**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Transport of desert dust mixed with North African industrial pollutants in the subtropical Saharan Air Layer" *by* S. Rodríguez et al.

Anonymous Referee #2

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General Comments (evaluation of the overall quality) The purpose of this paper is to describe the interpretation of chemical analyses of aerosol filter samples. The use of Mean Concentration at Receptor (MCAR) plots enabled the identification and quantification of the fraction of pollutants from North Africa transported coincidently in the Saharan Air Layer (SAL). It has been surmised for some time that pollutants from eastern southern Europe and North Africa are transported in the SAL westward over the Atlantic Ocean. The value of this work is the specific source identification, i.e., location and type, of North African aerosol emissions. For example, the identification of the specific aerosol sources (e.g., page 13-14) is an important advance bridging the gap between aerosol geophysics/geochemistry and air quality research.

The MCAR plots do show interesting and useful results. However, they are a bit of a blunt tool. They don't take into account the altitude of the trajectories (convective processes). They also include the emission magnitude of various sources regions. Thus it is possible for emissions from one source region could be allocated to another.

Specific Comments (address individual scientific questions/issues)

Page 3: The source of the AI data should be identified (i.e., which satellite?)

Page 4: The daytime upslope flow at Izaña is an important factor for aerosol collection only at night after January 2008. The consequence on sample representativeness of 24 hour sampling should be discussed.

Page 5: HF sample digestion of quartz filters will break down some or all of the filter matrix. Blank levels should be mentioned in the paper.

Page 5: A comparison of the two OC-EC techniques should be included since the analytical distinction between OC and EC is controversial and not necessarily consistent between techniques.

Page 6: The last paragraph of section 2.4 was not clear. In particular, I am not sure what is meant by process "2)".

Page 8: Data from the publications of Savoie and Prospero could have been used to generate sulfate to AI and nitrate to AI ratios. AI concentrations can be estimated using the gravimetrically measured dust concentrations and the AI to dust ratio from bulk mineral composition. This approach would have produced values with larger uncertainties than direct measurements. Nevertheless, those values would likely have been useful for comparison purposes. However, any correlation between these pollutants and AI would have likely been because of coincident transport of aerosols from different sources in the same air mass.

Page 8: If EC/OC data is not to be discussed in this paper, why was it mentioned at all?

Technical Corrections (typing errors, etc.)

Abstract: The first two sentences should be combined: Measurements of the chemical composition of particulate matter samples (TSP, PM10 and PM2.5) collected from 2002 to 2008 in the North Atlantic free troposphere at Izaña Global Atmospheric Watch (GAW) observatory (Tenerife, The Canary Islands) desert dust very frequently mixed with particulate pollutants in the Saharan Air Layer (SAL).

Abstract: The country names should be reordered: Industrial emissions from Northern Algeria, Eastern Algeria, Tunisia, and the Atlantic coast of Morocco appear to be the most important source . . .

Table 4: Are the data presented as mass fraction (I think) or %?

General comment on English usage: I have great respect for those who write scholarly papers in English when English is not their first language. That said, the clarity and impact of this paper would be much improved if it were edited for English usage.

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