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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sea salt emission, transportation and influence on nitrate simulation: a case study in Europe" *by* Ying Chen et al.

Anonymous Referee #3

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The authors apply WRF-Chem to investigate the effect of sea salt on aerosol nitrate concentrations and the transport mechanisms of sea salt aerosol to an inland site. Additionally, the results of the applied WRF-Chem setup are evaluated against observations. Although the impact of sea salt on aerosol nitrate in general is nothing new, the paper includes sufficient novel aspects and interesting details for a publication in ACP. One important finding is the overestimation of sea salt emissions by WRF-Chem's Gong (2003) sea salt emission scheme. Some more in-depth discussion seems desirable here, e.g. how well the wind speed in the source area are represented or how the applied scheme compares against the other sea salt emission schemes which are included in WRF-Chem.

The paper is easily comprehensible. However, it includes numerous language lapses, such as wrong usage of singular and plural, missing articles etc. The co-authors are

requested to support the lead author here. Also, some of the figures could be improved in some aspects.

Detailed comments:

P 5, l 30: How were the correlations calculated, from hourly values or from mean values? How well are spatial patterns represented? Please discuss also absolute error or mean bias.

P 5, l 42: How well match observed and simulated concentrations of the small particles?

P 6, l 1 and2: Please give some more evidence for this statement.

P 6, l 43: How was the PBL height estimated?

P 7, l 9: According to Fig. 6b, the sea salt layer does not yet touch the surface. What is the contribution of turbulent mixing after sunrise?

P 7, l 25 and 26: There could be also some other reasons, wrong turbulent exchange, wrong water uptake (also due to wrong relative humidity), . . .

P 7, L 29: Why can this be expected?

P 7, l 1 – 10: Please change the order of the figure, Figure 9 should be discussed here.

P 8, l 8: Is this really a probability distribution or a frequency distribution?

Figure 1 and Figure 6: Please consider using a different color scheme. In particular, the dark blue color for the low values is quite unfavorable and the blue arrows (and the map in Fig. 1) can hardly be recognized.

Figure 3: Please show also the R-case.

Caption of Fig. 4: Please mention which case is shown.

Caption of Fig. 5: Please mention particle size. Please mention the different scale for

observations and model results.

Figure 6 and (current) Figure 9: These figures should be oriented from West (left)to East (right). No need for the star, as Melpitz is located at the Eastern end of the figures.

Minor issues: P 2, l7: Partitioning is no 'formation'.

P 2, l 13: '. . . sodium nitrate is largely contributed to nitrates': please reword.

P 2, l 21, 22: 'opportunity' and 'make their influence more extensive': please reword

P 2, l 33: Southern ???

P 2, l 43: influence on what?

P 3, l 27: Please mention first that a resistance approach is applied.

P 6, l 10: Please reword: an event cannot be emitted.

P 7, l 33: A word seems to be missing here.

P 9, l 38: the last sentence is incomprehensible.

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