Answers for Referee 2

We thank reviewer #2 for his/her review, valuable comments and suggestions, that we took into account to improve the paper. Our replies are in blue.

General comments: The variable a priori information in the MOPITT processor is replaced by the fixed static one used in the FORLI-CO. As explained in introduction, the goal is to assess the consistency of the two products in view of climate applications. Some similarities are found and some differences detailed throughout the paper. The reader misses some conclusions wrt the original goal as to how to use these products for climate applications: is it for instance necessary to build a reprocessed MOPITT product with IASI and use only this in order to build a consistency time series from the two instruments? For the reasons explained in the paper -i.e. to bring the two products on the same baseline wrt the underlying measurements-, only the MOPITT v5T is analysed. Does it imply that one cannot envisage a climate CO record from the full MOPITT products (which supposedly has additional information) complemented with IASI? Or is the only way forward for climate purposes to assimilate these products in a model, i.e. they cannot be used on their own and collated to create a longer CO record? A clarification and preliminary conclusion on this question -the fundamental motivation for the paper- would be useful to the reader.

The conclusion of the paper was rewritten to expend on the limitations of the study, and give recommendations of what could/should be done regarding the other known factors that will impact the retrievals, in order to build more consistent records. The following sentences were added:

"A priori assumptions are thought to be the dominant component of the observed discrepancies, but bias differences remain (ranging from 5 to 18%) and can be explained by a combination of 1/the different time and location for the observations, 2/ the different vertical sensitivity of each instrument, and 3/ the different auxiliary parameters (in particular temperature, water vapour and cloud content) used in the retrieval. "

…

On a longer term/climate perspective, Essential Climate Variables (ECVs) are needed for all climate related gases. This requires continuous and unbiased long-term data records. MOPITT initiated a record of more than 15 years, which is being continued for the next >30 years by the IASI series of instruments, with the launch of MetOp-C currently scheduled at the end of 2018, and the IASI-New Generation instruments to be embarked on the MetOp-SG plateforms (Clerbaux et Crevoisier, 2013; Crevoisier et al., 2014). A systematic processing of both datasets using the same a priori assumptions is foreseen in the framework of the EU-FP7 projects QA4ECV, and this work is paving the way for establishing such a long term CO compatible record. Our analysis is limited to the study of the impact of the a priori assumptions (probably the dominant factor for discrepancy), whereas other variables are known to contribute to the observed differences, in particular cloud content and temperature profiles. For long term records and trend analysis it should be envisaged to reprocess the whole MOPITT-IASI series using auxiliary data coming from the same source, e.g. ECMWF (European Centre for Medium-Range Weather Forecasts) Reanalysis (ERA) for winds, cloud cover and relative humidity (Dee et al., 2011). Regarding the differences in time and location, as well as in vertical sensitivity, only data assimilation can process each dataset accordingly."

In section 6.2: The description of the retrievals algorithms should present briefly the respective strategy wrt cloud filtering in the processing chains of MOPITT and IASI.
They are expected to be playing a (potentially big) role in the differences observed btw the products, especially when L3 products are compared, and should therefore be briefly discussed.

It section 2.1.3 it is said that : “The two instruments are able to measure day and night, but clouds in the field of view can obstruct or reduce the visibility and prevent observation of the lower layers of the atmosphere.” In both case, the strategy is to avoid the cloud while keeping enough data to allow for a good spatial distribution. As said it Table 1 the cut-off value was chosen to be 5% for MOPITT and 25% for IASI but this 2 values can not be directly compared as cloud detection rely on different datasets.

Specific comments: P11.L6-7: What is known about the CO variability within 20-50km and 1h? Has there been studies or modelisations that can be referenced to give the user an estimate for how much these collocation errors would account for?
The CO variability (in time, and spatially) is large in areas where pollution or fires are encountered, but not over oceans or remote areas due to the CO lifetime of 1-3 months. Compared to earlier studies (ours, and other papers such as Sparling and Bacmeister, 2001) that used colocation distances around 100 km, we chose relatively tight criteria for the comparison of IASI and MOPITT with MOZAIC-IAGOS data to be within 0.5° of the MOZAIC-IAGOS profile path and within a ±12h time window. 0.5° corresponds to 36 to 56 km, depending on the latitude.

