

## ***Interactive comment on “Urban source term estimation for mercury using a boundary-layer budget method” by Basil Denzler et al.***

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The manuscript aims to develop and validate an emission quantification approach, with application to gaseous elemental mercury (GEM) in Zurich. My first impression was that the method developed is simply the well-known one box / urban column model (Daniel Jacob, 1999: Chapter 3), with addition of fixed day and night boundary layer heights, and that similar but more detailed treatment is given, for example, by Jin and Demerjian 1993 (Atmos. Environ.). Closer reading shows there is several differences, with use during inversion conditions, a simple boundary layer height (BLH) parameterization scheme, and a graphical tool. To this reader, the most interesting aspect was the BLH discussion. The proposed scheme appears the same as previous work by the authors (Bogdal et al. 2014b) but is enhanced by comparison to a more ad-

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vanced model. Still, this was mostly relegated to the supplement, and the validation against the advanced model is not so convincing since that model does show much better agreement for GEM concentrations, despite the better BLH representation. The paper should be clearer about what is novel since box models are well tread ground, and perhaps reorganized to expand on those aspects. The introduction could also do a better job setting up how the work fits in with past literature boundary layer budgets and urban emissions quantification.

One specific comment: what is the height above ground for the NABEL measurement? A homogeneously mixed assumption is mentioned on Page 4, but is this really justified, or simply is necessary since there is only one measurement location available? In the vertical, the stratified atmospheric inversion conditions could lead to error/bias when using a (presumably near surface) concentration monitor; the incinerator chimney source which is at 90 m also may not be represented by the measured GEM and lead to errors in the emissions estimate.

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