We made the following changes to the text as suggested by reviewer #1 (review comments are in italic; changes are in blue). We thank the reviewer very much for the useful comments.

In the revised manuscript, all the changes are in blue.

Reviewer #1's suggestions:

This paper aims at presenting the potential of synergistic CrIS/TROPOMI retrievals using MUSES algorithm. CrIS is in operation whereas TROPOMI is to be launched in 2016. The study focuses on one day (August 28, 2013) over Africa. Even if the paper could have been improved with other case studies or comparisons with aircraft profiles, the paper is interesting and well written. The subject of the paper is appropriate to AMT. I found the paper clearly presented, well organized and useful for the community. I recommend the paper to be published after the authors have addressed the following

minor comments:

About Section 3.2: 1) P 9 line 14: The authors should add the auxiliary data used in the retrieval process in the list of sources for the differences between CrIS and MOPITT. The surface temperature, temperature profiles, emissivity, cloud information data used in CrIS and MOPITT retrieval algorithms are different and play an important role.

Re: We revised the Page 9 line 16-18.

"The differences between CrIS and MOPITT observed CO VMR could arise from the following four sources: [1] a priori CO profiles used in the retrievals (Figs. 2D, 2E; Fig. 3B); [2] measurement sensitivity; [3] measurement date/time (MOPITT local time 10:30 am on August 27th, CrIS local time 1:30 pm on August 28th, 2013), which could lead to different meteorological conditions; [4] differences in auxiliary retrieved parameters such as surface temperature, temperature profiles, water vapor and cloud conditions."

Minor comments:

2) P 9 line 20: "to evaluate the impacts of the sources [1] and [2]": Only the source [1] is investigated when using a common a priori profile. P 9 line 23 -24: It should be said that when using a common a priori profile, both CrIS and MOPITT retrievals show smaller CO concentrations in the LMT. Rephrase (lines 24-25-26) "which indicates the consistency of measurements from two TIR sensors is insensitive to the choice of a priori".

Suggestion: "which indicates that the measurement sensitivity does not depend on the choice of the a priori." The statement (lines 26-27) "The differences:::precisions)." Is a bit straightforward. It is not as simple. The differences are smaller when using a common a priori. It doesn't mean that the 2 instruments have the same characteristics. P 9 line 30: "the estimated measurement uncertainty": How much is it for MOPITT? CrIS?

Re: We revised P9 line 23-27. In addition, we added in Table 5 for the estimated uncertainty of each data product.

"The diurnal variation of MODIS fire radiative power and fire counts for the time period of August 27 to 28, 2013, is weak. The retrievals for the same set of soundings were recomputed using a constant CO a priori profile, which is 100.0 ppb in LMT (Supplemental Material Figure 1) and representative of clean air conditions. When using common a priori profiles, both MOPITT and CrIS retrievals still show a latitudinal gradient (Suppl. Figures 1 and 2) with enhanced CO VMR peaked near 12 degree south, similar to the gradient shown in Fig. 3, though the amplitude of CO enhanced concentration is smaller. Consequently, it indicates that the consistency of measurements from two TIR sensors is insensitive to the choice of a priori. The mean differences between CrIS and MOPITT TIR improved to 2.8 ppb (Suppl. Table 1), with the RMS (or standard deviation) of the difference changed from 9.7% to 13.9%. Tables 4 and 5 show the measurement characteristics (Table 4 for sensitivity and Table 5 for the precisions) of the MOPITT and CrIS/TROPOMI. The mean and RMS of the differences between CrIS and

MOPITT multi-spectral CO data products are -23.6±37.6 ppb (or -9.7 ±16.8%, Suppl. Table 1), which is greater than the differences between CrIS and MOPITT TIR (2.8±24.9 ppb or 1.6 ±13.9%, Suppl. Table 1) and also greater than the estimated measurement uncertainty (CrIS 13.8%; MOPITT joint TIR/NIR 14.3%, Table 5)."

