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Atmospheric Measurement Techniques Discussions

Supplement of

HO_x radical chemistry in oxidation flow reactors with low-pressure mercury lamps systematically examined by modeling

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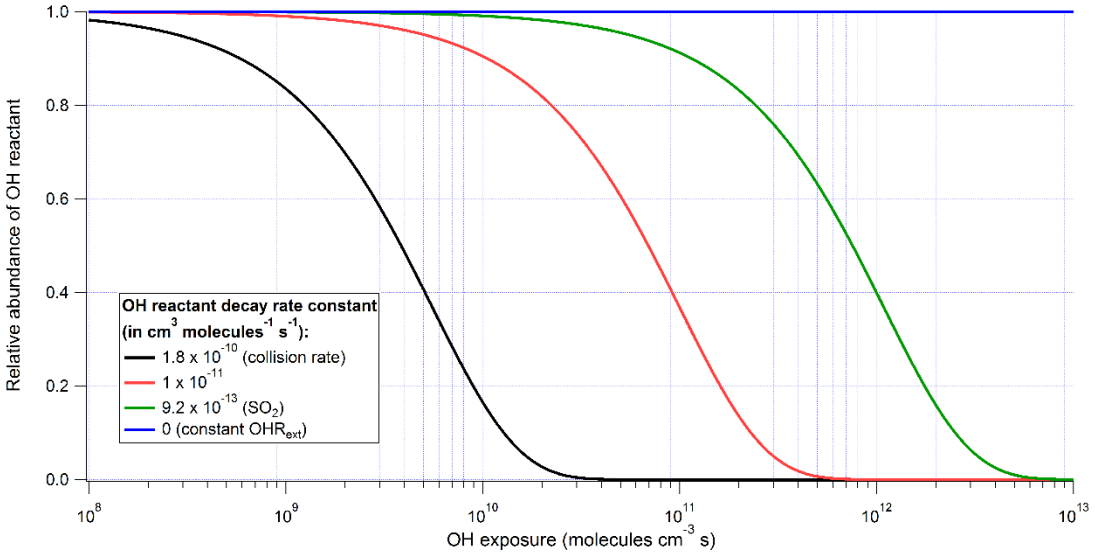

Figure S1. OH reactant abundance relative to the initial value as a function of OH exposure (in molecules cm^{-3} s^{-1}). Black, red, green, and blue curves show relative abundance of OH reactant consumed by OH at $1.8x10^{-10}$ (collision rate), $1x10^{-11}$, $9.2x10^{-13}$ (for SO_2 as OH reactant), and 0 (for constant external OH reactivity) cm^3 $molecules^{-1}$ s^{-1}, respectively.

