

Interactive comment on “Speciated atmospheric mercury and sea–air exchange of gaseous mercury in the South China Sea” by Chunjie Wang et al.

Anonymous Referee #2

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The manuscript presents ship-based measurements of atmospheric mercury species and dissolved gaseous mercury in the Pearl River Estuary and the South China Sea. The authors used the measurements to infer the sources and sinks of elemental and reactive mercury in the atmosphere, to estimate the sea to air flux of mercury, and to assess how the mercury concentrations in the South China Sea differ from other areas.

The manuscript is well-written, and presents the results in clearly with appropriate tables and figures. The authors provide a detailed description of their measurement methods, analyze their observations systematically, and provide support for their main conclusions.

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I do not have any major concerns about the manuscript, but a few minor comments as follows: Line 43: Here and elsewhere, I would reword “suffered less influence of human activities” to something like “less influence of fresh emissions.” Line 164: The back trajectories were initiated at 500m - much higher than the measurement altitude. This needs justification. Line 172: Fig. S1 does not show the sampling unit. Line 200: How were non-detects in the RGM and HgP measurements treated? Line 331: The bimodal distribution seems less obvious in Fig. 5b. Line 351-353: I am not convinced that these 1-month observations can be extrapolated to an annual dry deposition flux. I recommend removing that calculation unless there is other evidence supporting its validity. Line 365-367: It is not obvious why the small variability in the Hg⁰ concentrations implies that the evasion of DGM was an important source of Hg⁰. Line 381: It is not clear why are higher RH and lower temperature conducive to Hg² removal? By gas-particle partitioning?

Please mention in the main text that the acronyms are defined in the appendix.

Fig. 5: Using the same scales for the y-axes on panels a and b will be helpful.

Fig. 6: The PAR values can be removed. They do not add much information, but clutter the figure.

Fig. 9: How are the point measurements interpolated for the entire region? Was this interpolation necessary to calculate the sea-air flux? If not may be show the measurements like those in Fig. 3b.

Table 2: The correlation coefficients for HgP(2.5)-RGM and RGM-HgP(2.5) differ. Is that correct?

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