The word "observations" should sometimes be replaced by "retrievals", "data" or "products".For instance in: "compared the retrieved profiles to the collocated MOPITT observations" (P9 line 6) "shows the mean and RMS of the difference between CrIS and MOPITT TIR CO observations in LMT" (P9 line 12) "When using common a priori profiles, both MOPITT and CrIS observations" "3.3 Characteristics of joint TROPOMI and CrIS CO profile observations" Etc.
Re: [1] P9 line 6 "compared the retrieved profiles to the collocated MOPITT observations" was changed to "compared the retrieved profiles to the collocated MOPITT retrievals"; [2] P9 line 12 "When using common a priori profiles, both MOPITT and CrIS observations" was changed to "When using common a priori profiles, both MOPITT and CrIS retrievals"; [3] "3.3 Characteristics of joint TROPOMI and CrIS CO profile observations" was changed to "3.3 Characteristics of joint TROPOMI and CrIS CO profile retrievals".

Please remove all the unnecessary zeros (For instance, in Section 2: 648.750 > 648.75; 0.650 > 0.65; 14.0 > 14; 8.0 > 8 etc.)
Re: We removed the zeros in Page 4 line 18-16, line 29, Page 5 line 26 for "648.750 > 648.75; 0.650 > 0.65; 14.0 > 14; 8.0 > eight".

In Figs. 2, 3, 4, 5, 6, S1, S2: It should be nice to have titles for the subplots if possible ("MOPITT TIR/NIR"; 'CrIS a priori" etc.). It would help the readers.
Re: We added titles for the subplots for Figs. 2, 3, 4, 5, 6, S1 and S2.

Comments:
P 2 line 2: Add "to be launched" and "in 2016" : : : Monitoring Instrument (TROPOMI) aboard the European Sentinel 5 Precursor (S5p) satellite > Monitoring Instrument (TROPOMI) to be launched aboard the European Sentinel 5 Precursor (S5p) satellite in 2016 Introduction: The authors should mention the ACE-FTS CO product, which combined 2 bands (4.7 and 2.3 μm). Reference: Clerbaux et al., 2008. Ref: C. Clerbaux, M. George, S. Turquety, K. A. Walker, B. Barret, P. Bernath, C. Boone, T. Borsdorff, J. P. Cammas, V. Catoire, M. Coffey, P.-F. Coheur, M. Deeter, M. De Mazière, J. Drummond, P. Duchatelet, E. Dupuy, R. de Zafra, F. Eddounia, D. P. Edwards, L. Emmons, B. Funke, J. Gille, D. W. T. Griffith, J. Hannigan, F. Hase, M. Höpfner, N. Jones, A. Kagawa, Y. Kasai, I. Kramer, E. Le Flochmoën, N. J. Livesey, M. López-Puertas, M. Luo, E. Mahieu, D. Murtagh, P. Nédélec, A. Pazmino, H. Pumphrey, P. Ricaud, C. P. Rinsland, C. Robert, M. Schneider, C. Senten, G. Stiller, A. Strandberg, K. Strong, R. Sussmann, V. Thouret, J. Urban, and A. Wiacek, CO measurements from the ACE-FTS satellite instrument: data analysis and validation using ground-based, airborne and spaceborne observations, *Atmos. Chem. Phys., 8, 2569-2594, 2008.*
Re: We changed Page 2 line 2-3 to "the TROPOspheric Monitoring Instrument (TROPOMI) to be launched aboard the European Sentinel 5 Precursor (S5p) satellite in 2016". We revised Table 1, which includes ACE-FTS and IASI. We revised the list of reference accordingly.

