

Final Response on Referee Comments (RC 2)

"Nature and extent of shallow marine convection in subtropical regions: detection with airborne and space borne lidar-systems over the tropical North Atlantic Ocean"

by Gutleben, M., Groß, S, Wirth, M., Ewald, F. and Schäfler, A.

We want to thank the Referee for carefully reading the manuscript and for the helpful suggestions and comments. The comments and questions will be answered by direct response (**bold**).

Major comments

It is a great idea to compare the cloud observations from spaceborne CALIPSO and airborne measurement. As the authors stated in introduction, a systematic evaluation of the CALIPSO data set is desirable. But the abstract fails to clarify the important comparison results. "Cloud top heights vary with altitude" is common sense. Introduction is of clarifying the scientific or practical necessities, not a pile of references. The introduction in the manuscript is not well organized and cannot reflect the importance of this study. I suggest the authors reorganize and rewrite the introduction with a focus on what this study can contribute.

We agree with this referee, that the Abstract and Introduction fails to give the main objectives and findings of this study. We therefore revised the Abstract and the Introduction to reflect the objective of this study.

1. I cannot get the main idea of the manuscript from the title. What does "nature" in the title stand for? The title should be revised to properly summarize the manuscript.

We followed the advice of this referee and changed the title of the manuscript to 'Applicability of spaceborne lidar measurements to study shallow marine convection over the subtropical North Atlantic Ocean'.

2. The structure of the introduction is not clear. For example, the first two paragraphs are just a list of references without a clear conclusion from them or logical structure. What do the authors want to say with those two paragraphs?

We completely reworked the Introduction.

3. The manuscript strongly suffers from its poor written English and fails to efficiently deliver information. I just list some of the grammar errors and improper expressions in minor comments, but the authors need to thoroughly rewrite the manuscript.

In the course of the revision of the manuscript, we did a spelling and grammar correction.

4. The section discussion is unnecessary. It discusses some details of previous sections. It is better to recognize them into their corresponding sections.

We followed the suggestion of this referee and included the discussion in the corresponding sections.

I am interested to this topic, and this study is important for the CALIPSO applications for the scientific community. According to the above concerns, however, I suggest the authors thoroughly rewrite the manuscript and resubmit.

We thoroughly reworked the manuscript and took the referee's suggestions and comments into account.

Minor comments

Erroneous English grammars and expressions

The abbreviations must be defined before using them in abstract.

We modified the abstract.

The paragraph in section 2.1 is too long to follow.

We followed the advice of this referee.

Page 1 lines 6-8: "The study concentrates on the comparison and investigation of detected cloud top height distributions derived from measured WALES and CALIOP lidar profiles by use of a newly developed cloud detection algorithm."

We completely rewrote the Abstract. 'By use of' of is an incorrect English expression – this error has been fixed throughout the text.

Page 2 lines 1-3: Not clear.

We completely revised the introduction.

Page 2 lines 15-22: What does "footprint" mean? Resolution?

The term footprint refers to the ground area that is in the field of view of the lidar. In case of CALIOP it has a diameter of 90 meters. Together with the distance of each footprint it results in the resolution of the measurements. To

avoid misunderstanding we removed the references to the CALIOP footprint and only refer to the resolution.

Page 2 lines 28-31: Delete “We therefore ... system CALIOP”

We reworked this paragraph.

Page 5 line 1: “For the this study”?

We corrected that.

Page 6 lines 19-20, 24, and 27-30. I cannot understand.

We reworked this paragraph.

Please use comma when necessary. Please see page 8, lines 12-14; page 9, lines 8-9; page 15, line 5, ...

We did a spelling and grammar check.

Page 6 line 24. What does “stayed constant” mean?

It meant that we did not observed significant differences in the overall synoptic situation or circulation patterns. We reworked this paragraph to avoid misunderstandings.

Page 6 lines 26-28: ... form about 18 to about 10 N ...?

We reworked that.

Page 13 line 14: “Comparing” -> comparing with. Please fix this error throughout the text.

Error has been fixed throughout the text.

The reference styles are not consistent (Page 16).

The reference style and errors like journal abbreviations have been corrected.

Please add labels for Figure 3.

Done.

The calculation of cloud and cloudiness lengths is common practice, so the equation and its related description are not necessary.

We removed that.