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Comment

## ***Interactive comment on “Seasonal variation of aerosol size distribution at Puy de Dôme (1465 m a.s.l., central France)” by H. Venzac et al.***

**Anonymous Referee #2**

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The article evaluates one year of atmospheric particle number size distribution measurements in the 10 - 500 nm size range in particle diameter, conducted at Puy de Dôme observatory in Southern France by means of a Scanning Mobility Particle Sizer (SMPS). The one-year dataset is placed in a year-to-year context using a 4-year time series of integral particle number concentration. The particle size distribution data is analysed statistically with respect to diurnal and seasonal variations, and typical, parameterised average size distributions are provided for comparison with numerical models. For the cases of free tropospheric air, trajectory calculations are deployed to assess the horizontal origin of the air masses, also discriminated by season.

The article's concept is plausible, and the article constitutes an important piece of input for initialising and validating climate models that include explicit representations of the

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atmospheric aerosol component. It is therefore worth publishing.

Despite the clarity in concept, the article suffers from sloppy use of the English language and imprecise use of scientific terminology, scattered throughout the text. Some examples are included in the specific comments section, but cases are not limited to these examples. The article would certainly benefit from a language overhaul and assistance by an English native speaker.

Specific Comments:

page 15795, line 6: "..., and second, because mountain site are often influenced by long-range transport rather than local sources, ..." should be "..., and second, because mountain sites are often influenced by long-range transport rather than local sources, ..."

Section 3.1 and further: It is not specified whether concentrations are given for ambient or standard conditions of temperature and pressure. The authors should at least state the volume reference used or, preferably, use standard conditions of temperature and pressure throughout the article to allow for easy comparison with other measurements and models.

Page 15799, line 6-7 and further: The terminology used here is not precise enough. A log-normally distributed particle size distribution is characterised by its modal median diameter, its geometric standard deviation, and its integral number concentration. The authors should use these more specific terms here and throughout the rest of the article.

Page 15799, lines 8-16, Table1: The statement that a variation between 1.4 and 1.7 in the modal geometric standard deviation is not significant is certainly misleading. Even small variations in this parameter influence the shape of a log-normally distributed particle size distribution significantly. In the following lines, the authors discuss seasonal and diurnal variations of the nucleation mode median particle diameter. It would be

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helpful if this information was included for the other particle modes as well and assessable by the reader, e.g. by including the diurnal variation of the modal parameters in Table 1.

Page 15799, line 23: "The mode of Aitken particles is constant at 54-55 nm, at all time scales." This sentence is phrased rather sloppy. It should be rephrased using more precise terms like "Aitken mode median diameter".

Page 15799, line 26: "At last, the accumulation particles are found with a mode between 135nm and 145nm and ..." Also this sentence should be rephrased more precisely.

Page 15801, line 5: The authors did certainly not use the whole ECMWF institution for their study, but a certain product provided by the ECMWF. This product and its use should be specified, and the abbreviation ECMWF used more precisely throughout the section.

Page 15801, line 25: "Brünt-Vaisala" should be "Brunt-Väisälä"

Page 15803, line 7ff: "Three-days back trajectories endpoints number density calculated using ..." should be "Three-day back trajectory endpoint number densities calculated using ..."

Page 15803, line 20: "The comparison of air mass trajectories density for different seasons shows ..." should be "The comparison of air mass trajectory densities for different seasons shows ..."

Page 15805, line 3: "... the surface during summer as respect to winter can ..." should be "... the surface during summer as compared to winter can ..."

Page 15805, line 10: "As a result, we can, from this work, provide typical aerosol size distribution in the free ..." should be "As a result, we can, from this work, provide typical aerosol size distributions in the free ..."

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Page 15808, line 6 f.: "... about half the concentration of continental aerosols are in the ..." should be "...about half the concentration of continental aerosols is in the ..."

Page 15809, line 11: "Five years data of total ..." should be "Five years of data of total ..."

Figure 4: It is stated in the article that the size range of the used SMPS instrument extends from 10 nm to 500 nm particle diameter. In the left panel of Fig. 4 however, the winter particle size distribution extends beyond these bounds. Is this a boundary condition of the SMPS inversion algorithm used? The authors should give a reason for this extended size range, and also use section 2 to provide some more specifications about the inversion technique.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 15791, 2008.

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