

Reply for Anonymous Referee #2

Ozone is a major short-lived air pollutant when presents near ground, besides, it is a greenhouse gas that exerts direct influence on radiative forcing. The understanding of the variability and source of ground ozone in Antarctica remained limited, particularly in the inner Antarctica. In this paper, authors reported year-round observation of ozone in Dome A, the highest plateau in the Antarctica, they also compiled observation data from South Pole and a costal site to make comparison. They revealed the occurrence of ozone enhancement events (OEEs) at Dome A and analyzed the possible sources and transport that contribute to the OEEs. The technical quality of the paper, including its observation and data analysis, is generally good. I have two major concerns on the manuscript.

General comments

1. The ESSD journal concentrates on datasets and the related process of data production. The current version of the paper did provide valuable time series of year-round ozone observation at Dome A, but it reads more like a research paper and author performed comprehensive diagnoses on the OEEs. I would leave the decision on the suitability of the paper for the journal to the editor.

Reply: Thank you for your advice. In this article, we did not only introduced the ozone data of DA, but also hoped to show some different characteristics with other Antarctic stations. It can provide more information to the readership.

To highlight the importance of the data and the reliability of the observation, detailed introduction on the three instruments and field plan were added in Section 2.1. please find it in the context line 108-109.

2. Authors focused on ozone variability and OEEs at Dome A, they also included data from South Pole and a coastal site of Zhongshan Station and revealed different patterns of ozone variabilities in the three sites. However, in section 4, authors only analyzed the OEEs at Dome A site. The question is what's the purpose of including data from other two sites? Section 3 and 4 are not closely linked and I suggest authors to rethink the aims of the paper to stick to the main topic, e.g., differences in variabilities of ozone at three sites and possible reasons, or alternatively, the finding of strong OEEs at Dome A and its possible underlying mechanisms.

Reply: Thank you for your comments. As you said, section 3 introduced the surface ozone characteristics of DA, SP and ZS, section 4 introduced OEEs only in DA but not SP and ZS. That is because we found only at DA, there were OEEs in winter. The other two, only have summer OEEs. And several studies have carried out on the causes of summer OEEs, such as Cristofanelli et al. (2018) and Legrand et al., (2016). They suggested continental transport was the key reason. Thus we wanted to focus on the unclear one, which was the winter OEEs.

In Section 4.1, the first paragraph introduced the method, the second paragraph introduced the general OEEs results of the three stations, the third paragraph introduced the differences of OEEs among the stations and highlighted the speciality of DA (winter OEEs). Then, the

fourth paragraph explained the findings of summer OEEs by previous studies. This logics was aimed to bring up the 4.2 and 4.3, which was the discussion on DA OEEs.

Anyway, if you think it is not suitable, we can delete this part and focus on general comparison among the three stations.

3. Figure 8 and 9 can be combined into one figure and the layouts of the figure should be re-designed to make it neat and clear.

Reply: The figures has been merged.

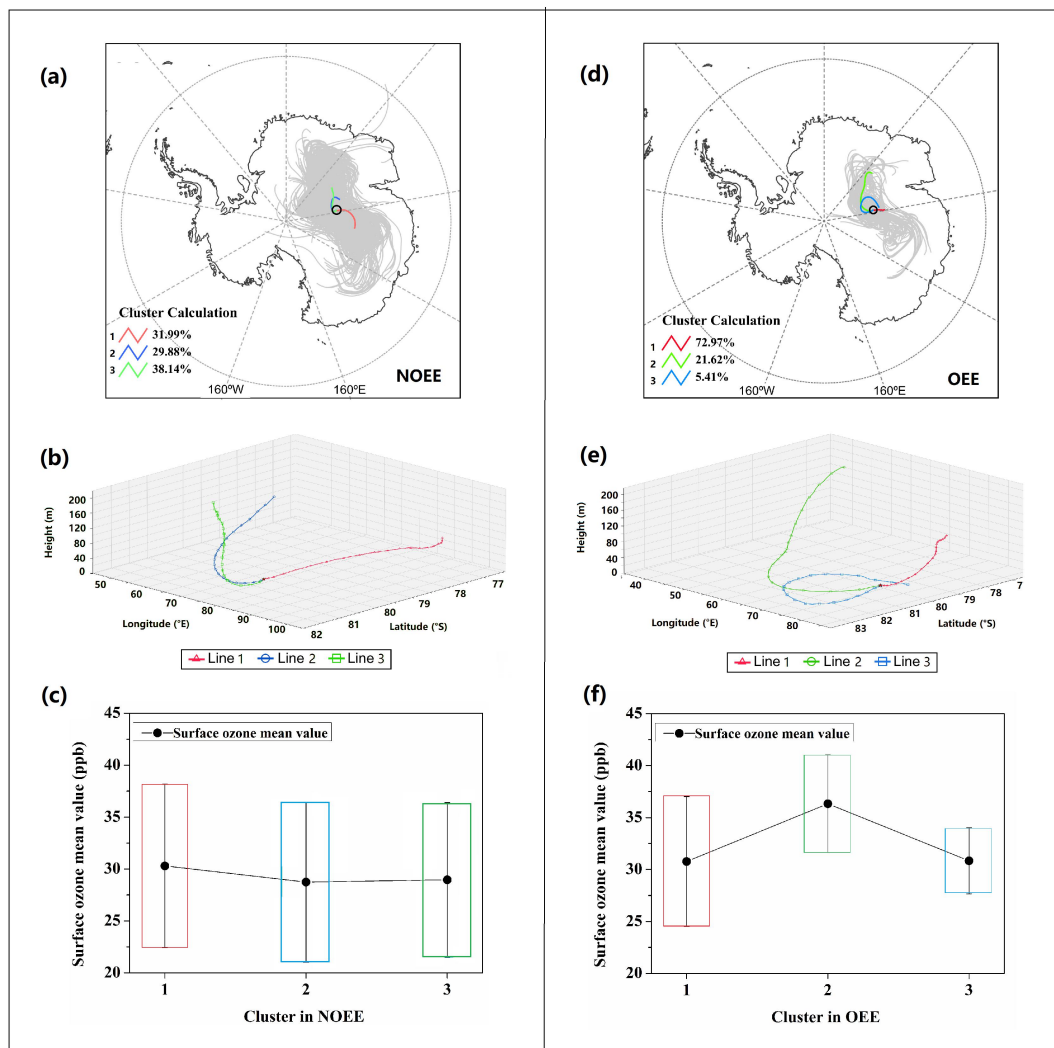


Figure 8: Backward HYSPLIT trajectories for each measurement day (gray lines in Figure 8a), and mean back trajectory for 3 HYSPLIT clusters (colored lines in Figure 8a, 3D view shown in Figure 8b) arriving at Kunlun Station during NOEEs. Subplot (c) shows the range of surface ozone concentrations measured at DA by cluster. Error bars are the standard deviation of the same cluster. Same as subplot (a, b, c), but subplot (d, e, f) for OEEs.