

Development of a common framework for handling particle scattering data

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There are now many published datasets on the scattering properties of realistically shaped snow and aerosol particles. These datasets represent increasingly sophisticated attempts to match the variability and detail of particles found in nature. This wide variability has caused several problems. When constructing a scattering database, scattering formulations make various approximations in their solutions of the electromagnetic equations. They require different types of input information and output different parameters. Database creators also make varied assumptions regarding polarization, particle orientation and dielectric parameters. Their databases frequently have different conventions for reporting basic quantities such as particle length, volume, fractal dimension and aspect ratio. There is no common format for storing and distributing structural and scattering data. These issues accumulate and introduce significant challenges when validating and comparing results and, also, when incorporating results into operational algorithms [1].

To address these issues, we propose a standard specification for storing particle structural and scattering data in NetCDF. We provide a set of high-level reference libraries in C and C++ to manipulate data in this format, and invite feedback from the community. Many potential uses are foreseen. We will briefly discuss some of these, including: cross-comparisons of particle models, matching modeled snowflake structures to field campaign images, and converting between volume-based and surface contour-based representations of particle structure.

References

- [1] Kneifel, S., J. Neto, D. Ori, *et al.*, 2017: The First International Summer Snowfall Workshop: Scattering properties of realistic frozen hydrometeors from simulations and observations, as well as defining a new standard for scattering databases. *Bull. Am. Meteorol. Soc.*, in press.

Preferred mode of presentation: Oral