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Supplementary Materials for

Chemistry and human exposure implications of secondary organic aerosol production from indoor terpene ozonolysis

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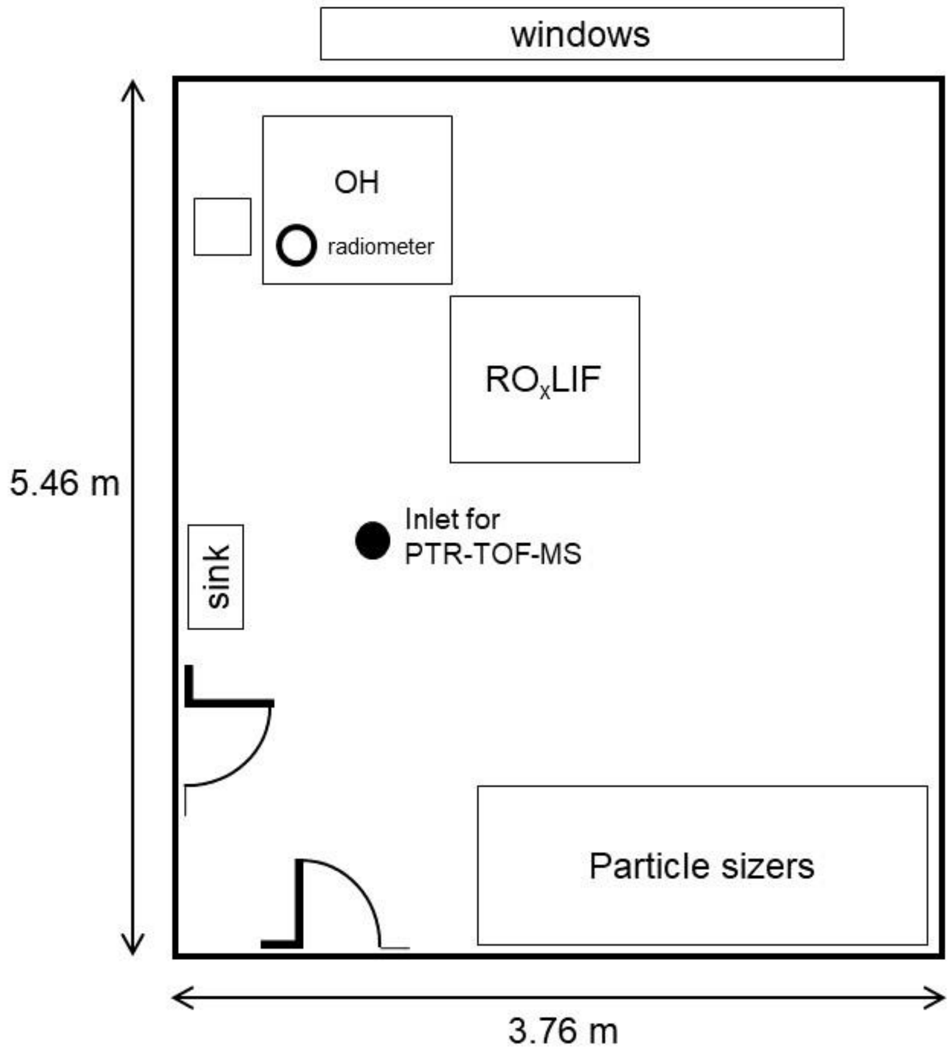


Fig. S1. Test room layout.

Spacing is approximate and instruments are not drawn to scale.

