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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Microphysics of Clouds over the Antarctic Peninsula – Part 1: Observations" *by* Tom Lachlan-Cope et al.

Anonymous Referee #2

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This paper compares cloud properties measured East and West of the Antarctic Peninsula during 2010 and 2011. The authors find more water drops and ice crystals in 2011, particularly in the East. They suggest that this could be due to air masses passing over the sea ice in the Weddell Sea more frequently in 2011.

General Comments: This work represents a major contribution to our understanding of clouds near the Antarctic Peninsula – which is currently quite limited - and thus should be published. Reviewer 1 brings up a number of important points that would be very interesting to see explored, and which seem to be quite relevant to supporting the authors' hypothesis. However, the paper already has 13 figures and 3 tables. Given the title ("... Part 1: Observations"), perhaps a reasonable option is to modify the manuscript to focus more on the observations themselves, adding more detail related to the cloud property measurements and the meteorological conditions dur-

ing the flights (as indicated by Reviewer 1), and relegate a detailed exploration of the hypothesis to Part II.

Major Comments:

1) Given the lack of knowledge of the properties of Antarctic clouds, this paper would benefit from an overall summary of the cloud properties that were measured, which would then be followed by the breakdown by year and location. A quantitative summary of the results (e.g. state the cloud properties measured) should also be included in the abstract.

2) Please clarify what data shows averages over flights and what shows averages of averages. For example, in Fig. 3, the points are averages over flights, correct? Why are there only 1 to 5 flights in each longitude bin / year when there were 12 flights?

3) The authors say on page 4, line 17: "the variability observed within each individual cloud would be much less than the variability between different clouds." Can they give a sense of what the variability within clouds and between clouds was? For example, it would be good to give the standard deviation for a few clouds, and for each flight within each longitudinal bin.

Minor comments:

1) Descriptions of the CIP and CAPS instrument are very brief, with references to other papers. More information should be given in the paper regarding these instruments and their accuracies.

2) Editing for grammar and clarity is needed throughout. Some examples: Page 2, line 15: "concludes on the possible implications" Page 2, line12: Before "In section 2" you should add an introductory sentence, e.g. "This paper is organized as follows." Page 6, line 21 "the CAPS probe will measure an aerosol ..." is better stated "the CAPS probe measures aerosol ..." Page 8, lines 2-6: Break up this sentence. Start a new sentence after "... in the east in 2011"

3) Tables 1 and 2: It would be helpful if the statistically significant numbers (or pairs of numbers in Table 1) were in bold font so they stand out.

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