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Comment

## ***Interactive comment on “An examination of the long-term CO records from MOPITT and IASI: comparison of retrieval methodology” by M. George et al.***

### **Anonymous Referee #2**

Received and published: 26 June 2015

Review report on the paper "An examination of the long-term CO records from MOPITT and IASI: comparison of retrieval methodology" by M. George et al. I find the paper nicely structured and the objectives well posed. The goal is to assess how much IASI and MOPITT products are or can be made a consistent climate record of atmospheric CO content. The study covers an extensive time series where the two missions overlap. Results are analysed on a global scale as well as in specific test sites representing different climate zones for CO, which makes it a very comprehensive assessment.

I can strongly recommend the publication of this paper for the essential information about and characterisation of the respective products it provides, with the few additional

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info and clarification listed below.

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.

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.

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 ?

Other comments:

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

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

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)

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)".

P2.L25: I suppose solar insolation is a repetition. "Solar illumination" ?

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.

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

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

P12.2: "don't" → "do not"

P12.18-19: if possible, recall in short what this screening of high values consist of and why.

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.

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 characterising better the error bars associated with the two products ? See general comment, how

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best to use them for climate purposes ?

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.

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."

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"

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 4095, 2015.

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