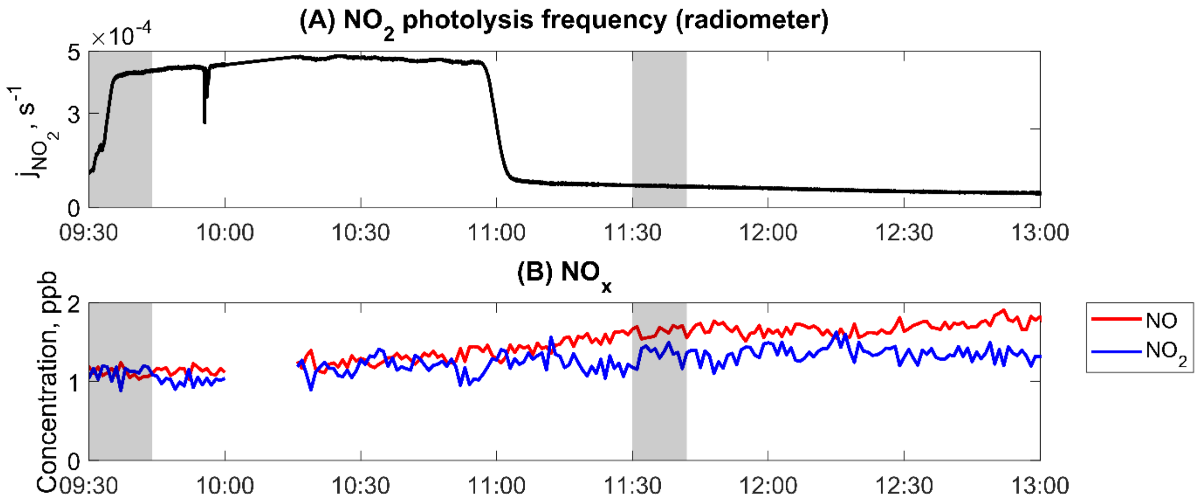


Fig. S2. Time series of additional measurements.

(A) Photolysis rate constant for NO_2 (J_{NO2}) **(B)** NO_x (NO and NO_2) concentrations.

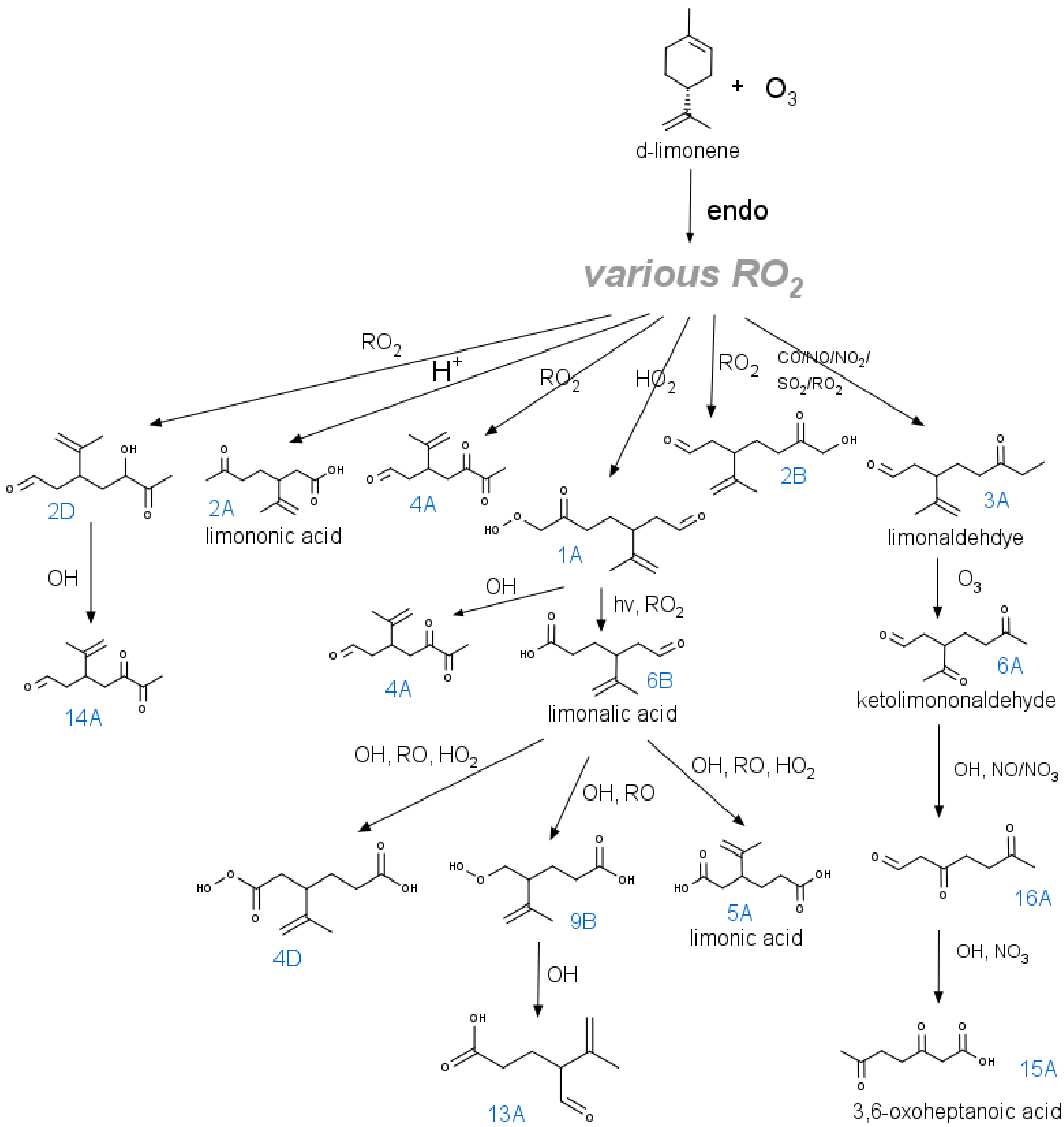


Fig. S3. Chemical mechanism for d-limonene ozonolysis through the endocyclic double bond.

