Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-622-AC2, 2020

Atmospheric Chemistry and Physics
Discussions

Interactive comment on "The influence of typhoons on atmospheric composition deduced from IAGOS measurements over Taipei" *by* Frank Roux et al.

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Received and published: 28 January 2020

(...) I recommend the manuscript to be accepted for publication largely as it is, with some minor corrections. I have some suggestions, optional for the authors, which may enhance the take home message of the work.

Minor changes and corrections:

1. Page 4: line 142: "where F is.." => No F in the equation

-> Equation (2) has been correctedÂă:

2. Page 7, Line 267: this sentence needs to be revised. The word "determine" is too

strong. ". . .two more cases to highlight the common features"?

-> "determine" has been changed into "investigate" in the revised version.

3. Page 8, you made a number of references of "low CO" to values of âĹij100 ppbv, which is somewhat problematic. Overall, the CO signatures are weak.

-> "low CO values" have been replaced by "CO values less than 100 ppbv" in the revised version.

4. Figures: 4.1. Figure 1 labels are too small to read on a print page. -> Figure 1 has been changed (see below) in the revised version.

4.2. Fig 4: "Yellow box" -> The change has been made in the revised version.

Additional suggestions:

1) Figure 1 serves a purpose but could have much more information content. As shown in later profiles, the individual profiles could be very structured. These mean profiles,however, are kind of uninteresting. Suggest you to try "box-and-whisker" plots with distribution in layers instead of mean and standard deviation.

-> In the revised version, Fig. 1 shows "boxplots" of RH, O3 and CO for each 500-m deep layer between the surface and 12 km altitude. Comments have been changed accordingly.

2) Figure 2&3 could use some color adjustment to highlight the features you want readers to see. Panels C in particular. Fig. 2C could be clearer if color changes for CO above/below 100 ppb and 50 ppbv. Fig. 3C should show color change at 0 to highlight direction change

-> The color codes for Figs. 2c (IAGOS CO), 3b (ERA-5 PV) and 3c (ERA-5 W) has been changed in the revised version in order to highlight contrasts.

3) After presenting the details of three cases, it would be more satisfying to have a

summary figure quantifying the layer influenced by the stratospheric air, its vertical extent and the amount of ozone enhancement. It is possible to do this using all 18 profiles but present the data in the tracer-tracer space. For an example, see Fig. 3 of Randel et al., 2016. If you have a large anti-correlation between O3 and RH, it would be a strong support for transport. The part of the tracer space with positive ozone anomaly and unclear anti-correlation with RH may indicate other mechanisms, including lightening NOx facilitated ozone production.

-> In the revised version, a figure (Fig. 4) has been added to show the two-dimensional distribution of O3 and RH from 4 to 12 km altitudes for 56 vertical profiles derived from IAGOS measurements during take-off from and landing to TPE at less than 1200 km from the centers of 7 storms that passed relatively close to TPE during July to October 2016. As discussed in the revised version, two populations can be identified : ozone-rich (50 to 100 ppbv) and dry (RH < 50%) air represents 35.8 % of the measurements, ozone-poor (<50 ppbv) air with various RH values (20 to 100 %) accounts for the remaining 64.2 %. The absence of measurements with positive ozone anomaly and high relative humidity indicates that lightning-induced nitrogen oxides are probably not the main cause of ozone production here. These results bear some resemblance with those Randel et al. (2016) derived from vertical tropospheric profiles collected during the "Convective Transport and Active Specied in the Tropics" experiment from Guam (14°N, 145°E) in January-February 2014. They also observed dry air (RH < 20%) with enhanced ozone (40-80 ppbv) contents within layers between 3 and 9 km altitudes, which they linked to quasi-isentropic transport from the extratropical UTLS. These data were obtained in the descending branch of the Hadley cell, with only occasional deep convection, which contrasts with the moister and stormier conditions that prevailed during July to October 2016 near Taiwan.

We thank Laura Pan for the constructive comments which helped to clarify the submitted version.

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2019.