Answer to Referee #1 (Report #2)

We appreciated the proper comments by the Referees, which helped to revise the manuscript very much. A part of the answers to the comments are in common to two Referees.

The primary deficiency problem is that the authors haven't fully answered Referee3's question yet, and I agreed on the raising the question (by Referee 3), regarding marine boundary layer (MBL) fluctuations (i.e., how high the MBL is in meters) association with LRT vs. local photochemical reactions at Oki. Authors need to rule out the possibility of errors in how well model simulated MBL heights against measurement (if multiple models would not be possible, just 'one remote (island) measurement against a single model approach would be enough for this purpose). This will make the role of the surface dry deposition be emphasized more.

Discussion on the relative importance chemical production and physical process to the diurnal variation of O_3 has been added in Line 299-312 (p.9-10). Original Fig. 6 showing only the net chemical production has been replaced by the figure showing both net chemical production and net physical process (vertical transport + horizontal transport) for Oki. The similar figure for Hedo is included in the supplementary Figure 6S-1. Vertical profile of O_3 in the lower-middle free troposphere during July at Oki is shown in the supplementary Figure 6S-2, which confirms that during the period of July 16-23 when the most distinct diurnal variation of O_3 was simulated by the models, no long-range transport occurred and O_3 in the lower-middle troposphere above the planetary boundary layer is rather low in general.

Unfortunately, no observational data of MBL height is available at none of the selected marine sites of EANET to verify the simulated MBL height so that we did not make specific discussion of simulated MBL heights.

Another deficiency is the sensitivity result (i.e., applying doubling and decupling of dry deposition velocities: it would be also probably possible to carry out based on just a single model (or employing a simple box model and note the results briefly), rather than only employing MICS-Asia III frame. This is because probably authors check to what degree the diurnal ΔO_3 variations (i.e., daily O_3 max. - daily O_3 min, as indicated in Fig. 3a and 3b at Hedo and Oki) might become observed levels. This process will check the long-term levels of O_3 as well as model's local photochemical reaction build-up capability and in turn authors may reach the conclusion in more robust way.

We fully agree that sensitivity analysis of dry deposition is very important for this paper, and we

made extra simulation by CMAQ model with different model domain setting (since the exactly the same versions of CMAQ could not be operated by a practical reason at the moment) by changing the deposition velocity (V_d) by a factor of 2, 10 and 10^{-5} (essentially zero). The results are discussed in Line 381-399 (p. 12) by adding an extra figure, Fig. 9. This analysis helped to clarify the importance of selecting the proper values of dry deposition velocity semi-quantitatively, and we mentioned the possibility of some factor other than dry deposition may contribute to the oceanic background of O_3 in this area of Pacific Ocean.

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Answer to Referee #2 (Report #3)

We appreciated the proper comments by the Referees, which helped to revise the manuscript very much. A part of the answers to the comments are in common to two Referees.

I still consider that some analysis of chemical production/ loss terms and physical removal terms of O_3 at the sites would be helpful.

Discussion on the relative importance chemical production and physical process to the diurnal variation of O_3 has been added in Line 299-312 (p.9-10). Original Fig. 6 showing only the net chemical production has been replaced by the figure showing both net chemical production and net physical process (vertical transport + horizontal transport) for Oki. The similar figure for Hedo is included in the supplementary Figure 6S-1. Vertical profile of O_3 in the lower-middle free troposphere during July at Oki is shown in the supplementary Figure 6S-2, which confirms that during the period of July 16-23 when the most distinct diurnal variation of O_3 was simulated by the models, no long-range transport occurred and O_3 in the lower-middle troposphere above the planetary boundary layer is rather low in general.

Besides, sensitivity model simulations with different deposition rates in CMAQ would help support the authors' conclusions that dry deposition is important for explaining model differences over the study region.

We fully agree that sensitivity analysis of dry deposition is very important for this paper, and we made extra simulation by CMAQ model with different model domain setting (since the exactly the same versions of CMAQ could not be operated by a practical reason at the moment) by changing the deposition velocity (V_d) by a factor of 2, 10 and 10^{-5} (essentially zero). The results are discussed in Line 381-399 (p. 12) by adding an extra figure, Fig. 9. This analysis helped to clarify the importance of selecting the proper values of dry deposition velocity semi-quantitatively, and we mentioned the possibility of some factor other than dry deposition may contribute to the oceanic background of O_3 in this area of Pacific Ocean.

I also agree with other reviewers' major comments, e.g. examinations of the models over a longer period (or the same month in multiple years) as suggested by reviewer #1;

The extra simulation for another year is beyond the scope of this study and is not feasible since the key parameters (meteorology, emissions, and boundary conditions) have been provided only

for the target year of 2020 in MICS-Asia III. In order to clarify the reason why we selected only July in this study, comparison of seasonal variation of O_3 at Oki between the observation and model simulations have been shown in a supplementary figure Fig. 1S.

More investigations of PBL simulations and calculations of net on-site photochemical production rate as suggested by reviewer #3.

As described above, we made a figure of vertical profile of O_3 in the layer above the PBL (Fig. 6S-2) by using CMAQ 4.7.1 and the discussion has been added in Line 307-312 (p. 10). Unfortunately, no observational data of MBL height is available at none of the selected marine sites of EANET to verify the simulated MBL height so that we did not make specific discussion of simulated MBL heights.

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