Supplementary material.

Fine and coarse dust radiative impact during an intense Saharan dust outbreak over the Iberian Peninsula. Part I: Short-wave direct radiative effect

María-Ángeles López-Cayuela[1], Carmen Córdoba-Jabonero[1*], Michaël Sicard[2, #], Jesús Abril-Gago[3,4], Vanda Salgueiro[5,6], Adolfo Comerón[2], María José Granados-Muñoz[3,4], María João Costa[5,6], Constantino Muñoz-Porcar[2], Juan Antonio Bravo-Aranda[3,4], Daniele Bortoli[5,6], Alejandro Rodríguez-Gómez[2], Lucas Alados-Arboledas[3,4] and Juan Luis Guerrero-Rascado[3,4]

[1]Instituto Nacional de Técnica Aeroespacial (INTA), Atmospheric Research and Instrumentation Branch, Torrejón de Ardoz, 28850-Madrid, Spain
[2]CommSensLab, Dept. of Signal Theory and Communications, Universitat Politècnica de Catalunya (UPC), 08034-Barcelona, Spain.
[3]Andalusian Institute for Earth System Research (IISTA-CEAMA), 18006-Granada, Spain
[4]Department of Applied Physics, University of Granada (UGR), 18071-Granada, Spain
[5]Institute of Earth Sciences (ICT) and Earth Remote Sensing Laboratory (EaRSLab), Évora, Portugal
[6]Department of Physics, University of Évora, 7000-671, Évora, Portugal
[#]Now at: Laboratoire de l'Atmosphère et des Cyclones (LACy), Université de La Réunion, Saint Denis, France

