

Reactions to the comments of referee 2 (referee comments italicized and bold, our reaction comments are neither italicized nor bold).

**Anonymous Referee #2**  
**Received and published: 7 June 2016**

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

***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.***

***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.***

We already responded, in detail, and reacted with some changes in the text to this exact comment in our previous response to this reviewer (as part of the ACPD phase). In the absence of any kind of recognition of that response we can only presume that the reviewer didn't see our rebuttal : we accordingly didn't change anything in response to this comment since we believed that we had adequately responded in the previous revision phase.

***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.***

As for point 1, we had already reacted to this exact comment (including text changes to the manuscript) in our previous response to this reviewer (as part of the ACPD phase). In this case the reviewer has inserted the text "(in your PhD Thesis, Baibakov, 2014)" into a copy of his previous comment. This insertion has no impact on the arguments we presented in our previous rebuttal (the PhD thesis gives a high level discussion of spectral cloud screening and the SDA while referring to (O'Neill et al., 2003) ; this is precisely the strategy that we pursued in our previous reaction to the reviewer).

***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 “cloudscreened” and “non cloud-screened”.***

Line 124 presumably. Made the replacement as suggested

We also attempted to clarify the whole narrative on the 3 data ensembles (raw or non cloud-screened, accepted or cloud-screened and rejected) in both the text surrounding equations (1) to (3) and in the Acronym and symbol glossary

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

Inserted the following parenthetical statement just after the first sentence of the second paragraph of Section 3.2: " (we leave the detailed discussion of these notable variations to the section below on temporal and spectral cloud-screening)". The "section below on temporal and spectral cloud-screening" refers to one of three new subsections in Section 3.2 whose delineation brings out a better focus on the key points that section (subsections called "Daily statistics", " Temporal and spectral cloud-screening", and "Monthly statistics"

***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).***

As for point 1, we already responded, in detail to this exact comment in our previous response to this reviewer (as part of the ACPD phase). In the absence of any kind of recognition of that response we don't see the point of reacting to this comment.

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

We don't know what this means because we do refer clearly to all the figures in the text, in the Appendix and in the supplementary material. The reviewer would do well to illustrate such open ended comments with examples of where improvements could be affected