The labels in blue correspond to entries in Table S2.

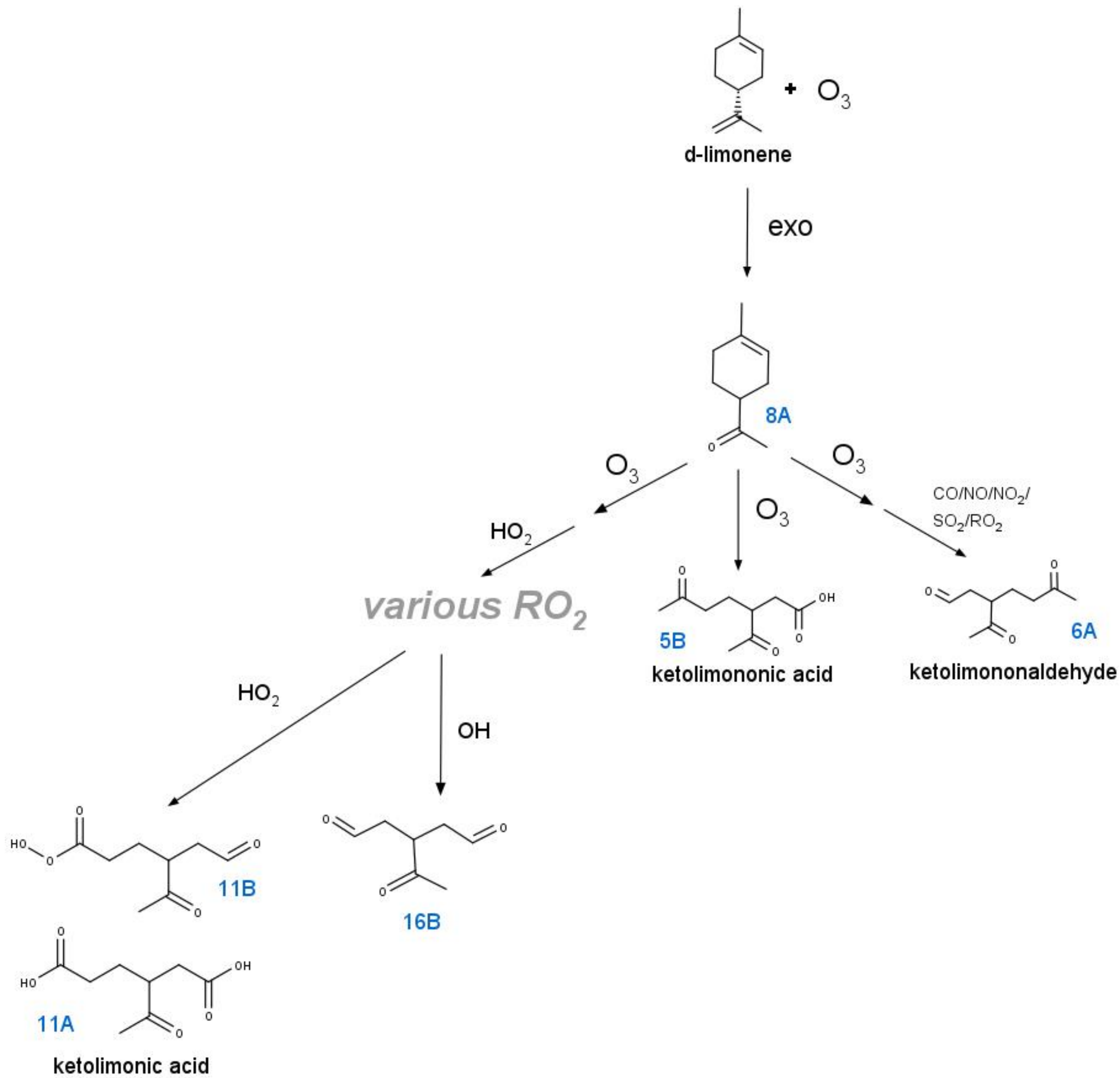


Fig. S4. Chemical mechanism for d-limonene ozonolysis through the exocyclic double bond.

The labels in blue correspond to entries in Table S2.

