Atmospheric
Measurement
Techniques

Open Access

Discussions

EGU

Interactive comment on "Ensemble-based satellite-derived carbon dioxide and methane column-averaged dry-air mole fraction data sets (2003-2018) for carbon and climate applications" *by* M. Reuter et al.

M. Reuter et al.

michael.buchwitz@iup.physik.uni-bremen.de

Received and published: 16 January 2020

Many thanks for taking the time to review our manuscript and for providing very useful feedback.

Referee: Reuter et al. describe the new Ensemble Median Algorithm (EMMA) XCO2 and XCH4 data products. The products provide consistent long-term Climate Data Records (CDRs) for these two Essential Climate Variables (ECVs). Observations by SCIAMACHY/ENVISAT, TANSO-FTS/GOSAT and OCO-2 have been used spanning

2003-2018, monthly at 5x5. I agree with the assessments of the other two reviewers that the paper is generally well-written with nothing too contentious or surprising in the results, but I have a few comments that I would like to see addressed before acceptance for publication.

Author's response: Please see below our response to each of your comments.

Referee: The most substantial issue is the need for clarification on bias-correction. On Table 1, the NIES data v02.75bc is described as bias corrected. Are the other data products bias corrected or not? ACOS v9.0.03 for OCO-2 primarily differs from v8 with respect to bias correction (but also filtering) so this fact should be clarified. If the OCO-2 data have been bias corrected, the citation Kiel et al. (https://www.atmosmeas-tech.net/12/2241/2019/) should also be added to Table 1. I understand that a global bias correction is applied in the EMMA method (as shown for Figure 5), but whether each individual XCO2 or XCH4 data set has any other bias correction applied first needs some clarification.

Author's response: All individual products are used with bias correction, if available. This means that we use the "final product" as recommended by the corresponding data provider and as available in the corresponding data product. We will add some text to highlight this. We also have added the reference to Kiel et al., 2019, to Tab. 1, as requested. In addition, we applied a global bias correction to each product as described in our manuscript.

Referee: Figures 1 and 2: The thumbnail global XCO2 and XCH4 maps as presented have little value other than to show the spatial coverage, which itself varies widely over a 6-month period due to seasonal factor. With separate color scales for 2003 and 2018, instead of a 60 ppm XCO2 scale and 240 ppb XCH4 scale, at least some more spatial variation for each map would be conveyed. That's my opinion, but it is really up to the authors.

Author's response: The purpose of Figs. 1 and 2 is "only" to provide an overview about

the data products. Both figures are already quite busy and therefore we prefer not to add a second colour bar. More details on the spatial structures are visible in other figures shown later in the manuscript (Figs. 7, 8, 13, 14).

Referee: Figures 5 and 6: a horizontal solid or dotted line at zero would provide a useful reference point to improve the readability of these figures.

Author's response: Zero lines have been added to the figures shown in the revised version of the manuscript as requested.

Referee: Figure 9 caption: outside of the high latitudes and Tropics, the Himalayas also seem to be an area of significant scatter.

Author's response: This is true. For the revised version of the manuscript we will add this information.

Referee: Figure 11: The label "NASA v9.0.03" should probably be revised to "OCO-2 v9.0.03".

Author's response: Strictly speaking, "NASA v9.0.03" should be replaced by "ACOS/OCO-2 v9.0.03" and "ACOS v7.3.10a" by "ACOS/GOSAT v7.3.10a". Unfortunately, these new strings would be quite long (and difficult to be consistently used also for several of the other figures). To deal with this we added additional information in the figure caption to avoid misunderstandings.

Referee: Line 139: "is currently is" -> "is currently"

Author's response: This has been corrected in the revised manuscript.

Referee: Line 206: "than" -> "then" Line

Author's response: This has been corrected in the revised manuscript.

Referee: 248: "collocation" -> "co-location"

Author's response: This has been corrected in the revised manuscript.

Referee: Line 303: recommend removing "a special observation mode, namely" since glint is not really that special. For OCO-2 it accounts for well over 50% of the data. The lack of SCIAMACHY glint capability is already elaborated upon later.

Author's response: The proposed text has been removed in the revised manuscript.

_____

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-398, 2019.