Review of Lennartson et al. (submitted to ACP)

Overall comments:

I recommend this paper for publication after some suggested revisions. This is an interesting study that explores different dimensions (spatial variations, diurnal variations, etc.).

The paper clearly needs to be improved in terms of use of English. Some corrections that I suggested at quick-review stage were not included in the current manuscript. The corrections or additions that were already made to the manuscript will be helpful for the readers.

GOCI does not have a channel longer than 865 nm. This seems like a weakness since it must be difficult to retrieve an unbiased estimate of the surface reflectance when the AOD is high. Since accurately estimating the surface reflectance is the biggest challenge to overcome when retrieving AOD over land from radiance measurements, I feel that there should be a sentence describing how GOCI handles the estimation of surface reflectance over land. Although probably too much to ask, I would have been more interested in (the diurnal variation of) AOD from the Advanced Himawari Imager, which seems more suited to measuring AOD over land with its shortwave IR channel. I suggest that the authors assess whether 68% of GOCI-AERONET AOD differences fall within the $0.15\tau \pm 0.05$ accuracy envelope mentioned on P8L11 by lumping together the AERONET-GOCI pairs from all sites during KORUS-AQ (especially if the authors feel this does not repeat previous work).

The authors found that WRF-Chem AOD does not correlate well with AERONET AOD, which is interesting, albeit disappointing. WRF-Chem's AOD bias is smaller than that of GOCI AOD however.

Specific comments:

P1L24 (see also P17L10): "the deficiency to describe" -> "a deficiency in describing"

P1L24: relatively -> relative

P1L27: patter -> pattern

P1L27: relative -> relatively

P1L29: "for constrain" -> "to constrain"

P2L1: "Their presence leads to" -> "They are involved in"

P2L5: track -> tract

P2L9: averages -> average

P2L10: with -> and

P2L17: "24" -> "24 times"

P2L17: This sentence implies that clouds do not exist at the surface. However fog is essentially cloud at the surface. Please verify that fog does not affect the performance of surface aerosol monitors.

P2L21: Delete “in emerging need of surface monitors”

P3L5: “one of its first kind” -> “the first of its kind”

P3L5: “that, through” -> “involving”

P3L11: Delete “needed”

P3L12: that -> what

P3L32: Add “over water” after hourly data.

P4L5: “ “season invariant” ” -> “seasonally invariant”

P4L14: Delete “studying”.

P4L14: Add “studies” after variation.

P4L24: Re “since these concentrations”, please clarify whether the concentrations were higher at midnight in fall/winter relative to spring/spring or in general (i.e., averaged over day).

P5L2: add space before m^{-3}.

P5L3: peaks -> enhancements

P5L8: emergently -> urgently

P5L16: category -> categories (?)

P5L16: What does “with an accuracy of 90%” mean? If this means “typical errors of ±10%”, please use this expression instead.

P6L5: advances-> improvements

P6L28: Delete “Joint”

P6L28: “between the” -> “developed at”

P6L29: Delete “data”

P7L14: Cite reference for CREATE if possible.

P8L9: Imagine -> Imaging

P8L11: Move “compared to V1” immediately after “bias” in this line.

P8L18: Define HUFS here.

P8L28: Delete “(or baseline)”. I suggest “climatological” over “baseline” throughout the manuscript.

P8L29: form -> from

P9L18: Do the authors mean: “has fewer intra-class similarities as compared to the coastal rural class.”?

P9L29: “evening-build” -> “late afternoon buildup” (see also P10L8)

P10L14: “maxima AOD” -> “AOD maxima” (see also P10L15).

P10L19 (and elsewhere): Exponent -> exponent

P10L20: This sentence is debatable. It implies that naturally occurring smoke from biomass burning is a minor contributor to the aerosol load. If that is true, the statement is OK.

P10L27: build -> increase

P10L32: build -> rise

P11L11: statically -> statistically

P11L16: later -> late

P11L17: started -> start

P11L17: diminishes -> diminish

P12L13: c -> cohesive (?)

P12L28: “findings surprising” -> “surprising finding”

P12L28: “longer observation than the” -> “as long a record as”

P13L3 (and elsewhere): AEROENT -> AERONET (e.g., see P15L2)

P13L4: time -> times

P13L8: is -> are

P13L12: under-predicted -> under-predict

P13L13: of -> to

P13L26: “over predicted” -> “overpredicted” (“overestimated” is actually better since these are not predictions, they are measurements)

P13L28: amply -> amplify

P13L28: Can’t the larger standard deviation for GOCI AOD be due to larger random errors than AERONET AOD?

P13L32: “minutely” -> “every minute”

P14L13-14: I am not convinced that the minima and maxima are real. The authors should add the standard error as a vertical error bar to each hour of the Jeju curve in Fig. 7c and use these (or a t-test) to judge whether these maxima and minima are statistically significant.

P14L21: Re: “process”, is there only one process? If not, change to “processes”.

P14L29: The systematic bias is more like 0.04-0.09 between 9 and 15 KST. This needs to be corrected.

P14L32: Delete “also”.

P14L32: shows -> show

P14L32 (and elsewhere): later -> late

P15L3: “that from” -> “with”

P15L4: relatively -> relative

P15L6: “too much skewness” -> “an overly strong tendency” (a suggestion)

P15L11: “Similar as its AOD variables” -> “Similar to AOD”

P15L12: “$PM_{2.5}$” -> “$PM_{2.5}$ data”

P15L24: outliner -> outlier

P16L4: AEROENET is not the correct spelling.

P17L1: larger -> large

P17L6: prolife -> profile

P28: Is what follows the ‘±’ for y and x the standard deviation of the mean? Please add this info to Fig. 5 caption. Assuming it is one standard deviation, it shows that GOCI AOD has a significant overall low bias.

P29: The caption should be “…AERONET AOD vs WRF-Chem AOD…”, etc.

P30: (Fig. 7 caption): m-3 -> m^{-3} (occurs twice)

P30: (Fig. 7 caption, and elsewhere): PM2.5 -> $PM_{2.5}$

P30: (Fig. 8 caption): R2 -> R^2

P31: I suggest plotting AERONET and GOCI separately in Fig. 9b.