P 3 line 8-12: This sentence should be rephrased. It looks like the references are about CO but they are not.
Re: We revised sentence to include O_3 – a species that also has been retrieved using multiple spectral algorithms. "Retrieval sensitivity to the LMT is critical for the operational use of satellite data in air quality, climate, and carbon applications, motivating the multi-spectral retrieval

approach for the species of O_3 and CO (Landgraf and Hasekamp 2007; Worden et al., 2010; Cuesta et al., 2013; Fu et al., 2013; Luo et al., 2013; Worden et al., 2013a, 2013b)."

P 3 line 13: The authors are talking about the NASA space missions in the Introduction. In Table 1, we expect either the NASA satellite missions or all the "CO" missions. If you choose NASA missions, remove SCIAMACHY. If you choose all the missions, add ACE-FTS and IASI.
Re: We revised Table 1: (1) added two rows for "ACE-FTS" and "IASI-A, B, C"; (2) the footnotes H and I.

[H] The IASI-A and IASI-B instruments are on-board MetOp-A (launched in 2006) and MetOp-B (launched in 2012) satellites. The third IASI instrument will be on-board MetOp-C with an estimated launch date in 2018. MetOp-A and B satellites are in a sun-synchronous, 827 km altitude orbit with a 9:30 am equator crossing time (ascending node), a few hours earlier than that of S5-P satellite. The IASI CO data product was retrieved from the 4.6 µm band (George et al., 2009).

[I] ACE-FTS on board the Canadian satellite SCISAT, operating in the solar occultation measurement mode at sunrise and sunset, provide high vertical resolution (3-4 km) profiles in the altitude region from middle troposphere to the thermosphere for over 30 atmospheric trace gases as well as the meteorological variables of temperature and pressure (Bernath et al., 2005; Boone et al., 2005; Fu et al., 2007; Allen et al., 2009; Fu et al., 2009). The operational ACE-FTS CO data product was jointly retrieved from the 2.3 and 4.6 µm bands (Clerbaux et al., 2008b).

P 3 line 20: Add Gambacorta et al. (2014) after "2014".
Re: Gambacorta et al., (2014) showed the prototype retrievals using CrIS full spectral resolution cloud cleared radiances. Since MUSES uses the CrIS L1B single footprint spectral radiances, we revised the sentence and added Han et al. (2015) that provides the information of the characteristics of CrIS full resolution single footprint L1B data products.
"The Cross-track Infrared Sounder (CrIS) aboard the Suomi-NPP satellite is a TIR sensor operating since October 28, 2011 and providing measurements of full spectral resolution radiances for all three spectral bands since December 4, 2014 (Han et al., 2015)."

P 3 line 27: Is it the first time that the MUSES algorithm is presented? Has it been developed for the joint CrIS/TROPOMI product? It should be mentioned. Is it based on an existing algorithm? Is there a reference?
Re: It is first time we descript. We revised line P3 line 26 to 29.
"The MUlti-SpEctra, MUlti-SpEcies, Multi-SEnsors (MUSES) retrieval algorithm, has a generic design that allows to incorporate hyperspectral forward model radiances from hyperspectral measurements from multiple sensors into the joint retrieval algorithm. MUSES has been applied to joint TES/OMI ozone retrievals (Fu et al., 2013; Worden et al., 2013b) using measured TIR/UV spectral radiances and joint TES/MLS CO retrievals (Luo et al., 2013) using measured TIR/Microwave spectral radiances. In this paper, we describe the first application of the MUSES algorithm to the combination the TROPOMI and CrIS spectral radiances to produce atmospheric CO Volume Mixing Ratio (VMR) profiles, which will have a vertical resolution that improves upon the EOS-Terra MOPITT multi-spectral CO data products."

P 4 line 12: It is said that TROPOMI's launch is planned for the summer. And it is said "late 2016" in the conclusion.
Re: We deleted "(estimated in late 2016)" in the conclusion to avoid the confusion. The launch date is now set for Q4 2016 and users will only get a L1b product after 6 months after launch. We expected that it would take some time (typically a few months after the launch date) for a satellite mission to create and release a stable version of L1B data product. The time gap is typically

designed for accomplishing the necessary activities in the mission operation plans e.g., a sequence of orbit maneuvers to form satellite constellation, to accomplish the decontamination/cooling of the instrument, and validation/evaluation of L1B data sets etc.

