Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-972-RC2, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Transboundary ozone pollution across East Asia: daily evolution and photochemical production analysed by IASI+GOME2 multispectral satellite observations and models" *by* Juan Cuesta et al.

Anonymous Referee #2

Received and published: 3 March 2018

This paper elaborates a comprehensive study of transboundary ozone pollution across East Asia via employing [1] the multiple-spectral IASI/GOME2 ozone profile product that provides the quantitative estimates of ozone concentration in the LMT; and [2] the combined modeling tools consisting of CHASER (global scale) and WRF-CHEM (regional scale) models. This study provides multi-species, multi-scale picture of pollutions across East Asia, helping in distinguishing between local and non-local drivers of pollution in LMT. The subject of the paper is appropriate to ACP. Below are a few comments concerning clarifications/extensions for consideration in the final publication

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in ACP.

This work uses the IASI carbon monoxide (CO) profile data to estimate the CO concentration in lower troposphere (LT), then use IASI LT CO and joint IASI+GOME2 LMT O3 as daily pictures for facilitate the study of daily evolution of pollution across East Asia. The authors should describe how well the IASI LT CO data could represent the CO variability in the LMT.

Drs. Miyazaki and Sekiya have developed a high-resolution CHASER simulation tool (version 4.0) with a finest spatial resolution of 0.56 degrees (Sekiya et al., 2017) – significantly higher that of CHASER and WRF-Chem models used in this study. The performance of CHASER v4 has been validated using reference data sets from satellite missions and aircraft flight campaigns. The authors should include this reference in this paper and provides some discussions. Sekiya T., Miyazaki K., Ogochi K., Sudo K., and Takigawa M., Global high-resolution simulations of tropospheric nitrogen dioxide using CHASER V4.0, Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2017-203, in review, 2017.

Page 4, Line 5-6: There is a multiple spectral retrieval algorithm developed for CO profile retrievals (Fu et al. 2016). They demonstrated the feasibility of combining the measurements from Sentinel-5 precursor (S5P) TROPOMI (near infrared) and Suomi-NPP (SNPP) CrIS (thermal Infrared) sensors to extend Terra MOPIIT both TIR alone and multiple spectral CO profile products capable of quantifying the first 2-3 km CO amounts, as well as improving spatial coverage and resolution in comparison to Terra-MOPITT. The authors could add some discussions nearby the end of first/beginning of second paragraphs of page 4, e.g, “The Sentinel-5 precursor (S5P) and Suomi NPP (SNPP) has successfully formed a new satellite constellation, leading to a unique opportunity to quantify the amounts of carbon monoxide in the LMT over global scale via combining the satellite measurements from SNPP CrIS (TIR) and S5P TROPOMI (NIR) instruments. Fu et al. (2016) presented the methodology and characteristics of joint CrIS/TROPOMI CO profile retrievals, demonstrating the feasibility of extending the

decadal record of Terra-MOPITT CO products (Worden et al., 2010 and 2013)." Fu D., Bowman K.W., Worden H., Natraj V., Yu S., Worden J.R., Veefkind P., Aben I., Landgraf J., Strow L., Han Y., High resolution tropospheric carbon monoxide profiles retrieved from CrIS and TROPOMI, Atmos. Meas. Tech., 9, 2567-579, 2016.

Worden H.M., Deeter M.N., Edwards D.P., Gille J.C., Drummond J. R., and Nédélec, P. P., Observations of near-surface carbon monoxide from space using MOPITT multi-spectral retrievals, J. Geophys. Res., 115, D18314, doi:10.1029/2010JD014242, 2010.

Worden H.M., Deeter M.N., Frankenberg C., George M., Nichitiu F., Worden J., Aben I., Bowman K. W., Clerbaux C., Co-heur P.F., de Laat A.T.J., Detweiler R., Drummond J. R., Edwards D.P., Gille J. C., Hurtmans D., Luo M., Martínez-Alonso S., Massie S., Pfister G., and Warner J.X., Decadal record of satellite carbon monoxide observations, Atmos. Chem. Phys., 13, 837–850, doi:10.5194/acp-13-837-2013, 2013.

Page 38, Line 2, Figure 2 caption: IASI+GOME -> IASI+GOME2

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