Atmospheric
Chemistry
and Physics
Discussions

ACPD

**Interactive
comment**

Interactive comment on "Secondary inorganic aerosols in Europe: sources and the significant influence of biogenic VOC emissions especially on ammonium nitrate" *by* Sebnem Aksoyoglu et al.

Anonymous Referee #2

Received and published: 20 September 2016

The manuscript presents a modeling study to investigate source contributions to PM concentrations in Europe. Using a 3-D model and source apportionment analysis, the authors identified major sources that contribute particulate sulfate, nitrate and ammonium in the modeling domain. They also discussed correlation between biogenic VOC emissions and secondary inorganic PM formation using sensitivity simulations and process analysis. The topic should interest atmospheric modeling community as well as policy-makers. However, there are a couple of issues that need to be addressed before the manuscript should be considered for publication.

Detailed and comprehensive source apportionment analysis is valuable and useful in developing effective air quality management plans. However, it is not clear what scien-

Printer-friendly version

Discussion paper

tific contribution this study brings: This study used existing model, modeling database, and analysis tools and methodologies. The authors should clarify/emphasize what their unique and noble contributions are.

The model performance section lacks any quantitative performance evaluation. The authors stated that the model performance has been presented in another paper (Ciarelli et al., 2016), but it appears that Ciarelli et al. mainly evaluated CAMx with a VBS approach while this study used a traditional SOA scheme. In any case, at least some basic statistical performance metrics should be provided. Also, I wonder if any sort of evaluation was done for the boundary conditions from MACC: It seems important considering that BC contributes significantly to sulfate. If manuscript length is a concern, these can be included in the supporting material.

And here are some specific questions: 1. It appears Table 1 doesn't include natural sources (biogenic, wildfires, etc.). They were not considered in the source apportionment analysis? Are their contributions minor?

2. Increased BVOC reduces inorganic nitrate formation, but will increase organic nitrate. What is the overall effect on total PM? Does the model adequately model organic nitrate formation?

3. Figure S10 shows significant nitrate reduction ($\sim$15%) over the ocean while SOA increases are mostly confined inland. There should be no BVOC emissions over the ocean. What is causing nitrate reduction there?