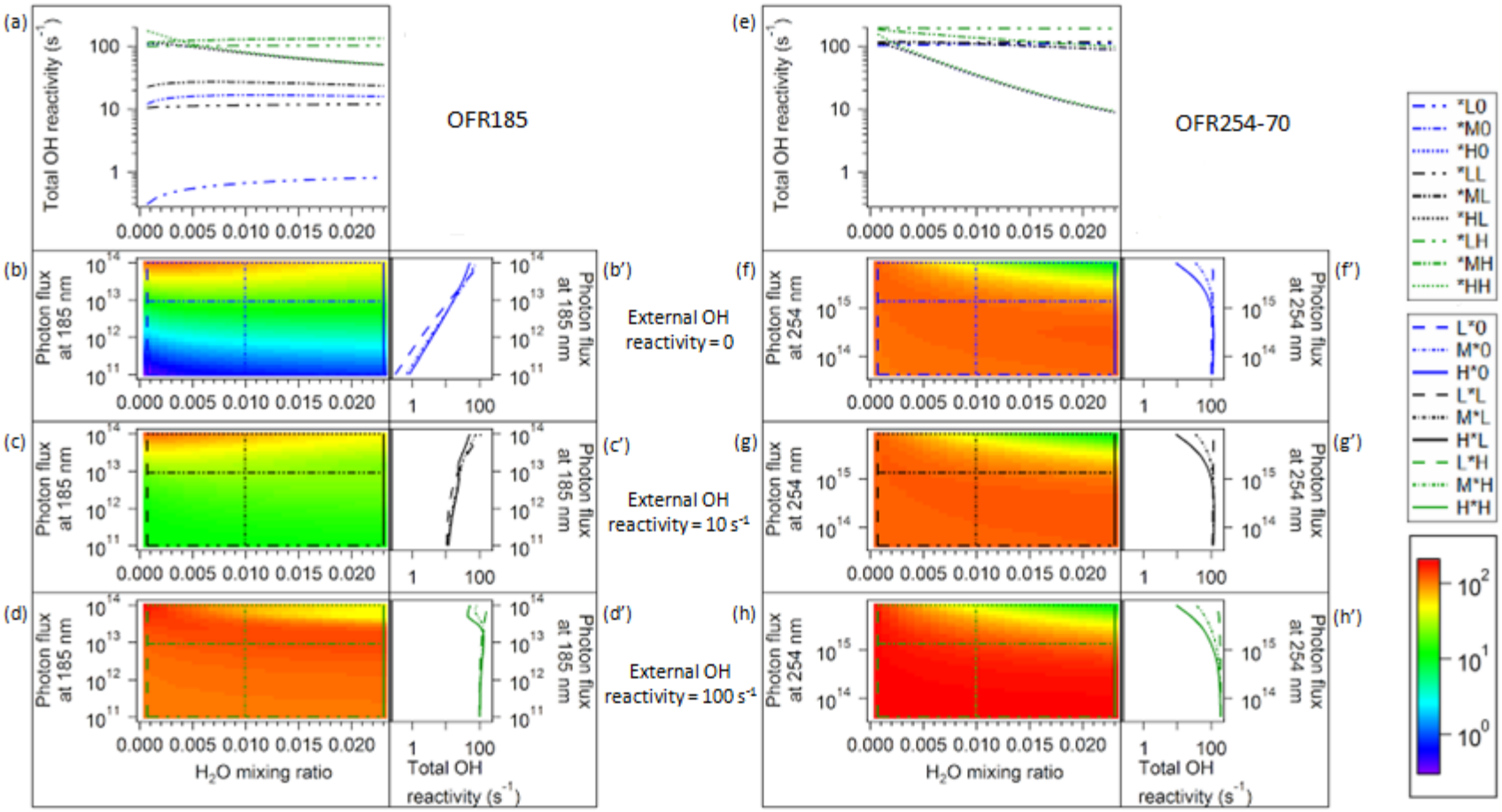

Figure S2. Total OH reactivity (OHR_{tot}, in s^{-1}) vs. the same parameters and in the same format as Fig. 2.

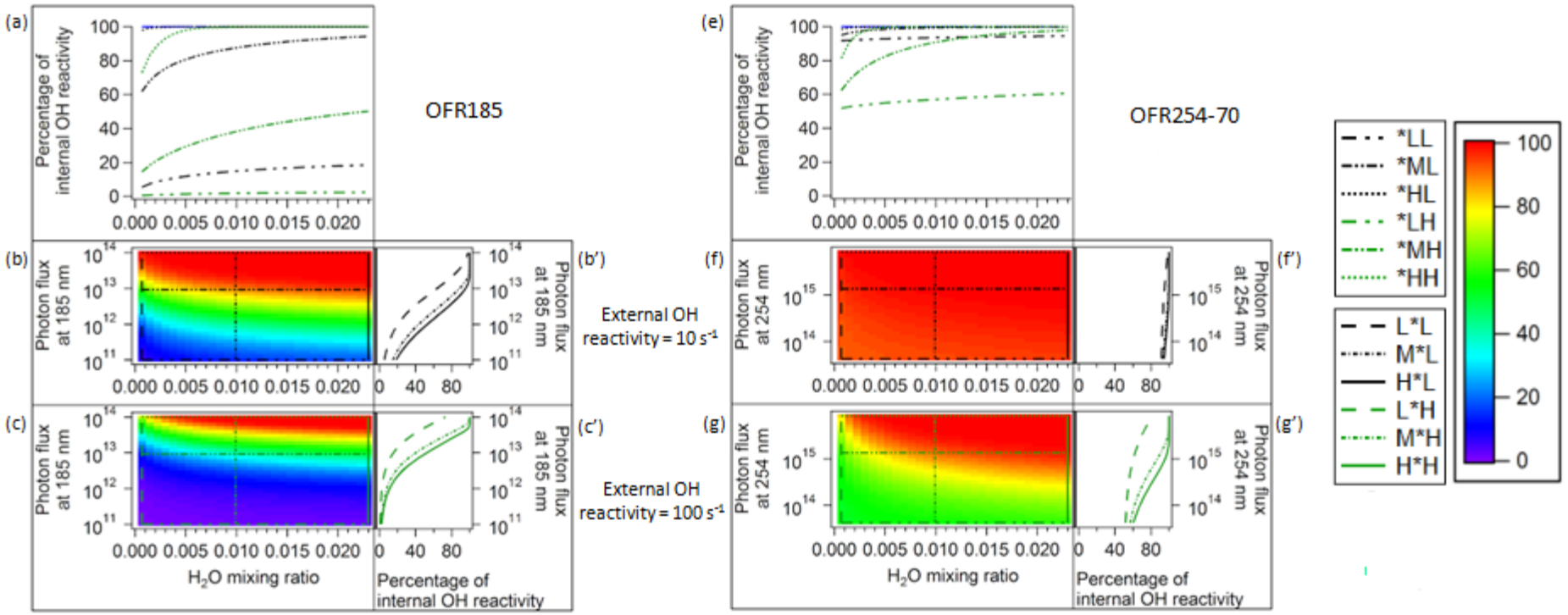

Figure S3. Percentage of internal OH reactivity vs. the same parameters and in the same format as Fig. 2, but without the case of no external OH reactivity, which is the reference case.

