Table S1: Characterization of measured compounds by various institutions (IU: Indiana University, UMass: University of Massachusetts, LD: IMT Lille Douai) into RACM2 groups.

RACM2	VOCs	Source	RACM2	VOCs	Source
NO	NO	UMass	**HCHO**	Formaldehyde	LD
NO2	NO_2	UMass	**ACD**	Acetaldehyde	LD
H2O	Water vapor	IU	**ACT**	Acetone	LD
HONO	Nitrous Acid	IU	**EOH**	Ethanol	LD
			ACE	Acetylene	LD
CH4	Methane	est	**ISO**	Isoprene	LD
ETH	Ethane	LD	**MACR**	Methacrolein	est*
HC3	Propane, isobutene, butane, neopentane, 2,2-dimethylbutane, 2,2-diemthylpentane	LD	**MEK**	Methyl ethyl ketone	LD
HC5	Isopentane, pentane, propyne, 2-methylpentane, 3-methylpentane, hexane, 2,4-dimethylpentane, 2,2,3-trimethylbutane, 3,3-dimethylpentane, 2,3-diemthylpentane, isooctane	LD	**MVK**	Methyl vinyl ketone	LD
HC8	Butyne, cyclopentane + 2,3-diemthylbutane, cyclohexane, 2-methylhexane, heptane, octane, nonane, undecane, dodecane, nC13, nC14	LD	**API**	α-pinene, β-pinene, 3-carene	LD
ETE	Ethene	LD	**ROH**	Borneol	LD
OLT	Propene, 1-butene, isobutene, 3-methyl-1-butene, 1- pentene, 2- methyl-1-butene, hexene	LD	**BENZENE**	Benzene	LD
OLI	trans-2-butene, cis-2-butene, trans-2-pentene, 2-methyl-2- butene, 1-pentene, cis-2- pentene, cyclopentane	LD	**TOL**	Toluene, chlorobenzene, ethylbenzene, styrene, isopropylbenzene, n-propylbenzene, 2-ethyltoluene, n-butylbenzene	LD
DIEN	1,3-butadiene, 3-methyl-1,4-pentadiene	LD	**MXYL/ PXYL**	m+p xylene, 3-ethyltoluene, 4-ethyltoluene, 1,3,5-trimethylbenzene + camphene, 1,2,4-trimethylbenzene + nC10, 1,2,3-trimethylbenzene + α-terpinene	LD
KET	Nopinone	LD	**OXYL**	o-xylene	LD
			ORA1	Formic Acid	LD

*Mixing ratios of CO were estimated based on published emission ratios of CO with benzene (Warneke et al., 2007). Mixing ratios of methacrolein were estimated based on measured MVK/MACR ratios (Apel et al., 2002)

