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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The role of long-range transport and domestic emissions in determining atmospheric secondary inorganic particle concentrations across the UK" *by* M. Vieno et al.

Anonymous Referee #1

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Review of "The role of long-range transport and domestic emissions in determining atmospheric secondary inorganic particle concentrations across the UK" by Vieno et al.

This study focuses on intercomparisons of surface measurements of inorganic particulate species concentrations with model predictions. The study focuses on the UK between 2001-2010. The paper concludes that its key findings are that the model and measurements agree for the most part, and that high nitrate episodes encountered were a result of imported pollution from other regions. The overall topic of inorganic aerosol composition (including identifying sources, transformations, sinks) is of rele-

vance to ACP. The paper is generally well-written and the methods used are described well and seem fine. The title reflects the contents of the paper and the abstract provides a concise summary of the paper. The key issue that requires much more attention is that this reviewer did not identify new insight provided by this manuscript that can help advance the community's knowledge of inorganic aerosol formation. The paper seemed like an intercomparison exercise between measurements and model predictions, with very general results. More depth is required in the analysis to contribute something to our knowledge of secondary formation of key species such as sulfate and nitrate. It would be recommended also to generate sufficient depth such that the results have broader geophysical implications for other parts of the globe too. The authors should consider addressing the sensitivity of nitrate, ammonium, and sulfate formation to various meteorological and thermodynamic conditions and the importance of formation pathways in fine versus coarse aerosol. Another topic that should be discussed in greater detail is how much of the aerosol mass is accounted for by the species investigated in this work for the study region. More intercomparison of the results of this study with other regions is warranted to at least try to put these results in greater perspective. The focus right now is too narrow for publication in ACP. Due to the issues above, I cannot support publication of this work in its present form.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 33433, 2013.