Supplementary materials

O_3 and PAN in southern Tibetan Plateau determined by distinct physical and chemical processes

Wanyun Xu[1], Yuxuan Bian[1], Weili Lin[2], Yingjie Zhang[3,a], Yaru Wang[3,b], Gen Zhang[1,*], Chunxiang Ye[3,*] , Xiaobin Xu[1]

[1] State Key Laboratory of Severe Weather & Key Laboratory for Atmospheric Chemistry of CMA, Institute of Atmospheric Composition, Chinese Academy of Meteorological Sciences, Beijing, 100081, China
[2] College of Life and Environmental Sciences, Minzu University of China, Beijing, 100081, China
[3] College of Environment, Peking University of China, Beijing, 100871, China
[a] now at School of Ecology and Nature Conservation, Beijing Forestry University, Beijing, 100083, China
[b] now at Leibniz Institute for Tropospheric Research, 04318 Leipzig, Germany

Correspondence to: Gen Zhang (zhanggen@cma.gov.cn) and Chunxiang Ye (c.ye@pku.edu.cn)

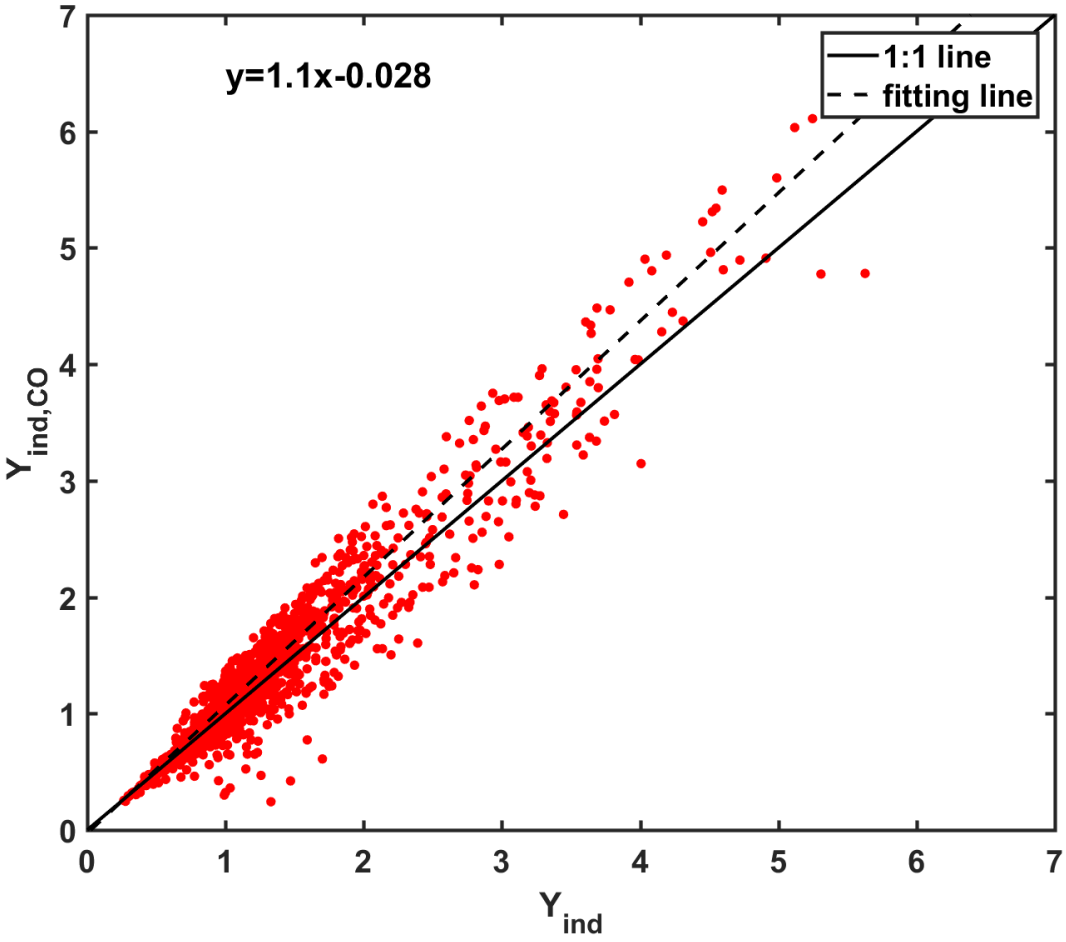

Figure S1. Comparison between Y indices calculated using or without using normalized CO concentrations.

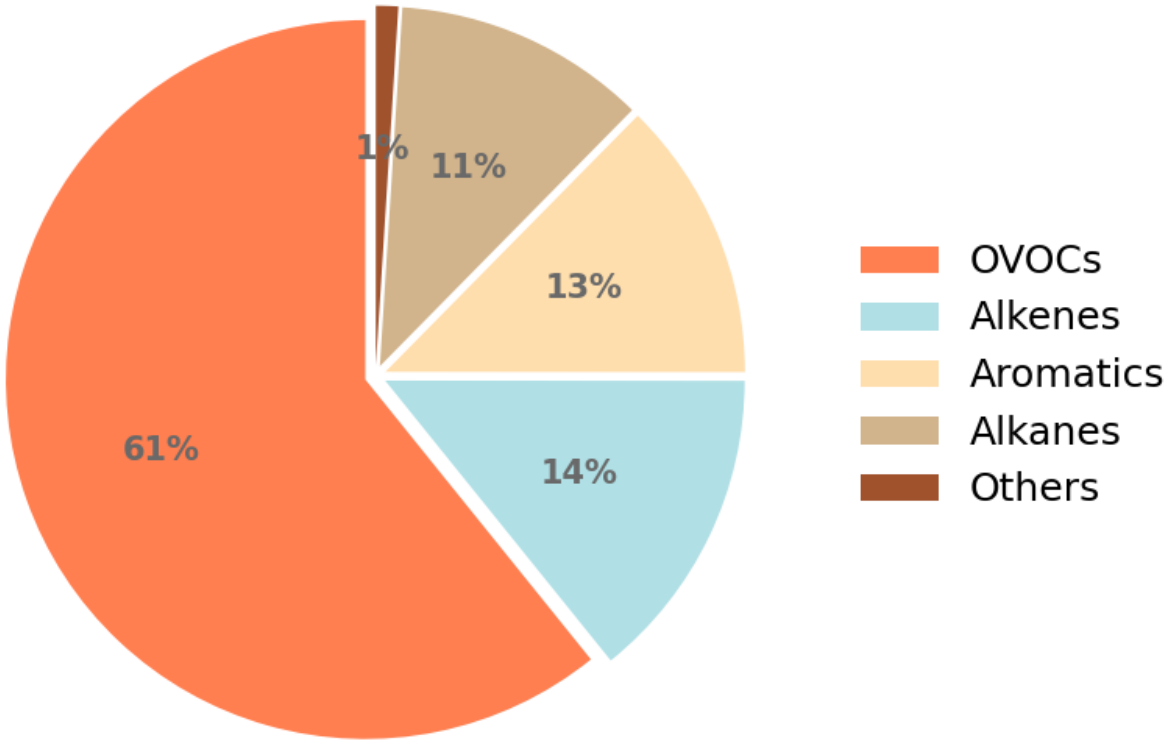

Figure S2. Contributions of distinct types of VOCs to total concentrations (concentrations in Propy-Equiv. ppbC).

