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Interactive comment on "A general database of hydrometeor single scattering properties at microwave and sub-millimetre wavelengths" *by* Patrick Eriksson et al.

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First of all, we thank the two anonymous referees and Ian Adams for taking time to review our manuscript and for the constructive feedback provided. The comments include fair criticism. Besides the various points raised, we are happy to notice that all three referees find a value in the database produced and that a general recommendation for publication is given.

In summary, we see a reason in basically all comments and they will be carefully considered in our revision. There are some main themes in the criticism and at this point we mainly comment on a general level.

The main part of the criticism deals with grammar problems and unclear language. We will do our best to improve on these aspects.

Some of the presentation issues are associated with our plans to make use of ESSD's "living data" process. Our understanding is that the ESSD article can be updated when we present new versions of the database, such as when including data for oriented particles. We plan to make use of this nice feature, and not writing a completely new article for database version 2 etc. For this reason some discussion is a bit broader than motivated by this database version, and features not yet used are mentioned (such as the database is planned to have a "melted" category). By making the presentation a bit broader, we wanted to both indicate that we have clear plans for extensions of the database and avoiding to end up with a text that has to be totally rewritten for the next database version. We understand that the text shall correctly reflect the current database version and will adjust the text accordingly, but we wanted to explain the reasoning behind our presentation approach.

This issue discussed in the paragraph above is most apparent with respect to active measurements. It's clear that the present data have restrictions with respect to radar applications, but as we have a special interest in synergy between active and passive microwave observations we wanted to include discussion of radar applications from start. Again, we will revise the text to remove unclarities.

Some response on a more detailed level:

* Ian Adams points out that 50 mm rain drops do not exist and found our choice to include such particles to be unphysical. It's true that rain drops break up when reaching a size of about 8 mm. On the other hand, drop size distributions applied do normally not consider this physical limit. In fact, they predict the presence of drops up to infinite size. For this reason, we included unrealistically large drops to allow the database user to integrate properties up to very high drop sizes (to evaluate the contribution from the unphysical size range). We would have preferred to offer a very broad size

coverage for all database habits (also suggested by Alan Geer inside the EUMETSAT study supporting the database development), but the use of DDA limited what we could achieve.

* The calculation of effective radar reflectivity (Eq 19) is defined in such way that the K-factor shall be set following the refractive index of liquid water, even if it is known that the backscattering is caused by ice hydrometeors. (Response to Referee #2)

* Referee #1 makes the comment that face-to-face sticking is generally not assumed in aggregation models and asks for an explanation. First of all, this is partly a matter of allowing overlap or not in the aggregation of the crystals. We make use of compact hexagonal crystals in our simulations, which are not easily deformed. Hence, it is questionable if significant crystal overlap in real aggregates is realistic. While dendrites are known to aggregate with the help of mechanical interlocking, faceted crystals tend to stick at surfaces, depending on electrostatic forces, surface melting or roughness (Hobbs et al., 1974). Admittedly, the no-overlap condition also makes the calculations of the aggregate volume more straightforward. Bear in mind that the particles are represented by polygon meshes in the simulations, and calculating the volume of overlapping crystals is therefore not trivial and would slow down the computations unless serious approximations are made. Hence, the decision is based on the belief that this assumption is valid for compact and pristine crystals, and the fact that it makes the aggregation simulation less complex. For aggregation of dendrites, this constraint would indeed make less sense.

References

Hobbs, P. V., S. Chang, and J. D. Locatelli (1974). “The dimensions and aggregation of ice crystals in natural clouds”. J. Geophys. Res. 79.15, pp. 2199–2206.

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