

Interactive comment on “Characterization of Mediterranean hail-bearing storms using an operational polarimetric X-band radar” by G. Vulpiani et al.

Anonymous Referee #2

Received and published: 27 July 2015

General Comments

This paper provides a summary of dual pol characteristics and inferred microphysics of 2 events sampled by an X-band radar in Italy. The authors describe the events and show results using an analysis of the dual pol characteristics. I find the results interesting in that they illustrate detailed characteristics of hail producing storms as observed by X-band radar. However, as I read the paper I was unclear if the authors were aiming to show new observations of extreme events as sampled with X-band radar or whether the intent was to simply document the occurrence of rain mixed with hail events in this region.

C2226

The analysis for each event was rather short in terms of describing the evolution of these storms only one or 2 cross sections at one particular time. As such, the results come across as a potpourri of observations with no clear focus on particular aspects of the events.

Are there plans for further analysis? It would be of interest to document the performance of the QPE for flash flood forecasting.

My major criticism of this manuscript is that the English is sloppy and the grammar needs to be cleaned up. As presented, the paper is difficult to read with many awkward sentences.

Recommendation: Major revisions

Specific Comments Note that I did not capture all the awkward sentence structure in the manuscript - I gave up after a few pages. I recommend the authors enlist someone who can help them improve the English grammar.

P. 7202 Line 2 “fruitful” – what does that mean?

Line 3 “couple” do you mean two?

Line 6: “It is used” – awkward

Line 10 “allowing to properly catch” –awkward

Line 15: “. . .fields amount. . .” – awkward

Line 16 “considered storm” storm considered

Line 21: “well retrieve..” awkward

Line 25 – do you mean sea breeze convection?

P. 7203 Line 1: “even though” – although ?

Line 20: “enhanced up” –unclear– do you mean enhanced, leading to signal extinction

C2227

Line 25: "if the objective"

P. 7203-7204

Not sure what the point of this discussion is: to argue for using other dual pol parameters in the discrimination of rain and hail? This section needs to be more focused.

P. 7204

Line 1: State here what other information is needed (e.g., Zdr)

Line 14: Zdr when used in combination with Zh and/or other parameters is used for hail. Zdr by itself doesn't necessarily mean hail

P. 7206

Line 4 need "an" before "applied fuzzy logic"

Line 24: "shortly summarized" - summarized briefly

P. 7207

Line 3: "A Fuzzy-Logic based approach resorting to the concept of data quality is applied" I don't know what this means

How is backscatter differential phase addressed? Some of the "jumps" in Phidp raw are suspicious and suggest backscatter. . .

P. 7208

Line 3 "In advance" awkward

Line 7 "is" required before "shorter"

Line 18: one of the coefficients should be for "DP" the other for "H"

Line 22 "increasing rainfall regimes" – what does this mean?

P. 7209

C2228

Why use MP relation for R(Z) if you have all the DSD measurements – why not come up with a tuned R(Z) since your tuning R(Kdp) and the attenuation coefficients? It seems strange to use an "off the shelf" R(Z) but tuned a tuned R(Kdp) relation. . .

Line 19: "cold system"? you mean system with cold cloud top temps. . .

Fig. 3: Please include a description of lightning detection obs in lower left panel

P. 7210

Line 1: "azimuth average" is misleading if this is vertical incidence data

Line 3: "overpassed" - passed over. What is height of zero deg isotherm based on – bright band signature? Very weak in this case – is that due to vertical incidence?

Line 6: what does low rho_{hv} imply about the hydrometeor distribution – that particles are melting? If this is true, please say so in the manuscript

Line 8: what does VMI represent?

Can Fig 5 be enlarged? hard to see details Same for Fig. 6. Suggest removing contour lines and perhaps filtering – blowup region of interest. Details of Zh and rho_{hv} look odd in these cross sections – Zh attenuated but then recovers at farther range? Fig 7 = Kdp of 13 deg/km? is that real? What kind of rainrate is that?

P. 7211

Line 4: "swiftly decrease" swift decrease

Line 22: land sea breeze???

Line 27: need a "was" before "observed"

Rainfall analysis: please include units in Table 1. Is the comparison done against 1 gauge or multiple gauges? Hourly rainfall or some other time interval? Are these statistics good in the sense that they captured the gradients and amounts fairly accurately compared to other X-band QPE analyses?

C2229

