**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Estimating marine aerosol particle volume and number from Maritime Aerosol Network data" *by* A. M. Sayer et al.

Anonymous Referee #2

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In this paper "Estimating marine aerosol particle volume and number from Maritime Aerosol Network data" by Sayer et al., using MAN data, the authors estimated aerosol particle volume and number concentrations based on an algorithm they developed from a previous study for AERONET data. The aerosol physical properties derived from this study were also inter-compared with the values reported from the version 5.1 and version 6 of MODIS aerosol products. Lastly, the authors inter-compared the estimated surface aerosol concentrations with values documented from existing studies. As the authors mentioned themselves, there are potentially significant uncertainties in this study, as uncertainties from various source of inputs for the study are rather large (see below for details). However, this study has its merits, and the authors are honest about limitations of their study. Therefore, I recommend publication of this paper if the authors could address the issues below.

The other two reviewers have made very nice comments. I will not repeat their comments. My biggest concern is the uncertainty analysis. Retrieving aerosol particle volume and number based on the spectral patterns across the selected wavelengths is not an easy task as various assumptions are needed for the study. For example, the authors used the MIE calculation which implies that clear marine aerosol particles from their studies are assumed to be spherical. However, sea salt aerosol particles may be irregularly shaped (as also pointed out by the first reviewer). Therefore, the question is how much is the uncertainty caused by the aerosol non-sphericity? Similarly, uncertainties in the study could be caused by uncertainties in other parameters such as size distribution, refractive index, relative humidity (also pointed out by one of the other reviewers), as well as spectral AOD values. Therefore, it would be a contribution to our knowledge if the authors could perform theoretical calculations and list the uncertainties in their retrievals with respect to the input parameters or major assumptions from their study. I am not trying to give the authors a hard time, but I would argue that such a table would shine a light into future research of this study area. However, if the authors think it is a daunting task, at least the authors should highlight parameters that could potentially introduce large uncertainties in this study.

Other minor changes: Page 14965, line 10, it would be beneficial to readers if the authors could define Cv,f, and Cv,c here, although the two terms have been defined in Figure 1.

Page 14977, line 15, "artefacts" should be "artifacts"