

Interactive comment on “Investigation of observational error sources in multi Doppler radar vertical air motion retrievals: Impacts and possible solutions” by Mariko Oue et al.

Anonymous Referee #4

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This paper investigates the impact of some sources of uncertainty on multiple-Doppler analysis of ground based radar data, with emphasis on vertical velocity. It is well written, clear and easily understandable. In fact, I don't have much to say about the points raised by the authors. The analysis process is good and the scientific argumentation is excellent.

Having said that, however, I am a little sceptical about the overall impact of this work and its general interest for the radar user community. Without being rude, it seems quite obvious that improving the VCP, the number of radars, or the time sampling resolution will have a positive impact on retrieved wind fields and, in particular, vertical velocity.

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This has been shown previously by many authors in many different radar network configurations. While I agree that findings and recommendations resulting from this study would be useful for ARM RGP laboratory users, they would be difficult to apply to other networks. Furthermore using numerical model outputs and radar simulators to build a reference wind field is quite common nowadays and cannot be considered as a new concept.

Actually reading section 2.3 of the paper should generate quite some frustration among any scientist interested in radar wind retrieval. Indeed, questions regarding the impact of prescribed hydrometeor fall speed, potential masks, attenuation by rainfall (especially at X-band), or velocity folding count among the main sources of questioning for users and developers of multiple-Doppler analysis methods. To the best of my knowledge, these issues have never really been addressed to date and I was hoping that this study would help to clarify them, which would have contributed to make this paper a truly original contribution to the field. To be consistent with my remark, however, I must mention that the study on the impact of advection is original and does answer important questions. .

To sum up, the work presented by the authors is of good quality, but its contribution to the field with respect to previous studies seems quite poor to me and results are barely applicable to networks other than ARM RGP laboratory. From there I see two options: 1/ Improving the paper by investigating additional sources of uncertainty such as V_t , velocity folding, attenuation... among others, or 2/ Clearly state that this study aims to optimize the performance of the ARM RGP network, without seeking to generalize its findings. Option 1 would require substantial additional work, but would undoubtedly represent an important contribution to the field. Option 2 would mostly imply cosmetic work (title, introduction, conclusions), but the impact of this paper would be limited.

Other remarks:

1/ Results are based on a single case. Authors should keep that in mind in their conclu-

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sions. The effectiveness of vertical wind retrieval depends on many factors, including wind shear for example.

2/ More details are needed regarding the wind retrieval method used in this paper. What about data interpolation and air-mass continuity equation (e.g., boundary conditions) ?

3/ More details are needed about the investigated weather system. Authors should include additional material to better describes the overall structure of the storm (e.g. vertical cross-section of model/radar reflectivity/wind fields).

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-442, 2018.