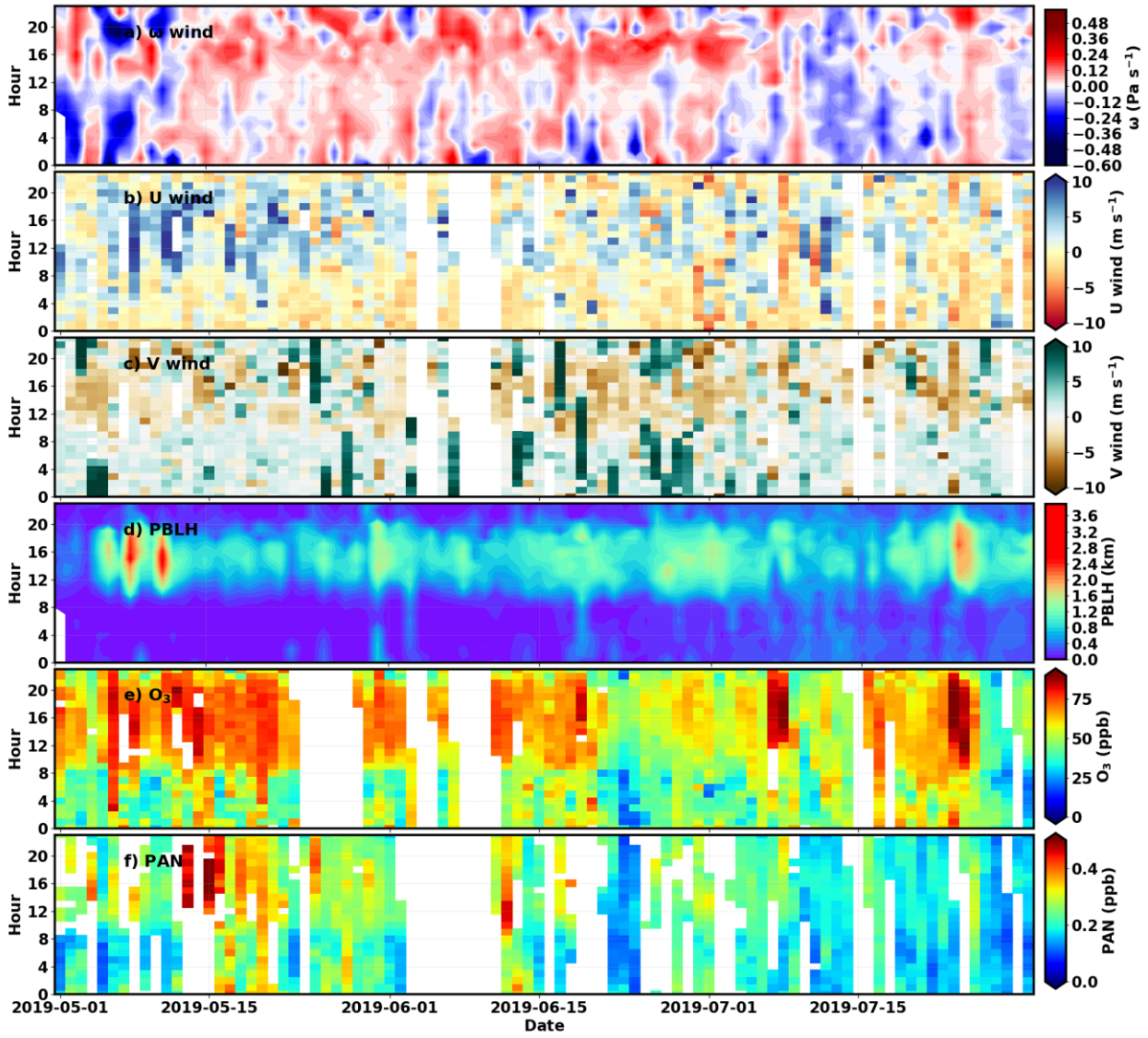

Figure S3. Season-diurnal variations of a) ω wind (ERA5), b) surface U wind, c) surface V wind, d) PBLH (ERA5), e) surface O_3 and f) PAN between 1 May and 31 Jul 2019 at Nam Co.

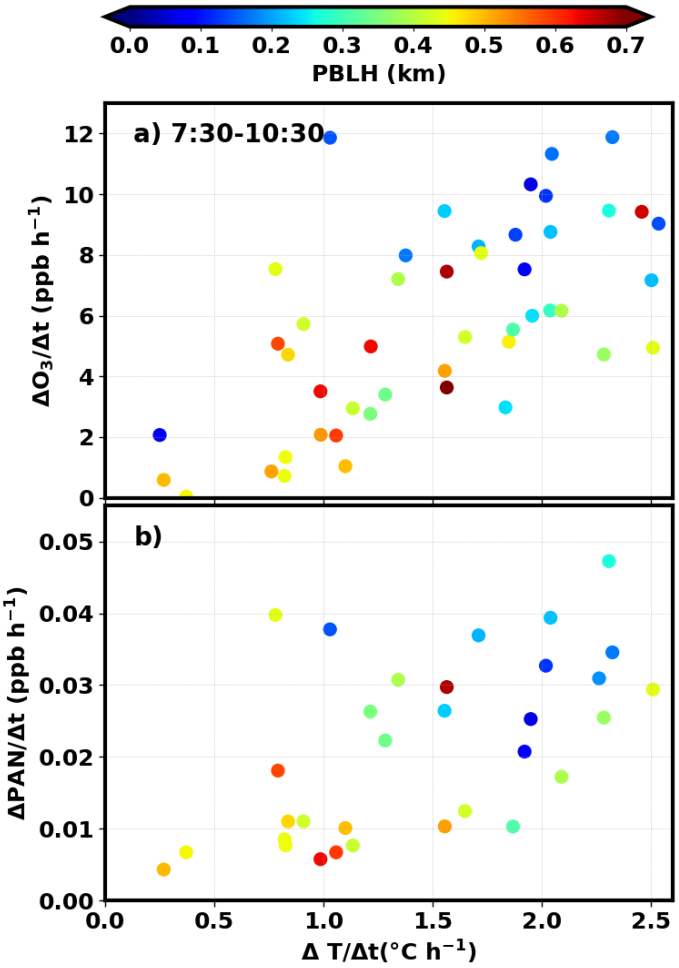

Figure S4 Variation of the a) O_3 and b) PAN morning (7:30 to 10:30 LT) growth rates with temperature growth rates, with colors representing morning time averaged PBLH (from ERA5 reanalysis data)