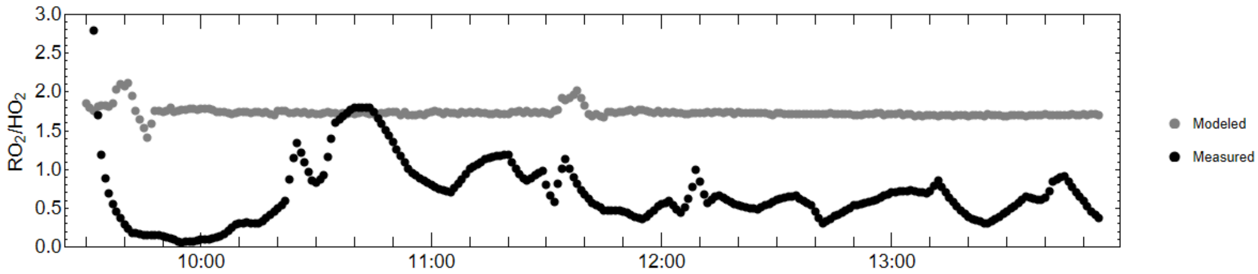


Fig. S5. RO_2-to-HO_2 ratios for measured and modeled RO_2 and HO_2.

Measured RO_2-to-HO_2 ratios range from 0.06 to 1.80, while modeled RO_2-to-HO_2 ratios range from 1.3 to 2.3. While the modeled ratios show that RO_2 is always greater than the modeled HO_2, measured ratios show that at times, measured RO_2 concentrations are at times lower than the measured HO_2 concentrations.

