Atmospheric
Measurement
Techniques

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Discussions

Interactive comment on
"Cézeaux-Aulnat-Opme-Puy De Dôme: a multi-site for the long term survey of the tropospheric composition and climate change" *by* Jean-Luc Baray et al.

Anonymous Referee #1

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The paper summarizes long term measurements at a cluster of sites around the puy de Dome near Clermont Ferrand in Central France. It describes the geography of the site, the (history of) deployments of various instruments and the measurement techniques used. It synthesizes major results obtained from the observations and places them into the context of other EU sites. In my mind, the paper is interesting to publish in AMT, because it gives a good review of observations available at this internationally recognized site. This will be useful for the AMT readership. Before publication, the authors should take into account several general and specific remarks:

1) The data availability is generally not discussed. This is not in line with current practice, and it is even more required for this review paper which has among its aims to better document the available data sets for a more widespread use. The procedure to download available ta sets has to be given.

2) A section should be added which shows the type of encountered air masses at the sites, and in particular the PUY site. What are the geographic origins, which part is free tropospheric and from the boundary layer. How does local pollution from Clermont Ferrand affect the site. Are there any small scale meteorological studies adressing this question ? Part of information is given in the results sections, but should be grouped in a section prior to it.

3) For all instruments and geophysical variables, information about measurement periods and frequencies, detection limites and uncertainties should be given in synthetic tables.

4) Carefull rereading of the paper is still required. I have corrected several grammer errors, but surely not all.

5) Specific remarks :

P6li190 Âń 5 Technical description of observation systems Âż At the beginning of this paper I would like to see a small overview of the measurement gements, roughly corresponding to the titles of the sub-sections.

P6li193 Âń After preliminary . . .. Âż In this paragraphe, it seems implicitly that aerosol is mainly sampled in cloudy air masses. The sampling strategy needs further explanation.

P8Li255 Are there calibration procedures for ACSM or OC/EC ?

P12l370 VOC measurements What are the storage times for the cartridges, and what are the precautions for sample stability ?

P18li561 6.1 Trace gases I think, it would be better to regroup the GHG measurements

mentionned in the beginning and the end of the section. For each result on tendencies and seasonal variations, it would be interesting to state the particularity of results at PUY (if there ary any) with respect to other European sites.

The impact of local and remote sources on trends and variability should be stated, this is related to the height of the boundary layer. For which source area is this recptor site representative ?

P18, li574 Âń …., while its primary precursors like NOx has significantly decreased (not shown). Âż This implies that the seasonal variation should become less marked over time, due to less phochemisatry in summer and less titration in winter. Is that what the autors want to state? Can this be derived from figure 8 (from visual quick inspection : might be tru, but not sure whether statistically significant?

Âń This feature is consistent with the ozone trend reported at surface stations within the EMEP network between 1990 and 2012. Âż What feature is meant here ?

P18li583 Âń The analysis of the 3-years atmospheric time series revealed how the planetary boundary layer height drives the concentrations observed at PUY. Radionu-clide measurements are used to determine the boundary layer / free tropospheric con-ditions. The CO2 surface flux are estimated and revealed a clear seasonalt cycle, under the influence of plant assimilation, and burning of fossil fuel. Âż

For these Âń one sentence statements Âż about results, are there publications and reports available ?

P19Li594 : Âń The variability of atmospheric aerosol at PUY shows a marked seasonal variation with a maximum during the summer, Âż Could the authors be more precise on the aerosol property concerned : PM mass, of which diameter, specific compounds, or particle number ?

P19Li594 : Âń as well as a non-negligible impact of nucleation (or new particle forma-tion (NPF) events) on the particle size distribution Âń This argument should be apart

from the previous one, probably about aerosol mass.

Page19li604 : Âńcoupled with the atmospheric dynamics captured by the LIDAR lo-cated at Cézeaux Âż I think the above peri-phrase can be deleted, because there is no clue about what lidar mesaurements contributed to the analysis. Else, please explain more the of lidar measurements.

P20li631 : Âń In particular, the general trend is a significant decrease of the daytime aerosol diffusion coefficient during summer and autumn (Pandolfi et al., 2018). Âż It is not clear in this sentence, that a long term evolution is meant. What is the time scale ? P20li634 : Âń This trend is in line with aerosol mass (PM) decay observed at European level, in relation to SO2 emission regulations. Âż What is then the contribution of sulfate to PM ?

P20li634 : Âń and higher elevation sites or ocean-influenced air masses contain a larger fraction of highly hygroscopic aerosols (sea salts). Âż This is not clear, so for PUY is the larger hygroscopicity related to oceanic air mass origin.

P22LI689 : Âń This long term observation of cloud biological composition is a unique worldwide database. Âż Where are these data (and others) available ?

P23LI736 : Âńthat the urban layer Âż the presence of such a layer should be explained much earlier, in a section about the air mass origin of the observations.

P24LI764 : Âńatmospheric compartments in order to identify the dynamical links and the strength of their exchanges Âż Are there Rn measurements that could be exploited to detect the PBL origin of air masses ?

P24LI780 : Âńcharacterize reactive (NO3 -, SO4 2-, NH4 + and K+) …. species transfer Âż Are there systematic measurments of rain water composition, which allow documenting their long term evolution ?

P24LI783 : Âńwe observed a seasonality of the washout ratio for radionuclides, with higher value in winter and lower value in summer. Âż A possible reason for this ?

P37-40, tables 1,2,3 : Âń Laboratory Âż It should be something like Âń if other than LAMP or OPGG or so. The tables should contain in additionmore some more specifications : time periods and frequency of measurements (not just starting date), detection limit and uncertainty, site where data base is available.

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2019-383/amt-2019-383-RC1-supplement.pdf