

1 **Response to Editor:**

2 Dear Author,

3 Thanks for further revising your manuscript. You have reasonably addressed the additional  
4 comments from the two referees. I have a comment on one of your added texts. In line 518, you  
5 state "the fraction of NO<sub>2</sub> is largest in winter". Is this true for most places? Is it due to higher NO<sub>2</sub>  
6 emission than NO or due to slower removal of NO<sub>2</sub> in winter (which is true)? but ozone  
7 concentrations are also lower in winter which would reduce the conversion of NO to NO<sub>2</sub>. So  
8 please verify this statement or simply remove it and just keep "chemical partitioning between NO  
9 and NO<sub>2</sub>".

10 Regards,

11 Tao Wang.

12 Thank you for this question. Our original intent was to note that seasonal and regional changes  
13 in NO–NO<sub>2</sub> partitioning can influence observed NO<sub>2</sub> variability, particularly under wintertime  
14 conditions when reduced photolysis and longer NO<sub>x</sub> lifetimes can favor enhanced NO<sub>2</sub> in polluted  
15 regions (e.g., Kenagy et al., 2018). However, we also note that the seasonal behavior of the NO<sub>2</sub>  
16 vs. NO fraction is regime-dependent and not universally applicable and have chosen to remove  
17 the specific statement to avoid overgeneralization. The sentence on line 511 now reads:

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19 "Seasonal differences in photochemical lifetimes (i.e., longest in winter), boundary layer mixing  
20 (i.e., more vertical mixing in summer), chemical partitioning between NO and NO<sub>2</sub>, meteorological  
21 variability, and contributions from additional emissions sources including soil NO<sub>x</sub> and fire  
22 emissions, can all modulate the magnitude and timing of observed NO<sub>2</sub> concentrations."

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24 **References**

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26 Thornton, J. A., McDuffie, E. E., Fibiger, D. L., Brown, S. S., Montzka, D. D., Weinheimer, A. J.,  
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28 V., Jaeglé, L., and Cohen, R. C.: NO<sub>x</sub> Lifetime and NO<sub>y</sub> Partitioning During WINTER, Journal of  
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