

**Response to review comments on MS# egosphere-2025-6197 by Wang et al.**  
(review query in black, response in blue)

**Reviewer: 1**

**Comments:**

The authors have generally done a good job at addressing my comments. I have a couple more things that I think need a second look:

- 1 . The changes to section 4.2 are good, with the focus on the two cities for which there are sufficient data within the ABL. However in section 3 the discussion of Hengshui and Shangqiu profiles (L261-273) also needs to be changed to reflect the lack of ABL sampling over these cities.

We have revised the text in Section 3.2 to clarify this limitation.

“The profiles over Hengshui and Shangqiu were stopped at 850 m above the ground and did not adequately sample the interior of the ABL. Nevertheless, they indicated that the surface influences on the ABL GHG budgets differed between the two locations. ...” (Lines 260-262)

“... In other words, the landscape near Shangqiu might be a sink of CO<sub>2</sub> but a strong source of CH<sub>4</sub>, and the landscape near Hengshui might be a source for both CO<sub>2</sub> and CH<sub>4</sub>. Given the lack of ABL sampling, the exact CO<sub>2</sub> and CH<sub>4</sub> concentration in the ABL at Hengshui and Shangqiu remained unknown.” (Lines 271-274)”

2 . It is good that there is now explicit discussion of the assumption that the horizontal advective flux can be ignored. I can see why the authors don't want to over interpret the trajectory analysis here, especially given the fact that dispersion models often perform poorly under conditions where storage flux dominates. But it still seems to me like the wind data from the AIMMS probe could be useful here in providing a qualitative indicator of the likely role advection plays. Even showing some wind profiles would allow the reader to judge for themselves to what extent the assumption made in this analysis holds?

The wind unit malfunctioned during the campaign. To address query, we have simulated the wind profiles using the WRF model. The results are presented in new Figure S5.

“...The wind profiles are presented in Figure S5.” (Lines 258-259)

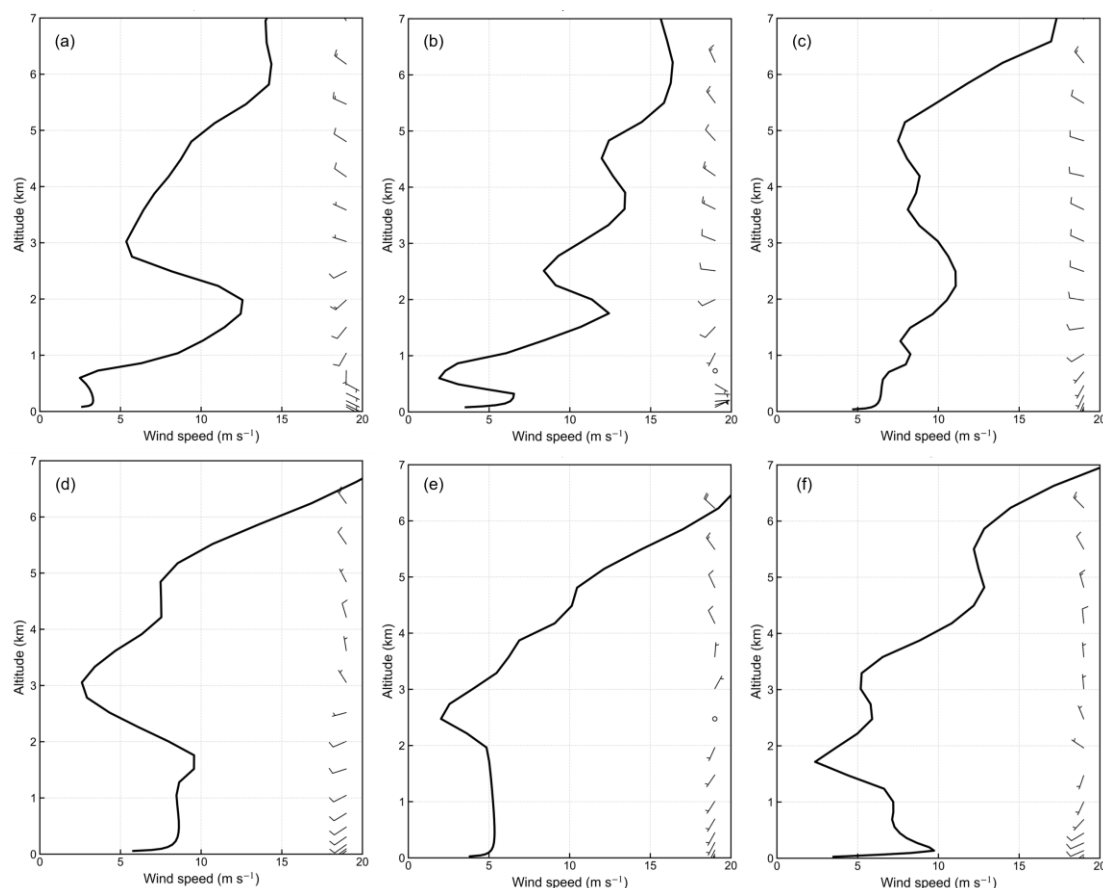


Figure S5: Wind profiles over the four cities (a: Beijing-daytime; b: Beijing-nighttime; c: Hengshui; d: Shangqiu; e: Nanjing-daytime; f: Nanjing-nighttime) These profiles were simulated with the WRF model. A two-domain nested setup (27 km and 9 km resolution, 49 vertical levels, with the model top at 50 hPa, model domain centered at 40.00 N and 115.00 E.) was used. The lateral boundary conditions were prescribed with ERA5. Spin-up time was 48 h.

Responds to editor:

1. Regarding figure S1: OpenStreetMap images must include visible attribution on images/snippers. Please repeat the full credit in the figure caption (e.g. “© OpenStreetMap contributors, <https://www.openstreetmap.org/copyright>”).

We have revised Figure S1. The original satellite basemap was too dim. The new basemap is based on the land use classification of Gong et al. (2019). This change is noted in the figure caption.

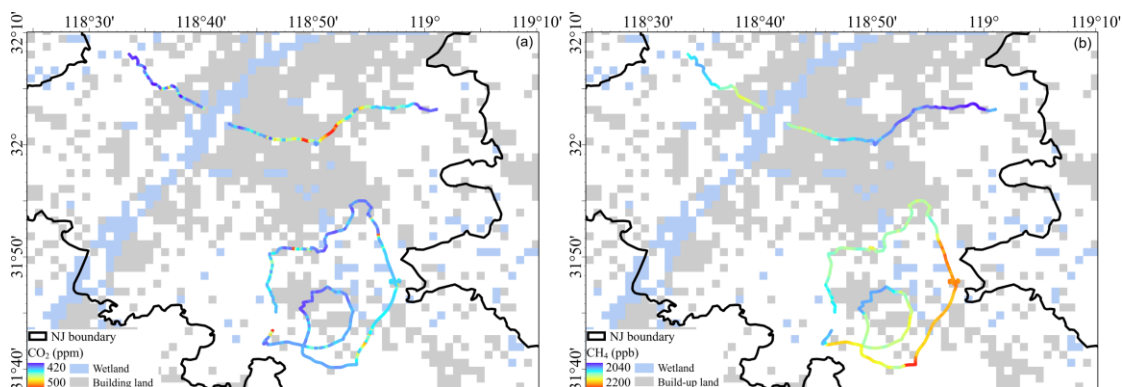


Figure S1: CO<sub>2</sub> and CH<sub>4</sub> concentrations from vehicle-mounted observation in Nanjing. The basemap shows wetland and build-up land according to Gong et al. (2019).