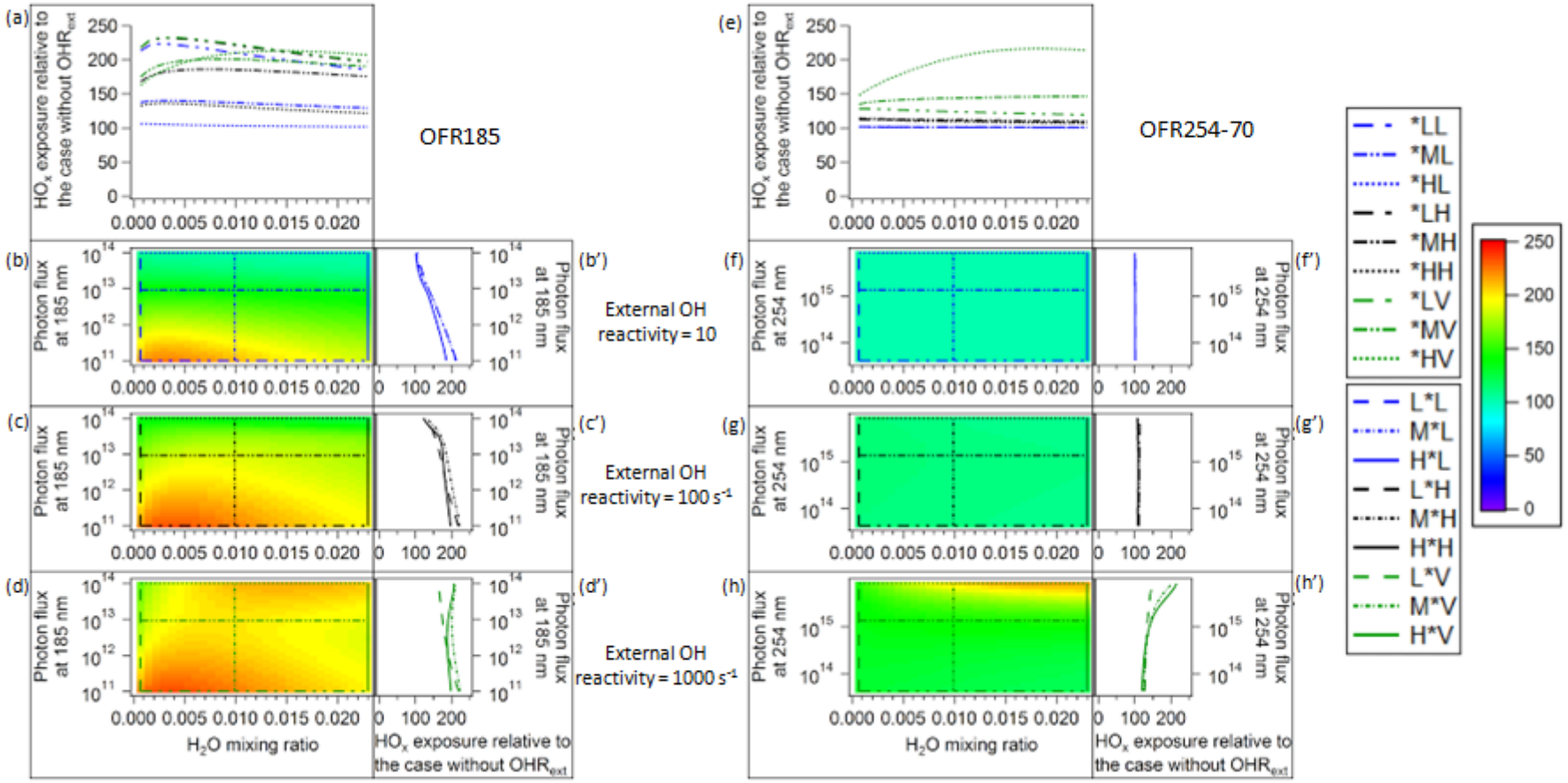

Figure S4. Percentage of total HO_x relative to the case without external OH reactivity (OHR_{ext}) vs. the same parameters and in the same format as Fig. 2, but for the cases of low (10 s^{-1}), high (100 s^{-1}), and very high (1000 s^{-1}) external OH reactivity.

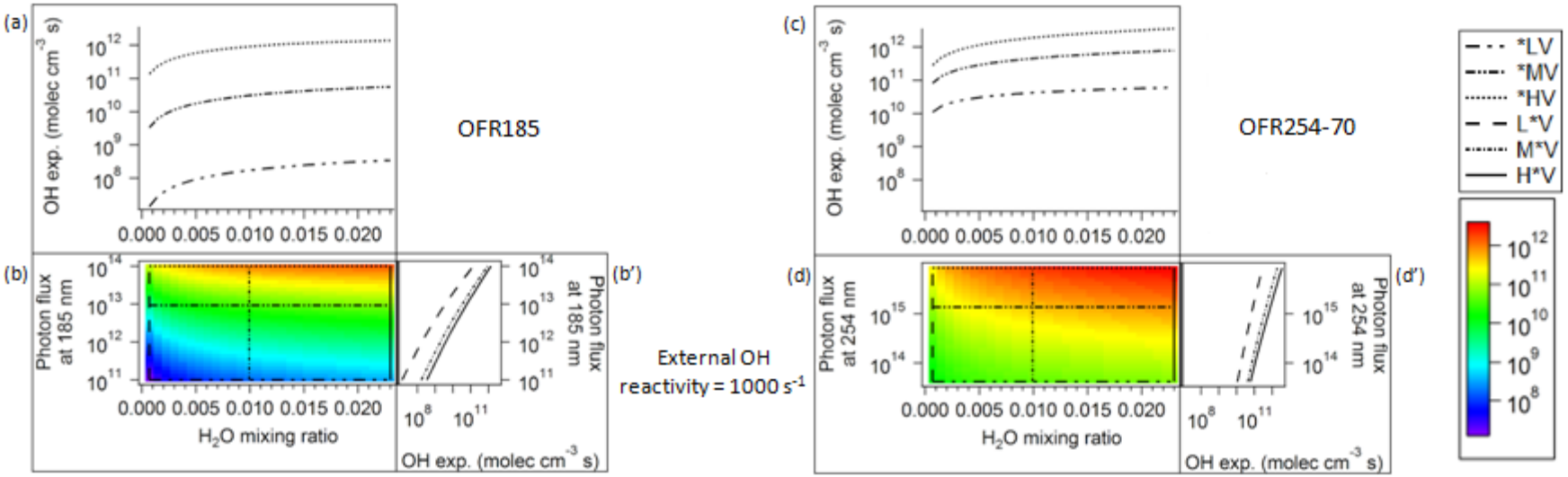

Figure S5. OH exposure (OH_{exp}, in molecules cm^{-3} s) in the same format as Fig. 2, but for the cases of very high external OH reactivity (1000 s^{-1}) only.

