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Interactive comment on “Atmospheric deposition of mercury and major ions to the Pensacola Bay (Florida) watershed: spatial, seasonal, and inter-annual variability” by J. M. Caffrey et al.

Anonymous Referee #1

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General comments: The authors present interesting time-series of mercury and major ions wet deposition fluxes to the Pensacola Bay watershed. The data of the study are compared to data collected at MDN and NADP sites along the Central Gulf of Mexico coast. Mercury is the element of interest that is analyzed in relation to major ions indicating either a marine origin (Na^+ and Cl^-) or the or an anthropogenic source, i.e. coal combustion (SO_4^{2-} and NO_3^-). There is a considerable overlap with the paper by Landing et al. ([http://www.atmos-chem-phys-discuss.net/9/27649/2009/.](http://www.atmos-chem-phys-discuss.net/9/27649/2009/)) concerning the scientific results. However, Caffrey et al. enable a different view on the data set and thus the paper could be considered for publication after accounting for some specific comments listed below.

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Specific comments:

Pages 4595 last line /4596 Line 1: - (deposition may be worldwide, Lin and Pekhonen, 1999) The referencing seems not adequate. The finding originates from a couple of years before. Second paragraph, Line 9: (nutrients and other contaminants) Nutrient supply by rain is first of all a natural process and might not be put together with contaminants.

P. 4597 2 Study area, Line 23: (... to release approximately 87 kg.) A reference is missing.

P. 4598 3.1 Mercury analysis, Line 16: (Rain samples in FEP bottles). There are some indication that FEP bottles increase the error in mercury analyses (Whalin and Mason, 2006). Was this potential error estimated or avoided?

P. 4599 3.3 Calculations and statistics, Line 12 (ANOVA): This should be explained and supported by a reference.

P 4600 Lines 14-17 and throughout the manuscript: (ng/m²/event) The unit is not clear and does not represent a flux, versus time is missing) Please use units of either concentration (e.g., ng m⁻³) or of flux (e.g., ng m⁻² d⁻¹). These data require a referencing to the companion paper.

4.2 Precipitation chemistry, first and second paragraphs: see comment concerning flux units. P 4601 Lines 7/8 (Ammonium fluxes were about ten percent of the nitrate fluxes): This comparison requires a molar basis (mol nitrate-N versus mol ammonium-N). P 4602 First paragraph (and P 4603 last para): Station numbers should appear in the map.

P 4604 Line 25: Box plots (medians and whiskers) representing the seasons should be added to Fig. 6

Table 1: I don't think that Table 1 is really necessary. The given information can be included in the text.

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Figure 2 is not really informative and can be deleted, except the Hg vs. Rain volume plot. In this case a fit and a regression function would be valuable. Figure 7: not necessary; it's not a new finding and the information can be given in the text. I would suggest to add a new figure, e.g., plots of mercury versus major ions: Hg vs. H⁺ and Hg vs. NO₃⁻ compared to Hg vs. Na⁺ perhaps for selected seasons might be interesting.

Reference Whalin, L.M. and Mason, R., 2006. A new method for the investigation of mercury redox chemistry in natural waters utilizing deflatable Teflon[®] bags and additions of isotopically labeled mercury. *Analytica Chimica Acta*, 558(1-2): 211-221.

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