To: Editor, *Atmospheric Measurement Techniques (AMT)*

Re: Manuscript Number: egusphere-2022-886
Title: Simulation and sensitivity analysis for cloud and precipitation measurements via spaceborne millimeter wave radar
Author: Leilei Kou; Zhengjian Lin; Haiyang Gao; Shujun Liao; Piman Ding

Dear Editor,

Thanks for your attention on our manuscript (ID: egusphere-2022-886), as well as your valuable suggestions to improve the paper. We appreciate editor and reviewers very much for the time and effort that they have put into reviewing the manuscript. Based on the suggestions, we have added more details about the shape/orientation and dielectric assumption in 2.26. Also, we have checked the typos, equations, figures and tables, authors and their affiliations, and references and citations carefully throughout this manuscript. We hope that the revised manuscript is now acceptable for publication in your journal.

* All the changed contents are highlighted in track change mode in the revised manuscript. More specific revisions against each point are explained as follows.

Thanks very much again for your help to our paper processing.

Best regards
Leilei Kou

Response to comments:

I found one detail lacking for understanding in 2.26 (Melting Modeling). The authors provide much detail on the change in density and particle size are calculated throughout the melting process, but there is no corresponding detail on either the shape/orientation (which are provided for the other particle types) and dielectric assumptions (for example, was the liquid water assumed to be a shell around a solid core, or homogenous mixture with the ice?). Please provide these details for consistency with the other sections on the hydrometeor microphysical modeling.

Response: Thanks very much for your valuable suggestion. We have added more details about the shape/orientation and dielectric assumption in 2.26 (Melting Modeling).

"Dielectric constant of melting snow depends on snow density and water fraction f_w. Here, we use the model that water is considered as background and snow is treated as inclusions, and compute the dielectric constant based on Maxwell-Garnett formulas for the mixture of snow and water (Ryzhkov et al., 2011; Zhang, 2017).

The scattering characteristics of melting particles are still calculated by T-matrix. It is assumed that the shape of melted ice particles gradually changes with the increase of mass water fraction f_w, so as to finally obtain the shape of raindrops with the same mass. We can introduce the axis ratio (γ_{ms}) relationship and the relationship of SD of the canting angle (δ_{mr}) for melting particles as (Ryzhkov and Zrnic, 2019):

$$\begin{aligned} \gamma_{ms} &= \gamma_s + f_w(\gamma_w - \gamma_s) \\ \delta_{ms} &= \delta_s + f_w(\delta_r - \delta_s) \end{aligned}, \quad (20)$$

where γ_s is the axis ratio of dry snow, γ_w is the axis ratio of raindrop of diameter which is produced as a result of snow melting, δ_r is the SD of the canting angle distribution of raindrops, whereas δ_s is the corresponding SD of the distribution of dry snow."

Besides, we have checked the typos, equations, figures and tables, authors and their affiliations, and references and citations carefully throughout this manuscript. Several typos have been modified in the revised manuscript. The changes are shown in the marked-up manuscript version.