Comment on acp-2021-966

Anonymous Referee #2

Referee comment on "The formation and composition of the Mount Everest plume in winter" by Edward E. Hindman and Scott Lindstrom, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-966-RC2, 2022

The manuscript „The Mount Everest plume in Winter" by E. E. Hindman and S. Lindstrom analyses the formation and composition of the Mount Everest plume. To do so, the authors examined two wintertime plumes in detail by using GMS images and atmospheric sounding data, which were used for an atmospheric model simulation. The results of this work conclude that the identified plumes are either composed of cloud droplets or ice particles, but were not composed of resuspended snow.

The authors describe their analysis method very clearly and summarize the history of plume studies at Mount Everest in a very nice way. Their analysis method is simple, but was never done before for the Mount Everest plume. For this reason, I recommend to publish this work in ACP after a major revision.

Major comments:

- This study is mainly based on satellite images with a very low resolution. For me as a reader, it was very hard to see the described observations on the images and especially the videos. I don't doubt their method, but I think it is worth it to put some more effort in the presentation of the images and videos to make the authors' statements more clear. I would recommend to add labels with time, km scale bars and markers for the location of the summits.
- The authors are focusing on the development process of the plumes and describe that the observed plumes and the Moore plume are not composed of resuspended snow. It gives the impression that plumes from resuspended snow are not possible at all, which I don't think the authors intend. I think the Authors should make clear that this is just a

case study over a few days (see Table 1) and plumes of resuspended snow might be still possible. I would also be interested in some more statistics. For example, how often do these plumes occur per month and how long do they usually persist? Also, the authors mention in the conclusions that the Everest plumes may be a source of snowfall. They didn't mention that before in the manuscript. A rough estimation of how much the plumes contribute to the snow fall would benefit the manuscript.

- The authors mentioned the visible differences between resuspended snow and banner clouds (line 51), which were shown in Schween et al. (2007). I was wondering if this might be another indicator to support the analysis, if pictures from Mount Everest would be available. But according to line 65, continuous imaging is not available. I was wondering about that and found a video live stream (https://www.skylinewebcams.com /de/webcam/nepal/khumbu-pasanglhamu/khumjung/mount-everest.html), which shows a view of Mount Everest from a similar position as in Figure 3. I think it would be possible to develop a simple program which takes snapshots of this stream and identify the plumes in addition to satellite images. Maybe that would help for a follow up study.
- The title is „The Mount Everest plume in winter". If you would change it to „The formation and composition of the Mount Everest plume in Winter" the reader would already have an idea what you are going to analyze.

Minor comments:

Line 8: „plume often forms"…. How often?

Line 10: „collect the corresponding meteorological data"… What kind of data?

Line 18: „is the highest elevation" …. How high?

Fig. 2 to Fig. 8: All Figures need panel labels like „a) , b), c)". That would make it much easier for the reader to find the panel.

Line 88: „400mb" and later in line 90 „300 mb". A space between number and unit is correct. Try to be consistent through the manuscript.

Line 99: „-35C" … it is -35 °C. This needs to be changed in the whole manuscript.

Figure 4 and 5: The profiles are too small and the resolution is too bad. It is not possible

to identify the numbers.

All Satellite images: It would be nice to have a km scale bar on the pictures to see the dimension. Same for the Videos.