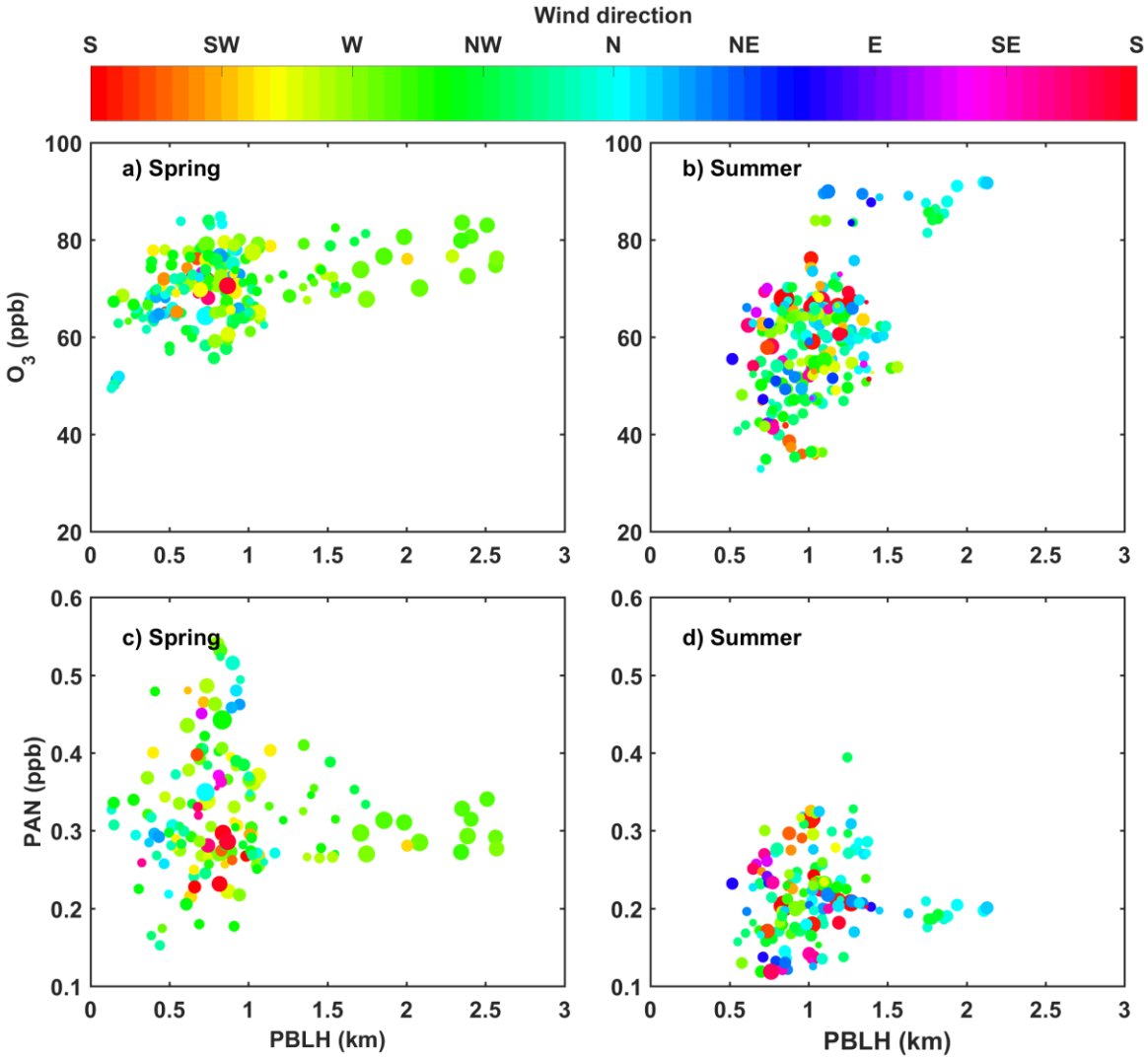

Figure S5. Variation of afternoon (12:00-18:00) O_3 (a,b) and PAN (c,d) with PBLH (from ERA5 reanalysis data) during spring (a,c) and summer (b,d) periods, with wind speeds and directions indicated by sizes and colors of scattered dots (precipitation associated data points excluded).

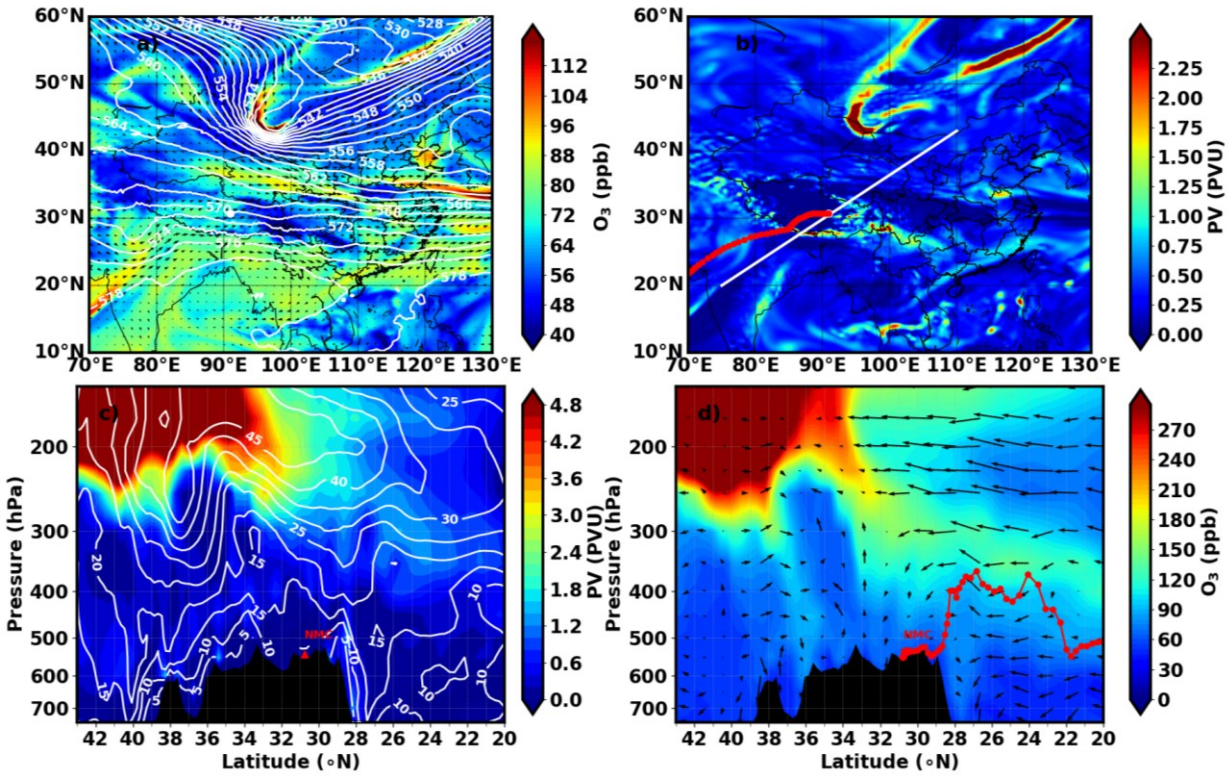

Figure S6. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 4:00 LT 11 May 2019