Correspondence to: Carmen Córdoba-Jabonero (cordobajc@inta.es)
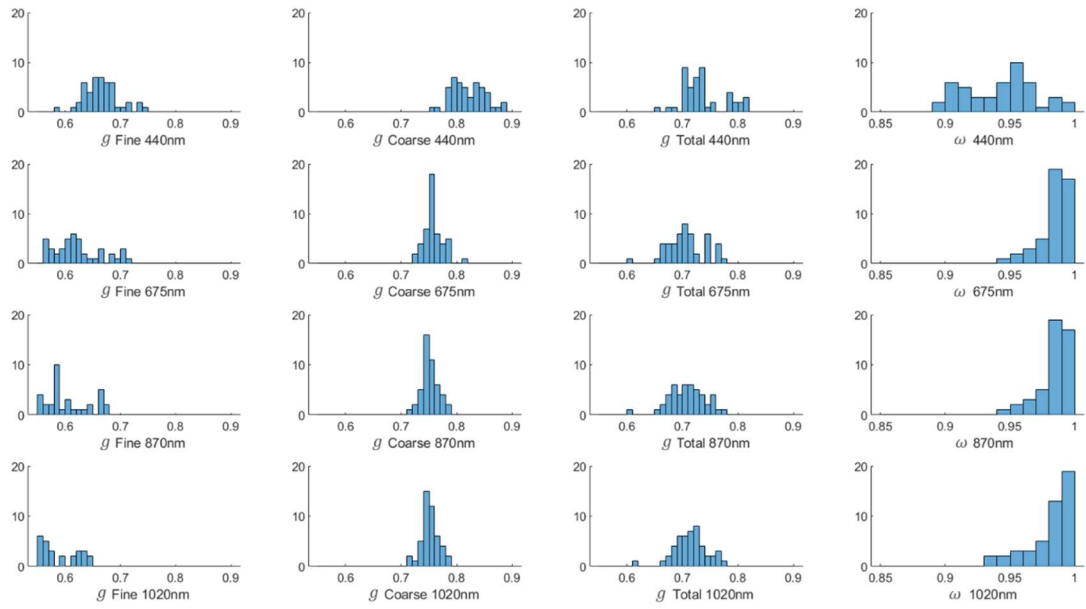
20   **Figure S1. Histogram of the optical properties (g and