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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Continental pollution in the Western Mediterranean basin: large variability of the aerosol single scattering albedo and influence on the direct shortwave radiative effect" *by* C. Di Biagio et al.

Anonymous Referee #2

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The manuscript by Di Biagio et al. presents particle number size distributions, aerosol scattering and absorption coefficients and the derived quantities, which were performed in the course of the seventeen flights during the TRAQA campaign. The objectives of the paper solves a well-defined questions: what is the heterogeneity on the optical properties in the Mediterranean Basin? and, how the observed variability is influencing in the evaluation of the radiative efficiency? To response these two questions, an analysis of the single scattering albedo is used.

The topic of the paper is suitable for ACP, the paper is well written and structured, the

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Discussion paper

experimental approach is sound, and the data interpretation is reasonable. Then, the reviewer recommends the manuscript for publication with minor revisions: for which I give some suggestions below.

Specific comments:

Line 268: Please, modify the sentence: 'The total particle number concentration in the Aitken (4nm-0.1 um; dNAitken)...' to 'The total particle number concentration in the ultrafine (4nm-0.1nm; dNUFP)...'. It is because nucleation mode is (4-30) nm and Aitken mode is (30-100)nm. Nucleation+Aitken modes is called the ultrafine mode (UFP= UltraFine Particles). Modiify the term dNAitkento dNUFP throughout the manuscript.

Line 387: please, check the reference section. Some references are missed (e.g. Toledano et al., 2007).

Lines 421-422 and Table 3: include the correlation coefficient between observed and fitted size distribution with the aim to analyze the goodness of fit function value.

Seccion 4.2 and Figure 3: Number and volume size distributions in terms on the different air mass origin will be welcome.

Lines 430-433: The single scattering albedo increasing with wavelength may also suggest a desert dust contribution. For dust particles, the scattering is fairly constant with wavelength so the SSA matches the decrease in absorption with wavelength (e.g. see Bergstrom et al., 2007 in ACP).

Figure 5: What is the meaning of the horizontal bars? Please, indicate in the Figure legend.

Figure 6: please, check the comment for Figure 5.

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