P 5 line 29: ~4 times > ~3.5 times
Re: We changed "~4 times" to "~3.5 times".

P 6 line 7: Recall "MUlti-SpEctra, MUlti-SpEcies, MUlti-Sensors" here.
Re: We removed the recall of "MUlti-SpEctra, MUlti-SpEcies, MUlti-Sensors" here.

P 7 line 18:"a priori uncertainty": Later in the paper, the authors are using "uncertainty" for error. Here I would suggest you use "variance". P 8 line 14-15-16: "and was applied to evaluating the characteristics of Aura TES (Bowman et al., 2006), joint TES/OMI data products (Fu et al., 2013), and MOPITT data products (Worden et al., 2010)" should be removed, it does not bring anything here.
Re: We changed "a priori uncertainty" to "a priori variance" and removed P8 line 14-15-16.

P 8 line 22: matrix of retrieved > matrix of the atmospheric
Re: The state vector contains both atmospheric and auxiliary parameters. We changed "matrix of retrieved" to "matrix of the full retrieved state, which contains both atmospheric and auxiliary parameters".

P 9 line 11: I would add "(or standard deviation)": RMS > RMS (or standard deviation)
Re: We changed "RMS" to "RMS (or standard deviation)".

P 9 line 12 and line 14: It would be nice to have the figures in % too.
Re: We added in the percentage differences in Table 3 and Supplemental Material Table 1.

P 9 line 30: "the estimated measurement uncertainty": How much is it for MOPITT? CrIS?
Re: We revised P9 line 23-32. In addition, we added in Table 5 for the estimated uncertainty of each data product.
"The diurnal variation of MODIS fire radiative power and fire counts for the time period of August 27 to 28, 2013, is weak. The retrievals for the same set of soundings were recomputed using a constant CO a priori profile, which is 100.0 ppb in LMT (Supplemental Material Figure 1) and representative of clean air conditions. When using common a priori profiles, both MOPITT and CrIS retrievals still show a latitudinal gradient (Suppl. Figures 1 and 2) with enhanced CO VMR peaked near 12 degree south, similar to the gradient shown in Fig. 3, though the amplitude of CO enhanced concentration is smaller. Consequently, it indicates that the consistency of measurements from two TIR sensors is insensitive to the choice of a priori. The mean differences between CrIS and MOPITT TIR improved to 2.8 ppb (Suppl. Table 1), with the RMS (or standard deviation) of the difference changed from 9.7% to 13.9%. Tables 4 and 5 show the measurement characteristics (Table 4 for sensitivity and Table 5 for the precisions) of the MOPITT and CrIS/TROPOMI. The mean and RMS of the differences between CrIS and MOPITT multi-spectral CO data products are -23.6±37.6 ppb (or -9.7 ±16.8%, Suppl. Table 1), which is greater than the differences between CrIS and MOPITT TIR (2.8±24.9 ppb or 1.6 ±13.9%, Suppl. Table 1) and also greater than the estimated measurement uncertainty (CrIS 13.8%; MOPITT joint TIR/NIR 14.3%, Table 5)."

P 10 line 8-9: How have the TROPOMI measurements been simulated? With what code?
Re: We described the simulation of TROPOMI measurements in Page 7 line 12 - 23. We applied VLIDORT program with specification of TROPOMI into the simulation of radiances and

Jacobians. To clarify this, we added "(described in section 3.1)" in P10 line 8-9.
"To access the characteristics of improved tropospheric CO profiling when combining TIR/NIR observations, we computed the averaging kernels, degrees of freedom for signal (DOFS, the trace of averaging kernels), and error covariance matrix for both synergistic and each instrument alone observations. We used the CrIS viewing geometry for the simulation of TROPOMI measurements (described in section 3.1) since the tandem orbit of Suomi NPP and TROPOMI is very similar. "

P 10 line 11-13: The authors are talking about the "tropospheric CO profiles" and then about "total DOFS". Suggestion to remove "tropospheric".
Re: We deleted the "tropospheric".

