

Atmos. Meas. Tech. Discuss., referee comment RC4  
<https://doi.org/10.5194/amt-2022-247-RC4>, 2022  
© Author(s) 2022. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## Comment on amt-2022-247

Anonymous Referee #1

---

Referee comment on "Retrieval of terahertz ice cloud properties from airborne measurements based on the irregularly shaped Voronoi ice scattering models" by Ming Li et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-247-RC4>, 2022

---

The paper assessed the capability of the Voronoi and sphere models in the retrieval of IWP and  $r_e$  using aircraft-based measurements of 380, 640, and 874 GHz brightness temperature. Based on the sensitivity analysis, the brightness temperature differences between 640 and 874 GHz are used for IWP retrieval, while brightness temperature differences between 380, 640 and 874 GHz are used for  $r_e$  retrieval. The authors find well correlations between the Voronoi-based retrievals and Evan's Bayesian retrievals using data from the CoSSI instrument. The comparisons of the retrieved IWP and  $r_e$  between Evan's Bayesian retrievals using data from the CoSSIR instrument and the inversion algorithm among the Voronoi and Sphere models suggest that the Voronoi model outperforms the Sphere model. Overall, the highlight of this paper is that the Voronoi model has been previously applied to visible and infrared applications in satellite remote sensing and climate model simulations, and now it is being applied over the terahertz region to investigate how well the model performs there. The paper is relatively well-written, and the figures are also well-displayed. The analysis is quantitative and clear, with no obvious flaws. This paper could be a good supplement to the development of satellite remote sensing of ice clouds in the sub-millimetre regions. The topic presented in this study is suitable for Atmospheric Measurement Techniques, so I recommend Minor Revisions for publication.

### Specific comments

- To ensure the effectiveness and representativeness of the Voronoi model in terahertz region, I recommend the authors compare the retrievals against more other ice crystal scattering models, such as the column aggregate?

