

## ***Interactive comment on “Ship-borne aerosol profiling with lidar over the Atlantic Ocean: From pure marine conditions to complex dust-smoke mixtures” by Stephanie Bohlmann et al.***

### **Anonymous Referee #3**

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The manuscript by Bohlmann et al. presents lidar measurements of aerosol properties performed during ship cruises between the southern and northern hemisphere. The data described in this manuscript are unique, and the analysis and presentation is clear and comprehensive. Thus I recommend publication after a few most minor revisions.

Considering the case study of marine aerosol conditions the authors determine a height of the marine boundary layer of about 300 m. How do they derive the boundary layer height? A short description of deriving BL height from GDAS/sounding data should be given.

How does the height of the MBL affect the aerosol properties above the MBL, the

C1

mixing with aerosols in the MBL and the drying of the particles?

What are the DRH and CRH values of marine aerosols?

Looking at Figure 6 one could assume a strong impact of the aerosols of southern edge of South Africa, especially in the height range about 600 m, where the dry marine aerosols was found. The authors should include the information that the dominating type in this region was marine aerosols. This can easily be derived from e.g. CALIPSO classification but should be included in the discussion of this paper.

The authors give mean Angstroem exponents of about 0.1 to 0.2. These values differ from the typical values of 0.6 (MAN, Smirnov et al., 2009). Why do the measured values differ from the reported typical values? More studies could be included reporting about Angstroem exponents of marine aerosols.

In the Saharan dust study the authors find that the backscatter coefficient at 532 nm 'is significantly larger' than at 355 nm. According to the given uncertainty range (Fig. 10) I would not call this differences significant. Later in this section the authors give mean lidar ratios (and uncertainty range?) for the different wavelengths. The uncertainty range of those mean values does not seem to give the uncertainty range shown in Figure 10. Please check these values.

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C2