ω) at the wavelengths 440 nm, 675 nm, 870 nm and 1020 nm at ARN station.**
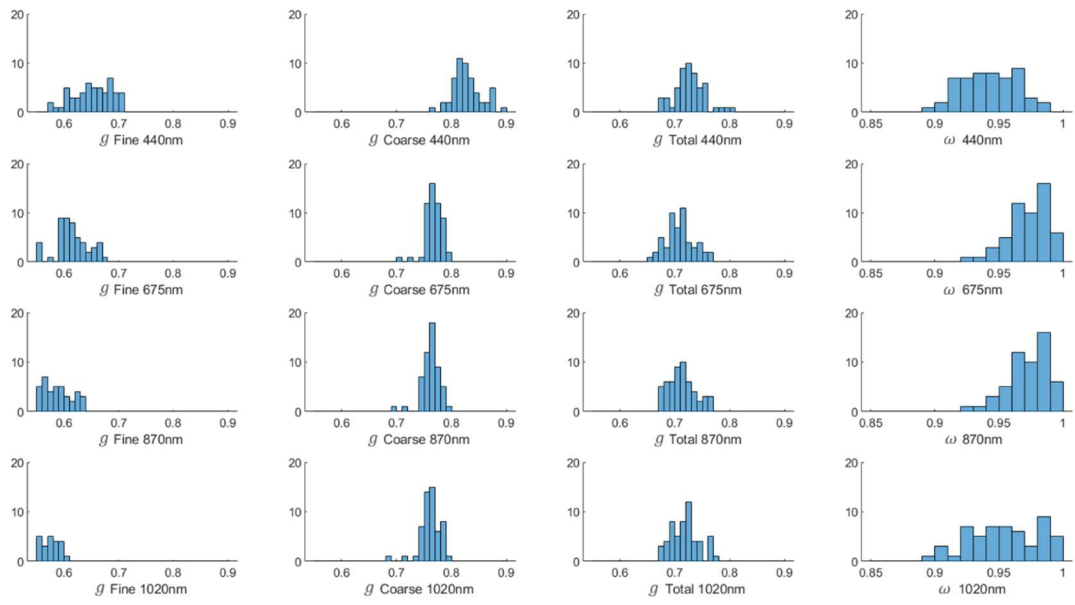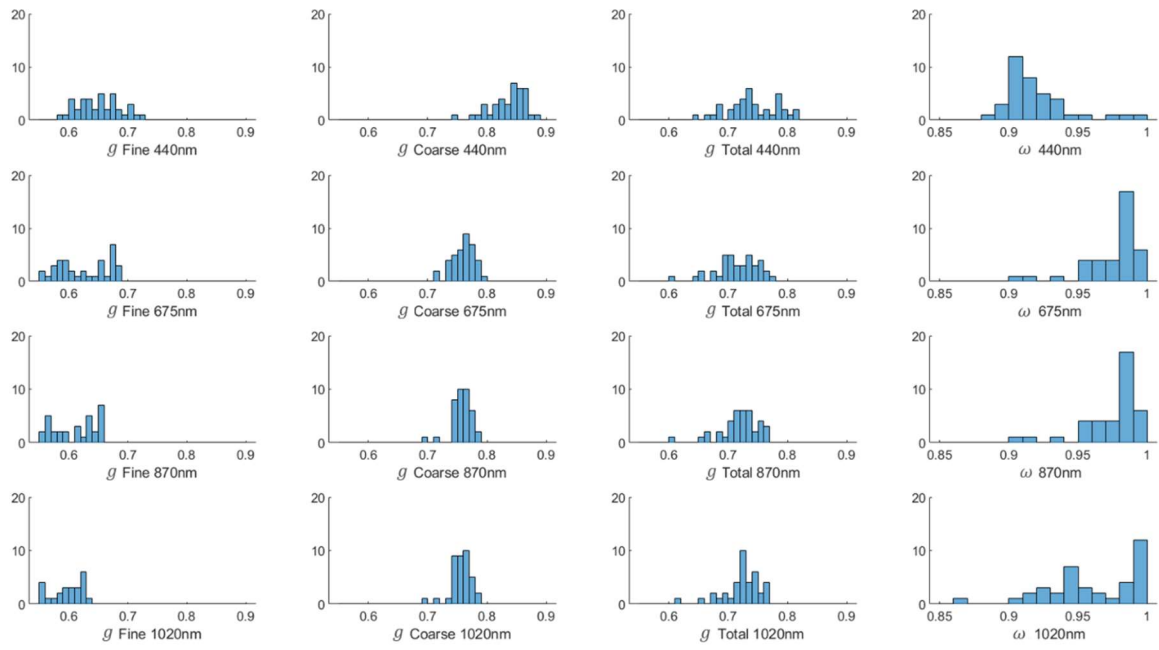