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Atmospheric Measurement Techniques Discussions

Interactive comment on "An overview of the lightning and atmospheric electricity observations collected in Southern France during the HYdrological cycle in Mediterranean EXperiment (HyMeX), Special Observation Period 1" *by* E. Defer et al.

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This manuscript describes the observations performed within the PEACH experiment in the framework of the HyMeX campaign, and specifically during SOP1. The different instruments used during SOP1, as well as the operational Lightning Location Systems and some results of specific observations are addressed.

The manuscript fits well within the scope of Atmos. Meas. Tech. and could be a valuable contribution to the literature. However, there are some issues that should be addressed:

Main comments:

- There is an excessive use of brackets "(...)" in the text, which makes it sometimes hard to read. To improve the readability of the manuscript, most of the text within the brackets should be incorporated within the text.

- Abstract: p8015 L18-L26 "A description of the different instruments ... are discussed." This text belongs to the Introduction section. The 'Abstract' should contain the results/outcome of the paper, and not just a description of the different Sections.

- 1 Introduction: p8019 L14-L19: I am missing the goal of this paper. The authors could provide a small paragraph at the end of the introduction containing what the authors want to bring to the scientific community with this paper, why has it been written? This is partly described in Sect. 2, but a short description is at place at the end of the Introduction.

- 2 The HyMeX program: p8020 L8: "Super sites". Explain a bit more what these sites are. How were these chosen? What makes them different from other sites? This is somewhat indicated in Sect. 3 L24 but could be described earlier.

- 3 The PEACH experiment: p8020 L20. Maybe one can start first with the goals of PEACH. For instance, part of Sect. 3.1. could be placed here to describe the scientific objectives.

- p8023: LMA, EFM, SLA are all described in a designated subsection. However, this is not the case for INR. Therefore, the authors could consider to include a subsection explaining the main parameters of the INRs, as has been done for the other instruments.

- 3.3 Operational Lightning Location Systems: The writing style of the subsections concerning the description of the OLLS is not coherent. The authors could slightly

rewrite these sections in order to converge the writing style of the OLLS subsections.

- Concerning the description of all the OLLS: It would be worth to include some LA and DE values + references, if possible within the region/neighborhood of HyMeX SOP1.

- 3.5 Modeling: This section is out of the scope of this paper and no further results are presented in this paper on the modeling aspects. Maybe the authors could just make a comment concerning the modeling efforts in stead of including sect. 3.5.1 and 3.5.2 in the manuscript. For instance p8034 L22-L26 can be removed to Section 5 Prospects.

- 4.1 SOP1 Climatology: The authors should include a bit more info on the climatology during SOP1: How many thunderstorm days were observed in the region of interest (describe Fig. 2), how many flashes have been observed during SOP1?, ...

Minor comments and proposed editorial changes:

Affiliations: Nowcast (with capital letter) and Météo-France (include hyphen)

Abstract:

- P8015 L1: The PEACH project (Projet ...) is the ...

- P8015 L7: During the HyMeX SOP1 (Special Observation Period) from 5 September to 6 November 2012, four ...

- P8015 L8: (OLLSs) under which ATDNET, EUCLID, LINET, ZEUS, and the ... + I think it is 'ATDnet' and not 'ATDNET'

- P8015 L23: Then, examples ...

- p8015 L24: Finally, future steps required for the delivery ...

1 Introduction:

- P8016 L10: ... ice particles, temperature and liquid water content.

- P8016 L16: However, such an electric field intensity is one order ...

- P8016 L19: or hydrometeor interactions present in high electric fields ...

- P8016 L22: exceeds a threshold: threshold is of the order of? Give an idea of this.

- P8016 L23: Hence, it is clear that the lightning activity of a thundercloud ...

- P8016 L26: occur in clouds, while ...

- P8016 L27: (positive) charge to the ground.

- P8016 L28: electromagnetic radiation when connecting to the ground.

- P8017 L2: connections to the ground (references?)

- P8017 L8: rephrase: 'A lightning flash then consists in a multi-scale physical process'

- P8017 L9: ... over large distances of a few km or more.

- P8017 L11: ... have been developed to detect and locate these ...

- P8017 L13: For instance, ...

- P8017 L14: ... borne sensors detect electromagnetic ...

- P8017 L21: rephrase: 'to provide the most comprehensive description for analyzing in details the lightning flashes', e.g.: provide the most comprehensive description in order to analyze in great detail ...

- P8017 L29: Flash rates ...

- P8018 L2: Flash rates reach a peak value ...

- P8018 L9: "(IC+CG)" already defined on p8017 L27 => can be removed

- P8018 L9: total lightning activity is a more ...

- P8018 L22: For instance, ...

- P8018 L24: ... in the pioneering model ...

