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Atmospheric Measurement Techniques Discussions

Interactive comment on "The Impact of Neglecting Ice Phase on Cloud Optical Depth Retrievals from AERONET Cloud Mode Observations" *by* Jonathan K. P. Shonk et al.

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We thank both reviewers for their suggestions and comments. Our responses are presented below. A marked-up version of the manuscript has been uploaded with changes highlighted.

Reviewer "A" Kudos to the authors for this very well executed study and write-up. Implementation of the suggested linear correction factor for measured optical depths larger than 20 will provide a much needed improvement to current data bases of cloud optical depth and fraction.

1. The only question that I have for the authors, who are free to address as they wish, is if local sounding information could be used to constrain estimates of cloud ice fraction when other types of measurements from radar or microwave radiometers are not available. Estimates of cloud base/top temperatures that can be derived from the 0 or 12Z soundings might be useful in this regard.

–> To apply the correction equation to AERONET cloud mode retrievals, we ideally need instantaneous estimates of ice fraction that could be aligned with an instantaneous AERONET retrieval of optical depth. However, approaches using radiosonde soundings (or also satellites) could be used to provide a general estimate of ice fraction over an area and a period of time. However, if the cloud regime changes, or the cloud formations are varying rapidly, this could be a source of extra error. Extra work would be needed on this. We have added sentences about this in the Discussion section (Section 5; page 15, lines 18âĂŤ22).

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