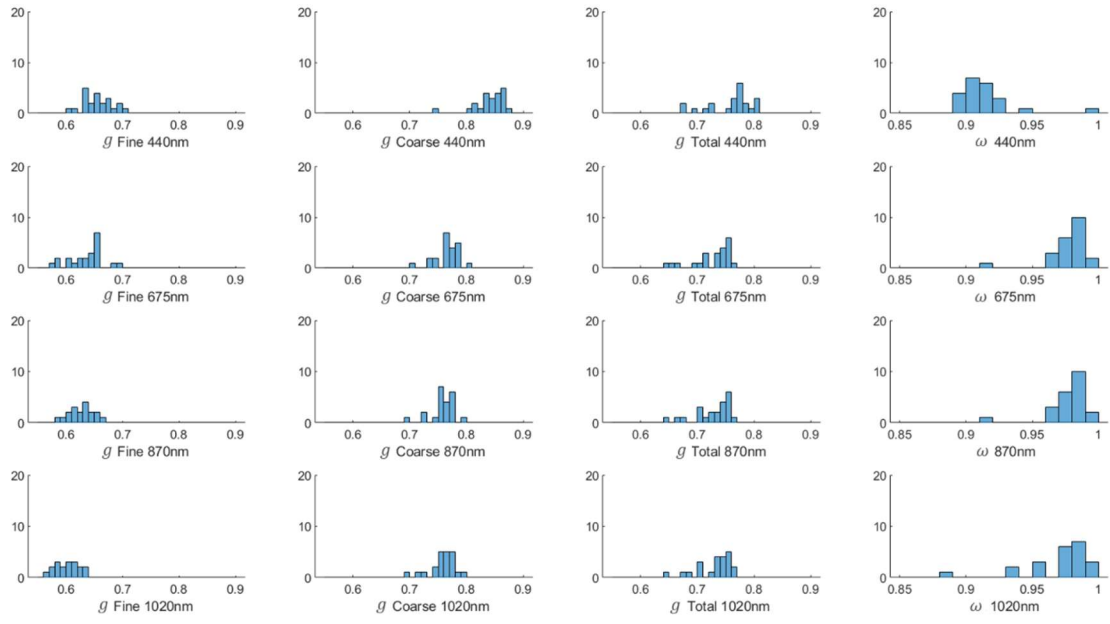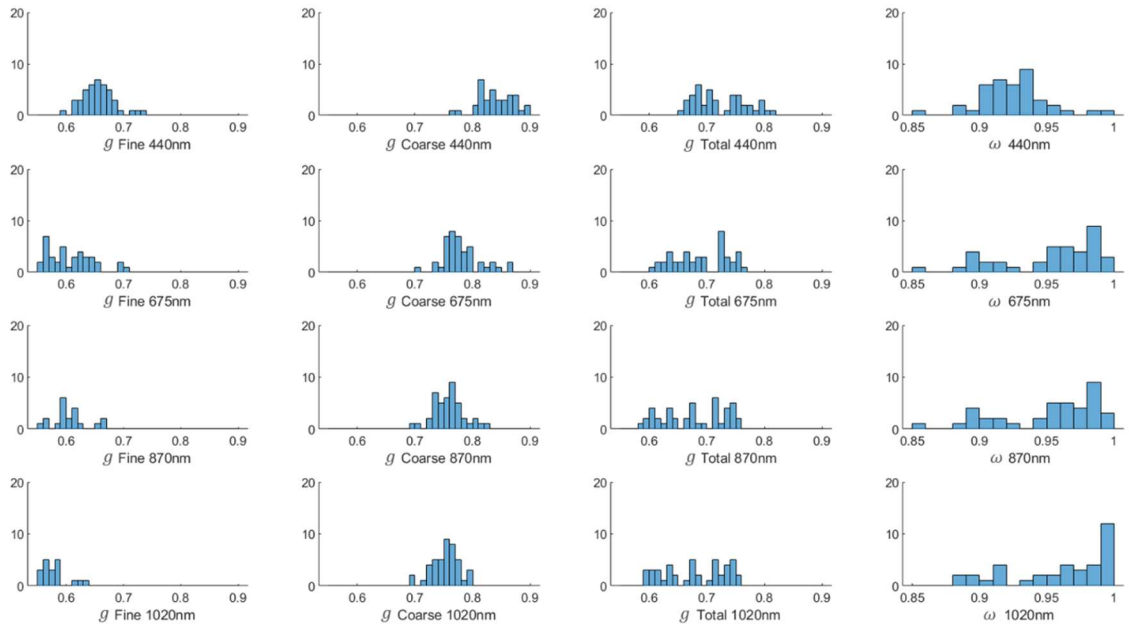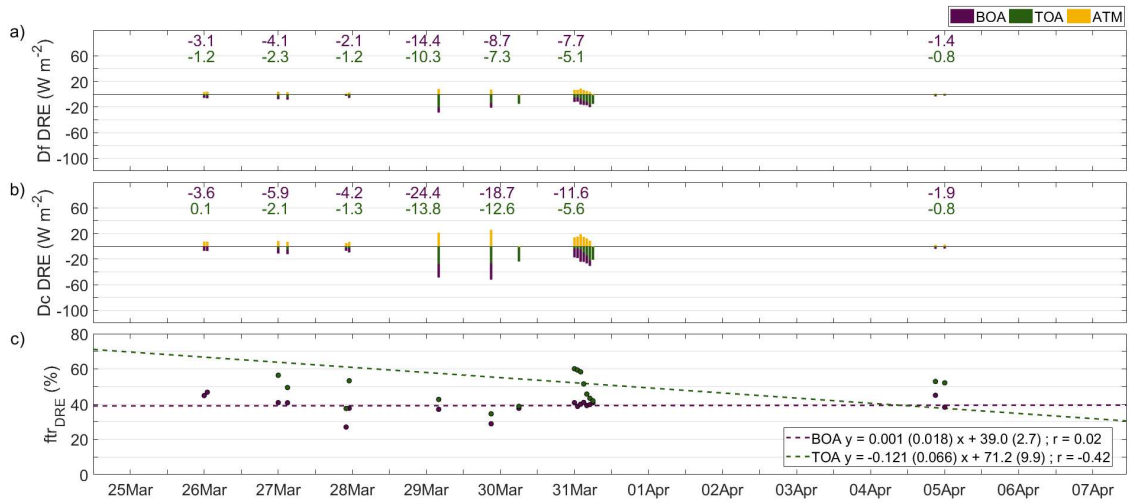
Figure S2. Same as Fig. S1, but at GRA station.

