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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Micrometeorological measurement of hexachlorobenzene and polychlorinated biphenyl compound air-water gas exchange in Lake Superior and comparison to model predictions" *by* M. D. Rowe and J. A. Perlinger

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We thank the anonymous referee for reviewing our manuscript.

Referee #2: The models are, however, well described elsewhere and the text is too dominated by model descriptions.

We shortened the model description section from 1949 words to under 1582 words,

and eliminated three equations. The sections describing the IBLTE and COARE models were shortened because these models are described elsewhere. A brief description of the IBLTE model is included for the convenience of the reader, with a reference to the full description. Use of the COARE gas transfer model to give semivolatile PBT organic compound transfer velocities is a new application, so it is necessary to give the details. We describe the Whitman two-film calculation in some detail in order to point out an inaccuracy in the water vapor transfer velocity parameterization that is commonly used in calculation of semivolatile PBT organic compound gas transfer velocities by this method. This explanation also helps the reader to understand the differences between the W2F and COARE gas transfer parameterizations, which we compare subsequently, and is the starting point for the error analysis equations.

Referee #2: I question the use of equations 7 and 8. It is well known that a Cen value of 2.6 is too high, the authors support the high value by suggesting that bubbles or buoyancy effects are important. The measurements are taken at low winds and buoyancy effects on kw is not expected to impact Cen, so I do not agree with this motivation for present data. For stable strat Cen is expected to be even lower than the neutral value. For CO2 more recent literature than Wanninkhof 1991 suggests other expressions.

We introduced Eqs. 7 and 8 in order to point out that Eq. 7 is inaccurate, even though it is commonly used to calculate PBT organic compound gas transfer velocities in the literature (we cite several recent examples). As the referee points out, in some communities it is well known that a Cen value of 2.6 is too high, but this information has not yet been utilized by the semivolatile PBT community. We include discussion of this point in order to bring attention to this point and to advocate for use of a more accurate means of calculating semivolatile PBT organic compound gas transfer velocities. We compare PBT organic compound transfer velocity estimates using the commonly-used W2F parameterization and the more complex NOAA COARE gas transfer model to show differences between the two methods. We re-wrote this section in order to make

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the objective of the discussion more clear to the reader.

We added a sentence in the revised manuscript to indicate that more recent CO2 transfer velocity expressions are available, and are reviewed, for example, by Ho et al. (2006).

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 983, 2012.