P 10 line 13: About the "error characteristics": They are not similar but smaller for CrIS/TROPOMI than for MOPITT NIR/TIR products.
Re: We revised the sentence in P10 line 13.
"We find that the CO profiles generated from joint CrIS/TROPOMI measurements have vertical resolution (Fig. 4D) and sensitivity (mean total DOFS of 2.22, Table 4) similar to the MOPITT joint TIR/NIR measurements (Fig. 4A, Fig. 6A; Table 4, mean total DOFS of 1.88), while the estimated total uncertainty (magenta lines in Fig. 6B and 6C) are smaller than that of MOPITT joint TIR/NIR measurements."

P 10 line 21: the change of DOFS > DOFS (?)
Re: We changed to "and DOFS (Fig. 5, CrIS 1-1.7; TROPOMI 1-1.5)", i.e., deleted "the change of ".

P 11 line 1: The total error consists of > The total error (or uncertainty) consists of
Re: We changed to "The total error (or uncertainty) consists of".

P 11 line 19-20: between CrIS and MOPITT TIR data products is > between CrIS and MOPITT TIR data products –August 27th– is
Re: We revised the sentence.
"The agreement of retrieved carbon monoxide volume mixing ratio in the lower most troposphere (surface to 3 km; ~700 hPa) between CrIS and MOPITT TIR data products –August 27th is -6.9±22.8 ppb when using different a priori profiles in retrievals; and 2.8±24.9 ppb when for using common a priori in retrievals."

P 11 line 29: "late 2016" See Comment P 4 line 12
Re: Re: We deleted "(estimated in late 2016)" in the conclusion to avoid the confusion. The launch date is now set for Q4 2016 and users will only get a L1b product after 6 months after launch. We expected that it would take some time (typically a few months after the launch date) for a satellite mission to create and release a stable version of L1B data product. The time gap is typically designed for accomplishing the necessary activities in the mission operation plans e.g., a sequence of orbit maneuvers to form satellite constellation, to accomplish the decontamination/cooling of the instrument, and validation/evaluation of L1B data sets etc.

P 28 Table 1: Satellite missions > NASA satellite missions (or add ACE-FTS and IASI, see comment P 3 line 13)
Re: We revised Table 1: (1) added two rows for "ACE-FTS" and "IASI-A, B, C"; (2) the footnotes H and I.
[H] The IASI-A and IASI-B instruments are on-board MetOp-A (launched in 2006) and MetOp-B (launched in 2012) satellites. The third IASI instrument will be on-board MetOp-C with an

estimated launch date in 2018. MetOp-A and B satellites are in a sun-synchronous, 827 km altitude orbit with a 9:30 am equator crossing time (ascending node), a few hours earlier than that of S5-P satellite. The IASI CO data product was retrieved from the 4.6 µm band (George et al., 2009).

[I] ACE-FTS on board the Canadian satellite SCISAT, operating in the solar occultation measurement mode at sunrise and sunset, provide high vertical resolution (3-4 km) profiles in the altitude region from middle troposphere to the thermosphere for over 30 atmospheric trace gases as well as the meteorological variables of temperature and pressure (Bernath et al., 2005; Boone et al., 2005; Fu et al., 2007; Allen et al., 2009; Fu et al., 2009). The operational ACE-FTS CO data product was jointly retrieved from the 2.3 and 4.6 µm bands (Clerbaux et al., 2008b).

P 29 Table 2 A priori Uncertainty > A priori Variance
Re: We changed "A Priori Uncertainty" in the first row of last column to "A Priori Variance".

