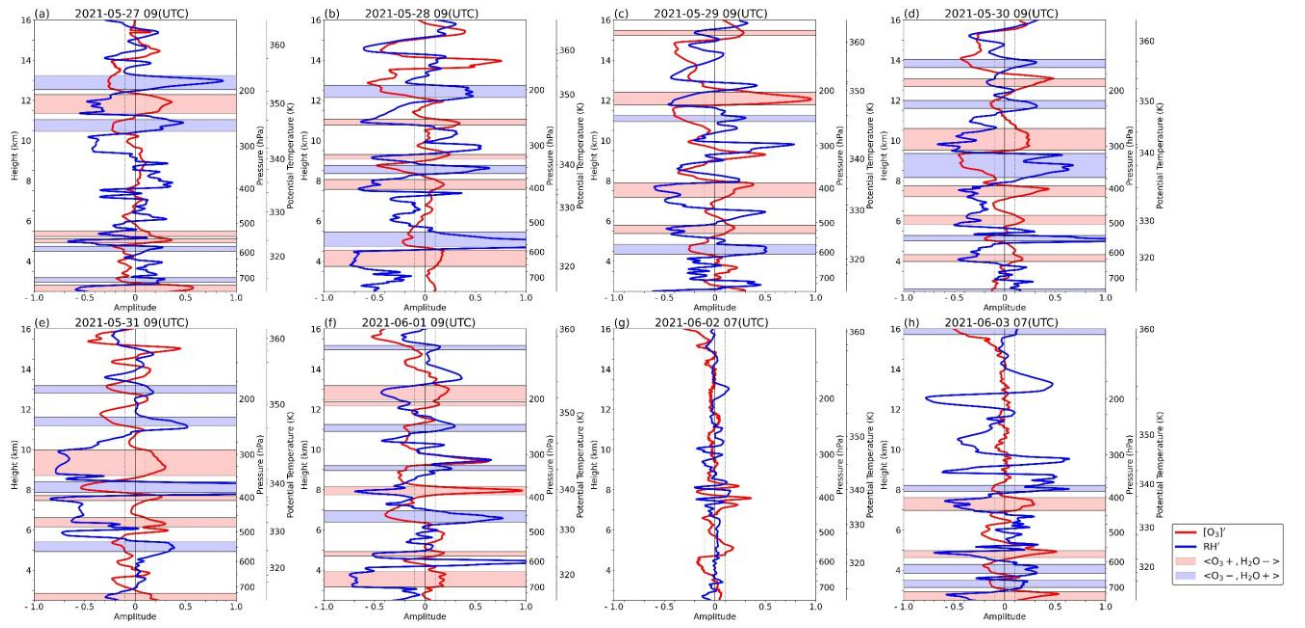
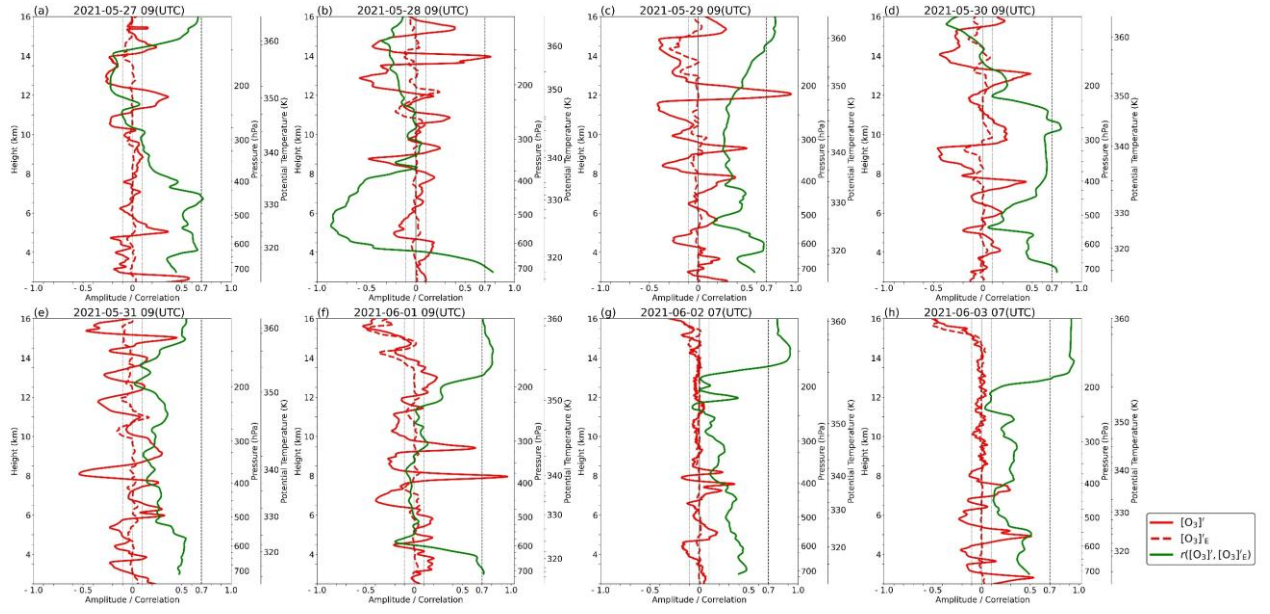




ESM_1: As for Fig. 2(a), but for the results from all balloon measurement data taken for the period from 27 May to 3 June.



5

6 **ESM_2:** As for Fig. 2(b), but for the results from all balloon measurement data taken for

7

the period from 27 May to 3 June.

