

Evaluation of analysis by cross-validation: Part I & Part II

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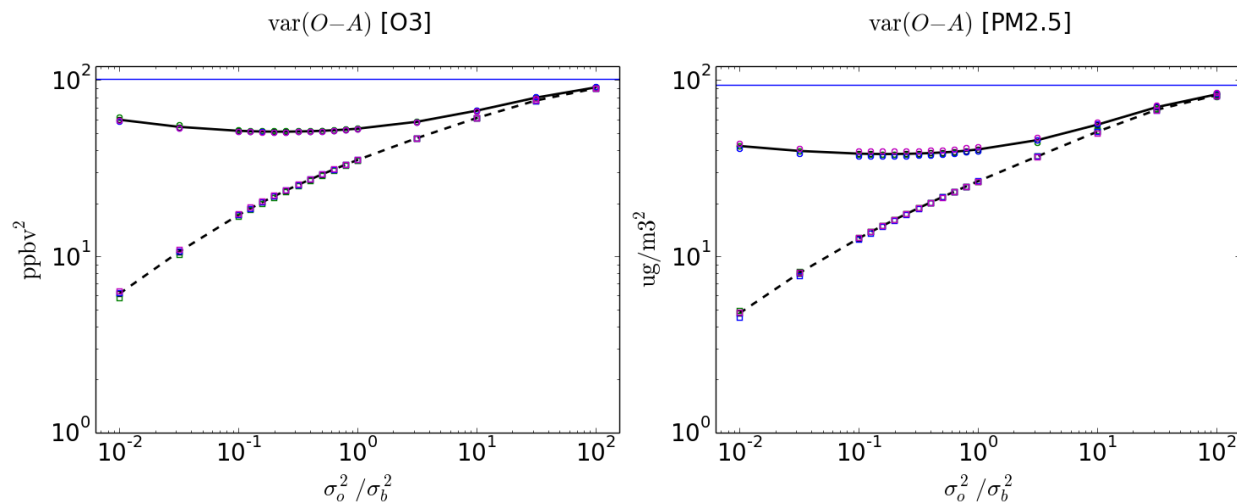


Figure S1. Variance of the observation-minus-residuals of O₃ (left panel) and PM_{2.5} (right panel) for the individual sets of cross-validation as a function of $\gamma = \sigma_o^2 / \sigma_b^2$. Left panel is for O₃ with ordinates in ppbv² units, and right panel is for PM_{2.5} with ordinates in $(\mu\text{g}/\text{m}^3)^2$. Circles are the individual subset results from the evaluation at the passive observation sites. Squares are the individual subset results from the evaluation at the active observation sites in the cross-validation experiment (i.e. using 2/3 of the observations). Blue curve is the variance of observation-minus-model. Note that the 3 subset results almost coincide.

