

Interactive comment on “African dust outbreaks over the western Mediterranean basin: 11 year characterization of atmospheric circulation patterns and dust source areas” by P. Salvador et al.

Anonymous Referee #2

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In the present study, Salvador et al. present a statistical classification of atmospheric circulation patterns that result in transportation of African dust over western Mediterranean. Four distinct patterns have been identified using in-situ PM₁₀ measurements from nine regional background (RB) stations at the Iberian peninsula and ERA-Interim ECMWF reanalysis data. A backward trajectories method is afterwards used to correlate each circulation pattern with transportation of dust from specific African dust source areas. These findings provide important contribution to our knowledge on dust processes and could be used as a reference for future dust studies in the greater

C775

Mediterranean area. Overall, the manuscript is well written and I recommend publication in ACP after some minor revisions.

Minor comments:

1. Dust load is usually referring to integrated columnar dust concentrations ($\mu\text{g}/\text{m}^2$) rather than surface dust measurements ($\mu\text{g}/\text{m}^3$). This may lead to misconceptions especially when describing computation of dust loads from surface measurements. Due to low deposition velocities and high elevation of dust plumes, the measured mineral PM₁₀ may be related to dust clouds arriving at the vicinity of the station during a time frame of 1-3 days. Thus, without accompanying information on the vertical structure of the dust cloud one cannot easily interpret PM₁₀ measurements to atmospheric dust load. For example, a detached dust layer elevated at 1 km height – with obvious implications for radiative transfer - could not be identified solely from air quality measurements. Please clarify on this.
2. p.5500, l.1 (and elsewhere). Omit “topography” or replace with “pressure level”
3. p.5500, l.15. Replace “The” with “This”
4. p.5508, l.8. “A shift of the North African high to the west” - The shift in Figure 2b is probably to the east.
5. p.5508, l.21. Correct “Argelia”
6. p.5510, l.16. How can Atlantic air masses be associated with both higher precipitation and dryer conditions across southern Europe?
7. Please clarify what you mean by dust load in Figure 7.
8. p.5514, l.3. Please number appropriately the four images in Figure 8 (i.e. a,b,c,d).
9. p.5515, l.24. “Displacement to the west” should probably be “Displacement to the east”.

C776

10. p.5516,l.21. Rephrase “their prediction and analysis of aerosol properties” to “forecast and analysis of aerosol properties”.

11. It would be interesting to provide also some comments on the possible differences in dust chemical composition and how this is related to the origin of the particles.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 5495, 2014.