

Manuscript amt-2015-171 – Reply to Reviewer # 3

The Authors thank the Reviewer for having appreciated the work, whose drafting will be improved taking into account his/her comments.

In the following paragraphs, we reply item-by-item to the Reviewer comments, which are enumerated and copied in blue color.

Specific comments

1. At title, “characterization” may not proper term. It is not described clearly how to characterize storms with a radar. This paper presents only radar observations and retrieved rainfall fields.

REPLY. We respectfully disagree with the Referee, as the noun “characterization” stands for “description”. Indeed, the manuscript describes the considered hailstorms in terms of the corresponding polarimetric radar signatures, i.e., the occurrence of hail and/or rain mixture is testified thanks to the analysis of the radar observations.

2. At abstract, line 9 of pp. 7202, are “A suitable processing” and “The crucial procedural step” same processes? What do “suitable” and “crucial” mean?

REPLY. The statement “A suitable processing” refers to the entire processing chain, whereas by saying “The crucial procedural step” we wanted to stress that the Φ_{DP} (and K_{DP}) retrieval step is the most important being the basis for attenuation correction and rainfall estimation.

ACTION. This point will be clarified in the revised manuscript.

3. Introduction session is confusing and not organized well. Especially line 16-21 of pp. 7203 and line 2-11 of pp. 7205, sentences are very confusing.

REPLY. Agreed.

ACTION. The first sentence mentioned by the Reviewer (“Notwithstanding, in spite of effectiveness..”) will be modified with “*Attenuation remains the major impairment for the operational use of X-band systems, despite the availability of robust correction methods and rainfall algorithms based on specific differential phase shift, which is immune to attenuation.*”

Lines 2-11 on pag 7205 will be changed as follows:

“Heinselman and Ryzhkov (2006), using radar measurements at S-band, confirmed the higher performance of dual-polarization hail detection algorithms with respect to methodologies employing radar reflectivity only for the diagnosis of hail .”

4. At session 2.2 Processing methodology, what’s the difference between K_{dp} , K_{DP} , K'_{dp} ?

REPLY. K_{dp} , K_{DP} are the same quantities, the notation will be made uniform. The use of the apex (K'_{DP}) was aimed at identifying the first estimate of K_{DP} .

ACTION. The subscript “dp” will be changed in “DP”. K'_{DP} will be removed, being confusing.

5. Line 18 of pp. 7208, $\gamma_H=0.048 \rightarrow \gamma_{DP}=0.048$

REPLY. Agreed.

ACTION. The manuscript will be modified accordingly.

6. Line 18 of pp. 7209, number is missing at “temperature image at (??) μm ”.

REPLY. Agreed. It is 10.8 μm .

ACTION. The manuscript will be modified accordingly.

7. Line 1 of pp. 7210, what does “azimuth-average vertical profiles” mean?

REPLY. The radar operates vertical scan (90 deg) rotating the antenna, i.e., we have 360 samples of vertical profiles collected in few seconds. We recognize that the term azimuth average is misleading.

ACTION. We will change “azimuth-average vertical profiles” with “average vertical profiles” and specify that antenna is rotating.

8. At figure 4, why ρ_{hv} is lower and fluctuating?

REPLY. The dual-pol data collected at very first range gates are very often unreliable, e.g., due to TR limiter mismatch at the two channels. In this case, it is likely to happen for the first 5-6 gates (1-1.2 km).

ACTION. A comment on this point will be added.

9. Line 11 of pp. 7211, “about 60 mm in 1h and about 70mm in 1h and half”. It is very confusing. Does it mean 60 mm (from 15 to 16 UTC) and 70mm (16 to 17:30 UTC)?

REPLY. 70 mm of precipitation were observed between 15:00 and 16:30 UTC. We agree that this must be specified.

ACTION. The manuscript will be modified accordingly.

10. Line 24 of pp. 7211, typo “estearn”

REPLY. Agreed.

ACTION. The manuscript will be modified accordingly.

11. Line 4 of pp. 7212, “they get merged around 6:00 UTC”. It is difficult figure out where they are merged. It will be good to indicate the area in the figure 9.

REPLY. Around 05:00 UTC two cells can be distinguished on the eastern coast of Sicily (mostly red colored), later they clearly merge.

ACTION. We will indicate the cells with circles.

12. Line 16 of pp. 7212, “A.S.L” is used previous sentence (line 18 of pp.7206).

REPLY. Agreed.

ACTION. We will introduce definition of acronym ASL previously in the text.

13. Line 20 of pp. 7212, is Figs.12-14 correct? According to text, I think Figs. 12-15 is correct.

REPLY. The text comments the Pseudo RHIs for the azimuth 111 and 122, which are reported in Fig. 12 and 14, respectively

ACTION. We will change Figs 12-14 with Figure 12 and Figure 14 (to avoid including also Figure 13).

14. Line 10 of pp. 7213, what does “absolute attenuation” mean? Please describe definition of “absolute” exactly, if it is not general term for weather radar.

REPLY. We were referring to the attenuation on Z.

ACTION. We will distinguish between “attenuation” and “differential attenuation”

15. Typos, line 12 of pp. 7213 : sintomatic, line 22 rain/hail misture, line 7 of pp. 7214 rain-hail mix

REPLY. Agreed

ACTION. The manuscript will be modified accordingly.

16. Line 27 of pp. 7213. As for azimuth 121 is correct? Or 122?

REPLY. The line comments the decrease of ρ_{hv} at azimuth 122, similarly to can be noticed at azimuth 121.

ACTION. To avoid confusion, we will change with “Also in this case, ...”

17. Line 17 of pp. 7214, “to satisfactorily reconstruct ... in a satisfactorily way...”, two “satisfactorily”

REPLY. Agreed.

ACTION. The sentence will be changed with “to effectively reconstruct the storm characteristics”.