

## ***Interactive comment on “Temporal and spectral cloud screening of polar-winter aerosol optical depth (AOD): impact of homogeneous and inhomogeneous clouds and crystal layers on climatological-scale AODs” by Norman T. O’Neill et al.***

**Anonymous Referee #2**

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Final comments to the manuscript “Temporal and spectral cloud screening of polar-winter aerosol optical depth (AOD): impact of homogeneous and inhomogeneous clouds and crystal layers on climatological-scale AODs” submitted by O’Neil et al. to ACP.

The paper is dealing with very important issue related to the derivation of true AOD in wintertime using star photometers, and estimated to be worth while to be published in ACP.

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However, there are several points to be modified before publication:

(General points) 1. There are too many acronyms, and some are not explained in the main text. Even you have a Table “Symbol and acronym glossary”, you still need to explain in the text. You don’t have explanation for “SDA”, which is very important word in this paper, “DR” and “GEOS”. What is GEOS? Also, you don’t need to use some acronyms, such as SS or LIC.

2. “Spectral cloud screening” or SDA algorithm is not well explained, even might be described in some where else (in your PhD Thesis, Baibakov, 2014), it is still need to be shown in this paper.

3. Line 27-29 in abstract and line 245-252: Discussions of sea salt events might be compared with references not only of Ma et al., 2008, but also of many others.

(Specific points) 4. Line 137: “each ensemble” should be described as “cloud-screened” and “non cloud-screened”.

5. Fig. 1: Why so many difference exists between the number of data points in cloud-screened AOD and spectral cloud screening results; grey, black, red and dark red?

6. Spectral cloud screening seems to be not well organized in case of Ny-Alesund because light red and dark red curves do not showing any substantial difference, especially in Fig. 2 (a), (c) and (d).

7. Generally, figures are not well referred in the main text.

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