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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "Establishment and preliminary application of forward modeling method for Doppler spectral density of ice particles" *by* H. Ding and L. Liu

**Anonymous Referee #2**

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The paper presents a methodology for the simulation of Doppler ice spectra for different ice habits. based on an hydrodynamic and scattering model (the self-similar Rayleigh Gans approximation). The topic is certainly timely and relevant. However I do not see how this paper is providing any novelty and any original contribution to the state of the art. First, radar spectra have been simulated for years both in rain and ice but the authors miss to cite any relevant reference in the field. Second, the simulations as provided clearly lack a lot of realism (no turbulence, no noise floor, ). The only simulated spectra that I can see are those produced in Fig.4, right panel. Such spectra have nothing to do with real spectra, do they? Why the authors are not plotting some of their spectra of Fig.6 for comparison? Therefore it does not make any sense to me



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to attempt a retrieval (the pre-condition to that is that the forward model can reproduce the measured spectra). The results plotted in Fig.6 and 7 therefore make no sense to me. In addition to that it is totally unclear how the authors have accounted for the vertical velocity (the retrieval of the vertical velocity is not a trivial task!), for turbulence and spectral broadening, for attenuation (how can you retrieve IWC if you have not corrected for attenuation?) and for radar calibration. The comparison with the aircraft data is also extremely nebolous. Plot 11 with ice water contents all over the place clearly shows that there is something not right. At a certain point the authors are even extending their methodology to rain (again all previous work on the field is never mentioned), distracting the reader from the main topic. I do recommend the authors to properly refine/revisit their methodology and resubmit later.

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