8

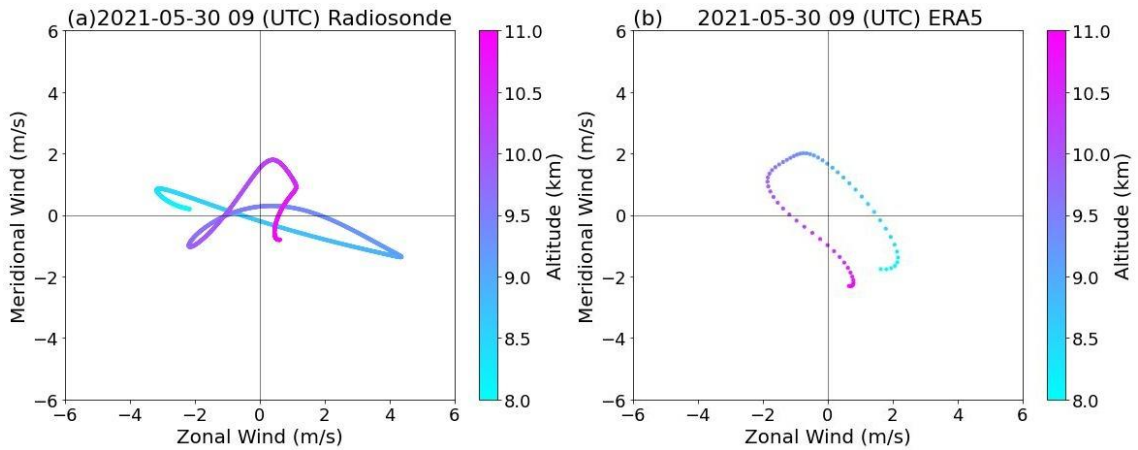
9 Caption only

10

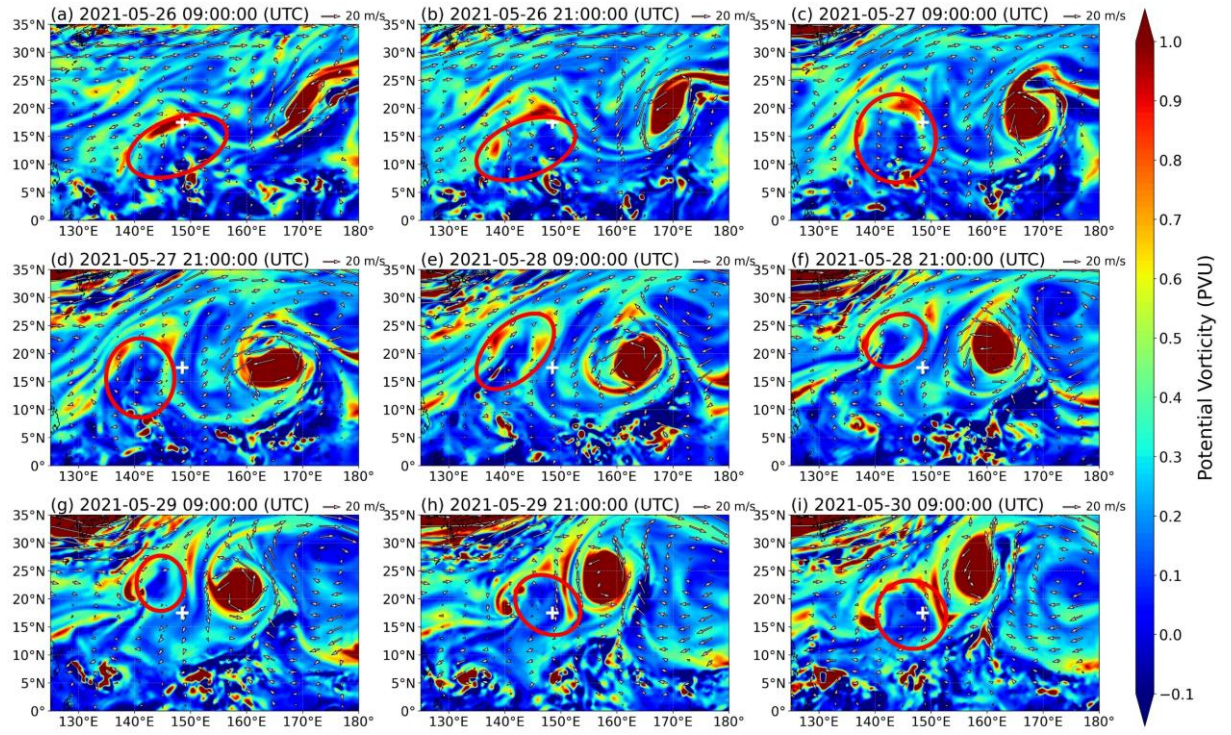
11 **ESM_3:** Latitude-pressure cross sections movie of $[O_3]'$ from May 29, 09:00 UTC to
12 May 31, 09:00 UTC, as derived from ERA5 data. The vertical dashed lines indicate
13 the location of the observation site (17.5 °N, 148.5 °E). The circles correspond to
14 the positions of the 105-hour backward trajectories for $< O_3 + ,H_2O->$ (yellow)
15 and $< O_3 - ,H_2O+>$ (blue), respectively.

16

17



ESM_4: Hodograph with the horizontal wind vector in the altitude range of 8.0-11.0 km at 09:00 UTC on May 30, 2021 as derived from (a) radiosonde data at 17.5 °N and 148.5 °E (09:39 UTC) and (b,) ERA5 data at the nearest grid point to the observation site (17.5 °N and 148.5 °E). A vertical bandpass filter with cutoff wavelength of 0.5 and 4.0km has been applied to the original data. Color of each data point indicate the altitude (see color bar).



27

28 **ESM_5:** As for Fig. 6 but for PV (unit: PV unit) on the 338-K isentropic surface.