P 31 Table 4: Suggestion to put the figures "2.22", "0.91" and "1.32" in italics and mention in the caption that it is the synergistic CrIS/TROPOMI product.
Re: We put "*0.22*[A], *0.91*[A], *1.32*[A]" in italics and added an footnote "[A] It is the synergistic CrIS/TROPOMI product.".

Trivia:
P 2 line 2: : : :The TROPOspheric: : : > the TROPOspheric
Re: We changed "The TROPOspheric" to "the TROPOspheric".

P 3 line 2: lowermost troposphere > Lower Most Troposphere
Re: We changed "lowermost troposphere" to "Lower Most Troposphere".

P 3 line 7-8: METOP-A/B > METOP-A and B
Re: We changed "METOP-A/B" to "METOP-A and B".

P 8 line 22: sate > state
Re: We changed "sate" to "state".

P 9 line 1: 2014 > 2013
Re: We changed "2014" to "2013".

P 9 line 3: observations. > data (Fig. 2A)
Re: We changed "observations" to "data (Figs. 2A)".

P 9 line 10: (Figs. 2 and 3) > (Figs. 2C, 2D and 3A)
Re: We changed "Figs. 2 and 3" to "Figs. 2C, 2D and 3A".

P 9 line 16: Figs 2D > Figs. 2D
Re: We added the missing "." in "Fig. 2D".

P 9 line 22: (Supplemental Material Figure 1 > (Supplemental Material Figure 1)
Re: We added the missing ")" in "(Supplemental Material Figure 1)".

P 10 line 13: (mean total DOFS of 2.22) > (mean total DOFS of 2.22, Table 4)
Re: We changed "(mean total DOFS of 2.22)" to "(mean total DOFS of 2.22, Table 4)".

P 10 line 16: Fig.4D > Fig. 4D
Re: We changed "Fig.4D" to "Fig. 4D".

P 10 line 17: showed > show
Re: We changed "showed" to "show".

P 10 line 22: had > has
Re: We changed "had" to "has".

P 10 line 23: generally above 2.0 > generally above 2 (Fig. 5A)
Re: We changed "generally above 2.0" to "generally above 2 (Fig. 5A)".

P 15 line 10: Amsterdam , 1992 > Amsterdam, 1992 (remove space after Amsterdam)
Re: We changed "Amsterdam ,1992." to "Amsterdam, 1992."

P 16 Han et al. 2013 and 2015 are not in the text.

Re: We added Han et al., 2013 in line 28 page 4 and Han et al., 2015 in Han et al., 2015.

"Currently, the operational Level 1B products provide full spectral resolution only for the long-wave IR band 1 for entire lifetime of the mission (Han et al., 2013). The full resolution (0.625 cm^{-1}) spectral radiance products for band 2 (was 1.25 cm^{-1}) and band 3 (was 2.5 cm^{-1}) have been available since December 4th, 2014 (Han et al., 2015)."

Figure 2: P 23 line 5: MOPITT multiple spectral CO fields > MOPITT multiple spectral (TIR/NIR) CO fields or MOPITT joint TIR/NIR CO fields (like in the caption of Supplemental Material Figure 2)

Figure 2: P 23 line 5: MOPITT thermal infrared CO fields > MOPITT thermal infrared (TIR) CO fields or MOPITT TIR CO fields

Figure 2: P 23 line 8: identical to those used in the MOPITT > used in the MOPITT

Re: We revised caption of Figure 3.
"**Figure 2**. Tropospheric carbon monoxide (CO) volume mixing ratio (parts-per-billion) profiles measured by Terra MOPITT (version 6.0) on August 27th, Suomi-NPP CrIS on August 28th 2013, and fire radiative power (milliwatts) measured by Aqua MODIS. (Panel A) MOPITT joint TIR/NIR CO fields; (Panel B) MOPITT TIR CO fields; (Panel C) CrIS TIR CO fields using a priori profiles used in the Aura TES operational retrievals; (Panel D) a priori CO fields used in CrIS retrievals shown in Panel C. (Panel E) a priori profiles used in the MOPITT operational retrievals shown in Panels A and B; (Panel F) Fire radiative power measured by Aqua MODIS over Africa for August 28th, 2013."