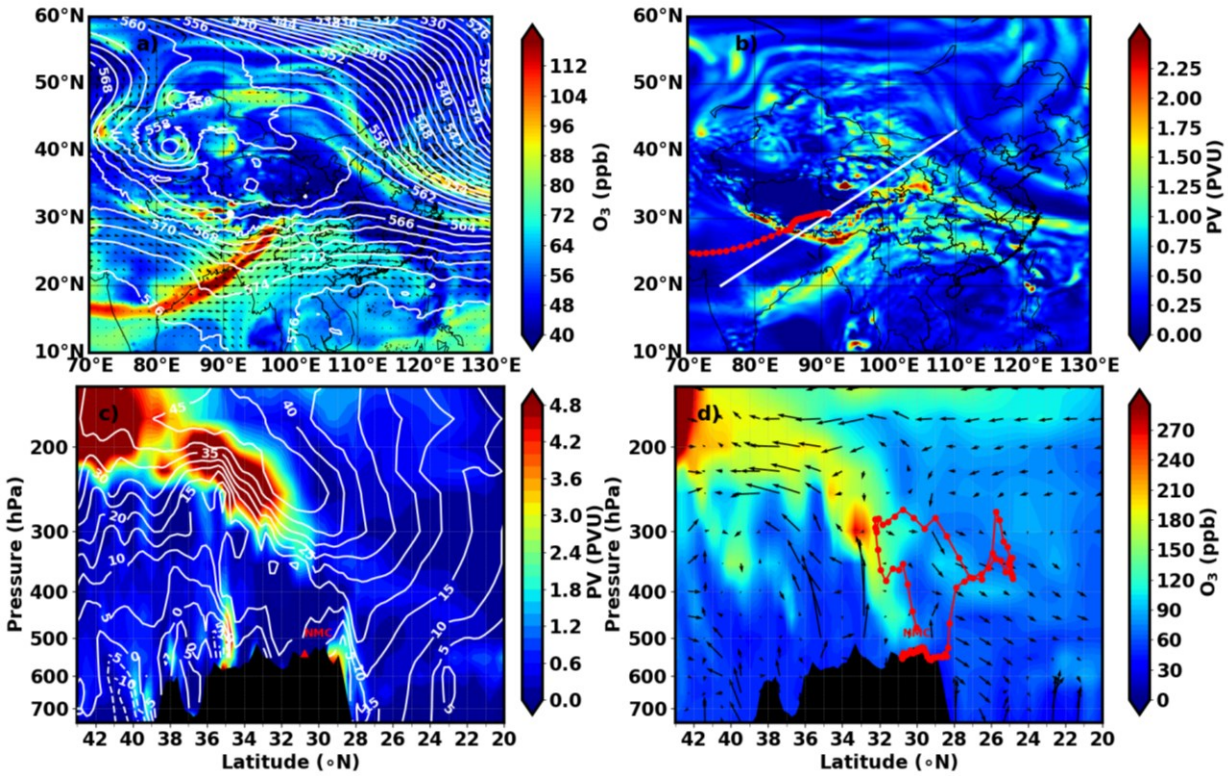

Figure S7. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 12:00 LT 6 May 2019

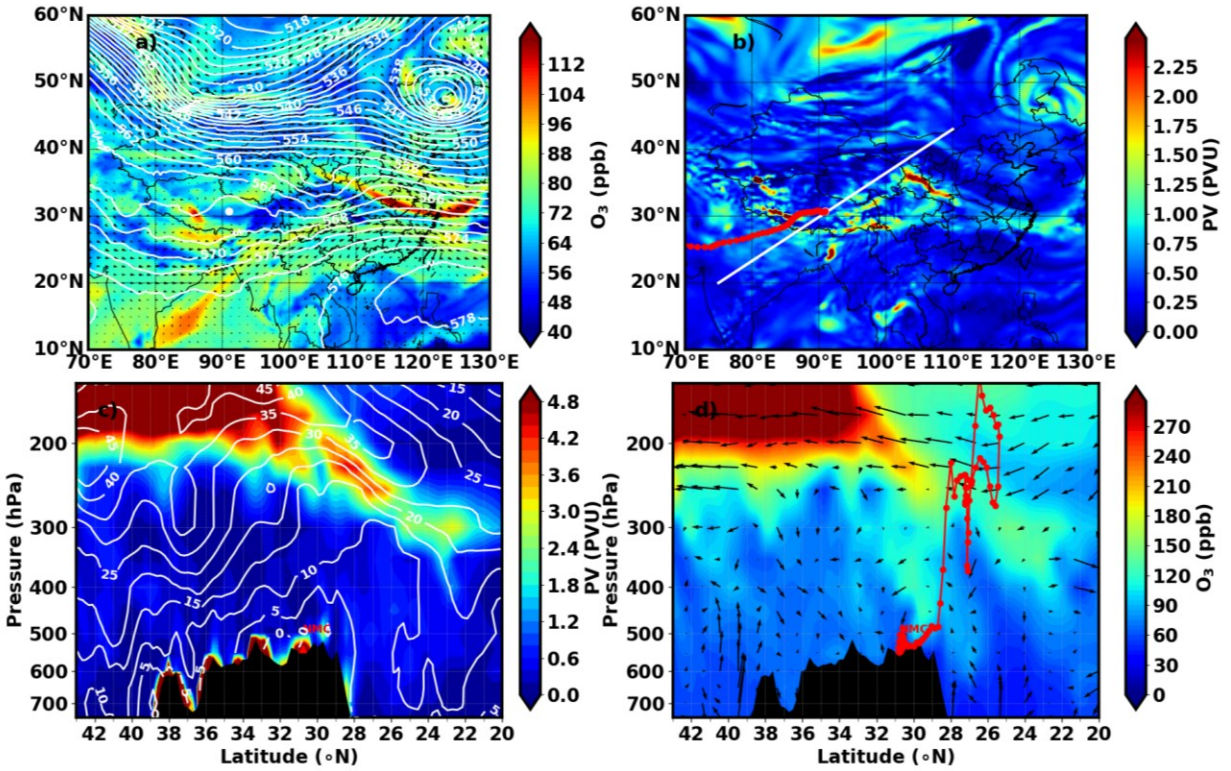

Figure S8. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 23:00 LT 13 May 2019