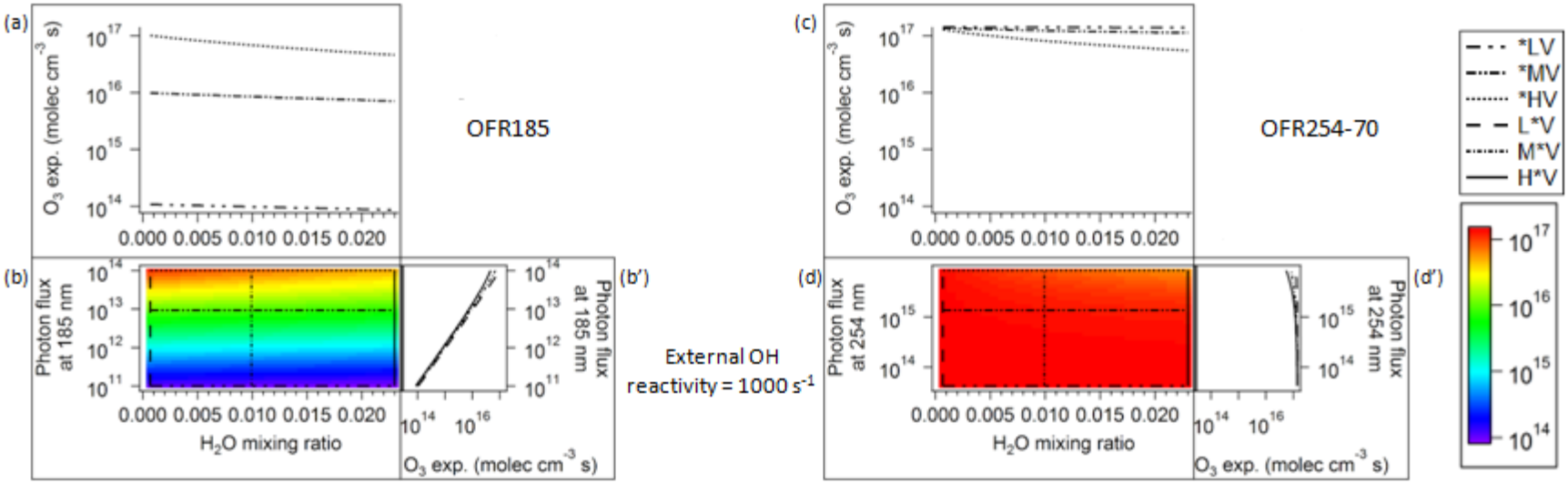

Figure S6. O_3 exposure (in molecules cm^{-3} s) in the same format Fig. 3, but for the cases of very high external OH reactivity (1000 s^{-1}) only.

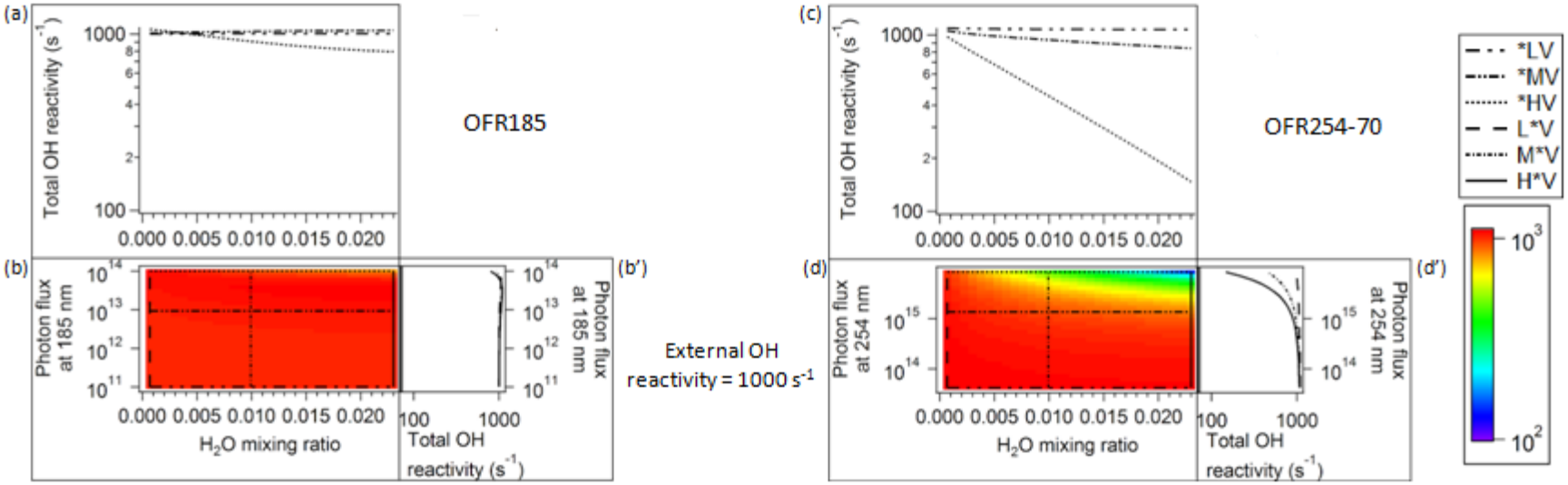

Figure S7. Total OH reactivity (OHR_{tot}, in s^{-1}) in the same format as Fig. S1, but for the cases of very high external OH reactivity (1000 s^{-1}) only.