Figure 3: P 24 line 6: ~700-hPa > ~700 hPa;
Figure 3: P 24 line 12: Auqa > Aqua;
Figure 3: same thing as comment Figure 2: P 23 line 5 and comment; Figure 2: P 23 line 5
Re: We revised caption of Figure 3.
"**Figure 3**. Averaged carbon monoxide (CO) volume mixing ratio (parts-per-billion) from surface to 3km (~700 hPa), fire counts and maximum fire radiative power (milliwatts) measured by Aqua MODIS over Africa for August 28th, 2013. (Panel A) MOPITT joint TIR/NIR CO data products (blue stars), MOPITT TIR CO data products (green triangles), and CrIS TIR CO VMR using a priori profiles identical to those used in the Aura TES operational retrievals (golden diamonds); (Panel B) a priori CO VMR used in MOPITT (green/blue) and CrIS (gold) retrievals. (Panel C) Fire counts (black squares) and maximum fire radiative power (blue plus) among the Aqua MODIS measurements whose data quality confidences are greater than 70%. ".

Figure 4: the averaging kernels of MOPITT TIR/NIR and CrIS have been switched.
Re: The order of MOPITT TIR/NIR and CrIS plots are normal. We revised the caption to include the spectral bands for each data set.
"**Figure 4**. Sample averaging kernels of measurements for the target scene near 22.99°E, 8.65°S. In all panels, green lines are the averaging kernels from the surface to 3 km (~700 hPa); magenta lines are the averaging kernels from 3 km (~700 hPa) to 100 hPa. (Panel A) MOPITT joint TIR/NIR measurements; (Panel B) Suomi-NPP CrIS TIR measurements; (Panel C) synthetic S5p TROPOMI NIR measurements; (Panel D) synthetic joint CrIS/TROPOMI (TIR/NIR) measurements."

P 29 Table 2 : lines 2,3,4,5: The dots at the end of the sentences A, B, C D are missing.
Line 3 : Brasseur et al. 1998 > Brasseur et al., 1998 Line 3 : Park et al. 2004 > Park et al., 2004 Line 14 : meuasred > measured Line 14 : earth > Earth
Re: We added the dots at the end of the sentences A, B, C, D, and added the commas after both "*Brasseur* et al." and "*Park et al.*". We changed "*meuasred earth* " to "measured Earth".

P 31 Table 4: Degree > Degrees Surface to 3 km > LMT: Surface to 3 km
Re: We revised title of Table 4 to "Degrees of freedom for MOPITT, CrIS, and TROPOMI carbon monoxide measurements.". We added the LMT into the second row of first column. "LMT: Surface to 3 km (~700 hPa)".

Supplement Material Figure 2: line 3: 700-hPa > 700 hPa Line 8: Auqa > Aqua
Re: We revised caption of Supplement Material Figure 2.
"**Supplemental Material Figure 2**. Carbon monoxide (CO) volume mixing ratio (parts-per-billion) from surface to 700 hPa, fire counts and maximum fire radiative power (milliwatts) measured by Aqua MODIS over Africa for August 28th, 2013. A common a priori profile was used in the MOPITT and CrIS retrievals. (Panel A) MOPITT joint TIR/NIR (blue stars), MOPITT TIR CO (green triangles), and CrIS TIR CO from MUSES algorithm (golden diamonds); (Panel B) a priori CO vmr used in retrievals shown in Panel A. (Panel C) Fire counts (black squares) and maximum fire radiative power (blue plus) among the Aqua MODIS measurements whose data quality confidences are greater than 70%. "