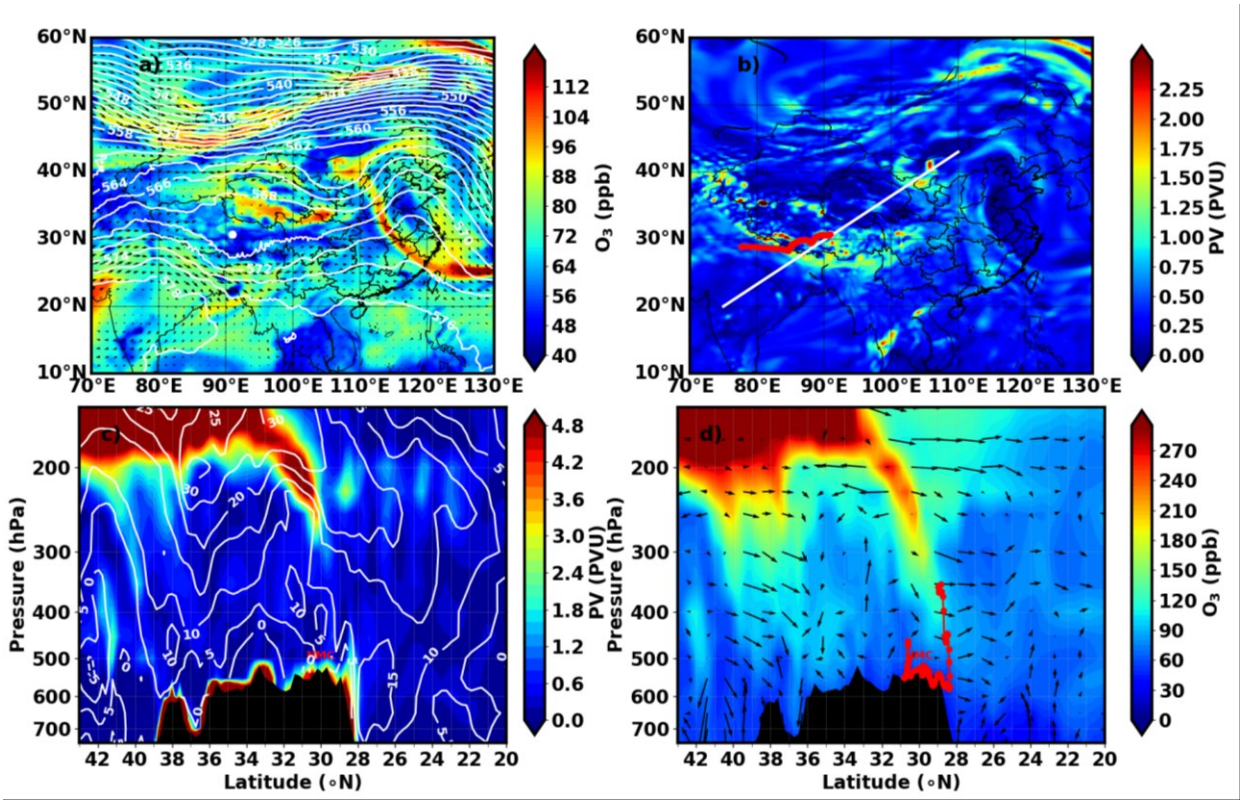

Figure S9. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 18:00 LT 23 May 2019

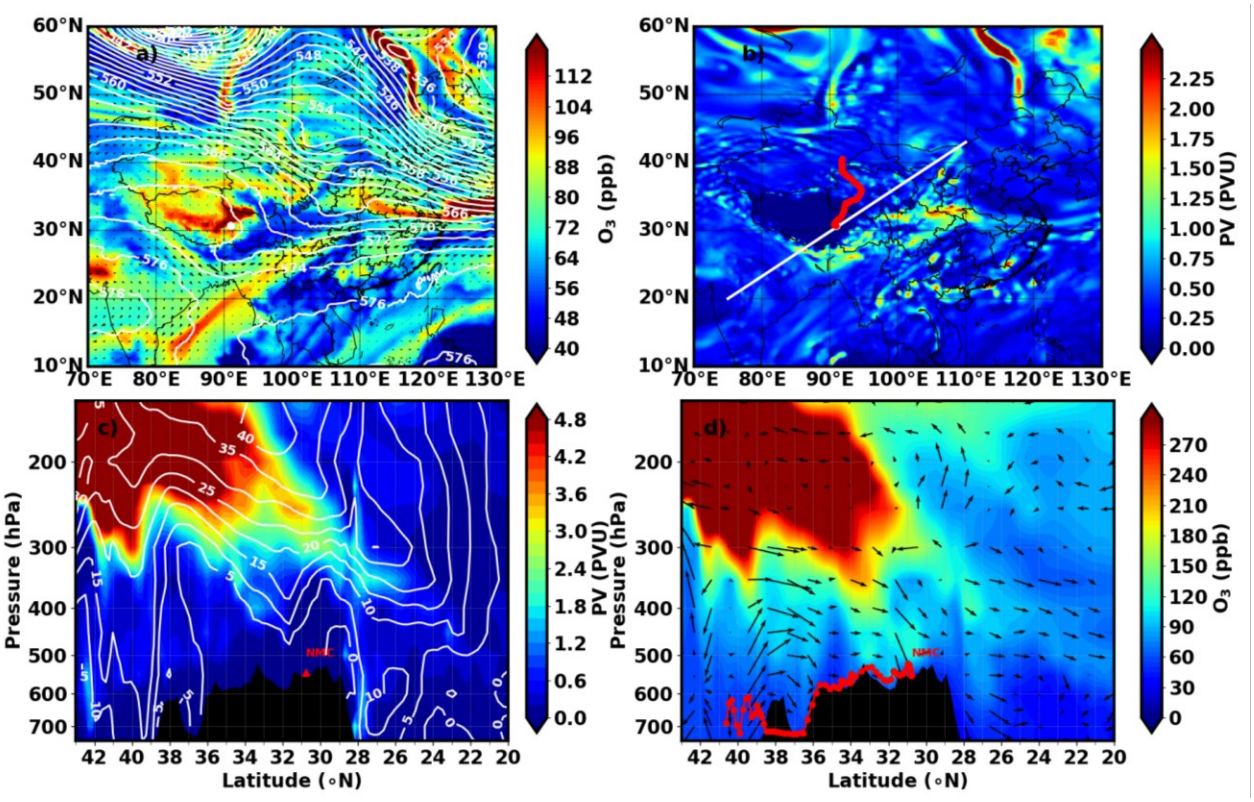

Figure S10. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 6:00 LT 31 May 2019

