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## ***Interactive comment on “A two-dimensional volatility basis set – Part 3: Prognostic modeling and NO<sub>x</sub> dependence” by W. K. Chuang and N. M. Donahue***

### **Anonymous Referee #1**

Received and published: 18 August 2015

Chuang and Donahue (2015) present the expansion of the 2-D Volatility Basis Set (VBS) to include NO<sub>x</sub>-dependence. The authors provide the mathematical overview of the 2-D VBS and detail how NO<sub>x</sub>-dependence fits into the parameterization. They proceed to test the implementation under varying conditions, i.e. varying NO<sub>x</sub> (using  $\beta$ ) and mass loadings (which is also used to represent variations in yields), in a box model. I would have like to have seen comparisons with experimental data but recognize that limited experiment data likely exist for such a comparison. The paper is generally well written and is recommended for publication after minor revisions as outlined below.

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## General Comments:

Terms IVOC, LVOC, SVOC, etc. are used multiple times (e.g. p. 17299, Fig. 1) but are not defined here (definitions are provided in Donahue et al., 2012). I suggest providing a brief definition/description of these terms.

Figure captions, especially figures 2-6, tend more towards discussion than description. I would suggest adding a sentence at the beginning of each to describe what is being plotted.

## Specific Comments:

p. 17292 Eq. 2: Do  $n_c$  and  $n_o$  correspond to the number of carbons and oxygens, respectively?

p. 17298 lines 6-7: Is there atmospheric relevance to  $\beta$  values of 1 and 0.15, e.g. typical rural and urban values?

Fig 2: I assume the blue lines for OM are for high-NO<sub>x</sub> conditions and would suggest indicating this on the legend.

Fig 3: Suggest noting in the caption the order of magnitude difference in the  $C_{OM}$  scales between plots (a) and (b).

## Technical Corrections:

p. 17285 line 4: “etc. Organics”

p. 17285 line 25: “organic compounds”

p. 17286 line 11: NO<sub>3</sub> has not defined

p. 17286 lines 17-18: “most commonly”

p. 17287 line 27: “30:46 can”

p. 17291 line 4: “MATLAB” (throughout)

p. 17296 line 9: “phase (Trump and Donahue, 2014),”

p. 17296 line 15: “left to a later”

p. 17297 line 22: “A concentration of 100  $\mu\text{g m}^{-3}$ ”

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 17283, 2015.

**ACPD**

15, C6018–C6020, 2015

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