

Interactive comment on “Modeling the global emission, transport and deposition of trace elements associated with mineral dust” by Y. Zhang et al.

Anonymous Referee #2

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The paper presents a method of using soil mineral maps to model the elemental content of atmospheric dust. The paper focuses on eight elements (Mg, P, Ca, Mn, Fe, K, Al, and Si), which are mostly of importance for ocean biogeochemistry. The technique represents an attempt to improve upon models that assume fixed fractions for these elements to simulate ocean deposition. This is a daunting task, since gridded soil maps can not capture all of the regional mineralogical variabilities, the range of elemental concentrations in soils and minerals is quite large, and the concentrations of minerals and elements in soils is different than the concentrations of minerals and elements in the atmosphere. Although the description of the model is quite brief in this paper and I am not a modeler, I suspect that many of the model parameterizations required to

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simulate elemental concentrations in the atmosphere are rudimentary at the present time. Nonetheless, this work is important for evaluating and improving key linkages between soil and atmospheric aerosol composition, and the effect dust deposition on ocean biogeochemistry. I have only minor comments that should be considered before publication.

There are a few spelling errors here and there. For instance, words like fractions of, dusts, and observed in appear on line 19 of page 12. This may have occurred in the typesetting process, but a spell checker could easily weed out these problems.

There are some grammar issues in a few places: line 28 on page 15, line 28 on page 16.

Page 7, line 5 and Table 1b: I find it a little odd that the authors are citing "personal communication" with one of the co-authors. Perhaps "unpublished data" would be more appropriate?

Pages 8 & 13: SD is never defined. I know that it means standard deviation, but it might be a small barrier for some readers.

Page 15, line 23: I don't know that I would say that the model and observations are generally consistent in Figure 10, but then again, I am having a really hard time analyzing such small figures. At first glance, I see a lot of red bars that are much higher than the blue bars. Perhaps a scatter plot with a 1:1 line would be more appropriate for such a comparison? You could use different shapes and colors of the points for the various sites. At any rate, figures are important for "hooking" your readers into reading more, and these small panels will hook few people.

Figure 2: Way too many world maps for one figure – break it up!

Figure 10: Figure panels are also way too small, and the resulting axes fonts are too small, too. Try to limit yourselves to four panels per figure.

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