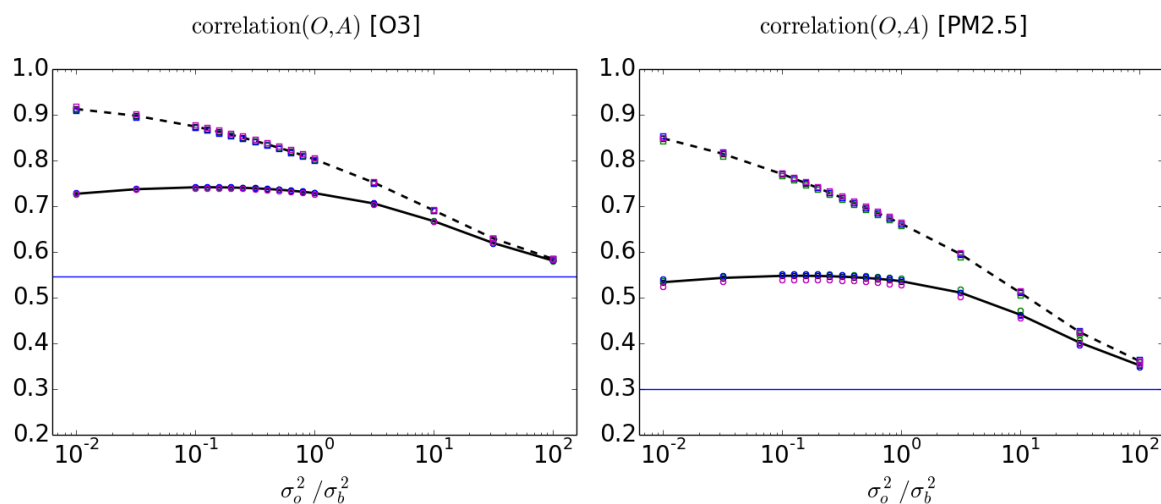


Figure S2. Correlation between observations and analysis of O₃ (left panel) and PM_{2.5} (right panel) for the individual sets of cross-validation as a function of $\gamma = \sigma_o^2 / \sigma_b^2$. Symbols and lines same as for Figure S1.

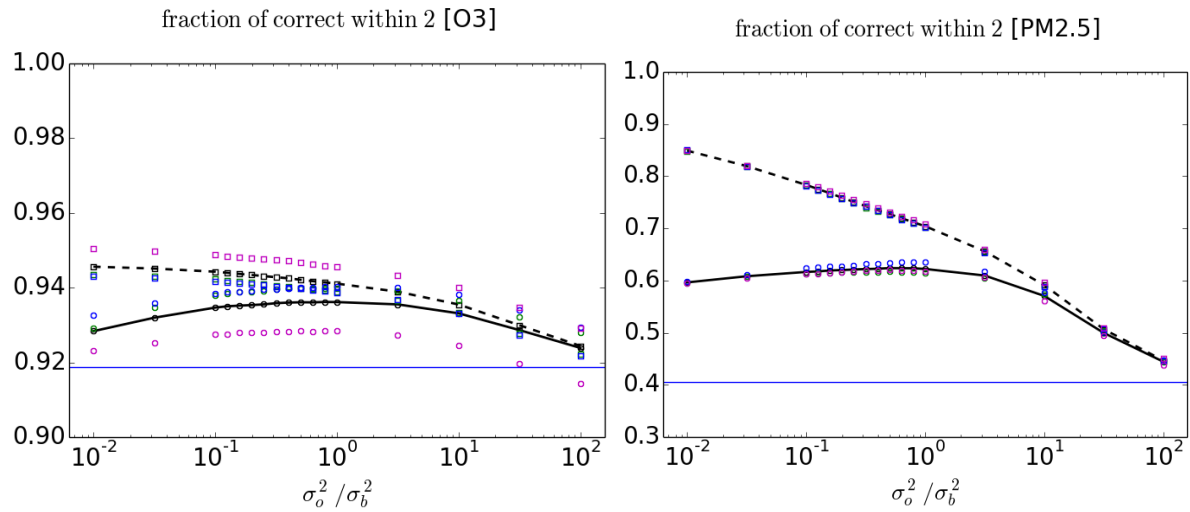


Figure S3. Fraction of correct within a factor 2 for O_3 (left panel) and $PM_{2.5}$ (right panel) for the individual sets of cross-validation as a function of $\gamma = \sigma_o^2 / \sigma_b^2$. Symbols and lines same as for Figure S1.

