Atmospheric
Chemistry
and Physics
Discussions

ACPD

Interactive
comment

Interactive comment on "The Green Ocean: Precipitation Insights from the GoAmazon2014/5 Experiment" *by* Die Wang et al.

Anonymous Referee #1

Received and published: 16 April 2018

Overall: This paper looks at precipitation characteristics during the GoAmazon2014/5 campaign using coupled RWP and disdrometer measurements. The study has the aims of improving our 1) interpretation of radar rainfall relationships, 2) understanding of DSD differences between wet/dry seasons and convective/stratiform regimes, 3) understanding of the possible role of polluted/clean regimes in invigorating convection, and 4) concept of the 'Green Ocean' with the previous points taken as context. There are many angles to this study, and overall it does a good job of addressing the above points. The language and flow of the paper, along with how 'in-depth' the discussion was, greatly improved as the paper progressed; I think it would be beneficial to flesh out some of the discussion in sections 3-4, improve the structure/flow of some of the paragraphs, and clean up some of the figures.

Printer-friendly version

Discussion paper

Recommendation: Accept with minor revisions/considerations.

Introduction

This section successfully highlights the motivations and benefits of studying precipitation properties using data from the GoAmazon2014/5 campaign; however, certain sentences/paragraphs seem to be more elaborate repetitions of previous ones (see the following in-depth comments for examples). Concisely rephrasing some parts may make this section less wordy and easier to parse through. Overall, it does do a good job of summarizing the many different angles/benefits this study will have.

P2 L2-6 "diverse forcing conditions" is vague; sentences could be restructured, as it seems a bit circular/hard to follow

P2 L9-11 This is a bit repetitive of the previous paragraphs; could integrate together somehow.

P2 L11 "Low-level barrier" is a strange phrase to use?

P2 L13-15 Needs restructuring/rewording, seems out of place as it is now

P2 L18 Mention that this is what was used in GoAmazon?

P2 L23-25 The "Green Ocean" terminology needs to be better defined

P2 L22-32 These set of sentences need to be restructured or rephrased, especially towards the latter lines

P2 L34-35 I am not sure what is being said in this sentence and would suggest rewording

P3 L4-5 This study seems pretty focused on just the GoAmazon dataset; is it accurate to say that you are looking at this in the context of global variability and shifts in this?

P3 L5 What is the benefit/meaning behind "(or, practical)"?

P3 L10 Unnecessary "a" in "...capture a continuous convective cloud..."

Dataset and Methodology

I liked this section, 2.1 in particular gives a great overview of the total precipitation statistics embedded in a realistic idea of the associated uncertainties. The paper covers a lot, and the use of specific subsections made sure the reader was orientated properly. The main confusion for me is within the discussion for Figure 1, which could possibly use some clarification (see in-depth comments).

2.1 The ARM T3 Precipitation Dataset and Processing

Subtitle (and subsequent subtitles) Unnecessary "the"; this subsection also concerns the RWP, so not just the precipitation dataset?

P3 L29 Reference/reason for R>0.5 mmhr^(-1) and total drops > 100?

P4 L2 Missing "and" before listing the mass-weighted mean diameter

P4 L9 Comma missing after (degkm-1)

P4 L10 Why 20 degreesC?

P4 L18 Is this from your RWP analysis? Or should there be a reference here?

P4 L20-22 This seems like an incomplete sentence as you state "we first…" and do not follow it with anything else

2.2 The Arm T3 Aerosol Observations and Aerosol Regime Classification

P4 L30 "…aerosol classification is that each…"

P5 L4 The phase "and associated classifications" seems unnecessary

P5 L5 "…potentially a factor of 3 or more…"

P5 L10-12 Are these from Thalman et al. (2017) again?

2.3 PARSIVEL Sampling and Rainfall Relationship Interpretation

P5 L21-22 Uncertainty in what? Radar quantities? Is there a way to provide a numerical value for the "variability established by previous studies" here?

P5 L22 Unnecessary "However,". Does the anticipated estimated uncertainty mentioned previously not include instrument offsets? These two sentences don't flow very well and could possibly do with some rearranging

P5 L27-30 It may be beneficial to add a reference as to why 'b' is fixed and the variability of 'a' is tested P5 L34 (Figure 1) For my clarification, Figure 1 is for the S-band wavelength, yet the discussion of the figure seems to include that of shorter wavelengths in comparison? Am I misinterpreting something here?

Summary Precipitation Results and Interpretation for Retrieval Methods

I enjoyed the discussion on the wet/dry seasonal differences. I feel like this is one of the most interesting parts of this section, but that some explanations and discussion of observations could be expanded upon.

