Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Evaluation of the MACC operational forecast system – potential and challenges of global near-real-time modelling with respect to reactive gases in the troposphere" *by* A. Wagner et al.

A. Wagner et al.

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Author's answer referee 2: Thank you very much for the comprehensive review of our paper! We have tidied up the numbering of the figures and tables; we have changed the introduction and re-structured the discussion and conclusion and we included the requested changes.

Concerning the use of NO2 surface observations for the validation: We absolutely agree with the referee that surface measurements of NO2 would indeed be very useful

in addition to the satellite observations. However, for the global model validation this has not been implemented in MACC so far. For the validation of the global model, it was important for us to compare especially the spatial patterns of NO2 which can hardly be captured globally by the sparse amount GAW station observations. In MACC-III, the validation with MAX-DOAS is tested, however, with regional models with higher spatial resolution.

Specific comments:

page 6280: line 4: Avoid one sentence paragraphs -done

line 19: better: "in their respective summer months" instead of just "in the summer months" -done

page 6282: line 16: It is no the 'paper that investigates', more something like this "In this paper we describe the investigation of..." -done

page 6284: line 24: "Table 2 lists the assimilated data products." instead of "...lists up..." -done

page 6291 line 23: The figure order needs to be checked. This should be Figure 2 and not Figure 11, the Figure order has to be changed. -done

page 6292: line 8: Figure 13 (which should be plot 3) shows very large variability in the model data, compared to the observations. The agreement does not seem very good for the high latitude stations but there seems to be indeed an amelioration after Jul 2012. -Yes, as described in the text

line 15: O3 in tropical regions (30_S to 30_N) seem to have min 20% differences up to 40% -yes, but the average of all stations is 20%

line 19: could you show the correlation coefficients on the plots? - We initially had MNMBs and correlation coefficients in the plots, which turned out somewhat busy and unreadable. So we decided to list them in the tables (Table 4 and 5). Table 6 should be

Table 4. Please change Table order. - done

Figure 12: Legends are not legible, there are too many lines. The plots should be numbered a, b, c. There are curves that stop, eg the pink line in plot a. in Dec 2011. Why? Or one starts in Jun 2010 (black?) Maybe the plots should be stacked on top of each other. -Because the observational data is not available for all stations during the whole time period

page 6293: line 8: The correlation does not show a distinct seasonal behaviour in Fig 12, but the MNMBs or the RMSEs not either on this plot! How do you know this? - MNMBs and RMSE show higher (positive MNMBs) values during the summer months and lower values (negative MNMBs) during the winter months.

line 15: There also seems to be a phase shift at KOS, KOV and CVO. TSU seems to have random observations, but the black points are not really visible behind the red line. -done

line 27: Figure 15 should have the panels stacked and numbered a, b, c. -done

page 6294: line 6: MNMBs have already been described. These descriptions (also for RMSEs) could move to the O3 section. - done

line 20: Reference to Table 4 should come earlier (line 7). -done

line 24: Figure 2 could have the 3 plots stacked again. -done

page 6395:line 3: Fig 3: Why do you use different stations for O3 and CO? -the observational validation data sets are different for CO and O3. Some stations provide measurements only for either CO or O3.

page 6296: line 1: Why do you use the IASI product, when you know that it is not as good as the MOPiTT product for higher latitudes? -In the course of the validation work, it has become clear that these differences exist between the two data sets. Now, both data sets are assimilated in the MACC operational suite.

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page 6296: line 27: There is a stray 'to' -done

page 6298: lines 7-9: 'realistically reproduces': Isn't this a bit of an exaggeration with up to 110%underestimations for NO2? Incidentally the values are all negative overall and range from 5% to 70% underestimation. The values for CO seem to be 15% to -23%, whereas the overall values of -50% to 28% do not really agree well... -done

line 9: It would be good to have a Table with the satellite results for CO, too. -done

page 6299: lines 27 to end of Discussion: O3 section should probably come first in the discussion. -done

page 6301: line 8: 'however with a negative offset' should probably be 'however, with a large negative offset' -done

line 18: Wasn't the impact of the fire emisson error rather large!! -done

General: Be consistent, sometimes it is Fig. in the text other times it is Figure. -It was recommended by a referee to use "Figure", when starting a sentence, apart from that we use "Fig".

Figure 9 Caption, the latitudinal and longitudinal boundaries are defined in Figure 1 not in the text! -done