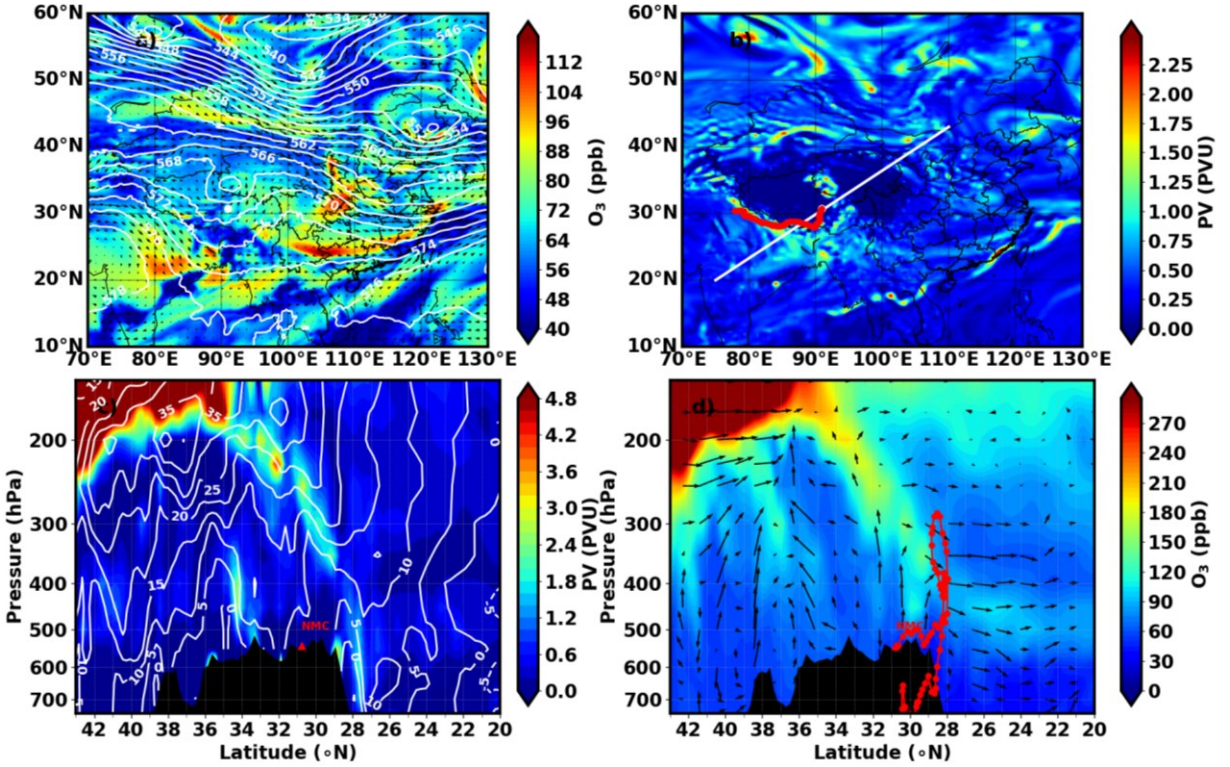

Figure S11. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 8:00 LT 3 Jun 2019

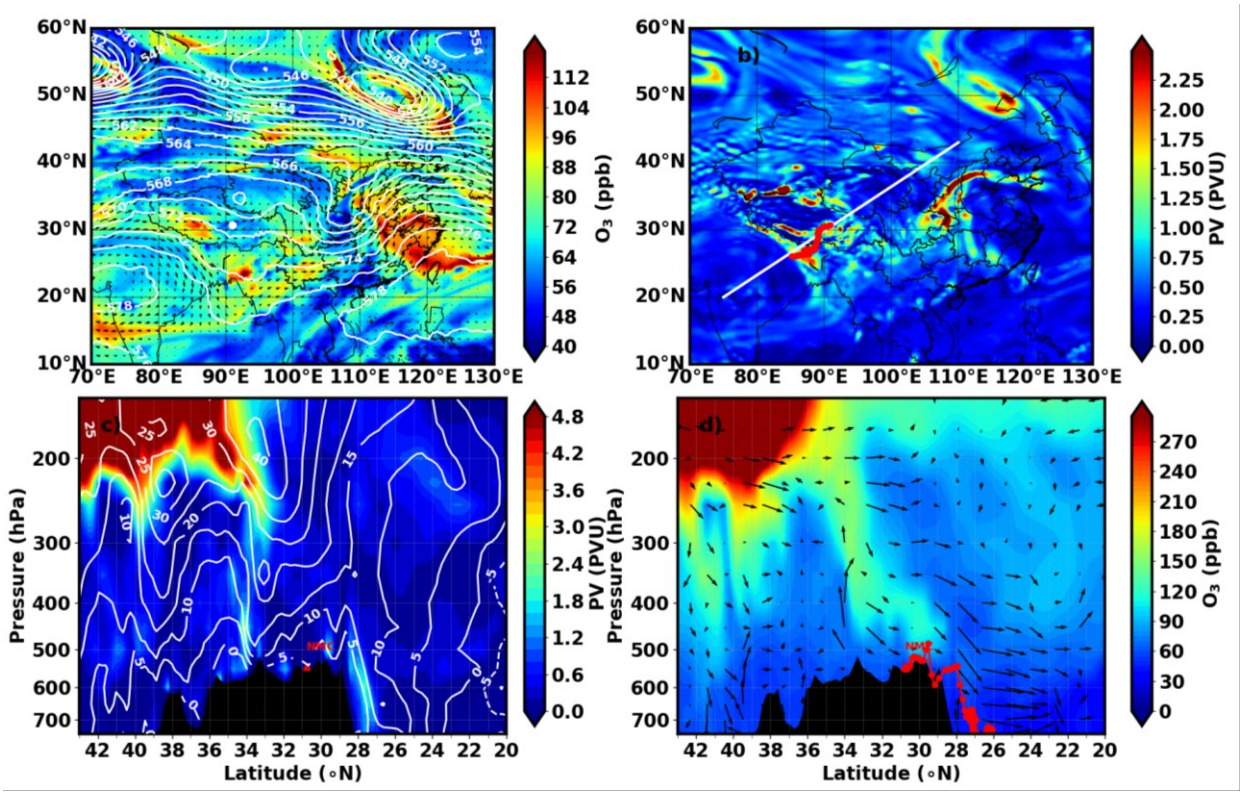

Figure S12. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 2:00 LT 5 Jun 2019

