

Interactive comment on “Role of dust alkalinity in acid mobilization of iron” by A. Ito and Y. Feng

Anonymous Referee #1

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General Comments

This study uses a chemical transport model to simulate the effects of dust alkalinity on aerosol acidity and its effect on iron solubility. The main conclusion is that fine mode aerosols need to be acidic in order for modelled soluble iron concentrations to agree with observational data whereas coarse mode particles would have to be buffered by carbonate dust for modelled soluble iron to match observations. Of note is that this study includes the effects of combustion sources on soluble iron, although the authors conclude that these contributions are small compared to dust emissions. I would recommend that this manuscript be published subject to the clarifications listed below.

Specific Comments

Page 10403, line 16-20

C4618

An explanation of why the smaller particles were treated differently from the larger particles is needed.

Page 10403, line 17

Diameters < 1.25 microns would include both bins 1 and 2.

Page 10403, line 20-22

It is unclear whether all of your aerosol size bins are internally-mixed or if it is only the smallest two size bins. Are the combustion emissions also internally-mixed (this could also be clarified on page 10406, lines 14-16)?

Page 10405, line 10

I would suggest changing this sentence to “iron fractions of combustion emissions” and changing the corresponding caption on Table 2.

Page 10409, line 20

Are there any observational data that suggests that aluminosilicate dusts would be externally-mixed with carbonate dusts in the fine mode? Or that aluminosilicates are found preferentially in the fine mode compared to carbonate dusts?

Page 10410, line 10-12

Do these values represent the range of monthly values, or is it only for the month of April, as the caption for Figure 6 suggests? Similarly, the caption for Figure 6 should be clarified. If it is only for the month of April, it should read “Average soluble iron deposition for the month of April 2001”.

C4619

Page 10411, line 11-12

Please specify that deserts are the dominant source of soluble iron compared to combustion.

Technical Corrections

Page 10400, line 21

“dust mobilized from arid regions supplies THE majority of the iron”

Page 10401, line 15

“mineral aerosols originating from”

Page 10401, line 29

“thorough atmospheric”

Page 10403, line 7-8 and 17-19, page 10405, line 26

Line 7 and 8 on page 10403 and line 26 on page 10405 refer to radii but diameters are used on page 10403 lines 17-19. Please be consistent.

Page 10403, line 19

Correct the grammar in the second sentence.

Page 10403, line 28

“from the air suggest” or “of airborne aerosol measurements suggest”

Page 10404, line 5

“assumed to be in thermodynamic equilibrium”

C4620

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 10399, 2010.