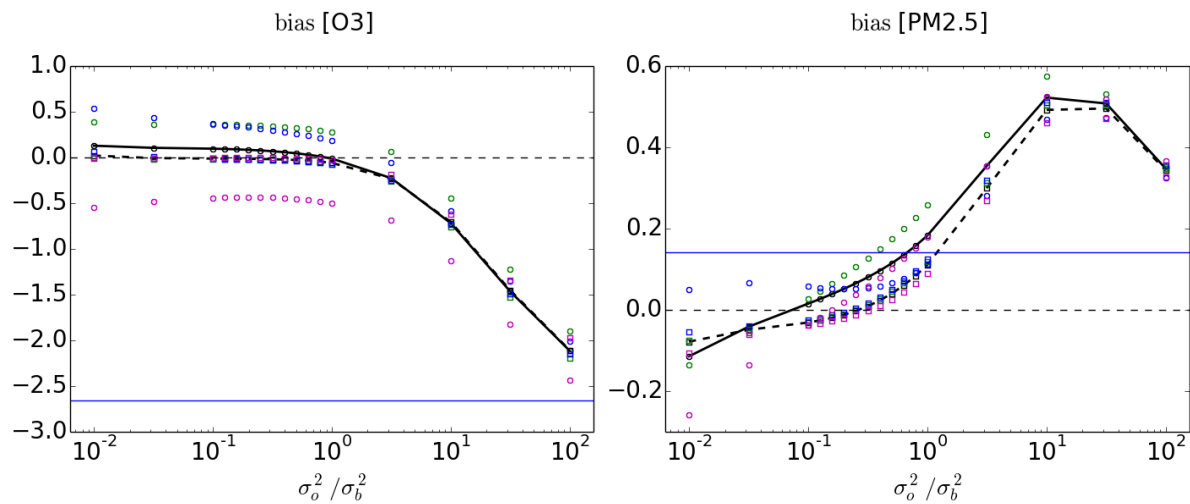


Figure S4. Bias between observations and analysis of O_3 (left panel) and $PM_{2.5}$ (right panel) for the individual sets of cross-validation as a function of $\gamma = \sigma_o^2 / \sigma_b^2$. Symbols and lines same as for Figure S1.

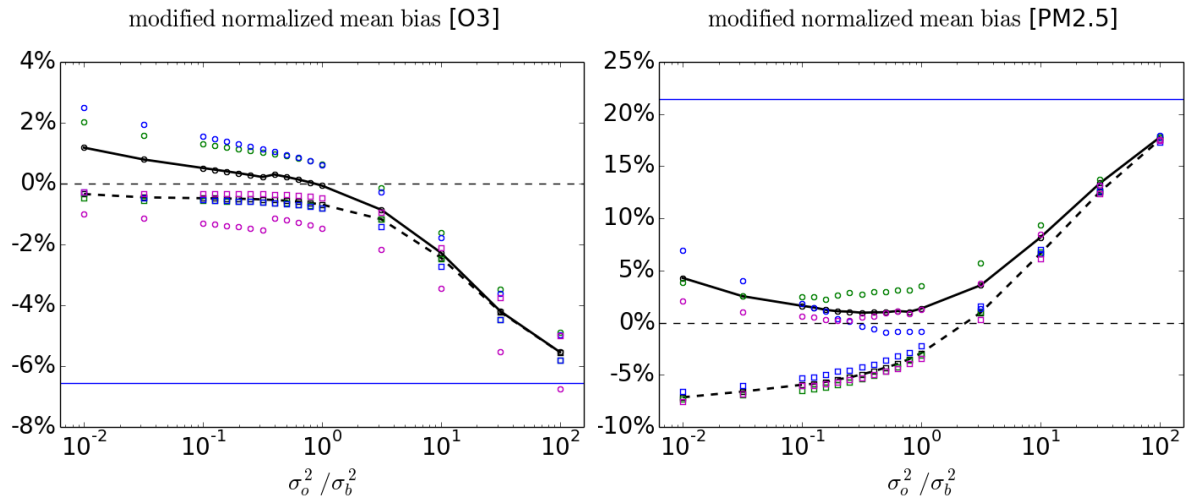


Figure S5. Modified normalized mean bias of O₃ (left panel) and PM_{2.5} (right panel) for the individual sets of cross-validation as a function of $\gamma = \sigma_o^2 / \sigma_b^2$. Symbols and lines same as for Figure S1.