25

Figure S3. Same as Fig. S1, but at EVO station.

30

Figure S4. Same as Fig. S1, but at TRJ station.

35

5

Figure S5. Same as Fig. S1, but at BCN station.

40

Figure S6. Hourly-average dust direct radiative effects (DRE, Wm⁻²) at BOA (purple), TOA (green) and in the atmosphere (yellow) in GRA station for (a) dust fine and (b) dust coarse modes. The daily mean values are also included above the bars, with their corresponding colour. (c) Fine-to-total (Df/DD) ratio of the hourly-average dust DRE (ftr_DRE) at BOA (purple) and TOA (green). A linear fit was calculated between 26 March and 5 April. Both linear fittings and correlation coefficients are included in the legend. The standard deviation of the slope and intercept are shown in brackets. The absolute increase in ftr_DRE ratio (δDRE) of +0.001 % h⁻¹ (-0.121 % h⁻¹) is equivalent to an increase (decrease) of +0.02 % day⁻¹ (-2.9 % day⁻¹) at BOA (TOA).

Figure S7. Same as Fig. S6, but at EVO station. A linear fit was calculated between 26 March and 5 April. Both linear fittings and correlation coefficients are included in the legend. The standard deviation of the slope and intercept are shown in brackets. The absolute increase in ftr_DRE ratio (δDRE) of +0.018 % h^{-1} (+0.028 % h^{-1}) is equivalent to an increase of +0.77 % day^{-1} (+0.64 % day^{-1}) at BOA (TOA).
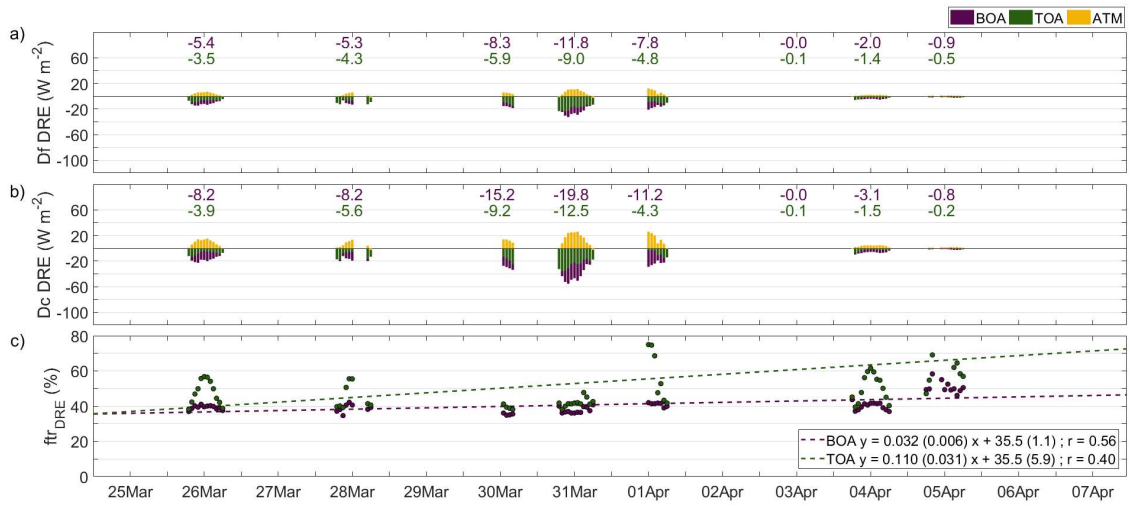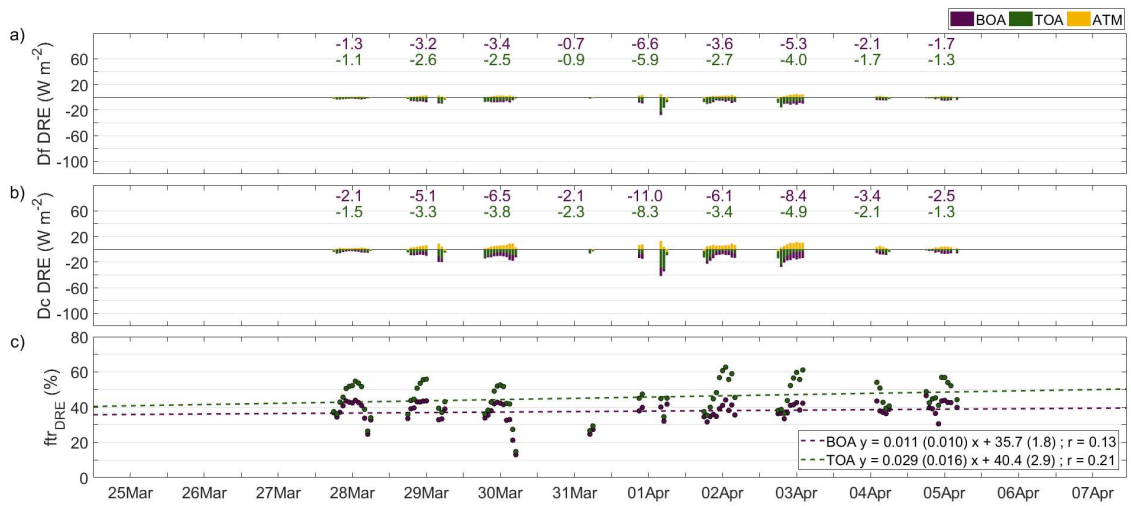
Figure S8. Same as Fig. S6, but at TRJ station. A linear fit was calculated between 26 March and 5. Both linear fittings and correlation coefficients are included in the legend. The standard deviation of the slope and intercept are shown in brackets. The absolute increase in ftr_DRE ratio (δDRE) of +0.032 % h^{-1} (+0.110 % h^{-1}) is equivalent to an increase of +0.77 % day^{-1} (+2.64 % day^{-1}) at BOA (TOA).

Figure S9. Same as Fig. S6, but at BCN station. A linear fit was calculated between 28 March and 5 April. Both linear fittings and correlation coefficients are included in the legend. The standard deviation of the slope and intercept are shown in brackets. The absolute increase in ftr_DRE ratio (δDRE) of +0.011 % h^{-1} (+0.029 % h^{-1}) is equivalent to an increase of +0.26 % day^{-1} (+0.70 % day^{-1}) at BOA (TOA).