P6 L9-11 Have you considered/is it possible to compare or mention possible datasets from a climate/region more comparable to the Amazon? SGP will obviously (and as acknowledged by yourselves) have differences to the Amazon even though it is continental, so do any datasets (even short term) exist for an even more relevant point of comparison? I do like how they both have similar processing, so I understand why this dataset is used and do not think it is unnecessary, but extra comparisons may be interesting

Table 1 The AM and SGP abbreviations could be defined in the caption for completeness

P6 L7-16 I understand that you have addressed the reasons why there are differences elsewhere, but a sentence on the fact that a tropical vs midlatitude location would account for these differences may be worthwhile here. A lot of what is said here is expanded on in later sections – is this paragraph completely necessary?

Table 2 Is this better suited in supplemental material?

P6 L21-22 SGP is a continental reference, but I think more emphasis should be on the comparison between latitudes instead

Figure 2 Is there any way to show wavelength differences on the same/additional figure? Several parts of the discussion reference wavelength differences and it may be nice to see them summarized in a figure

P6 L30-31 Would be nice to expand on this "significant change" a little here – what/why etc.

Convective/Stratiform Regimes for Rainfall Relationships and DSD Properties

P7 L25 Have the authors considered restructuring to explain the convective/stratiform classification before analyzing the results of doing such here? I cannot find where the RWP classification is actually discussed. A few sentences of what the classification would be beneficial to the reader

Figure 3 This figure could be cleaned up. Consider moving the color bar for the top/bottom two plots outside of the main displays so it is less cluttered and can be seen more clearly.

Figure 4 The white color assigned to the low probabilities is not easy to see when there is a white background. Furthermore, the color bar for these probabilities seems odd – is there any other way to present the probability legend (same problem with subsequent figures)? To make the captions clearer, I would address the shading and the dots separately in terms of what they represent

Amazon Precipitation Properties: Cumulative Dataset Characteristics

The differences between wet and dry seasons could be highlighted more in this section since it is an important aspect of the study. The findings on precipitation originating from congestus/shallower cloud systems is nontrivial, and the importance of this in

context of the introduction could be emphasized more. I think explaining the RWP classification before now will help in latter parts of this section

Figure 5 I like this figure, but the legend/labels in subplot c need to be fixed as the overlapping text is confusing/messy

P8 L22 The fact that cloud top heights could extend 2 km above the heights shown seems a large difference. Can some comment be made about whether this is significant? Does this have any implications for the study or conclusions?

P8 L22-24 What is the reasoning behind relating the winds during the wet/dry season to the modest values of Z in these sentences? Not a lot is said about subplot 5c and the need for highlighting the wind directions in the different seasons

P9 L3 What is meant by "magnitude exceeding threshold as on Figure 6"?

4.1 Disdrometer Convective-Stratiform Segregation: Alignment with RWP Signatures

P9 L29-30 I agree that the use of BR would minimize the contributions of shallower organized convection – but I am unsure of the applications of this given that a large portion of deeper organized convection also falls to the left of the BR line

Figure 8 Should re-label the dashed and solid lines (BR/TM)

P10 L3 I am not sure what the phrase "orients this dataset in BR/TM formulation spaces to the left of the BR line" means. Also, more explanation of how this figure was produced may be necessary.

P10 L5-6 Looking at Figures 8a/c, it isn't obvious that contributions to the histogram are oceanic. I.e. DSDs are not significantly above the dashed TM line. The argument looks more solid for those DSDs identified as stratiform by the RWP

4.2 Cumulative Precipitation Properties According to Cloud Regime and Season

P10 L11 Again, need some discussion previous to this to back up why this is assumed

to be a reasonably proxy

P10 L14-15 "Deeper cumulus clouds are associated with additional maritime continental DSD properties as similar to Darwin studies" – I look at Figure 9a, and I am not sure I see where this comes from. It is not obvious to me that a significant portion is to the right of the BR line, at least not relative to Figure 9b.

4.3 Stratiform Precipitation Properties Associated with Amazon Convective Events

P11 L2 An expansion on the discussion on Table 3 should either be given, or perhaps move this table to supplemental material. Not much is said about it here and it gets overlooked

Amazon Precipitation Properties: The Green Ocean Characteristics

Figure 13 Nothing is written in the text about the transitional period.

P14 L8 "...role of aerosols in the following invigoration arguments"

––––––––––––––––––––––––––

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-101, 2018.