Comments

- Paragraph at line 246: Provide more details on the TROPOMI comparison. What is the motivation for doing this? Were the TROPOMI columns matched to the Pandora locations using the same method as is used for GEMS?
  ➔ As GEMS is GEO satellite, it needs to compare with other LEO satellites. Therefore I added and revised the sentences as follows.
    - Since GEMS is the first GEO satellite and differs from the LEO satellite with observation geometry, an additional comparison was conducted with the LEO satellite TROPOMI. TROPOMI NO_2 total columns used for comparison with Pandora NO_2 and downloaded from Copernicus open data access hub (https://s5phub.copernicus.eu; last access: 07 January 2021). TROPOMI offline channel (OFFL) dataset data were used with a quality assurance (QA) value larger than 0.75 and a cloud radiance fraction less than 0.3. In the same way as comparing Pandora and GEMS, pixels close to the Pandora measurement sites were selected and compared.

- The conclusion is still lacking some details. In particular, you mention that this is the first time that GEMS, TROPOMI, and Pandora NO2 were compared, but do not provide any details on the comparison or what the results mean. It would also be useful to discuss how the agreement between GEMS and Pandora NO2 compares to the agreement between other, similar types of measurements. Can you conclude that the GEMS data is of a quality appropriate for use in scientific studies?
  ➔ Thank you for your opinion. And I added the details about comparison results, and evaluation as follows.
    - The first comparison of NO_2 VCDs from the GEMS showed relatively lower values than Pandora (MBE = -0.43–-0.17) with moderate correlations (R = -0.62–-0.78) over Seosan. NO_2 retrievals from the TROPOMI also showed consistent comparison results; the TROPOMI NO_2 underestimated the ground-based retrievals with MBE from -0.64 to -0.19 with comparable correlations (R = 0.58–0.74). However, due to the limited Pandora measurements at the beginning of the GEMS operation, further comparisons at broader regions of GEMS FOV for long-term periods are essential for the relevant studies using the GEMS data.

Minor Edits

Line 118: November 28th of what year?

➔ It means November 28th, 2020. So, I added the year.

Line 119: change “day 28th” to “November 29th”

➔ I changed day 28th to November 28th

Figure 2: Not all panels have y-axis labelled.

➔ All panels have the same y-axis.

Line 217: Change “fir” to “for”

➔ I corrected it.

Line 251: change to “less underestimation”

➔ I changed “underestimation less” to “less underestimation”

Figures 10 and 11: Mention dot colour meanings in the caption. Which colour is the regression line fit to?

➔ I added the mention of color meaning as follows.

- Figure 11. The scatterplot of NO2 VCD between Pandora and GEMS in the CF conditions < 0.7. (a), (b), (c), and (d) represent the CC, DHJ, DM2, and SS sites, respectively. The colored dots mean different ranges of CF. The grey dashed line represents the 1:1 line and the black solid line represents the regression line.

Figure 11: I suggest using a different colour for either the green or red dots as it is difficult for colourblind people to distinguish between these.

➔ Thank you, I changed the dot color.

Line 337 (equation): Are the indices on VCD_1 and VCD_2 mixed up?

➔ The 337 line doesn’t have any equation or VCD. If you mean “Intercomparison VCD (338 line)”, that is not indices VCD_1 and VCD_2 mixed up. To prevent misunderstanding, I modified it to dVCD. And, when VCD_1 and VCD_2 are considered together, it is only when the horizontal effect is considered.

Line 354: Change “GENS” to “GEMS”

➔ I corrected it.