Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2020-331-RC1, 2020

Earth System Science Data Discussions

Interactive comment on "Measurements from the *RV Ronald H. Brown* and related platforms as part of the Atlantic Tradewind Ocean-Atmosphere Mesoscale Interaction Campaign (ATOMIC)" *by* Patricia K. Quinn et al.

Anonymous Referee #1

Received and published: 28 December 2020

This paper describes recent measurements collected by several instrument platforms (ship, buoys, remotely operated ocean and aerial systems) in the vicinity of Barbados during 2020 to study shallow trade-wind clouds. Other papers describe other instrument platforms associated with ATOMIC and the corresponding EUREC4A campaign. The purpose of the paper is to present the types of measurements available as well as the status of particular instruments during their deployment. The intercomparisons of measurements (where appropriate) are particularly useful to provide users confidence in the dataset. As such, this paper will be useful as a reference to those wishing to

use the dataset for scientific analysis. I have checked the ftp and web sites to confirm that the data described is available to the public. While there does not appear to be any unique measurements, the combination of upper-ocean, near-surface, and lower atmospheric measurements from the platforms (and when combined with measurements described elsewhere) is a good dataset to advance the understanding of shallow tropical convective clouds as well as air-sea interactions and the marine boundary layer.

General Comments:

1) The paper is well-written and organized and I just have some specific comments to clarify the details. At times, the paper uses nautical jargon that may be difficult for some atmospheric sciences to understand. The authors should try to make the text generic enough for both atmospheric and ocean science communities.

2) There are instances in which instrumentation did not work – which is common for field campaigns. But it would be useful for the authors to elaborate a bit on how the missing planned data might have on the overall science objectives of the campaign.

3) The paper does a good job at describing the how sampling was conducted during the campaign, but in many places it does not provide any rational as to why the sampling strategy was conducted to serve the objectives of the campaign. A few sentences here and there will help the reader understand the reason for those choices and provide potential users the scientific justification for the sampling and how the data may be used.

Specific Comments:

Line 94: Wave glider, SWIFT, Saildrones, RAAVEN UAS, and SVPS acroynms all need to be defined. Perhaps they are commonly known in the NOAA community, I found it difficult to initially understand what these systems really were. Some are defined in the abstract, but it would be useful to define them all at the same point in the text, and this

seems a good place to do that.

Line 115: Change “Bridgetown” to “Bridgetown, Barbados”.

Line 117: “abaft” is a jargon – and a better phrase is needed for a more general audience. What constitutes “high” concentrations? Are these periods when the instrument is sampling the ship’s plume? If so, have these periods been masked out or defined with a flag in the dataset? In line 111, the text talks about avoiding contamination from the ship’s stack, but the authors have not made clear in this sentence whether the peak values are contamination or not.

Figure 1: I found it very difficult to follow all the tracks in the two panels. The panel for leg 1 does not have the longitude defined (are they meant to be the same as the leg 2 panel). It would make more sense to me to have the insets as panels on the right side of the primary plots. It would be useful to include a larger geographic plot indicating the broader context of the study region. Perhaps a satellite image showing the clouds of interest in the region. Including island locations, such as Barbados is needed as well in the legs 1 and 2 panels.

Line 122: The paper focuses on data collected during legs 1 and 2. What is not clear is how many legs were there and over what time frame? Why focus on these legs as opposed to others (if there are any)? Some additional text is needed to clarify.

Figure 2: Please define the size range for the aerosol number concentration.

Line 133: This section describes the deployments of the various platforms during leg 1. It would be useful to start the section, with a brief description of the science objective associated with the sampling transects.

Line 224: as with the Section 2.1, it would be useful to state the objectives of this leg. Where the science objectives the same, and the objective was to simply collect more similar data? Was this a continuation of leg 1 and just a means of separating out the separate ship tracks?

Lines 229-230: Can you say what was the criteria for the SST fronts in determining where to deploy the SWIFTS?

Line 242: Was there a reason for the ship to remain at S3 for 3 days? Please define.

Lines 289-191: This sentence is a nice summary of the purpose of NTAS and its location. The sort of summary which is needed in parts previous two sections to define a purpose of the sampling strategy.

Lines 365-368: Given that one of the science objectives of ATOMIC was to study shallow oceanic convection, do the radar malfunctions affect the rest of the science that can be done with the dataset?

Line 376: It would be useful to provide an approximate height of the upper limit of valid data from the Doppler lidar.

Line 395: I do not see how the aerosol measurements on the ship reflect the objective of assessing the impact of aerosol-cloud interactions which occur within the clouds. Is the assumption that aerosols and CCN at the ocean surface are similar to those at cloud base? The radiation measurements will assess the column integrated impact of aerosols, but do not contain information on their vertical distribution and thus the possible concentrations at cloud level.

Line 414: What is meant by “reprocessed, gridded, and harmonized”? The next sentence implies a common vertical grid spacing for the radiosondes – so does this also mean a reprocessing and harmonization? Or is there something else meant by reprocessing and harmonization?

Line 663: Are there satellite measurements of SST that could be superimposed on Figure 1 maps to provide a context for the in situ measurements? The larger-scale image might be useful to go along with the description in this paragraph.

Line 821: Do you mean upwind and close to BACO? Seems that RHB was always upwind of BACO.

Line 826: Please include the measurement uncertainty value here.

Lines 828-830: Some plausible explanation for the difference in the aerosol size distribution is warranted. While the bimodal distribution is similar, the magnitude is larger at BACO. The previous paragraph implies CCN was similar between BACO and RHB during the same time period. CCN depends on aerosol size, but perhaps the differences in size do not have a significant impact at 0.4% supersaturation? Are the differences possibly due to differences in the instruments? What does this mean for scientists wishing to interpret aerosol-cloud interactions in the region?

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