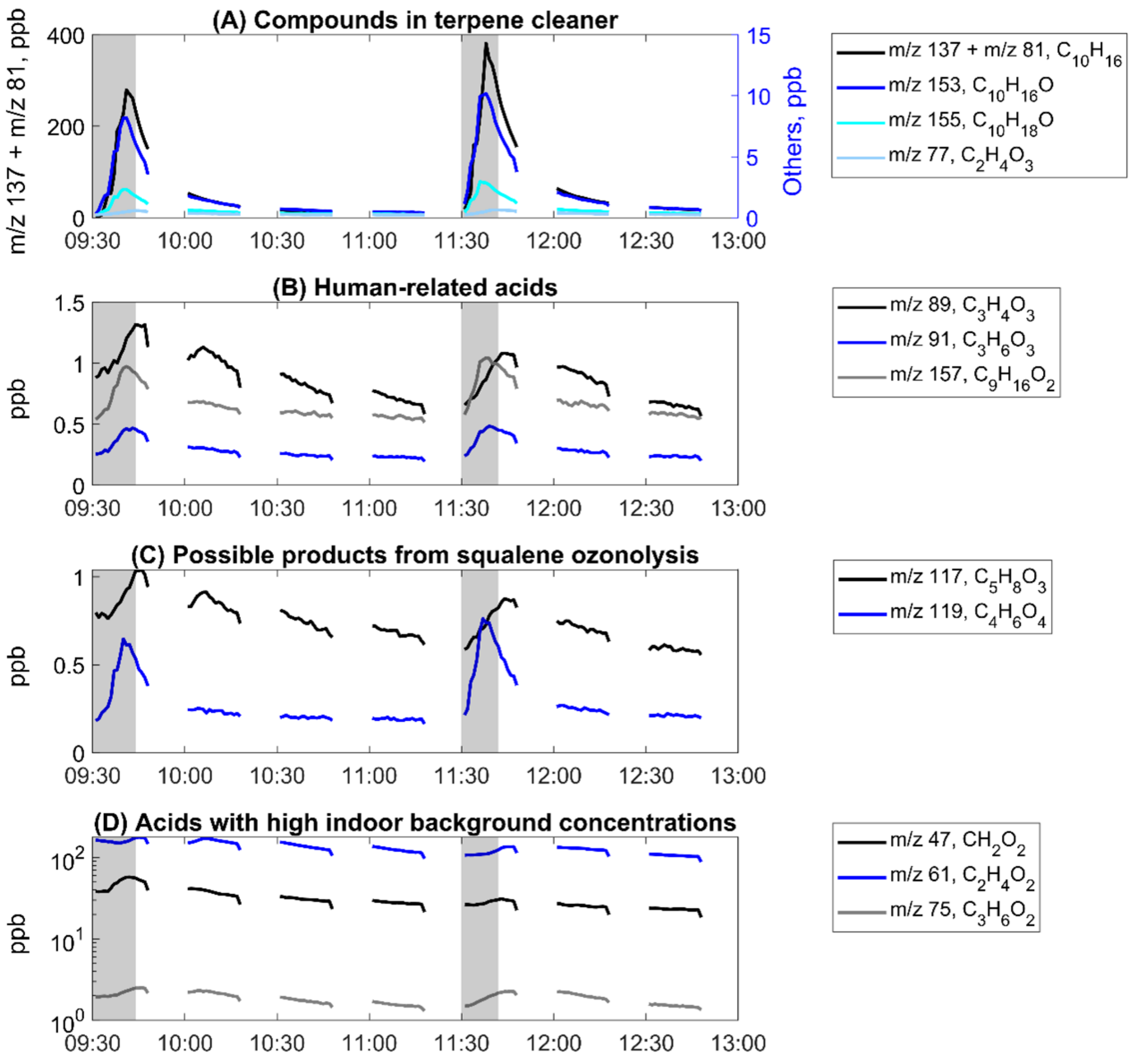


Fig. S6. Other organic compounds detected by PTR-ToF-MS.

(**A**) Primary emissions consumer cleaning product, (**B**) possible human body-associated emissions of organic acids, (**C**) products from squalene ozonolysis, and (**D**) acids with high indoor background concentrations. Gray shading corresponds to active periods of mopping and wiping during the cleaning events. Note: a researcher was present during the mopping and cleaning periods.

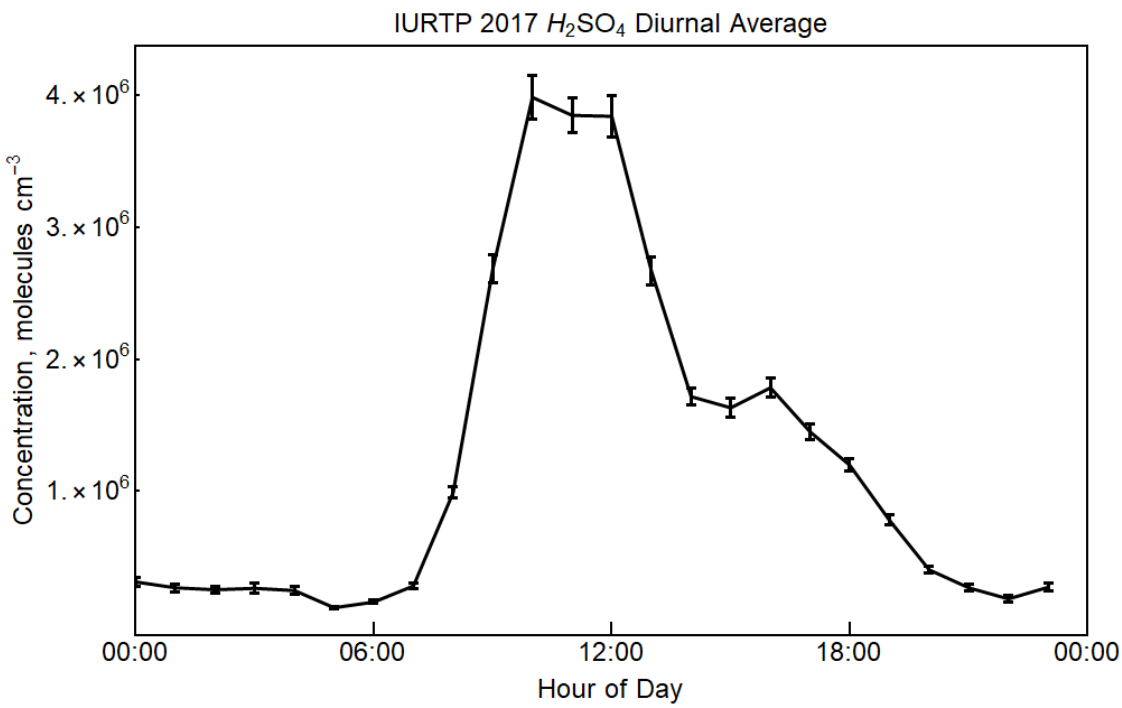


Fig. S7. Diurnal average of ambient H_2SO_4 concentrations at the IURTP field site in 2017.

Gas-phase ambient H_2SO_4 was measured with a Chemical Ionization Mass Spectrometer (CIMS) by the University of Colorado–Boulder.

