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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of North America on the aerosol composition in the North Atlantic free troposphere" *by* M. Isabel García et al.

Anonymous Referee #2

Received and published: 27 March 2017

General comment: This manuscript presents the seasonal and spatial aerosol chemical composition in the North Atlantic free troposphere. It comprehensively investigated the main contributions of PM10 and PM2.5 are dust, which accounts for more than 50% of PMx. The seasonal evolution was resulted from the North American outflow, which moved from low latitudes in winter to high latitudes in spring. The author also concluded that the major contributions of organic aerosols are associated with biogenic sources. This manuscript firstly presents the long-term (∼5 years) evolution of aerosol composition in the North Atlantic free troposphere. Overall, this manuscript provides knowledgeable and useful investigation results of aerosol components in North Atlantic free troposphere, which reported the effects of Saharan Air Layer (SAL) and westerlies. The results are clearly presented and the topic is suitable for Atmospheric Chemistry and Physics. The manuscript is recommended for publication after the following minor

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comments are addressed.

Minor comments:

1.P3. Line 24: The authors wrote, “the uncertainties may be significant below this threshold vale.” What’s the percentage of uncertainties in this method? Does the difference of 15% humidity affect the concentrations of PMx?

2.P6. Line 7 : The authors also wrote, “ high uncertainty of the manual gravimetric method”. How high is the uncertainty?

3.P4. Line 7: The authors used “ the empirical ratio of Na and sulfate (=0.25) “ to determine the sea salt sulfate and non-sea salt sulfate. Please specify the ratio of Na and sulfate. Is it SO42-/ Na+ =0.25? Bonsang et al. [1980] reported that the ratios of SO42- to Na+ could be greater than 1, and the sulfate contributions could be due to gas-to-particle conversion of the oxidation of marine SO2. It would be good to state the assumptions of this method.

4.P12. Line 27: The OM is rich in southeastern US and could be from biogenic emissions. It would be good to add some examples and references of biogenic emissions.

5.P11. Line1: The author wrote, “ because nitrate may experience negative artefacts during sampling we cannot discard underestimations.” If there were possible underestimations, would the authors recommend any further methods to improve them?

6.P.15. Line 25: The authors wrote, “ the aerosol composition. . .. will be influenced by air quality policies and use of (potential dust emitter) soils in North America.” This conclusion points out that the air quality policies and anthropogenic sources are important. I don’t find any air quality policies related to dust emission control addressed in this manuscript. The aerosol composition could be influenced by many factors and sources that were addressed in this manuscript. It would be good to emphasize the important contribution.

7.Abstract line 24 : The author wrote, “ our results suggest that a significant fraction of

organic aerosols may be linked to sources other than combustion." What's the fraction of organic aerosol do authors suggest?

Technical correction:

1.P13. Line 13: " are Izaña are extremely low" should be "at" Izaña are extremely low.

Reference:

Bonsang, B., B. C. Nguyen, A. Gaudry, and G. Lambert (1980), SULFATE ENRICHMENT IN MARINE AEROSOLS OWING TO BIOGENIC GASEOUS SULFUR-COMPOUNDS, Journal of Geophysical Research-Oceans and Atmospheres, 85(NC12), 7410-7416, doi:10.1029/JC085iC12p07410.

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