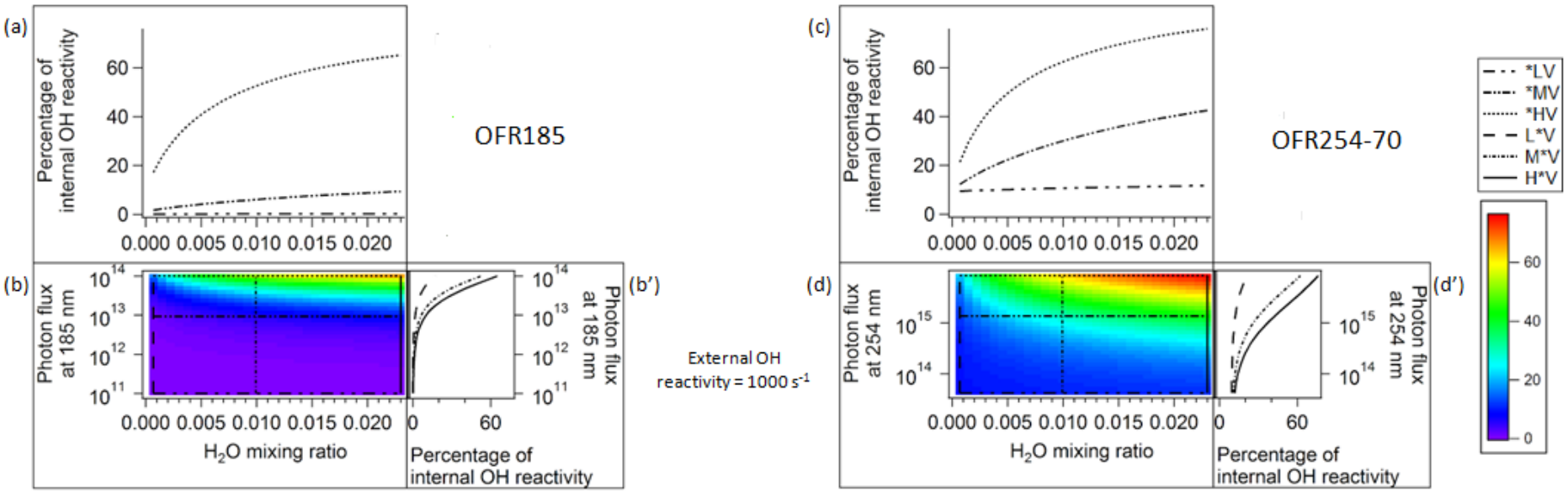

Figure S8. Percentage of internal OH reactivity in the same format as Fig. S2, but for the cases of very high external OH reactivity (1000 s^{-1}) only.

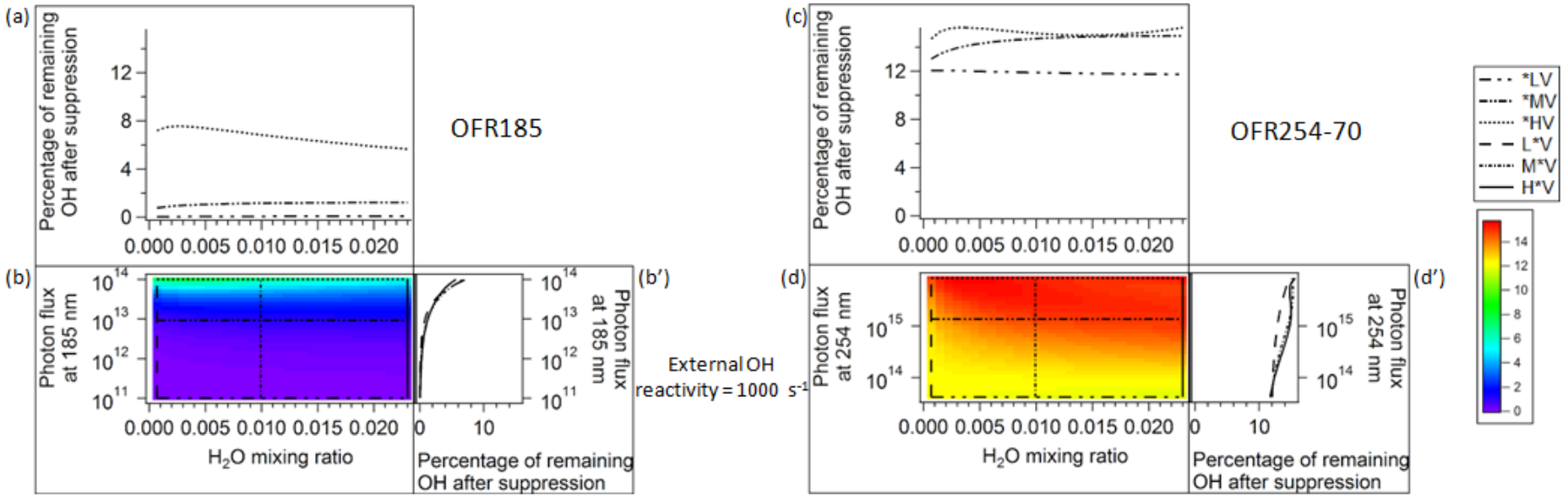

Figure S9. Percentage of remaining OH after suppression in the same format as Fig. 4, but for the cases of very high external OH reactivity (1000 s^{-1}) only.

