Dear Reviewer!

We thank You for careful reading and some fruitful suggestions.

Our answers are in BLUE!

Significantly changed text or added text is given in BOLD in the revised version of the manuscript.

The paper aims to highlight and quantify the role of extreme events of wildfire smoke to the ozone depletion in the Arctic and Antarctic. The study is based on lidar measurements concerning the evolution of the smoke in the stratosphere and on ozonesondes concerning the vertical distribution of ozone. The authors further analyze a unique lidar dataset, already presented in previous studies, concerning the presence of wildfire smoke in the polar stratosphere and aim to associate this with ozone depletion in the Arctic and Antarctic. They provide a very comprehensive review on the impact of various types of stratospheric aerosols on PSC formation and attempt to describe the potential impact of aged smoke on PSC formation. They also provide a very detailed analysis of the characteristics of the aerosol layers and the ozone departures at various layers from ozonesonde measurements. The paper is very interesting, well written and structured and it is of high importance, concerning the potential impact of possible increasing extreme wildfire events on ozone loss. The paper should be accepted for publication but some open questions/issues should be addressed or considered in a revised version.

The authors present vertically and temporally resolved ozone anomalies using the 2010-2019 period as a reference. Is the choice of this period arbitrary? They don't provide any significance of these anomalies and it is hard to judge to what extent the event they present are unique and unexpected.

We discuss the selection of the 2010-2019 time period as reference period in Sect. 3.2 and 4. The period is selected because trend effects are visible in the Antarctic ozone time series. Also other groups concentrate on periods such as from 2012-2019 (Rieger et al., 2020, Yook et al., 2020). So we decided to use 2010-2019 for both, Arctic and Antarctica.

The authors associate ozone anomalies with ozone loss but they don't mention what is the contribution of dynamics in the observed anomalies. I believe that the authors claim that there is an excess chemical loss due to the presence of wildfire smoke compared to previous years. How do they exclude the impact of different dynamics. How significant are such changes (in dynamics) compared to the climatology during the years under study? These is not clear in the analysis.

We assume that transport effects and trend effects are widely eliminated when averaging ten years of data… as written in Sect. 4. Then, any ozone deviation from the mean ozone profile should indicate the smoke impact. We improved the key figures (Figures 7 and 12) as suggested by Susan Solomon so that one can see the year-to-year springtime ozone variability, and the impact of temperature (on PSC volume) and transport (dynamics). And for Antarctica, the dynamics impact is likewise low, and very large for the Arctic.

The authors show relative occurrence of PSCs from CALIPSO. How does this compare to average values? Is this frequency larger than the previous years? And if yes how is this associated solely to the presence of smoke? Please comment on this.

We mention in Sect. 5.4 that the PSC amount we derived from the CALIOP data varied not much from 2015 -2021, within just 10% around the mean.