. Fig. 7

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

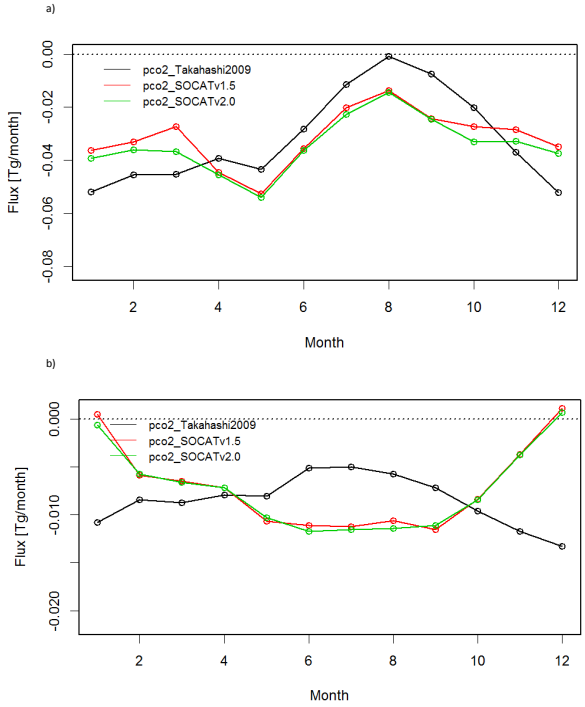

Fig. 7. Example new Fig. 8

OSD
12, C1525–C1534, 2016

Interactive Comment

CC BY