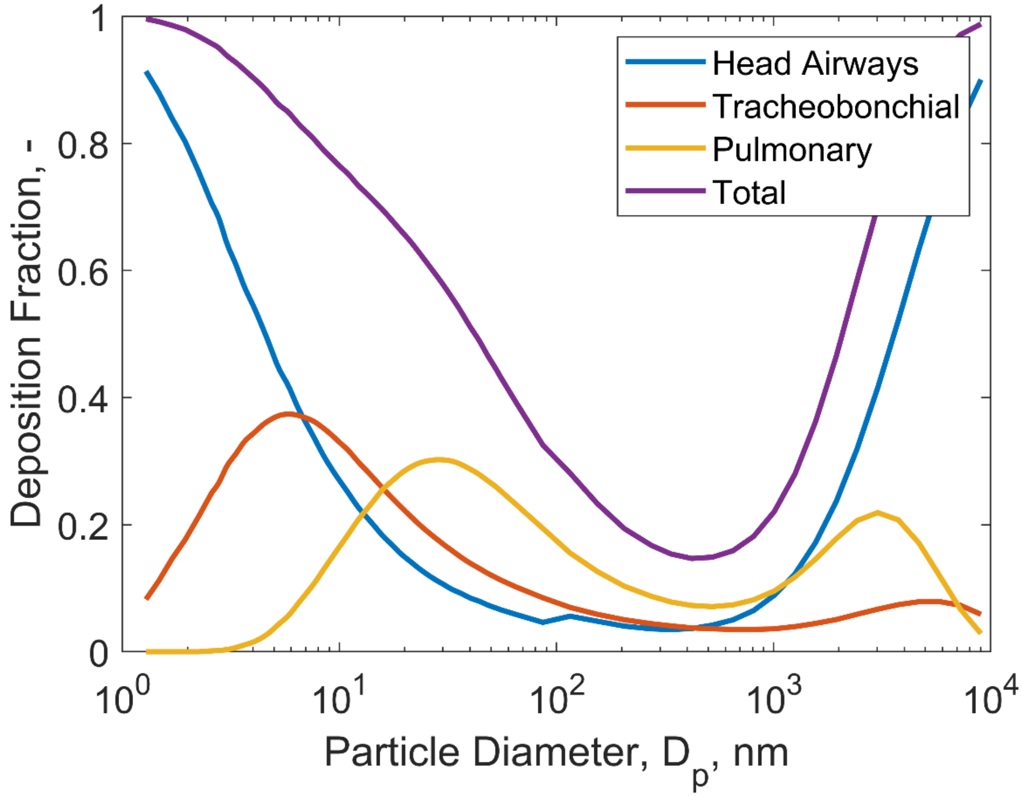


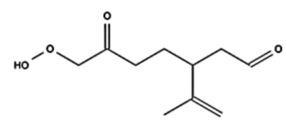
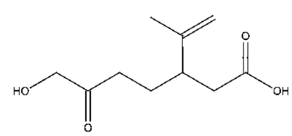
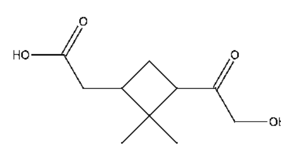
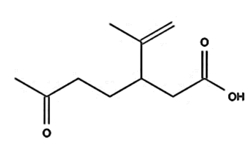
Fig. S8. Size-resolved regional and total particle deposition fractions for the human respiratory tract.

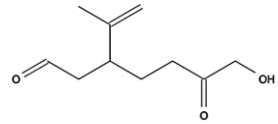
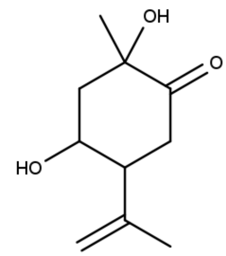
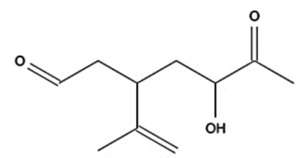
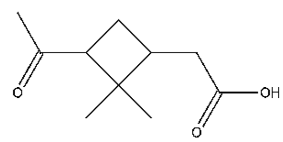
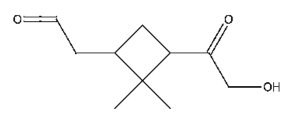
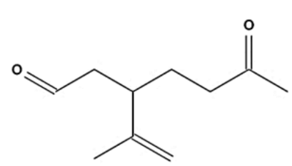
Table S1. Abundance, fraction, and ozone reaction rate constant of select monoterpenes detected via GC-MS.