Sparling, L. C., and J. T. Bacmeister (2001), Scale dependence of tracer microstructure: PDFs, intermittency and the dissipation scale, Geophys. Res. Lett., 28, 2823–2826.

Other comments:
P1.L25: would write "retrieved quantities" rather than "retrieved products"
Done.

P2.L5: reword "based on IASI a priori constraints" by "using the same a priori information as in IASI product" for clarity.
Done.

P2.L6: the v20100815 comes a bit blank to the non-familiar reader. Introduce it before, e.g. in P2.L3 e.g. " ...versions available in 2013: v20100815 for IASI and v5T for MOPITT)
Done. We added: “(v5T for MOPITT and v20100815 for IASI)” after “The analysis is performed by first comparing the available 2013 versions of the retrieval algorithms” in the abstract.

P2.L16: suggest to reword "to less constrained var-cov matrix" by "to larger errors associated with the a priori (and hence the relatively larger weight on the measurements)".
The part of the sentence “due to the less constrained variance-covariance matrix” has been changed to “due to a larger variability associated with the a priori”.

P2.L25: I suppose solar insolation is a repetition. "Solar illumination"?
We think that solar insolation is more appropriate here.

P4.L2: suggest to reword "from recorded data" by "from instrument measurements (e.g. radiances...)" P4.L2: "It constrains" could be advantageously replaced by "it regularises". A suggestion.
Done. We replaced “from recorded data” by “from instrument measurements (e.g. radiances)” and “It constrains” by “It regularises”.

P6.L11: insert "viewing" in "using a Nadir viewing geometry"
Done.

P6.L13: the instruments do not measure CO directly. Suggest to replace "To measure" by "The retrieval of CO"

Done, we replaced “To measure CO” by “To retrieve CO”.

P12.2: "don’t" –> "do not"
Done.

P12.18-19: if possible, recall in short what this screening of high values consist of and why.
We removed the sentence “It was observed that high values of CO related to fires are sometimes filtered in the MOPITT processing (see Clerbaux et al., 2008).” because it was highlighted for MOPITT v3 but it is not demonstrated for v5.

P13.3: Will other studies examine the effect of the other parameters, and possibly of the observation error covariance matrix which is not addressed in this paper but is an important component of the OEM.
The priority for further studies should be on assessing the impact of cloud contamination and temperature profiles, because our preliminaries studies have shown that it can significantly also impact the CO retrievals. It will be difficult to reprocess the MOPITT and IASI series using the same parameters, eg ECMWF reanalysis, or Eumetsat L2 V6 for temperature when the MetOp data will be reanalyzed backwards, but it should be a goal. It is difficult because it requires major changes in the retrieval codes, and because of computing time.

About the error covariance matrices it is a very good point as it is one of the weakness of the current processing: the CO retrieved total column and profiles have been evaluated, but the associated errors are still to be analyzed to establish how realistic the OEM-derived budget are.

P21.23...: for climate purposes, beyond the absolute retrieved quantities, the associated error is a key information, which may differ from the theoretical error estimate derived from the retrieval itself. Can this intercomparison study contribute to characterizing better the error bars associated with the two products? See general comment, how best to use them for climate purposes?
See the comment before. In order to compare the theorical error and the observed discrepancies between IASI, MOPITT v5 and MOPITT vX1 at each altitude level, two new subplots have been added to Figure 9 (see e and f). It can be seen that the smoothing factor dominates the error budget, and that the discrepancies are within the error bars under 400 hPa.

P22.L12: "is a step in that direction". What would be the next ones? The author is invited to put this work in perspective and give some indications as to the next directions to take.
See the reply to your first comment, the Conclusion section was rewritten to clarify which steps could be envisage to build a homogeneous record.

P22.L20: Metop-SG satellites are not Sentinel 5 platforms but EPS-SG platforms. Please correct "IASI-NG instruments to be embarked on the Metop-SG platforms."
Done.

P23.L5: Complete "The IASI L1 and L2 input data are distributed in ..." P23.L11: Ether provides the data from Eumetcast, it should be reflected in this sentence: "for providing the IASI L1C data and L2 temperature data disseminated via Eumetcast"
Done.