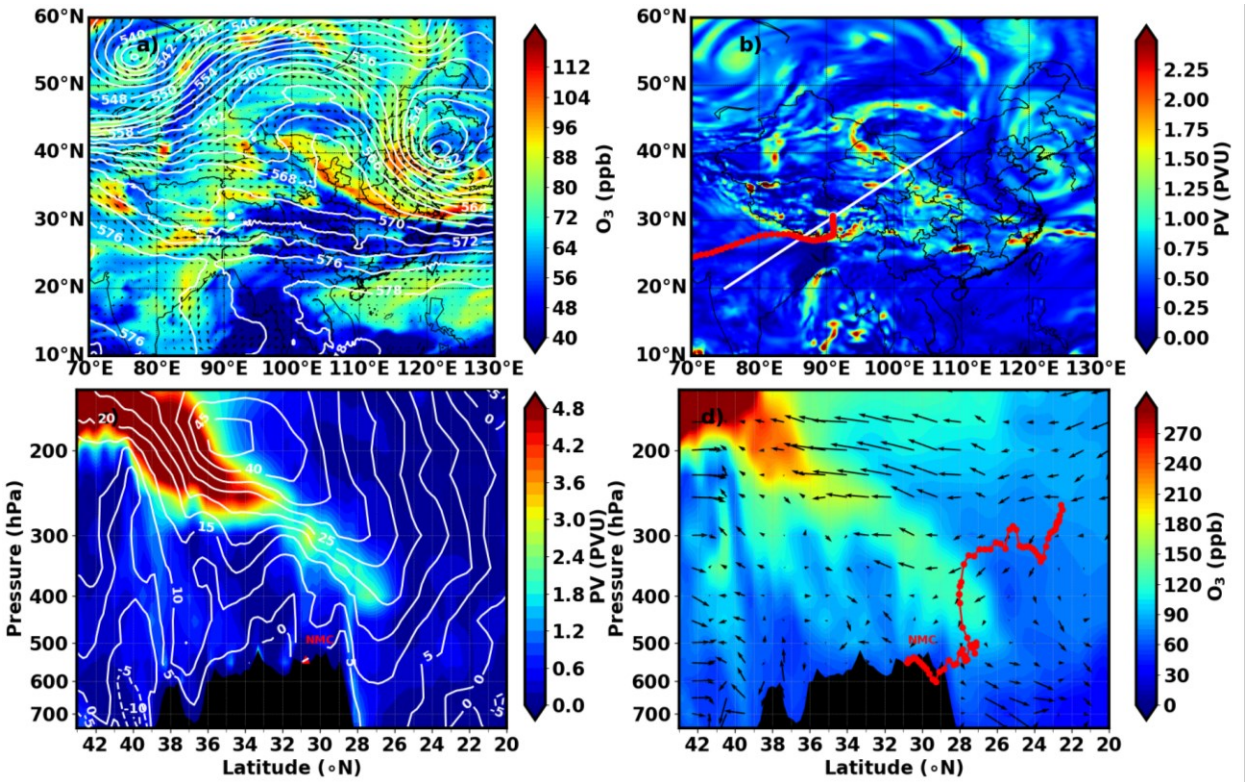

Figure S13. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 2:00 LT 9 Jun 2019

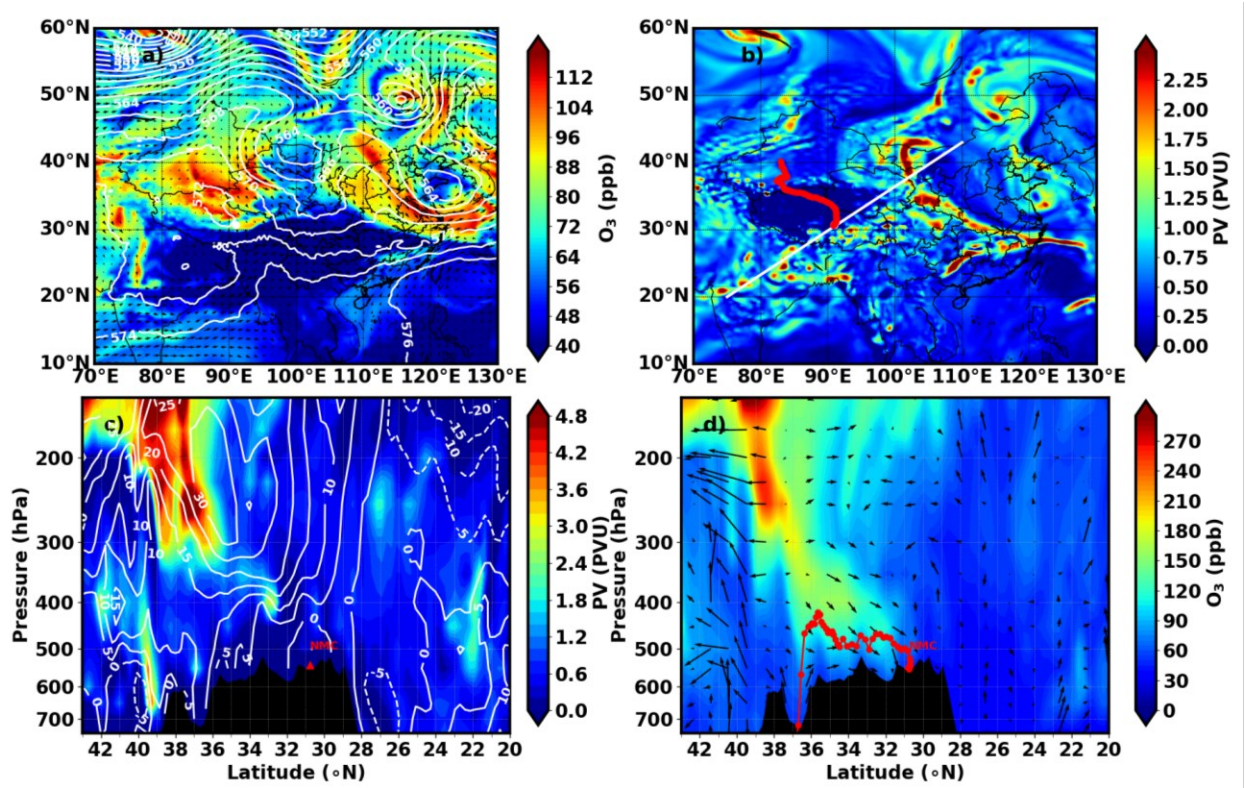

Figure S14. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 9:00 LT 7 Jul 2019

