

## ***Interactive comment on* “Modelled deposition of nitrogen and sulfur in Europe estimated by 14 air quality model-systems: Evaluation, effects of changes in emissions and implications for habitat protection” by Marta G. Vivanco et al.**

### **Anonymous Referee #2**

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The authors compare simulated S and N deposition from 14 models. The paper presents extensive information about the performance of the different models and is definitely worth publishing. However, the paper must be improved in several aspects before it can be published. In particular, some more attempts must be made to explain the reasons for the large differences in simulated deposition among some of the models. Furthermore, parts of the paper are not well organized and hard to read.

### **Detailed comments:**

Line 100 and Table 2: What is the reason for using such an obsolete version of WRF? Which parameterizations were applied? How does the meteorological input deviate from WRF-Common for those models where a different meteorological input was used and how does this affect the S and N deposition?

Lines 102-110: Information (including tables and figures) about the different boundary conditions and emission data should be given in the supplement. Please summarize quantitative differences in the paper briefly.

Line 135: This section does not describe the model evaluation, just the evaluation method.

Section 2.2: The 'Results and discussion' section includes the evaluation, which should be indicated by a separate subsection. Generally, this section should be better organized by adding subsections.

Lines 231 and 232: 'giving the highest/lowest' sounds somewhat odd.

Line 411: What does 'previously' mean in this context (earlier in this paper, another paper – if so a citation is required)?

Section 6: The 'Conclusions' are just a summary and should at least include some critical comments about the deviations of the simulation results from some of the models and future directions.

Table 2: ED\_LOTO: Does the addition of '(nudged)' mean that no nudging was applied for any other model?

Table 3, last line: the order of SO<sub>2</sub> and TSO<sub>4</sub> should match the order of the nitrogen compounds.

Table 5: The figure caption should be enhanced (add explanations for CL\*<sub>exe</sub> etc.).

## Figures:

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The order of the figures should be reconsidered. In some places, the discussion would require a different order of the figure. Figures 5 and 7 seem not to be discussed.

### **Abbreviations:**

It may increase the readability of the paper if some of the extensively applied abbreviations were replaced by the full text in some places.

Please explain why `_N` and `_S` are sometimes added e.g. to TNO3 or WSO4. To me the additions `_N` and `_S` seem to be unnecessary.

Section 3: Why is OND introduced here as a new abbreviation instead of using TNO3 (or TNO3\_N)? Same for RN.

Lines 373 – 376: The abbreviations, which are explained here are already used in section 4.1 without explanation.

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