

Interactive comment on “Atmospheric Processing of Iron in Mineral and Combustion Aerosols: Development of an Intermediate-Complexity Mechanism Suitable for Earth System Models” by Rachel A. Scanza et al.

Anonymous Referee #2

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This paper, develop an iron dissolution scheme of intermediate complexity that can be used in Earth system models. The overall presentation of the article is clearly structured, and the description of tests and calculations is also complete. However, there are some problems you should clearly explain and corrected before this paper is accepted. 1. Page 3, line 18, you said “We simulate four types of iron (readily-released Fe, medium-soluble Fe, slowsoluble Fe and combustion Fe)”. But on page 5, line 24 , you have said “Three types of dust Fe are simulated in the model: readily-released iron (FeRR), medium-soluble iron (Femed) and slow-soluble or refractory iron (Feslow)”.

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There are some confusions, please explain clearly. 2. Page 6, line 13, it is recommended that “FeRR, Femed and Feslow” should be enclosed in parentheses. 3. In equation (1), R should be constant. However, there is no explanation in the following text, please explain clearly. 4. In equation (1), please explain how to calculate R. 5. In equation (2), please explain the significance of each physical quantity. 6. Page 7, line 15, you said “There tends to be more oxalate in the model simulations in tropical regions (Figure 2 from (Myriokefalitakis et al., 2011)) which is better captured in our model simulations using the OC+SOA versus the sulfate proxy for modeled oxalate concentrations.”. Have you verified it? Please explain this. 7. Page 11, line 28, you have said “While the oxalate mechanism derived from the sulfate proxy (SS2) has marginally stronger correlations compared to the reference case, the difference between these is not statistically significant. ”. Please explain the statistical relevance and variability mentioned. 8. Page 13, line 6, you said “Again, however, the fractional iron solubility is inversely related to total and soluble iron deposition, a result consistent with theory and observations”. Please explain in detail the theories and observations mentioned in the text.

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