- P8018 L25: Altaratz et al. (2005). Based on the references, it should be (2005), not (2003)

- P8019 L4: CRMs are the preferred modeling tools ...

- P8019 L8: ... and by Sounders et al. (1991). Those disagree ... (make a new sentence, original sentence is too long)

- P8019 L15: ... strategy of the HyMeX ...

- P8019 L17: Section 5 then discusses the perspectives ...

2 The HyMeX program:

- P8019 L23: ... and lead to expensive property damage.

- P8019 L24/L25: remove 'dedicated to the hydrological cycle in Meditarranean' since this is exactly what HyMeX stands for.

- P8019 L26: As part of this ...

- P8019 L27: ... during 2 months from 5 September 2012 to 6 November 2012 over the Northwestern ...

- P8020 L7: ... lidar, and rain gauges

- P8020 L10: Additionally, various

- P8020 L13 & L15: two times 'autumn', the last one on L15 could therefore be removed

3 The PEACH experiment:

- P8021 L5: ... geostationary satellites can offer ...

- P8021 L15: However, further ...

- P8021 L17: ... of the parent clouds ...

- P8021 L15-L20: Last sentences could be split into 2 sentences to improve readability.

3.1 Scientific objectives and observational/modeling strategy:

- P8021 L21: The scientific objectives, i.e. p8021 L22 – p8022 L18, could be removed and replaced at the beginning of Sect. 3. Therefore, the title could become '3.1 observational and modeling strategy'. Thus, p8022 L19 could be the new start of Sect. 3.1.

- P8021 L25: Who are member of the PEACH team, this hasn't been described yet.

- P8021 L26: and modeling-based scientific ... in relation to the HyMeX goals: ..

- P8022 L10: ... to HPEs and flash-floods ...

- P8022 L12: observations to improve monitoring

- P8022 L13/L14: try not to use "(...)"

- P8023 L3: (SLAs), as well as

- P8023 L6: Finally, ...

- P8023 L9: (MBA and MPA, respectively)

- P8023 L11: also includes a range of numerical ... + rephrase 'hosting or not a lightning/electrification scheme'

- P8023 L21: remove ', of course,'

- P8023 L23: In addition, ...

- P8023 L25: ... help to investigate ...

- P8023 L28: of the lightning flashes, as well as ...

- P8023 L29: ... tHunderclouds, allows ...

- General comment: 'in situ' or 'in-situ': be consistent throughout the paper

- P8024 L2: Finally, ...

- P8024 L7: As a result, ...

- P8024 L9/L10: three times ‘stage’ in 1 sentence is a bit too much. Make use of synonyms.

- P8024 L11: ... in conjunction with the operational network of Météo-France ...

- P8024 L13: start a new paragraph with: ‘In the following we ...’. However, this sentence is too long and could be split into 2 sentences: In the following we give some ... observations. Several other studies are underway to investigate the ...and rain patterns, as derived ... + However: ‘in the following’ is not true in this case: ‘in the following’ the instruments are described in Sect. 3.2, so text should be changed accordingly.

3.2.1 The HyMeX Lightning Mapping Array (HyLMA):

- P8025 L10: what are the errors at 300km?

3.2.3:MBA/MPS

- P8026 L3: (MBA) and a microphone array (MPA).

- P8026 L10: ... has a sensitivity of a few ...

- P8026 L24: The data from each sensor of the arrays were ...

3.2.4: EFM

- P8027 L8: include space between ‘etc. The’

- P8027 L9: ... due to the variety ...

- P8027 L11: ... irregularities, and the charge ...

- P8027 L17/L19: orientated -> oriented

- P8027 L15/L20: field mills / field-mills: be consistent

- P8027 L25: avoid “(...)”

3.2.5: VFRS

- P8028 L2: VRFS acronym has been already introduced earlier in the text, so no need to do this again.

- P8028 L23: scenario, e.g. location . . .of the storms, the VRFS . . .

3.2.6: Locations and status of the research instruments

- P8029 L12: Finally, ...

- P8029 L21: distributed to the HyMeX Community.

- P8029 L22: Additionally, ATDnet ...

- P8029 L23: to the HyMeX ...

3.3.2: EUCLID/Meteorage

- P8031 L9: As of August 2009: what is the present status during SOP1 of EUCLID/Météorage?

3.3.3: LINET

- P8032 L7: remove “(total lightning)”, since it looks now as if cloud strokes = TL

- P8032 L8: Typical baselines

- P8032 L12: is somewhat lower: any idea how much lower?

3.3.4 ZEUS

- P8032 L19 : remove ‘Very Low Frequency’, since the VLF acronym has been introduced already earlier in the manuscript

- P8032 L22/L23: remove ‘(‘ ... ‘)’

- P8032 L25/L26: use other word for ‘major’

3.4: Instrumentation during EOP and LOP

- General comment: Maybe this section can be moved to Sect. 5 'Prospects' section, since this paper deals only with SOP1 observations

- P8033 L3: For instance, ...

