

Interactive comment on “The exchange of SVOCs across the air-sea interface in Singapore’s coastal environment” by J. He and R. Balasubramanian

Anonymous Referee #1

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This paper represents the continuation of work by the authors on the assessment of SVOCs (PAHs, OCPs, and PCBs) in Southeast Asia, including air, rainwater, and sea-water concentrations, estimation of wet and dry deposition, and air-sea exchange rates. This is important work needed for evaluating human exposure to these toxic chemicals. The available data are analyzed and evaluated using various models (scavenging, dry deposition, air-sea exchange) adapted for these classes of compounds. The authors have made a thorough effort in explaining the rationale for the measurements and the ability of the models to capture the processes leading to the dry deposition, scavenging, and air-sea exchange of these compounds. The methodology used by the authors for both the experimental and the modeling portions of the work, including the assumptions needed to estimate air and sea-water concentrations, uptake of PAHs, OCPs and OCPs into water droplets and dry deposition of these substances, appear to be sound

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and well explained, as well as thorough references to the literature for supporting their modeling approach and parameters needed as inputs to the models.

My main concern with the paper pertains to the reported accuracies and precision of the data in the text and in the tables. For example, in the abstract annual dry and wet deposition rates of PAHs and OCPs are reported as 1328.8 (961.1) $\mu\text{g}/\text{m}^2/\text{y}$ and 811.8 (578.3) $\text{ng}/\text{m}^2/\text{y}$ (dry) and 6667.1 (1745.2) and 115.4 (98.3) $\mu\text{g}/\text{m}^2/\text{y}$ (wet), respectively, where the numbers in the parentheses represent the standard deviations. Moreover the annual dry deposition rate for PCBs is reported as 5421.4 (3426.7) $\text{ng}/\text{m}^2/\text{y}$. From such numbers, one might be inclined to think that the measurements (and model calculations) are accurate to 1 part in 10,000 or better, and yet the standard deviations imply large variability and that the precision is really not as good as 1 part in 10,000. There are several elements that should be reported – the uncertainty in the measurements (sample collection) and the analysis (e.g., the uncertainties in the extraction process and the detection limits of the GC-MS for the various species), as well as the uncertainty in the parameters that are used in the models to estimate dry and wet deposition. I suspect in the measurements, as well as the extraction process, the uncertainties, are likely in the range of 5-10 %. The detection limits of the GC-MS may be of the order of a few hundreds of ng, if that. The uncertainty of the model parameters may be of the order of 10%. The authors should provide some error analysis, but in any case the reported precisions seem quite optimistic. Moreover, in Tables 2 and 3, for summarizing the sum of PAHs, OCPs and PCBs, the standard deviations cannot be summed, as they are not additive!

A few other minor points: p.13240, line 12: “SEA” should be written in lower case “sea”. p.13240, line 13: “the optical counter” should be replaced by “an optical particle counter”. p. 13244, line 16: “4” diameter” should be replaced by “4-inch diameter” or better yet “10-cm diameter”. p. 13252, line 26: “14 200 ng” might be better as “14.2 μg ”. p. 13253, line 16: “(Wurl et al., 2006) – is it a, b, or c? p. 13257, line 24: “Sic.” should be replaced by “Sci.” p. 13259, line 27: “farrington” should be replaced by “Farrington”.

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p. 13260, line 15: “Hobbs, F. V.” should be replaced by “Hobbs, P. V.” p. 13261, line 24: “obbard” should be replaced by “Obbard”.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 13235, 2009.

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