

The manuscript presents aerosol properties measured on Barbados, comparing ground-based results with airborne data during the CARRIBA field campaign (2010-2011). Measurements of the particle size distributions as well as the cloud condensation nuclei concentrations are shown and compared. Differences in the particles' properties are found depending on the air mass regions and were characterized for three typical cases found on the Caribbean island: marine type, Aitken type and accumulation type. This subdivision was based on ten-days back-trajectories calculated using the FLEXTRA model. Also the chemical composition, its influence on hygroscopicity and CCN activity were investigated. It was found that the knowledge of a mean hygroscopicity parameter and a time-resolved dry size distribution are enough to predict CCN concentrations within 15% uncertainty. The data and uncertainties regarding the specific set-ups are discussed extensively and the manuscript is well-structured. Therefore, I recommend it for publication after minor revisions.

General comments:

- 1) All supersaturation values occurring in the CCNCs lack a corresponding measurement uncertainty. As this is crucial for the further retrieved kappa- values it would be interesting to know the numbers and how much they influence the kappa-value calculations. This is also missing in Figure 2 where supersaturations are plotted.
- 2) It is mentioned that for the airborne data-set the size distributions were measured using an SMPS in combination with an OPC. Could you comment on which index of refraction was used for the OPC diameter retrieval? Also, in Figure 1 it should be mentioned that the ground based measurements are only from SMPS data, while the airborne results comprise a combination of the two techniques. I would suggest to explicitly delineate the SMPS and OPC regions in the plot for the airborne data-set.
- 3) In the discussion of the sea spray influence the authors state that primarily super-micron particles contained sea salt. It would be really helpful to see the OPC size distributions up to a diameter of 2.5 micrometers and investigate whether the super-micron particles appear in these measurements as well.
- 4) Hygroscopicity parameters (kappa) are discussed for different air masses and supersaturations. However, in section 3.2, where results are presented, no uncertainties are mentioned regarding the single kappa values and it is not specified for which size the values were retrieved (or if it is a mean over all sizes?). Later in the manuscript (Page 10, line 6) it is stated that no size dependent trend was found. This information should be shifted to the beginning of the chapter. It would be helpful to plot also the size dependence in Figure 2 as a subplot. With regard to the uncertainties, they would also help understand statements like "results agree within uncertainty" which are mentioned several times.
- 5) The authors state that ground based and airborne data are well comparable and that results found at the ground represent the aerosol in the sub cloud layer at Barbados (see Section 4). However, one has to be careful with this comparison as the data which is referred to in this case was measured during 1 pm and 3 pm UTC. A recent publication showed that the aerosol properties in the lower PBL are strongly dependent on time of day as the mixing of the layers

takes time and therefore a fully mixed PBL can only be found later in the day (see Rosati et al., 2016). Therefore, it would be advisable to mention the time period that was compared in this statement as the results in the morning at the ground might not have been representative for the overall marine sub cloud layer.

- 6) Figures 5, 6, 8 and 10 need legends to be better and more easily understood. Also, figures with subplots should be numbered as a), b) or equivalent.

Specific comments:

Page 2, line 9: please cite the actual chapter 7 of the IPCC instead of the whole work

Page 4, line 8: the acronym "SALTRACE" is introduced but not explained

Page 4, line 11: the acronym "CARRIBA" should be explained when it's first mentioned!

Page 6, line 3: replace "total CCN number" with "polydisperse CCN number" if this is actually meant. Could you also give a size range that can be measured by the mini-CCNC?

Page 7, line 3: replace "again and again" with "repeating"

Page 7, line 9: delete extra "the"

Page 9, line 18: data is plural; replace "was" with "were"

Page 12, line 4: replace "summarized" with "summarizes"

Page 13, line 1: wrong units are given for the $dN/d\log D_p$ concentrations

Page 14, line 5: replace "weather" with "whether"

Figure 2: replace "besides" with "except"

Figure 5: the error bars were omitted for the "left" panel but it would be recommended to at least give an approximate value in the figure caption

Figure 6: the background colors grey and orange are not explained in the caption.