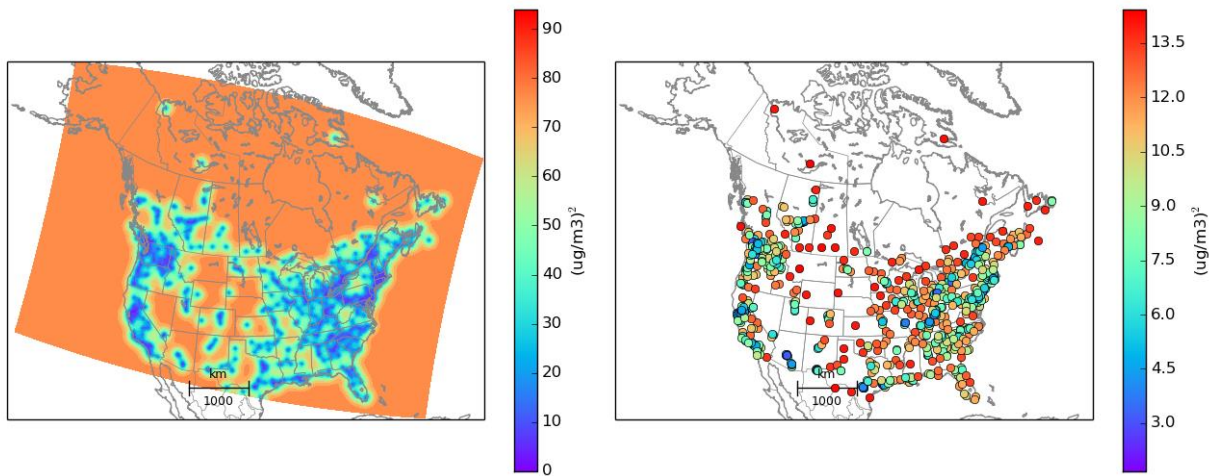


Figure S6. Analysis error variance for ozone optimal analysis case PM_{2.5} iter1. Left panel is the analysis error on the model grid and on the right panel at the active observation sites. Note that the color bar of the left and right panels are different. The maximum of the color bar for the left panel correspond to $\sigma_o^2 + \sigma_b^2$.

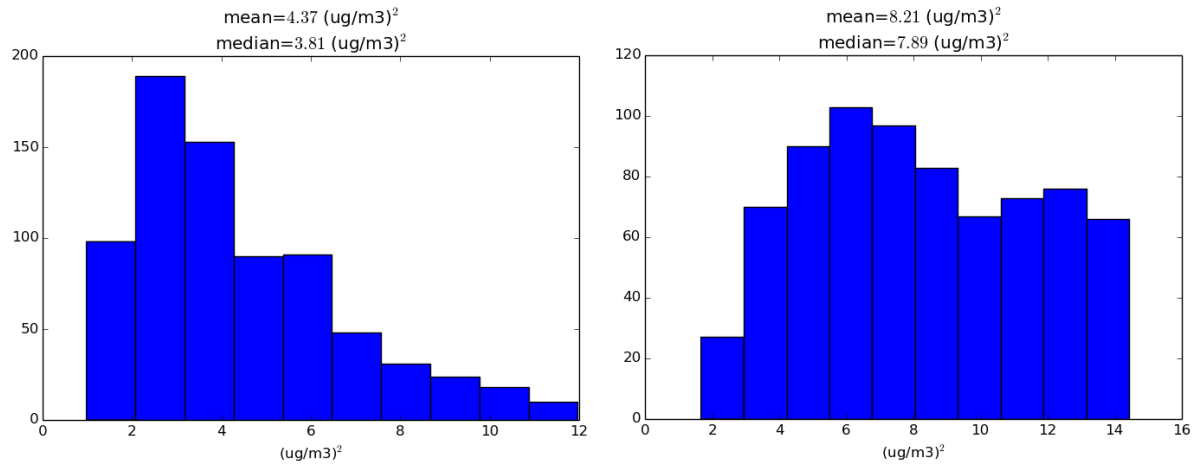


Figure S7. Distribution (histogram) of the ozone analysis error variance at the active observation locations. First analysis experiment PM_{2.5} **AR2 iter0** (no optimization) on the left panel, and optimal analysis case PM_{2.5} **AR2 iter1** on the right panel.