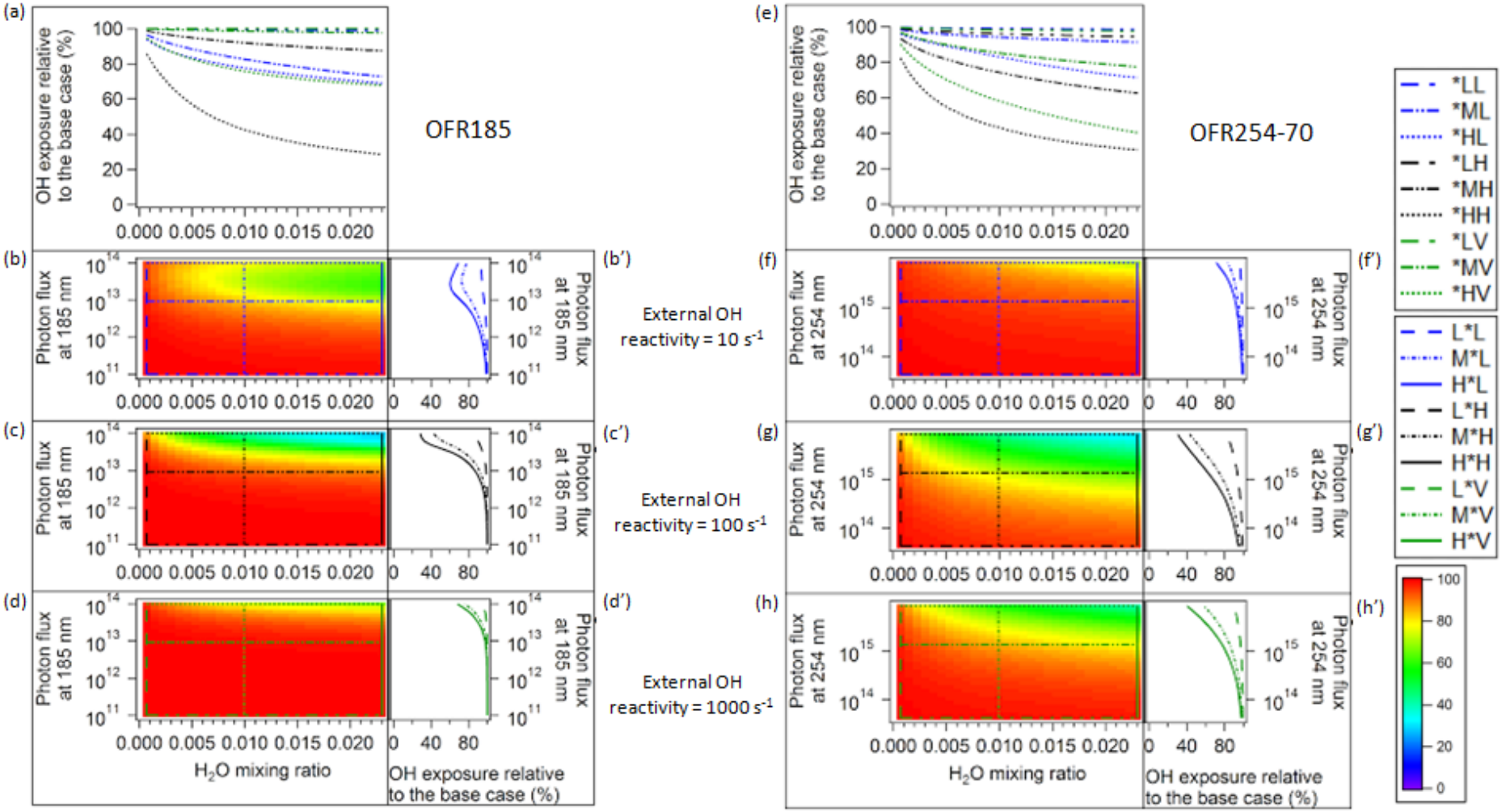

Figure S10. Percentage of OH exposure in the case of constant external OH reactivity (OHR_{ext}) relative to that in the base case (Fig. 2) vs. the same parameters and in the same format as Fig. S3.

