

***Interactive comment on* “Contribution of personal weather stations to the observation of deep-convection features near the ground” by Marc Mandement and Olivier Caumont**

Anonymous Referee #1

Received and published: 9 August 2019

Review of “Contribution of personal weather stations to the observation of deep-convection features near the ground” by Marc Mandement and Olivier Caumont (nhess-2019-229), submitted to Natural Hazards and Earth System Sciences (NHESS).

Summary:

The paper describes four big-impact weather events in detail, where the authors show the added benefit of using temperature, pressure and relative humidity observations

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by Netatmo personal weather stations in addition to the standard weather station networks. The increased detail that can be obtained is demonstrated both quantitatively and qualitatively, provided the PWS observations are properly quality controlled, for which a successful method is proposed. This is a very important topic, as high resolution weather monitoring is useful both for (urban) operational applications and for validation of numerical models, and this data source shows a lot of potential.

The article is well written with figures of high quality. Both the structure of the paper and the figures/schematics are helpful in the clarity of the overall manuscript. The message that PWS observations improve the resolution at which weather events can be described is founded in a complete and well-reasoned analysis. I recommend this manuscript to be published after minor revisions, taking into consideration the following comments.

Major comments:

- Section 4.1: the method relies considerably on the notion that the reported elevation of the PWSs are accurate. Do the authors have any idea how valid the assumption is that the reported PWS altitudes are correct?
- Section 4.4: the quality control seems to be based on checks where time series of a PWS are compared with those of SWS. This seems to be based on time series over the complete event and can therefore only be performed afterwards. The authors could consider a variation of the method that could be applied in real-time, or comment on the possibility of operational implementation in the discussion.

Minor comments:

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- P2, line 8: comma after 'evolution'.
- P2, line 13: consider using 'Additionally,' instead of 'Also'.
- P2, line 19-20: should there indeed be two citations?
- P2, line 23: 'leaded' should be 'led'.
- P2, line 26: 'establish' should be 'establishing'.
- P2, line 31: de Vos et al. (2017) uses precipitation data retrieved from the Wundermap platform, not the Netatmo platform, and only part of PWSs are of type Netatmo. The paper does discuss Netatmo precipitation measurements in particular in an experimental context evaluating 3 Netatmo gauges. This sentence may be adjusted to reflect that. You could consider referencing de Vos et al. (2019) doi:10.1029/2019GL083731, which focusses on precipitation measurements from Netatmo PWSs only.
- P3, table 1: consider replacing 'Hour of...' for 'start time' and 'end time', as the periods don't start or end at a rounded clock hour.
- P3, line 4: consider leaving out ', focussing'.
- P3, line 10-14: the section references are incorrect.
- P3, line 24: 'the 26th'
- P4, line 1: no 'the' before 25.
- P4, line 3: 'However' instead of 'But'.
- Section 2.1 – 2.4: very well explained and informative. However, no source is provided for the number of fatalities, rescue operations, etc. This (likely a news archive?) may be mentioned once in the beginning of the section.

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- P10, line 11: 'Netatmo provided in near real time only 10 min time step measurement', how does this follow from the previous statement that the mean time step is 5 min?
- P11, line 4: 'linear interpolation': does this mean that a measurement is attributed to the 10 min time stamp it is closest to in time? Or is a weighted average constructed? How are data gaps handled in that case? Some more information would be desirable.
- P11, line 11: Some more background on the field tests, i.e. the duration, would be desirable. It may also be constructive to mention some quantitative errors found in other papers for comparison, see e.g. Fig 2 in Meier et al. (2017) doi:10.1016/j.uclim.2017.01.006.
- P12, Figure 7: the figure is very helpful in clarifying the method. I would prefer to replace 'x' by a dot, as it reads as a letter instead of a multiplication sign.
- P12, line 4: 'The radius is larger for pressure because it is the minimum radius allowing to cover the entire Metropolitan France' is this because of the low number of SWSs that measure pressure, and are therefore the ranges of SWSs and PWSs the same? Is there a different expectation in spatial variability for each of the variables, and if so, is that also a factor to consider when determining the range?
- P13, line 25: the citation should be '(de Ruiter, 2016)' as Tom is a first name.
- P14, line 8: do the authors mean that altitude varies with spatial distance and therefore values grid points at a some distance may differ from the value at the station?
- P14, line 28: 'less than half of the measurements are available': when are measurements not available? Given the linear interpolation of time lines, how large

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- should a data gap be to result in an unavailable 10 min interval? (This can be explained on P11, not necessarily here.)
- P15, line 22: 'tends to' should be replaced by 'approaches'.
 - P18, line 11: is the reference to Sect. 6 correct?
 - P18, line 28: for clarity the authors may choose to change '73
 - P18, line 30: 'on average' instead of 'in mean'.
 - P19, line 3: 'the increase' instead of 'increase'
 - P19, line 12: 'in mean' should be replaced by 'on average'.
 - P20, line 9: for clarity the authors may choose to change '17
 - P20, line 11: 'in mean' should be replaced by 'on average'.
 - P21, Figure 10: consider increasing the symbol size in subfigure (a) for improved readability.
 - P27, line 5-6: 'Two PWSs ... extension southwards.' Sentence is unclear, please rephrase.
 - P33, line 13: citation lacks 'W.', see the 2018 citation below.

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