

General comment

The paper presents a sensitivity study aiming to address the error sources that affect the X-band Doppler radar-based retrieval techniques of vertical air motion. The main added-value of this work just lies in the comprehensive discussion of the limitations of such techniques. The paper productively contributes to add and extend the current research literature on this topic and can be accepted after some minor revisions.

Specific comments, suggestions and edits are provided below for the author's consideration and referenced by line number.

Specific questions/issues

- In my opinion, this study has one main limitation that needs to be considered and discussed. Such issue deals with the estimation of hydrometeors fall velocity (V_f). The authors state (Page 9, Lines 16-17) that V_f used in their work is the one predicted by WRF model simulation; therefore, they assume that no errors related to V_f are introduced in their experiment. In a more realistic scenario, the retrieval of wind field from radar Doppler measurements is strongly related to the variability of the terminal fall velocity of hydrometeors, which constitute a great source of uncertainty. I suggest to carry out, if possible, an additional experiment considering a scenario in which the hydrometeor fall speed is estimated from radar reflectivity measurements and not prescribed by WRF model or, at least, a more comprehensive discussion about the relationship between radar-estimated V_f and wind retrieval.
- Pag. 9, lines 13-18: the attenuation along the path is one of the main issue affecting the quality of X-band radar measurements. In my opinion, the authors should carry out a more in-depth sensitivity analysis concerning this issue and its possible impact on vertical wind retrieval.
- The abstract should be more concise. I suggest to summarize the results in a four or five lines, at most.
- Section 2, paragraph 2.1: please add some more details, for the convenience of the reader, about the MCS event considered in this work and about the study area.
- Figure 2. Not very clear, in my opinion. Please avoid the use of jet colorbar in panel (c-f).
- The conclusion section should be reduced, by summarizing the main results of the study.
- The results of this study are presented only from a qualitatively perspective. Please introduce some common scores, such as the Root Mean Square Error, that quantitatively summarize the experiments performance.

Technical corrections

Introduction

- **Pag. 2, lines 13 and 20:** I suggest the use of the semicolon to improve the sentence structure.
- **Pag. 2, line 23:** please add “the” before “aforementioned”.
- **Pag. 3, line 10 and Pag. 3, line 25:** please add a comma before “especially”.
- **Pag. 3, lines 11-12:** I suggest to revise this sentence.
- **Pag. 3, line 13:** please add a comma before “by”.
- **Pag. 3, line 16:** please replace “are” with “have been”.
- **Pag. 4, line 8:** please add a comma before “that”.

- **Pag. 4, line 11:** please replace “second” with “secondly”.
- **Pag. 4, line 16:** please add a comma after “to do so”.
- **Pag. 4, line 19:** please replace “we are investigating” with “we investigate”.

Data and methods

- **Pag. 4, line 26:** I suggest to use “consists in” instead of “is composed” and to remove “following steps”.
- **Pag. 5, line 20:** please substitute “retrieved” with “obtained” or “determined”.
- **Pag. 6, lines 3-4:** remove “in their study”.
- **Pag. 6, lines 5-6:** reformulate this sentence.
- **Pag. 7, line 3:** add a comma before “such”.
- **Pag. 8, line 5:** add a comma before “with”.
- **Pag. 8, line 8:** add a comma after “box”.
- **Pag. 9, line 10:** please add “carried out” before “in this study”.
- **Pag. 13, lines 10-11:** reformulate this sentence.

Results

- **Pag. 13, line 14 and line 15:** add a comma after “fields” and before “field”, respectively.
- **Pag. 14, line 13:** add a comma before “using the original...”.
- **Pag. 16, line 18:** add a comma before “but”.
- **Pag. 16, line 26:** please revise “velocities lather than”.
- **Pag. 18, line 14:** please remove the comma between “density” and “should”.
- **Pag. 21, line 5:** please add a comma after “VCP”.
- **Pag. 21, line 9:** add a comma after “...2016)”.

Conclusions

- **Pag. 21, line 27:** please replace “were” with “was”.