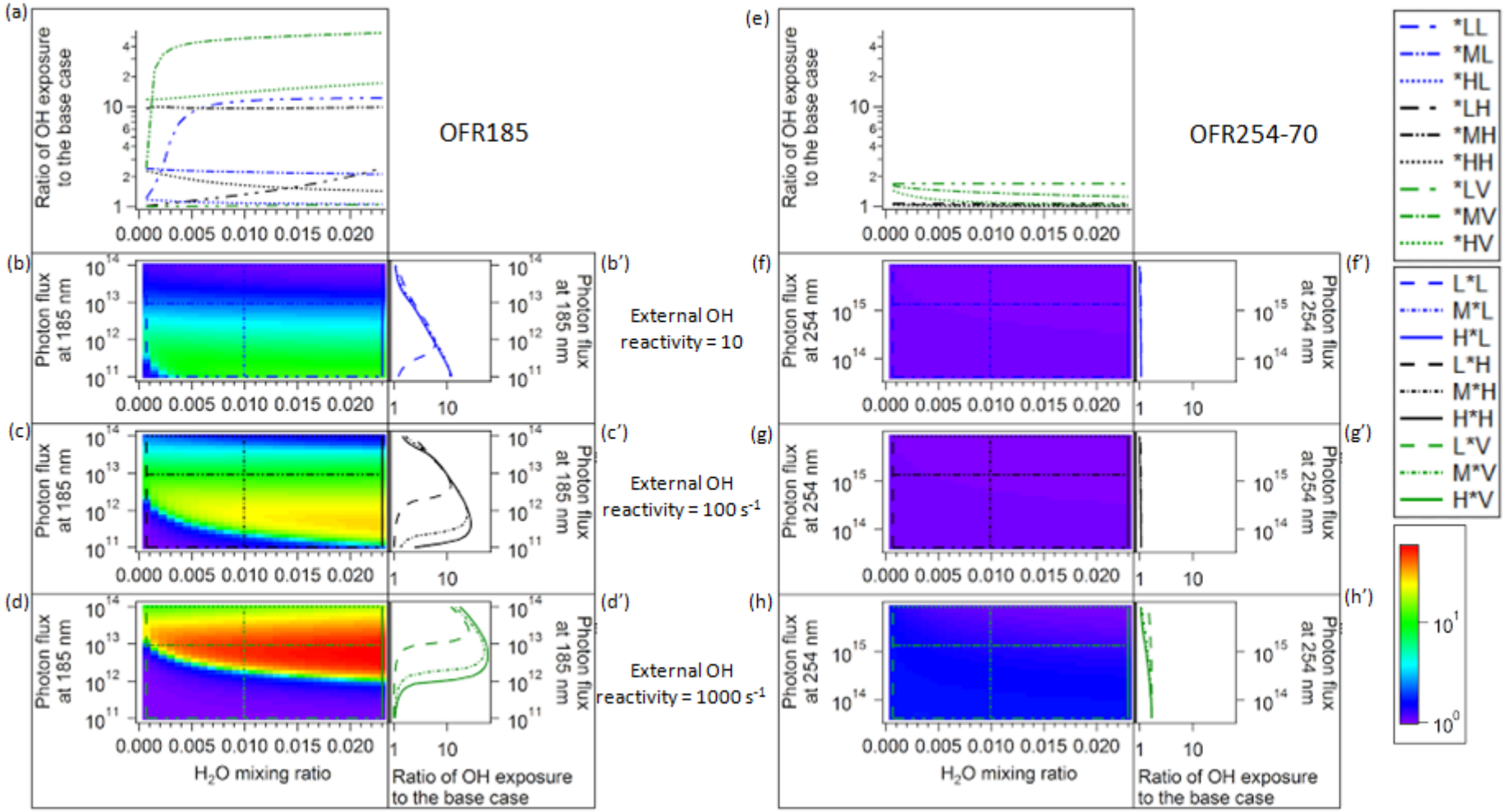

Figure S11. Ratio of OH exposure in the case of external OH reactivity (OHR_{ext}) decaying at collision rate to that in the base case (Fig. 2) vs. the same parameters and in the same format as Fig. S3.

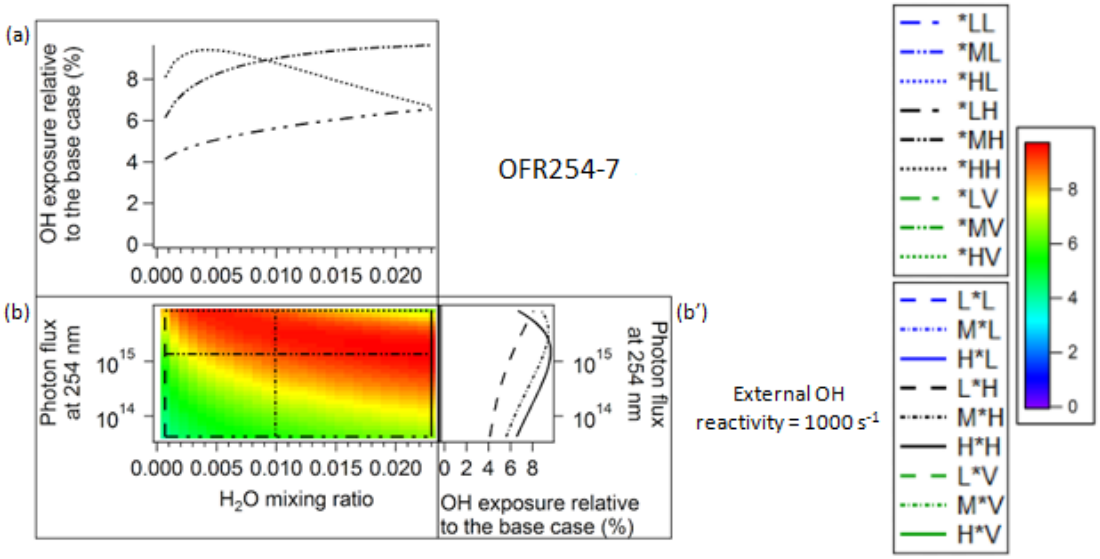

Figure S12. Percentage of OH exposure in OFR254-7 to the base case (OFR254-70) vs. the same parameters and in the same format as Fig. S4c, d, d'.