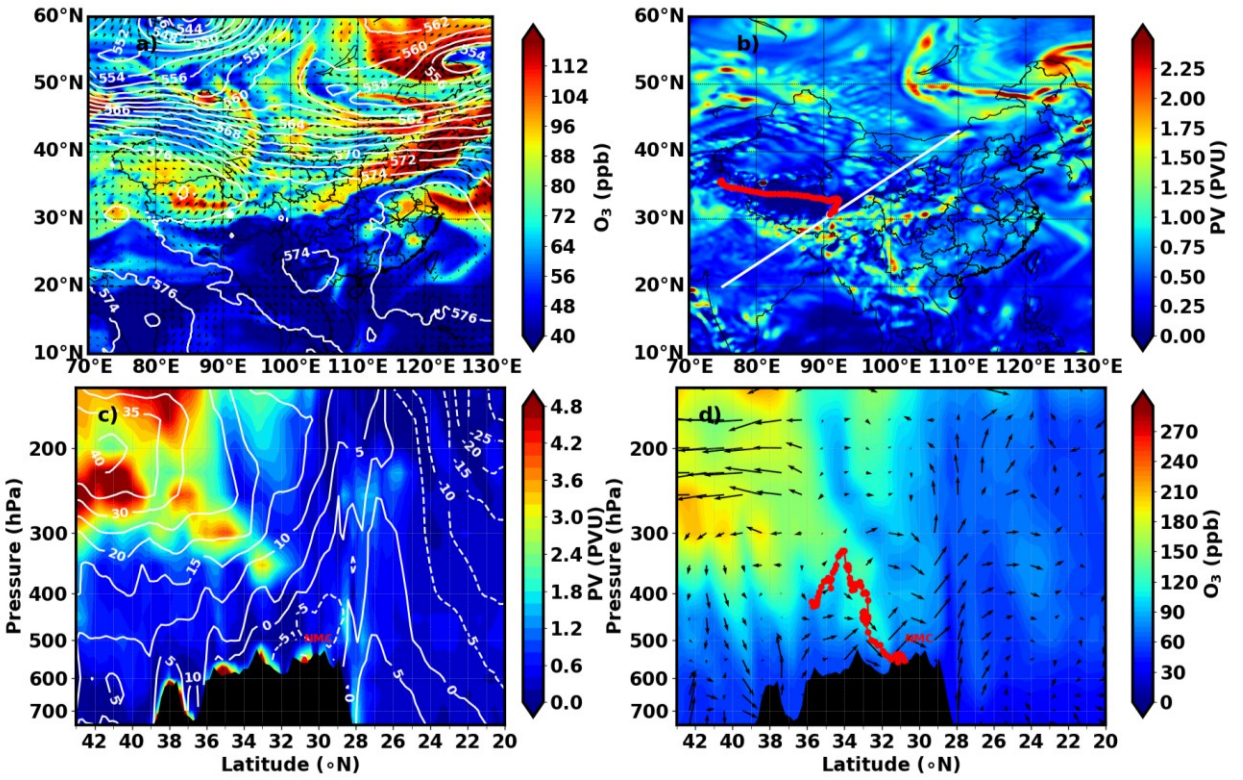

Figure S15. 500hPa ERA5 a) O_3 mixing ratio (shading), geopotential height (white contour lines), horizontal winds (black arrows), b) potential vorticity (shading), 72h backward trajectory (starting from Nam Co station, red dotted line), and a white line along which the cross section of c) potential vorticity, u winds, d) O_3 mixing ratio, v winds and vertical velocity were calculated for 16:00 LT 23 Jul 2019

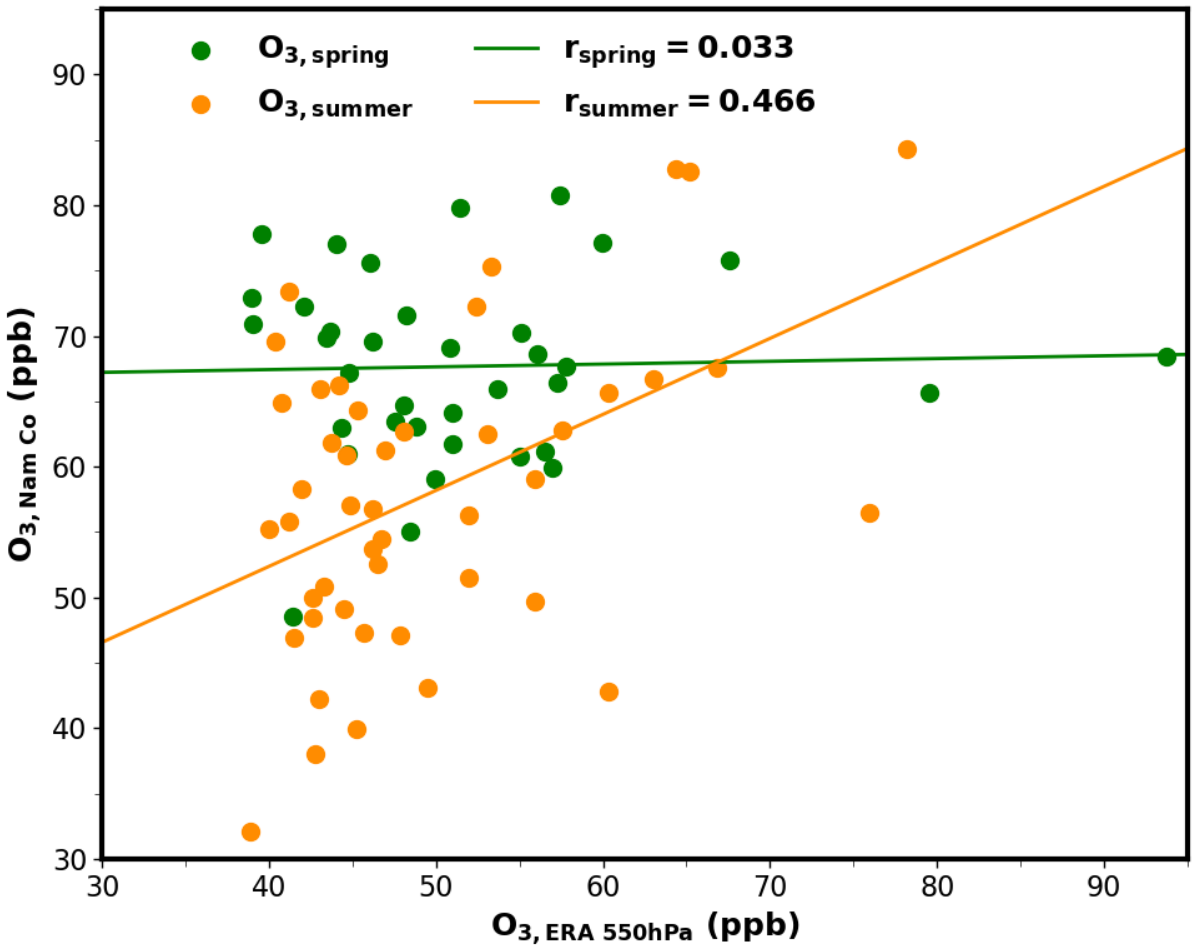

Figure S16. Correlation between spring (green) and summertime (orange) O_3 observations at Nam Co ($O_{3,\ Nam\ Co}$) and O_3 mixing ratio at 550 hPa from the ERA5 reanalysis data