Reply to comments of Reviewer #2:

We would like to thank Reviewer 2 for their helpful comments. We divided Reviewer #2's comments into three separate sub-comments and addressed each of them in turn.

Comment: The single scattering properties of ice particles provide a link between physical properties of ice crystals, snowflakes and remote sensing observations. So for the use of single scattering properties, it is important to know physical properties of ice particles they represent. The authors present the method that have used to generate "realistic" ice particles, but it would be important to show mean microphysical properties, for example m-D relations, distribution of aspect and areal ratios. It would also be important to compare these properties to what is reported in literature and provide a connection to circumstances the presented database can be applied in.

Reply: The microphysical properties of pristine ice crystals and graupel are introduced in Sections 2.2-2.4, while the m-D relations of aggregates are not provided in this manuscript but described in Botta et al. (2010, 2011). The detailed description of the aggregate m-D relations was added in Section 2.1. Note that the database contains, within files, the exact distribution of mass within each particle in the database. As such, all physical properties can be computed from these files.

Botta, G., K. Aydin, and J. Verlinde, 2010: Modeling of microwave scattering from cloud ice crystal aggregates and melting aggregates: a new approach. IEEE Geosci. Remote Sens. Lett., 7, 572–576, doi:10.1109/LGRS.2010.2041633.

Botta, G., K. Aydin, J. Verlinde, A. E. Avramov, A. S. Ackerman, A. Fridlind, G. M. McFarquhar, and M. Wolde, 2011: Millimeter wave scattering from ice crystals and their aggregates: Comparing cloud model simulations with X- and Ka-band radar measurements. J. Geophys. Res., 116, D00T04, doi:10.1029/2011JD015909.

Comment: This is also related to the comparison of the presented database and Leinonen et al. (2015) results. It would be important to know whether microphysical properties of the ice particles in both studies are actually comparable.

Reply: As mentioned in our response to the comment above, the microphysical properties of the ice particles are stored in the database (see supplement Table S4b). This information can be used to compare to the properties of ice particles in other databases; that said, it is beyond the scope of this paper to present such a detailed comparison here. We compared our aggregate results with those of Leinonen and Moisseev (2015) to illustrate their similarities and differences over the mass range provided on page 10 lines 28-31. The reviewer is correct that to interpret these differences we must know detailed information about the physical properties of the aggregates in the two databases; such a comparison is beyond the scope of this paper, the purpose of which is to introduce the database, but we do provide the information necessary to pursue it.

Leinonen, J., and D. Moisseev, 2015: What do triple-frequency radar signatures reveal about aggregate snowflakes?, J. Geophys. Res. Atmos., 120, 229-239, doi:10.1002/2014JD022072.

Comment: As the new scattering databases become public, it is not always clear how these databases will be utilized. One line of thinking is to select modeled ice particles with m-D relations as closely related to the ones observed in nature and to apply the corresponding single scattering properties. This approach implies that particle formation mechanisms used for the creation of the database and the one in nature are the same across all particle sizes. This may or may not be true. So it is interesting to hear the authors opinion on how do they foresee the presented database will be used. Connected to that, it would be important to provide enough information in the paper about the content of the database, in terms of the main microphysical properties of ice particles, to facilitate the database use.

Reply: As the database is meant to cover as many variabilities in ice particle type, size, shape, and orientation as possible, it leaves the choice to potential users on how to decide to use the database (e.g., following specific m-D relations to select ice particles). Again, the detailed microphysical properties are stored in the database (supplement Table S4b), so potential users can apply or combine different criteria in selecting ice particle results from it. For example, for new microphysical parameterization schemes, such as developed by Harrington et al. (2013) that effectively evolve the mass-dimensional relationship, the particles can be selected differently as time evolves. The reviewer is certainly correct in pointing out that perhaps the biggest gains will be made from proper application of appropriately constructed databases. From our perspective just what is an appropriately constructed database is an open research question and hopefully one that will be answered in the not too distant future.

Harrington, J.Y., Sulia, K. and Morrison, H., 2013. A method for adaptive habit prediction in bulk microphysical models. Part I: Theoretical development. *Journal of the Atmospheric Sciences*, *70*(2), pp.349-364.