

Interactive comment on “Measurements of aerosol and CCN properties in the Mackenzie River delta (Canadian Arctic) during Spring-Summer transition in May 2014” by Paul Herenz et al.

Anonymous Referee #1

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This paper presents aerosol size distribution and CCN data from a three week ground-based campaign in the Western Canadian Arctic. The campaign was conducted in the springtime during which it is known that there is a transition from springtime to summertime aerosol conditions. The findings of the paper are that both sets of aerosol distributions (i.e. summer and spring) can be inferred from the data, and the hygroscopicity parameter was observed to be about 0.2. The strength of the paper is that few aerosol measurements have been conducted in the Arctic and so this adds to the data base of such measurements. A weakness is that there is no new conceptual idea presented in the paper.

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This paper would represent a more significant contribution if more vertically resolved measurements were presented, and so I am puzzled why the POLAR6 aircraft data are not presented more comprehensively given that the plane was probably flying more frequently that only during the overpass periods. I suggest that these data be added to the revised paper.

Also, the paper should be careful to not claim to have characterized the transition from spring to summer aerosol. That can only be done at a fixed location if a full annual cycle of aerosol parameters is observed, ideally over many years. During a short campaign, the best one can hope to observe are snapshots of different aerosol distributions from different sources. While the authors distinguish their air masses into spring and summer-types, I believe they could just have been easily characterized the periods as continental and marine. For publication, it has to be justified that the general trajectory pattern displayed in Period 2 is indeed characteristic of springtime conditions at this location, i.e. do the size distributions during this period have the character they do because they are more like those in the spring or because they are of continental origin?

Lastly, although the paper is improved compared to the originally submitted version in how it references past work, it is still lacking references to past characterization of the CCN behavior of marine aerosol (currently, only one reference from the authors is presented) and Arctic aerosol. As well, there is a large suite of aerosol size distribution measurements from North American sites (e.g. work by Leaitch et al in Elementa, and Croft et al., Collins et al. and Burkart et al. in ACP) that is ignored and is arguably more relevant than the more geographically distant (but referenced) measurements at Svalbard. Lastly, there is the recent paper by Freud et al. in ACP that comprehensively describes aerosol character across the Arctic. Given that the merit of the current paper is that it adds new measurements to those already performed, it is necessary that the new measurements be presented alongside what has already been reported in the literature. The literature is more comprehensive that what is listed above; I only

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included recent publications.

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