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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characteristics of atmospheric mercury deposition and size-fractionated particulate mercury in urban Nanjing, China" *by* J. Zhu et al.

Anonymous Referee #2

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J. Zhu et al. Characteristics of atmospheric mercury deposition and size-fractionated particulate mercury in urban Nanjing,China

This manuscript presents result from a nine months study on mercury levels in precipitation and size fraction of particulate mercury. This ms is very descriptive and very obscure sometimes. This manuscript is really difficult to read and there are several useless parts. A significant effort of synthesis should be made. The experimental section is very weak and lots of very important and basic details are missing. This naturally led to a certain degree of doubt on the quality of the measurements which is re-inforced by the fact that some samples were contaminated due to sample handling.

The scientific discussion is not very deep, and I do not see any new or original results in the present study. I also recommend detailed correction by a native English speaker.

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Line 1 : Âń persistent Âż is not appropriate for Hg which is not degradable per se, because it is an element . Persistent is used for organic molecules. In the case of mercury as for other metal, persistence is obvious.

“pollutant”: do not forget that Hg is also a compound that is emitted by natural sources. Line 2: “ecology” is a discipline.

Negative effect are not provided via the bioaccumulation only but also by biomagnification and toxic and ecotoxic effects.

Line 5-7: I do not agree with your definition of atmospheric mercury. Please revise it. RGM and HgP are not chemical forms but are operationally defined by Tekran users.

Line 11. Fu et al 2010 is self-citation, there are earlier reference dealing with deposition velocity of divalent species.

Line 11 sentence “atmospheric deposition is (. . .) the main process for scavenging atmospheric mercury”. I do not understand. What could be other processes?

Line 15: Consider revising this sentence which is not clear

Line 18: What is the meaning of “human influence”? Are you talking about anthropogenic sources?

Line 21: The construction of this sentence is awkward.

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line15 is there any evidence of HgP association with ice crystal? More generally, the authors suggest that the nature of airborne particles that are likely to sustain Hg adsorption is known. I do not think that is it the case, those are assumptions.

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line 7: precipitation sampler brand? Did you use MDN standard samplers? How does this sampler complies hg sampling requirements? Where blanks made? How? Results? There is a lack of analytical details Also some samples were contaminated during handling. What do you mean? How are sample generally handled? What kind of bottle? How is it cleaned? How is the sample preserved? Is the system refrigerated? Sampling frequency? Overflow handling? How was total Hg determined in details? Standard, reagents, blanks, replicates and all the basic information that is needed.

I understand that major ions were analyzed in the same sample? How can it be since most of the procedure for Hg collection use acid-cleaned bottles? How can Hg be preserved in your samples during collection without using acid (Hcl or equivalent)? In that case, IC analysis is impossible using the same sample. How does a Wan Tang professional IC work?

Why particle were sampled on random days? Is there any sampling strategy behind?

Same question that for Total Hg. How was Hg measured in those filters? Were blank available?

Pge 28315

Line 19. You say that your estimate should be more accurate than the previous colleagues. Did you compare it ? is it based on a comparison of both approaches?

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line 4: should I understand that Hg in precipitation is only measured in 5 days samples? Please clarify because it is very confusing.

Line 22-28: I do not understand your point

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line 9 and subsequents:

I am not convinced that the relationship between precipitation and deposition flux suggest a continuous source of mercury during a precipitation event. This study does not show enough data during a precipitation event itself to prove it. The authors hypothesize GEM oxidation as a permanent source, but GEM oxidation rate are really slow (except with high bromine radicals concentrations). What about anthropogenic and natural sources of divalent Hg compounds?

How can photochemistry enhance GEM oxidation? Please, give details.

By the way, high TGM peak provide more GEM which is not effectively scavenged.

Where are provided those correlation coeff? How are they calculated?

Line 18: "on the other hand (. . .)" the fact that a portion of atmospheric water-soluble Hg is not present in your THg wet deposited samples may be due to several reasons including sample collection and preservation: an important loss of THg will happen in your sample over a 5 days period; the vertical distribution of Hg(II) compounds may be heterogeneous; some divalent compounds might not be easily soluble if attached to some organics. I do not understand what is the continuous emission source.

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line 2. I think that the fact that urban Japan is closed to urban china is not a major criterion explaining different Hg fluxes. Anthropogenic sources are likely the main driver.

Line 7: more coal burning occur in Guyang. Is there a scientific report/study about it? Is there any estimate of anthropogenic sources in those 3 cities? What is space heating? You state that Hg content in coal decreased through the last year? Is it a scientific fact? Are they any studies?

In London, wet depositions are not comparable but largely higher than at Nanjing (0.7-

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*18.1 vs 15-45).

Your conclusion (line 19-21) is very trivial and should be removed. You should also precise that depollution of power plant exhaust , pollutant dispersion are also important factors.

Line 23: I doubt that H+ was measured.

Line 25: among the ionic constituent: Author suggest that sulfate contribute the most? How is it calculated? Is it an average of all samples?

Line 27: this is not a trend really. How is it calculated? Is it an average, or do individual samples show the same pattern?

Page 28319: I do not understand how the total anions contribution is calculated.

Line 2: how was the pH measured or calculated?

How is obtained the reference level provided b China Met Administration ? Is it consistent to compare both values?

Your average pH is more alkaline, but I do not mean anything since a mean pH is a non-sense.

Sulfate and nitrate should provide more acidity since there are associated with strong acids.

Line 6: better correlation between ions do not necessarily mean that there are associated. This approach is not scientifically sounded. Please check the corresponding literature.

Line 14-18. I do not follow this discussion about marine sources of Hg. This is really unclear. From what I know, oceans are not thought to be an important source of divalent Hg.

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Line 2 Sources of carboxylic acids of low molecular weight are the direct emissions from burned biomass, automotive vehicles, ants, vegetation and formation through secondary chemical transformations in the atmosphere from biogenic and/or anthropogenic precursors.

Lien 10-14: this is out of scope and it is not relevant with the present results.

Line 27 and fig 2: how many samples were used to calculate the monthly value?

Page 28321:

line 4-14: Should I understand that TGM was measured? Where does it come from? Please remove all this paragraph or change your ms by presenting TGM values.

Figure 2: what does the percentage on the horizontal axis mean?

Line 23: what do you mean with “a small peak”?

Page 28322

line 6-11: The detailed explanation is not needed here.

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line 10: What is “morey”?

Line 16: I do not understand why the concentration of HgP was estimated since you measured it.

typos Table 1 : precipitation amount.

Page 28321 Line 24, “regarded” Page 28325 line 1: “mercury” Landis et al 2002 : page numbers are not correct

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