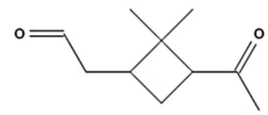
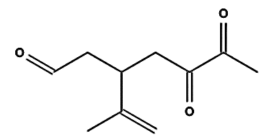
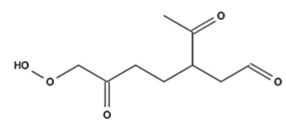
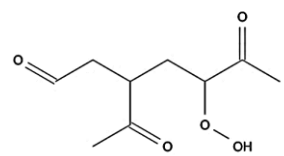
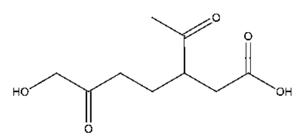
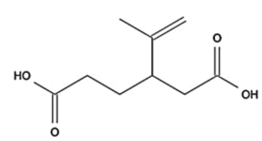
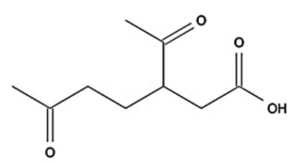
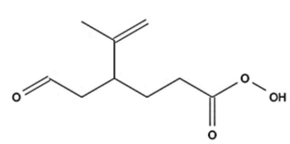
Monoterpene	Abundance (Absolute counts)	Relative fraction	Second-order rate constant (ppb^{-1} hr^{-1})	Reference
d-limonene	1.1×10^{7}	0.44	1.9×10^{-2}	(*10*, *78*)
α-pinene	2.5×10^{6}	0.10	7.56×10^{-3}	(*78*)
β-pinene	4.0×10^{6}	0.16	1.32×10^{-3}	(*78*)
camphene	7.5×10^{6}	0.30	7.94×10^{-5}	(*78*)

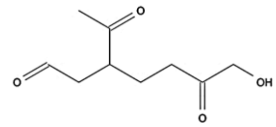
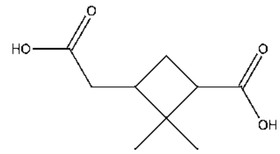
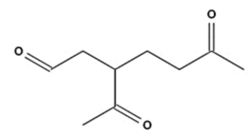
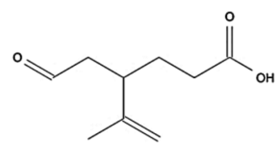
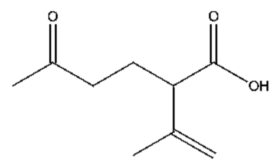
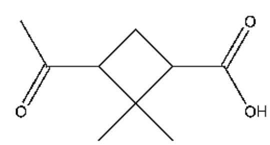
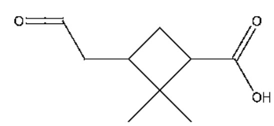
Table S2. List of gas-phase secondary oxidation products detected by PTR-ToF-MS and their molecular formula assignments.

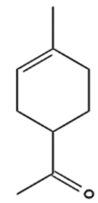
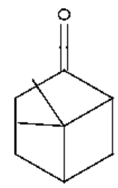
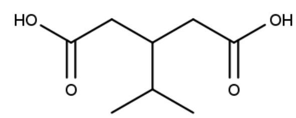
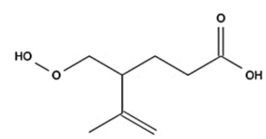
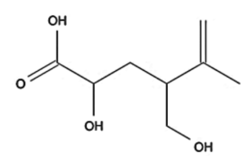
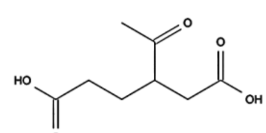
Compounds of the same molecular formula are grouped together and separated from other groups by a gray shading/border. "Label" column corresponds to the labeled structures in Figure S3 and S4, if shown. Only oxidation products from α-pinene, β-pinene, and limonene are considered.

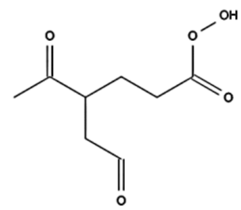
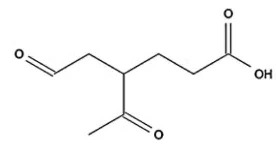
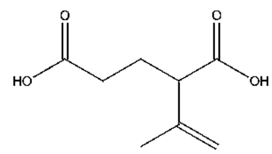
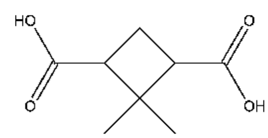
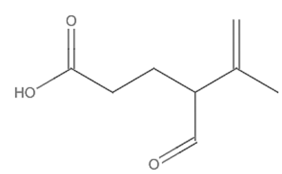
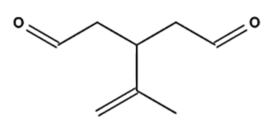
Molecular Formula	Protonated mass	Common Name *(IUPAC name)*	Reference	Structure	Label
$C_{10}H_{16}O_4$	201.163	-	*(77, 81)*		1A
		7-hydroxy-limononic acid	*(82)*		1B
		10-hydroxy-pinonic acid	*(82)*		1C
$C_{10}H_{16}O_3$	185.117221	Limononic acid *(3-Isopropenyl-6-oxoheptanoic acid)*	*(4,82,83)*		2A

