

Interactive comment on “Saharan dust events at the Jungfrauoch: detection by wavelength dependence of the single scattering albedo and analysis of the events during the years 2001 and 2002” by M. Collaud Coen et al.

S. Martin (Editor)

scot_martin@harvard.edu

Received and published: 13 January 2004

Editor Comment: These comments from a third referee have been received a little late (one day after official closing date of open discussion), but they should still be taken into account.

Review of manuscript by Coen et al. §Saharan dust events at the Jungfrauoch: Detection by wavelength dependence of the single scattering albedo and analysis of the events during the years 2001 and 2002†.

The manuscript reports the measurements of the absorption coefficient performed with

an aethalometer and scattering coefficient measured with an integrated nephelometer at the high alpine research station in the Swiss Alps from March 2001 to December 2002. Based on those data, the single scattering albedo (SSA) as a function of the wavelength were calculated for dust and dust-free atmospheric conditions. The Authors also report TSP measurements which were used to evaluate the contribution of dust to total suspended particulate matter. The main conclusions are that the spectral dependence of SSA has a distinct features in the presence of dust that can provide a good criteria for discriminating between dust and dust-free aerosol loadings.

My major concern is that not any discussion of the accuracy of SSA calculations are provided. Since the spectral SSA is the key part of the manuscript, it would be important to provide a detailed analysis of the uncertainties and errors pertinent to measurements of the absorption and scattering coefficients. Given numerous well-known problems in using the nephelometer and aethalometer for dust studies (e.g., recent results from ACE-Asia and PRIDE), this analysis would be required to support the main conclusion made by the Authors regarding the specific spectral dependence of SSA for dust. At least the error bars must be shown in Figures 1 and 2.

Some major issues that shall be address are as follows: 1) How to correct the scattering coefficient for the truncation error for the case of dust because the method developed by Anderson and Ogren (1998) is not appropriate for this case. Strictly speaking, one needs to know the scattering phase function of the nonspherical dust particles but this parameter remains uncertain. 2) Assessment of the absorption coefficient using Eq.[1] requires more justification. My main concern is how the empirical factor C is estimated. The authors cited the study by Weingartner et al (2003) in which this factor determined for several types of soot aerosols at 450 and 660 nm. One can argue that for dust this factor can be very different and have different wavelength dependence in the range of wavelengths from 370 to 950 nm. All the above issues control the resulting spectral dependence of SSA and thus need to be addressed.

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