

# ***Interactive comment on “Above-Cloud Aerosol Radiative Effects based on ORACLES 2016 and ORACLES 2017 Aircraft Experiments” by Sabrina P. Cochrane et al.***

**Anonymous Referee #2**

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## General comments

This paper introduces an approach to derive aerosol properties from aircraft measurements in the presence of underlying clouds, which normally bias the retrieval. Although I'm not an expert on aircraft measurements, the manuscript is easy to read. The sections can be better structured though, separating methods and results better. The manuscript is well suited for publication in AMT, and I recommend publication after a few minor modifications, which focus mainly on the clarification of the text, to make it more accessible for the general audience. It is up to the authors to follow these recommendations.

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Section 1.2. There are two references in the publication list that are not mentioned in the text: Peers, 2015 and De Graaf, 2012. These two publications describe DARE retrievals from specific instruments which are unique and useful in their own ways for DARE retrievals from satellite platforms (polarization measurements from POLDER, and hyperspectral measurements from SCIAMACHY). It makes sense to briefly mention these studies in this section.

It would be useful to have an idea of the situation on the two selected days during which the measurements were obtained. Section 2.5 and figure 2 give the technical details and the exact locations, but it would be nice to have a general idea of the situation: Are we looking at smoke above clouds, which I know was the general goal for the ORACLES campaigns? Where was the smoke coming from, was it aged, how far are we from the coast? How closed was the cloud field, which is rather relevant in this study? A figure showing e.g. satellite overview and flight track may help, and a general description of the meteorological situation would be nice.

I belief p13, l.22 – p14, l.16 should be part of section 3 and described before section 3.1.

I found section 3.1.1. hard to understand. The relevance of  $H_\lambda$  is clear, but the determination of  $H_\infty$  is not clear to me. I don't understand the legend and the symbols used in Figure 4a. How and why are the dates and the wavelengths mixed?

Section 3.2: p18, l23: Figure 6b shows the example at 380nm according to the title of the figure.

Section 4.1: The authors describe figure 7 here, but switch to Figure 8 on p22, l.2. This should probably be Figure 7 as well.

App. A.2 The SSA is described here, depicted in Figure 7, not 8. Do the authors mean Figure 7a and 7b on p. 48?

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