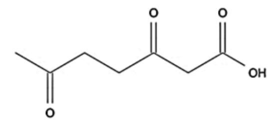
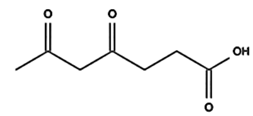
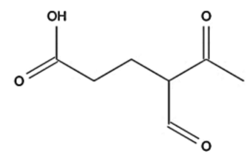
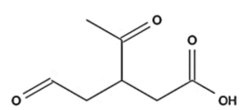
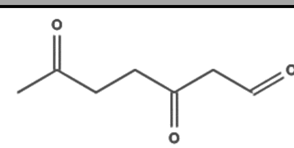
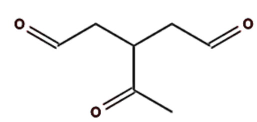
$C_{10}H_{16}O_3$ (cont'd)	185.117221	7OH-lim (7-hydroxylimononaldehyde) *(7-Hydroxy-3-isopropenyl-6-oxoheptanal)*	*(4,83)*		2B
		4-Isopropenyl-1-methyl-1,5-dihydroxy-2-oxocyclohexane	*(83)*		2C
		-	*(77,81)*		2D
		Pinonic acid	*(82)*		2E
		10-hydroxy-pinonaldehyde	*(82)*		2F
$C_{10}H_{16}O_2$	169.122306	Limononaldehyde/ Limonaldehyde *(3-Isopropenyl-6-oxoheptanal)*	*(4,82)*		3A

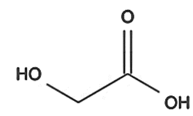
		Pinonaldehyde *(2,2-dimethyl-3-acetyl-cyclobutyl-ethanal)*	*(77,81)*		3B
$C_{10}H_{14}O_3$	183.19945	*(3-(2,3-Dioxobutyl)-4-methyl-4-pentenal)*	*(77,81)*		4A
$C_9H_{14}O_5$	203.091400	-	*(77,81)*		4B
		-	*(77,81)*		4C
		7-hydroxy-keto-limononic acid	*(5, 77, 81, 82)*		4D
$C_9H_{14}O_4$	187.096485	Limonic acid *(3-Isopropenylhexanedioic acid)*	*(4, 5,82,83)*		5A
		Keto-limononic acid *(3-Acetyl-6-oxoheptanoic acid)*	*(5,82,83)*		5B
		-	*(77,81)*		5C

		7-hydroxy-keto-limononaldehyde	*(77, 81,82)*		5D
		Pinic acid	*(82)*		5E
$C_9H_{14}O_3$	171.101571	Keto-limononaldehyde *(3-Acetyl-6-oxoheptanal)*	*(82,83)*		6A
		Limonalic acid *((4R)-5-Methyl-4-(2-oxoethyl)-5-hexenoic acid)*	*(4,5,77, 81–83)*		6B
		Norlimononic acid	*(5,82,83)*		6C
		Norpinonic acid	*(82)*		6D
		Pinalic 3-acid	*(82)*		6E

$C_9H_{14}O$	139.11581	Keto-limonene/ Limonaketone *(4-Acetyl-1-methyl-1-cyclohexene)*	*(4,77, 81, 82)*		8A
		Pinaketone	*(82)*		8B
$C_8H_{14}O_4$	175.096485	3-isopropylpentanedioic acid	(*5*)		9A
		-	*(77,81)*		9B
		-	*(77,81)*		9C
$C_8H_{12}O_5$	189.15803	Keto-limonic acid *(3-Acetylhexanedioic acid)*	*(5,77, 81, 82)*		11A

		-	*(77,81)*		11B
$C_8H_{12}O_4$	173.080835	Keto-limonalic acid	*(5,82)*		12A
		Norlimonic acid	*(5,82)*		12B
		Norpinic acid	*(82)*		12C
$C_8H_{12}O_3$	157.09	-	*(77,81)*		13A
$C_8H_{12}O_2$	141.145	-	*(77,81)*		14A

$C_7H_{10}O_4$	159.065185	3,6-oxoheptanoic acid *(3,6-Dioxoheptanoic acid)*	*(5,83)*		15A
		4,6-oxoheptanoic acid	(*5*)		15B
		(4-Formyl-5-oxohexanoic acid)	*(77, 81)*		15C
		(4-Oxo-3-(2-oxoethyl)pentanoic acid)	*(77, 81)*		15D
$C_7H_{10}O_3$	143.135	-	*(77, 81)*		16A
		-	*(77, 81)*		16B

$C_2H_4O_3$	77.023320	Glycolic acid	*(77)*		17

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