

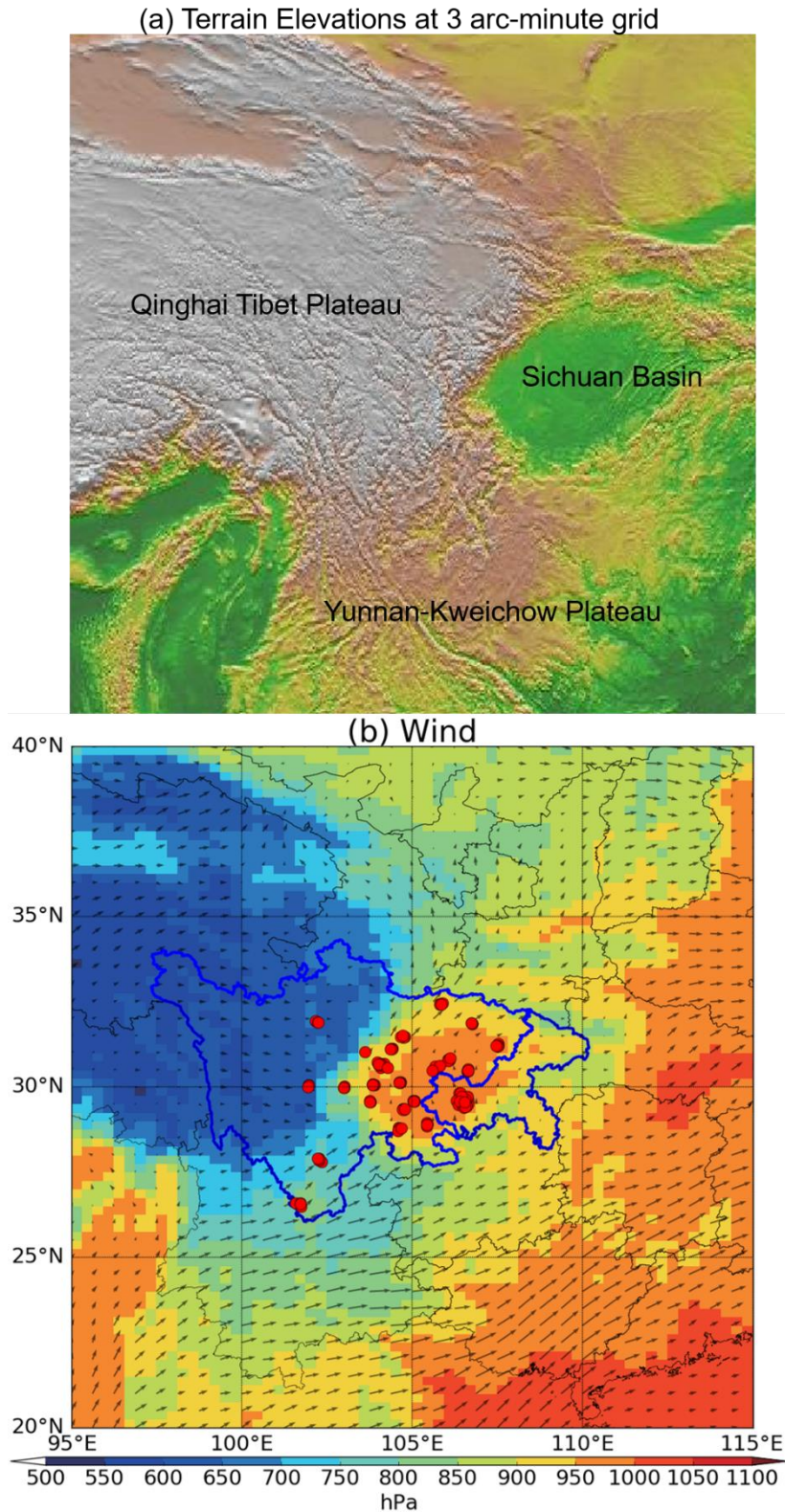
# Supplement of response letter #1

## Section S1. Data filter criteria

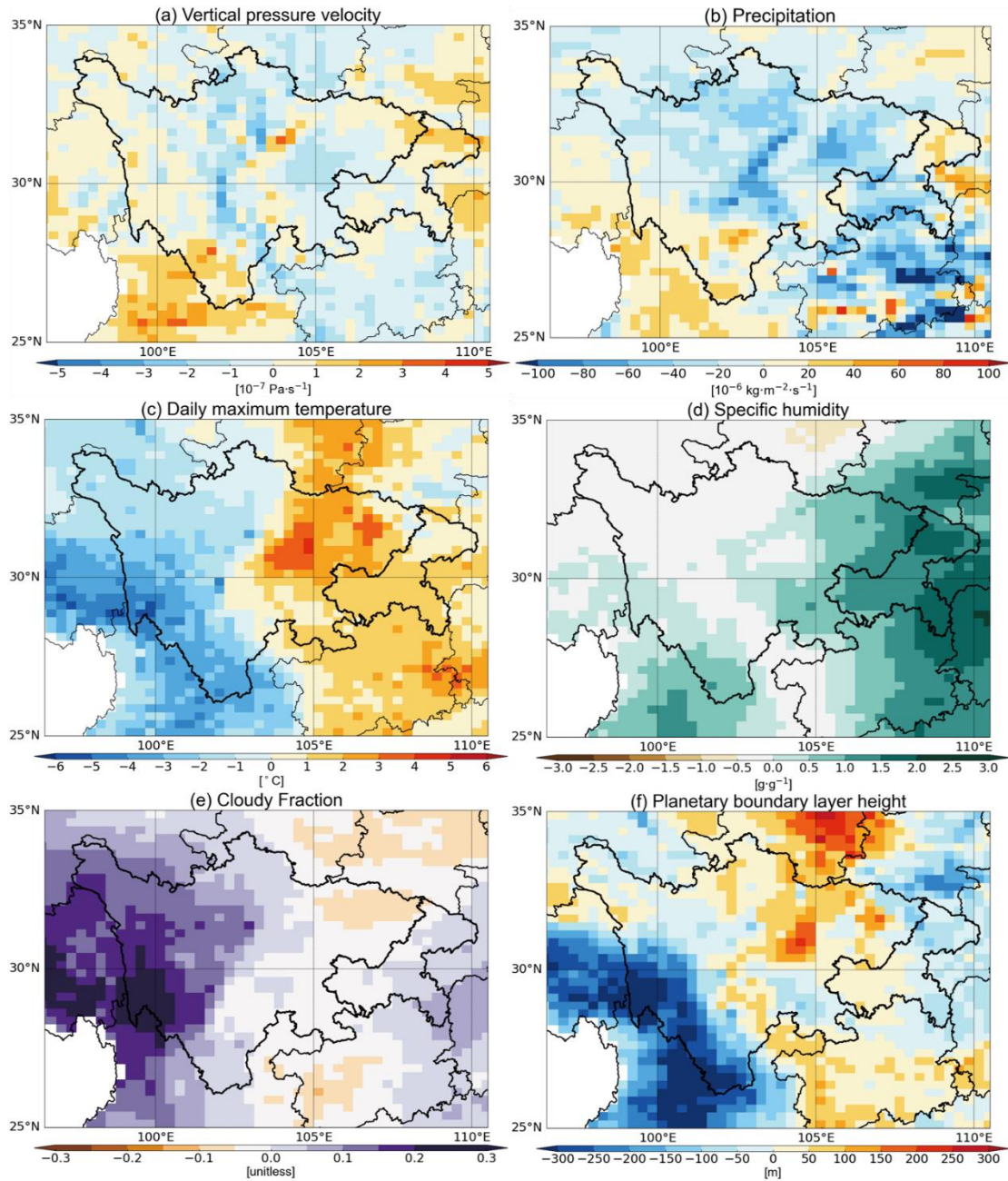
We applied a data quality control method used in Lu et al. (2020) to remove unreliable ozone data. Hourly observed data points were transformed into  $Z$  scores, and then, the observed data were removed if the corresponding  $Z_i$  met one of the following conditions: (1)  $Z_i$  is larger or smaller than the previous one ( $Z_{i-1}$ ) by 9 ( $|Z_i - Z_{i-1}| > 9$ ), (2) The absolute value of  $Z_i$  is greater than 4 ( $|Z_i| > 4$ ), or (3) the ratio of the  $Z$  value to the third-order center moving average is greater than 2 ( $\frac{3Z_i}{Z_{i-1}+Z_i+Z_{i+1}} > 2$ ). The formula for calculating  $Z_i$  is as follows:

$$Z_i = \frac{X_i - \bar{X}}{\sigma} \quad (1)$$

where  $X_i$  represents the  $i$ -th item in the dataset, and  $\bar{X}$  and  $\sigma$  are the average and standard deviation of dataset  $X$ , respectively. The distribution of CNMEC sites over the SCB is shown in Figure 1 of the manuscript.



**Figure 1** Terrain elevations (a) and surface temperature and wind fields (b) over the SCB and surrounding regions. The spatial resolutions for (a) and (b) are  $3 \times 3$  arc-minute and  $0.25^\circ \times 0.25^\circ$ , respectively. The white area in black line is Tibetan Plateau (with altitudes of 4–5 km a.s.l.), the yellow area in red line is the Yunnan-Kweichou Plateau (2–3 km a.s.l), the green area in circle is the SCB (0.5–1 km a.s.l).



**Figure 2** May-June mean differences in vertical pressure velocity (a), precipitation (b), temperature (c), specific humidity (d), cloud fraction (e), and PBLH (f) between 2020 and 2019 over the SCB and surrounding regions. All these meteorological parameters are from the GEOS-FP dataset. The vertical pressure velocity is prescribed at the PBLH and others are at the surface.