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Atmospheric Measurement Techniques Discussions

Interactive comment on "Assessing the impact of different liquid water permittivity models on the fit between model and observations" *by* Katrin Lonitz and Alan J. Geer

Anonymous Referee #1

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General comments: The manuscript reports on tests of several models for liquid-water dielectric constant within the Integrated Forecast System of ECMWF. The models are compared with respect to calculated microwave brightness temperatures and differences from satellite observations. Weather forecasting is an important application of a dielectric model, and this manuscript makes a substantial contribution on the subject of modeling the electrical properties of clouds. This question is within the scope of AMT. The manuscript recognizes difficulties such as the treatment of scattering within the radiative-transfer algorithm, but shows that some meaningful conclusions can be drawn about the dielectric models.

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Specific comments:

1. The conclusions section provides a good summary of the paper. However, the abstract's brief statement of the recommendation may mislead, since Rosenkranz15, TKC16, and Stogryn95 yielded nearly equivalent improvements.

2. The closure experiments described in this paper are based on ECMWF-IFS, and it should be said that other forecast systems could conceivably yield different results.

3. In the second paragraph of Section 5 (on p.23), the reasoning is hard to follow. Lines 16-17 state that there is a neutral impact on humidity, temperature and wind. But line 23 says "An improvement seen for ATMS is a result of an improved FG field in humidity..."

Technical corrections:

4. page 3, lines 21-23. "Permittivity ... consists of a real (scattering) component, and an imaginary (absorption) component." Actually, both real and imaginary parts of permittivity are involved in scattering and absorption by spherical droplets.

5. page 7, lines 16-17. The sentence "The two most recent permittivity models Rosenkranz15 and TKC16 give about 50% of the absorption compared to Liebe89 for frequencies around the 183 GHz water vapour absorption line." belongs under the discussion of Fig.2a for 240K, starting at line 20.

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