- P8033 L4: ... web site, while ...

- P8033 L5: are delivered to the HyMeX database.

- P8033 L6: '12 LMA': however, on p8029 L16: '11 stations' => make consistent

4.1 SOP1 climatology

- P8036 L7: Interestingly, this new ...

A regular IC

- P8036 L12: an example of a regular

- P8036 L13: What is meant with #06?

- P8036 L16: Do not use '(' and ')', just make it into a normal sentence. For instance: 'For more information on ... the interested reader is referred to Thomas ...'

- P8036 L17: rephrase: 'and distributed between 4 and 12 km height.'

- P8036 L19: msl? => asl?

- P8036 L23: propagated faster: as evidenced from?

- P8037 L2: Finally, ...

A regular negative CG

- P8037 L7: ... and the different OLLS, but ...

- P8037 L8: at close range of about 25 km by the VRFS instruments. VFRS has been

already explained, so 'FM and video camera' can be removed.

- P8037 L11: ... 1464 VHF sources derived from at least ...

- P8037 L17: rewrite a bit: ATDnet reported 7 events, whereas EUCLID identified 5 strokes ..., and LINET categorized 8 strokes as ...

- P8037 L23: ... close to each other ...

- P8037 L28: remove '('...')' in the text, the same for p8038 L4

- P8038 L6: FM should become EFM as defined first on p8023 L3, also on p8038 L12/L19

- P8038 L12: Additionally, the noisy EFM ...

- P8038 L28: For instance, ...

- P8039 L1: for a specific type of flash, ...

- P8039 L2: time in UTC?

- P8039 L3: the upper discharge splits in two parts, one progressing continuously upward ...

- P8039 L5: first at a constant altitude of 8 km during 50 ms before descending and ...

- P8039 L6: shows clearly several branches

- P8039 L10: Additionally, ... IC events a few ...

- P8039 L13: This example demonstrates ...

- P8039 L21: The HyMeX SOP1 data offers a unique opportunity to study ...

- P8039 L23: ... enough and well pronounced to be detected ...

- P8040 L5/L6: rephrase sentence: 'HyLMA suggests that ... extensive lightning flash'

- P8040 L18/L19: remove '(...)'

- P8040 L21 strokes/fixes into flashes

- P8040 L21: This unusual flash example demonstrates ...

- P8040 L23: Additionally, ...

- P8040 L24: Rephrase 'while others emanate from a single OLLSs'? What is meant here? Detected by only 1 OLLS?

Concurrent VHF and acoustic measurements:

- P8041 L7: (with one composed of a few ...)

- P8041 L9: one composed of a few

- P8041 L11: one composed of a few ...

- P8041 L12: Point forgotten at end of sentence: ... in the domain of interest.

4.2.2 Storm and regional levels:

- Rephrase title

- P8042 L5: Here we discuss some storms recorded ...

- P8042 L27: in 24 h, and reached locally levels of up to 30-40 mm in Ardeche.

- P8043 L8: in the evening of 23 September ...

- P8043 L26: ... system progressing eastwards ...

- P8044 L3: include explanation for 'while the CG flashes in the afternoon were mostly negative'?

- P8044 L19: Additionally, ...

- P8044 L21: (French Riviera), which offers ...

- P8044 L23: Finally, Fig. 9F ...

- P8044 L27: in the complex located at ...

- P8045 L5: ... from the same flashes ...

5 Prospects:

- P8045 L12: This task will help to refine ... (or will help refining ...)

- P8045 L24: Southeastern France and which will be used in ...

- P8046 L4/5: remove '(...)'

- P8046 L6: should then help to identify

- P8046 L10: performed in the near future to ...

- P8046 L13: ... May 2014 for a minimum of five years.

- P8046 L14: ... fall where electrical activity ...

- P8046 L16: Finally, ...

Table 1: 'Météo-France' and 'MBA/MPA'

Fig. 1:

- In the figure M1 and M1&M2 are not indicated correctly

- The white star in the box which is indicated now as MBA, should this become MBA/MPA?

Fig. 2:

- Indicate a) and b) in the figures

- In the text 'a)' should be replaced: '... climatology a) in terms of days with ...'

- '... as sensed by' => 'based on'

- What is written in between brackets ‘(about 0.3% ... climatology)’ should be written in the text and not in the caption of the figure.

Fig. 6: - Bolt-from-the-blue

Fig. 8:

- rewrite: ‘...recorded during between ...’

- (g): ...’available only for EUCLID and LINET with ...’: I see black stars for ZEUS as well

Fig. 9: Figures are too small to see

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