

Interactive comment on “Assessment of performance of the inter-arrival time algorithm to identify ice shattering artifacts in cloud particle probes measurements” by A. Korolev and P. R. Field

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This paper addresses the issue of decreasing the uncertainties in the measurement of cloud properties related to the shattering of ice crystals on the leading edges of optical spectrometers. This is an important topic as it impacts the interpretation of measurements that have been made for more than 30 years with various versions of these instruments. The study that is discussed in this paper evaluates the relative efficiency of two approaches for removing potential artifacts in the measurements that

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are the fragments of ice crystals that are incorrectly identified as natural crystals.

One approach is to design leading edges that when impacted by ice crystals will direct the fragments away from the sensitive sample volume. The second approach is to identify pairs of fragments by their spatial distance.

This is a very careful and thorough study that is a culmination of many years of work by the co-authors who have produced here a very useful guide for those making or using these instruments for cloud research. I have attached an annotated PDF with a number of small grammatical corrections and suggestions for minor changes that would help clarify a number of points.

I would make the following recommendations:

- 1) The relevant metric that is calculated and used in the statistical analysis is the inter-particle spacing, or distance. I acknowledge that the community that processes these measurements is accustomed to referring to the "interarrival time", since that is the parameter measured in the instrument; however, in order to underscore that it is the physical spacing of the crystals that is important here, I think that the title of the paper should be changed to "Assessment of performance of the inter-particle spacing algorithm to identify ice shattering artifacts in cloud particle probes measurements".
- 2) I think the authors should actually state how many particles should be sampled in order to generate the inter-spacing distributions. This is a non-trivial question since it depends on the width of the spacing intervals and it will also determine how well separated the two modes are, when there is a shattering mode in addition to the normal mode.
- 3) Related to recommendation (2), the authors have presented three, very distinct cases that illustrate the good (no shattering), the bad (shattering indistinguishable from good particles) and the ugly (two modes with some separation). The reader is left with no quantitative method to assess the how many babies are being thrown out

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with the bathwater. Put in a different way, are there cases where the inter-spacing method should NOT be applied, or should it always be applied but accompanied by a quantitative estimate of how many good particles have been removed?

Please also note the supplement to this comment:

<http://www.atmos-meas-tech-discuss.net/7/C3210/2014/amtd-7-C3210-2014-supplement.pdf>

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