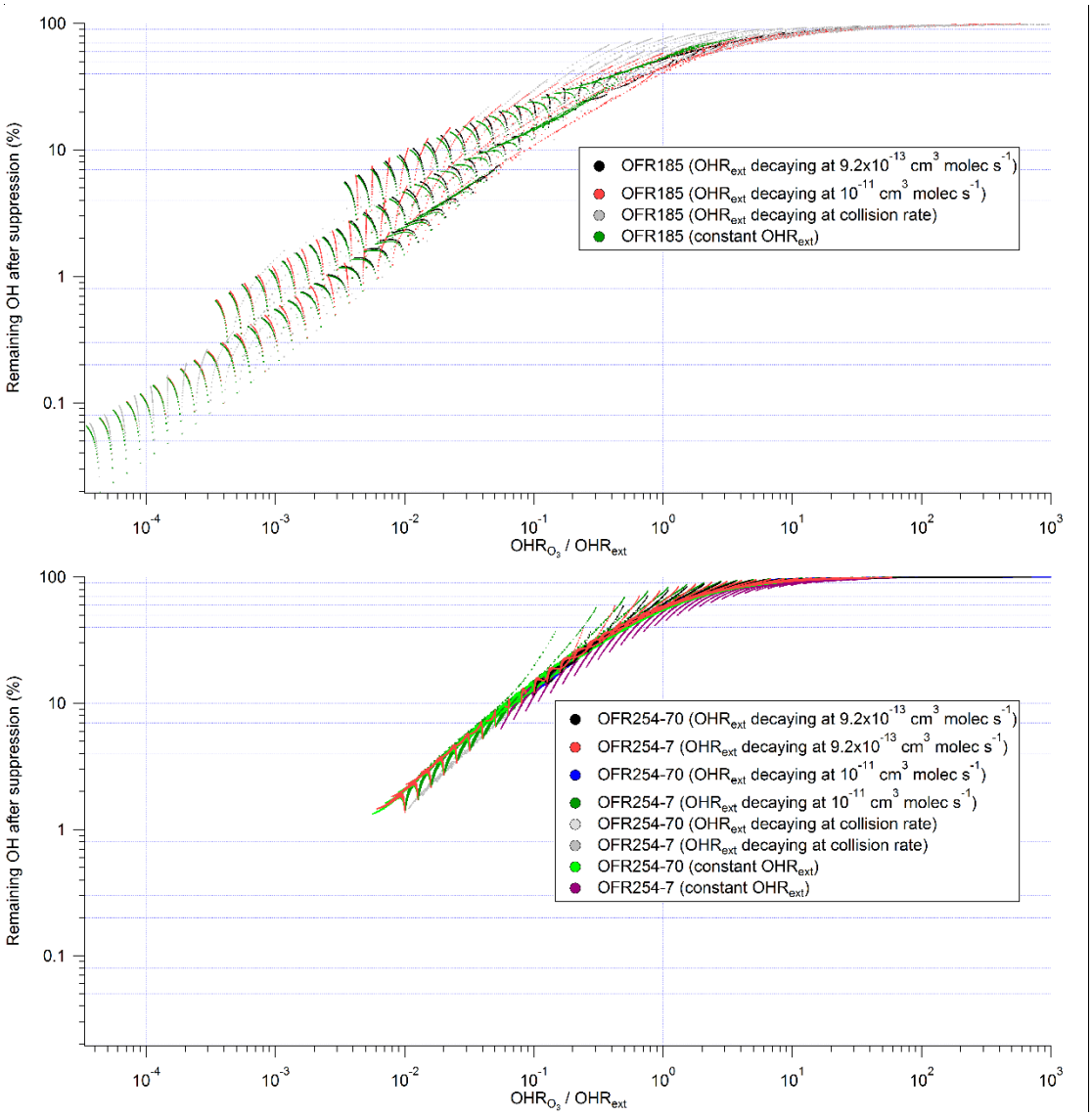

Figure S13. Percentage of remaining OH after suppression in OFR185 (upper) and OFR254 (lower) in the same format as Fig. 8. Within each plot, cases with OHR_{ext} decaying at $1x10^{-11}$ cm^3 $molecules^{-1}$ s^{-1} and collision rate and constant OHR_{ext} are contrasted with the base case (SO_2 as OH reactant, decaying at $9.2x10^{-13}$ cm^3 $molecules^{-1}$ s^{-1}).

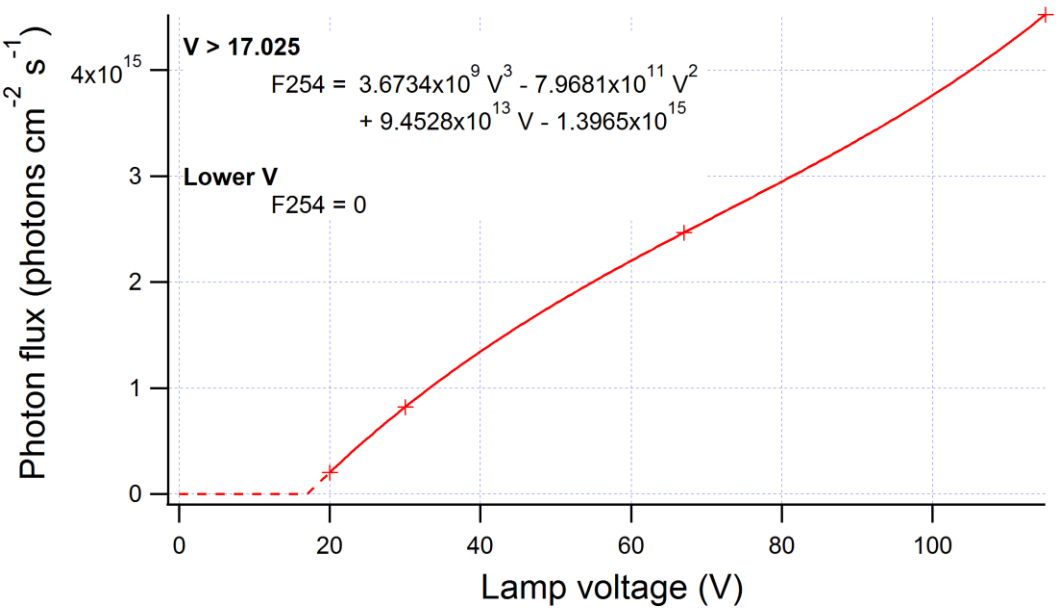

Figure S14. Low-pressure Hg lamp emission at 254 nm as a function of lamp voltage. The markers show data points from Li et al. (2015)'s estimation. The curve is obtained by fitting the data points with a 4-parameter polynomial. Voltages lower than 17.025 V (the curve's intercept with the abscissa) result in no photon emission.

Table S1. Fitting parameters of the two estimation equations (Eqs. 5 and 6).

Eq. 5				Eq. 6	
a	15.514	c_2	0.060786	a	13.322
b_1	0.79292	d	-0.42602	b	-0.22101
b_2	0.023076	e	0.39479	c	0.43529
c_1	-1.0238				

Reference

Li, R., Palm, B. B., Ortega, A. M., Hu, W., Peng, Z., Day, D. A., Knote, C., Brune, W. H., de Gouw, J. and Jimenez, J. L.: Modeling the radical chemistry in an Oxidation Flow Reactor (OFR): radical formation and recycling, sensitivities, and OH exposure estimation equation, J. Phys. Chem. A, revised, 2015.