

Interactive comment on “A European aerosol phenomenology-6: Scattering properties of atmospheric aerosol particles from 28 ACTRIS sites” by Marco Pandolfi et al.

Anonymous Referee #2

Received and published: 9 February 2018

GENERAL REMARKS

The manuscript approaches a European aerosol phenomenology on scattering properties of atmospheric aerosol particles from 28 ACTRIS sites, based on measurements with various types of integrating nephelometers. The manuscript focuses exclusively on ACTRIS sites in Europe, with the addition of Arctic and Antarctic stations and one mountain station in Bolivia, operated jointly by ACTRIS and local partners. The efforts for bringing this extensive data set together are huge and the richness of data is the major contribution of this work to an important scientific discussion on the long-term evolution of extensive and intensive aerosol properties in industrialized and rural re-

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gions of the world. However, in its current version, the manuscript is very difficult to read and it is hard to follow any story line of the paper. Major revisions are required to make this manuscript acceptable for publication in ACP.

Major concerns refer to the organization of the manuscript, presentation of results and lacking of joint in-depth analyses of the observations in combination with existing publications on the long-term evolutions of aerosol optical properties.

Before resubmission of the manuscript, the following concerns should be considered:

1. Organization of the manuscript and the presentation of results:

- The abstract is far too long and requires substantial shortening.
- The results sections in Chapter 3 require a substructure to become more readable. Currently, paragraphs are too long and there is no line of arguments the reader can follow. Instead the paragraphs are highly descriptive and do not point at the key messages of the data analyses. In its current form, the reader likely misses a large part of the information contained in this manuscript.
- The conclusions section is not well structured and a lot of information may get lost. Sharpening and shortening of this section is recommended. Finally, what are the key points of the presented work? This should be clearly expressed.

2. Consideration of published results on the long-term evolution of aerosol optical properties:

Although previous studies on aerosol scattering properties (see, e.g., Andrews et al. (2011), Collaud Coen et al., (2013) and Zanatta et al., (2016)) are mentioned in the text, they have been included into the discussion only briefly. A discussion is missing (or got lost due to the current organization of the manuscript) whether the results presented here are in agreement with the published results, or whether they provide new findings, and then the question would be: where do differences come from? Finally, the discussion of the evolution of aerosol light scattering properties together with light

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absorption properties published in Zanatta et al. (2016) is completely missing.

MINOR COMMENTS

1. In section 2.2.2.1, the applied truncation correction is described. For light absorbing aerosol (single scattering albedo < 0.8) a method proposed by Müller et al. (2011) is applied. However, Massoli et al. (2009) presented a correction scheme particularly for light-absorbing aerosols measured with the TSI Model 3563 Integrating Nephelometer. It should be briefly discussed why this approach has not been applied at the stations running TSI Model 3563 instruments.

2. In section 2.2.2.3, wavelength adjustments were conducted for sites where multiple-wavelengths data do not exist. For that purpose SAE values were prescribed (1.5 for FKL and SIR and 2.0 for CMN). The choice of these SAE values should be justified.

3. Before resubmission, checking of the language by a native speaker is highly recommended.

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