Review of "Response of acid mobilization of iron-containing mineral dust to improvement of air quality projected in the future"

This study uses an atmospheric chemical transport model to investigate the deposition of soluble iron and its response to change in anthropogenic emission of combustion aerosols and gaseous pollutants. The authors concluded that future reduction of NOx emission would lead to a decrease of soluble iron deposition to the northeastern Pacific. But the continuing growth of global shipping would bring more soluble iron to the northeastern Pacific. The model the authors used has been continually developing to constrain various factors that affect iron solubility and iron deposition over the open ocean. Although I a few major comments regarding the model approach, I would recommend for publication in ACP.

Major comments:

1. From the statement of page 28180, lines 23-25, it seems that only mineral dust and sea salt aerosol are separated into four different size bins. This is in contradiction to the statement of page 28181, lines 14-17. In addition, did the authors assume that different size bins of mineral dust have the same mineral compositions as well as the same dissolution rates? The authors should have described how the 4 size bins of aerosol are treated differently in the model in more details.

2. While comparing the modeled Fe dissolution curves with experimentally measured Fe dissolution from African and Asian dust (page 28189, second paragraph), the author only adopted one experimental result from Shi et al. But the mineralogy of mineral dust can be quite varied, and experimental conditions to study iron solubility are quite different between different studies (researchers). The authors should have included more experimental data, rather than just relying on one single experiment.

3. Atmospheric processing and material composition can effect iron solubility of mineral dust and other iron containing aerosols (i.e. oil fly ash and coal fly ash). Have atmospheric processing and composition of combustion aerosols also been taken into account in the model? If not, the authors should have stated the assumptions and explained why the assumptions have been made in the manuscript.

4. Although the model has taken into account source material, mineralogy, surface acidity, and atmospheric processing effecting iron solubility, many recent studies have been suggested that organic acids, such as oxalic acid, might be very important in promoting atmospheric iron by proving protons for acid mobilization and by forming iron-organics complexes. The missing of the effect of organic acids in the model probably mislead the model prediction.

Minor comments:

1. Page 28176, line 19. Missing period in "(Kraemer, 2004) Since"
2. Page 28181, line 1. Spell out "DMS"
3. Page 28184, line 27. Missing period in "(Table 1) Most iron is"