

Interactive comment on “The impact of mineral dust on the day-to-day variability of stratiform cloud glaciation occurrence” by Diego Villanueva et al.

Anonymous Referee #2

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General comments

The authors analyzed the impact of fine and coarse dust aerosols on the day-to-day variability of stratiform cloud glaciation occurrence by using 4 years' satellite cloud phase products and MACC aerosol reanalysis. Compared to the previous study, this study mainly focused on the day-to-day variability of cloud phase. The results showed that the phases of stratiform clouds is highly dependent on temperature and latitude, and dust aerosol mixing ratio is anti-correlated with the average occurrence of fully glaciated stratiform clouds. Generally speaking, the paper is interesting, and tables and graphics are well constructed. As a result, I am recommending the paper be

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accepted with major revisions if the authors response properly my comments. The some main questions and comments I have are listed below in the specific comments to the authors.

Specific Comments:

- (1) One of my concerns is: The applicability of MACC aerosol reanalysis, especially over the southern ocean, where ground-based measurements are sparse. There is no direct observation evidence of dust aerosol to prove the applicability of MACC aerosol reanalysis. In addition, the variable used in this study is dust mixing-ratio? Isn't mass concentration? I think that the dust mass concertation should be more proper for this analysis.
- (2) One suggestion: The section 3 includes too much information, and it is easy to confuse the readers. May you provide us one table or flow chart? The authors also reconstruct this section to make the method more clear. For example, move the lines 177-195 to the first paragraph, and following sentences interpret these variables.
- (3) Line 125: What is the mean of the Jan'0?
- (4) Line 140: Please provide the detailed information about the classification of non-precipitation.
- (5) For the equations 3.2-3.5, FPR or FPR*?
- (6) The main concern is: the authors how to peel off the impact of meteorological condition from dust loading. Because the aerosol and dynamical factor usually are co-variability. Thus, some discussions about dynamical factor are necessary.

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