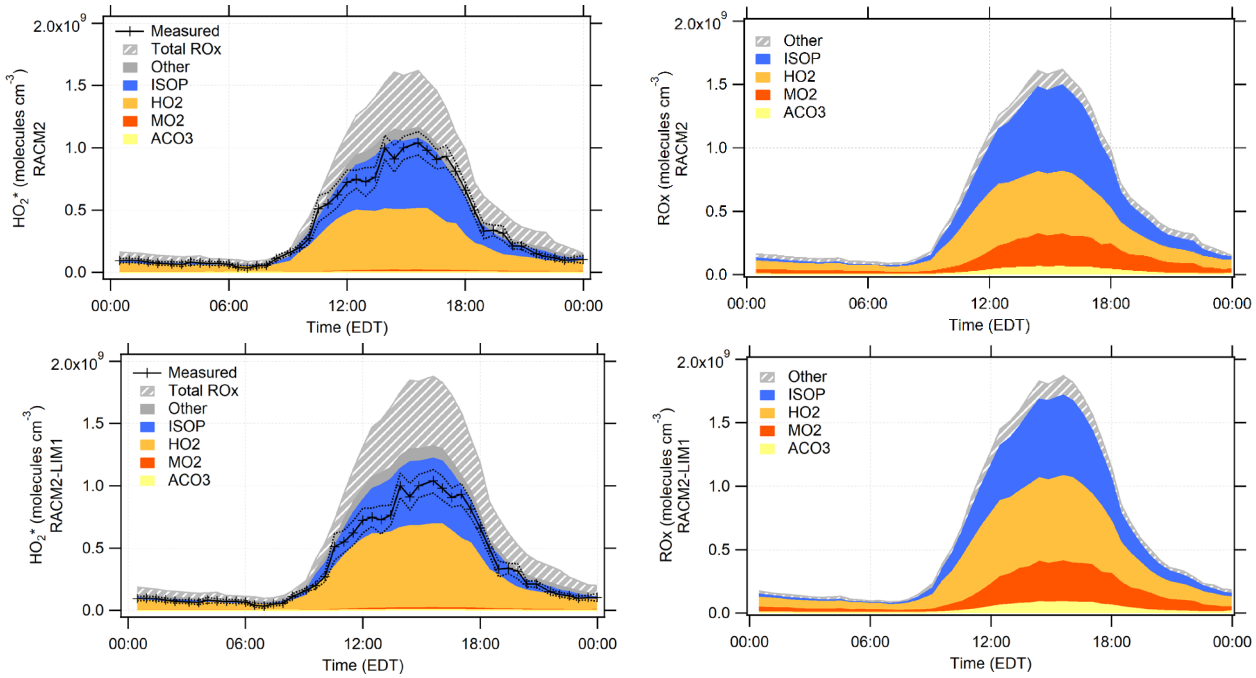

Figure S1. The RACM2 and RACM2-LIM1 diurnal average modeled peroxy radical concentration and composition. Left panels show the modeled contribution to the measured HO_2* concentrations. Measured 30-min mean HO_2* is shown by the black line with ± 1σ standard error shown by the dotted black lines. Right panels show the total RO_2 composition predicted by each model.

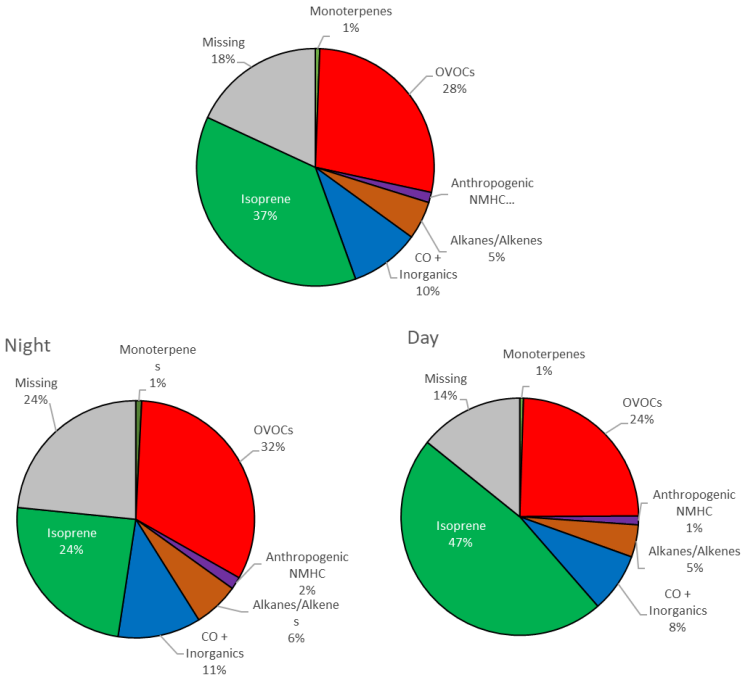

Figure S2. The diurnal average components of the mean calculated OH reactivity over the course of the campaign (top), as well as that during daytime (08:00-20:00 hours) and nighttime (20:00-08:00 hours).

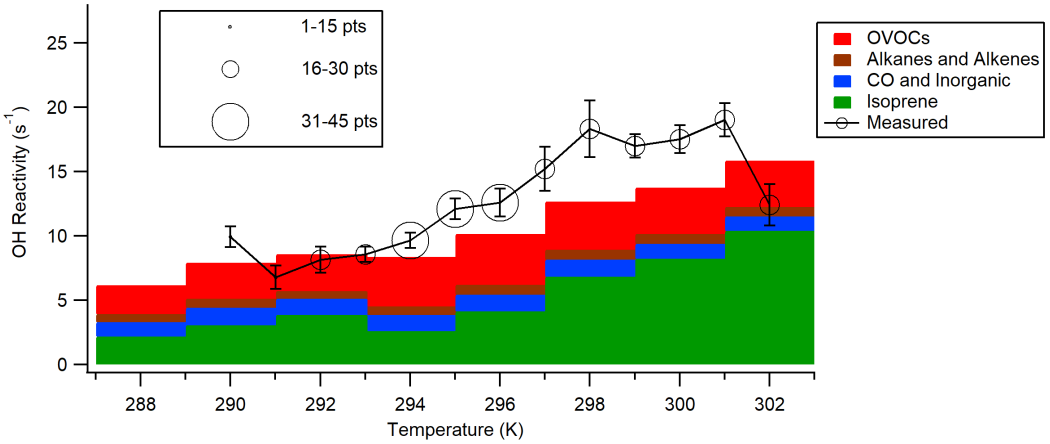

Figure S3. Median measured and calculated OH reactivity separated by the measured components over the observed temperature range. Size of the measured symbol indicates the number of measurements in each temperature bin. Error bars represent ±1σ standard error.

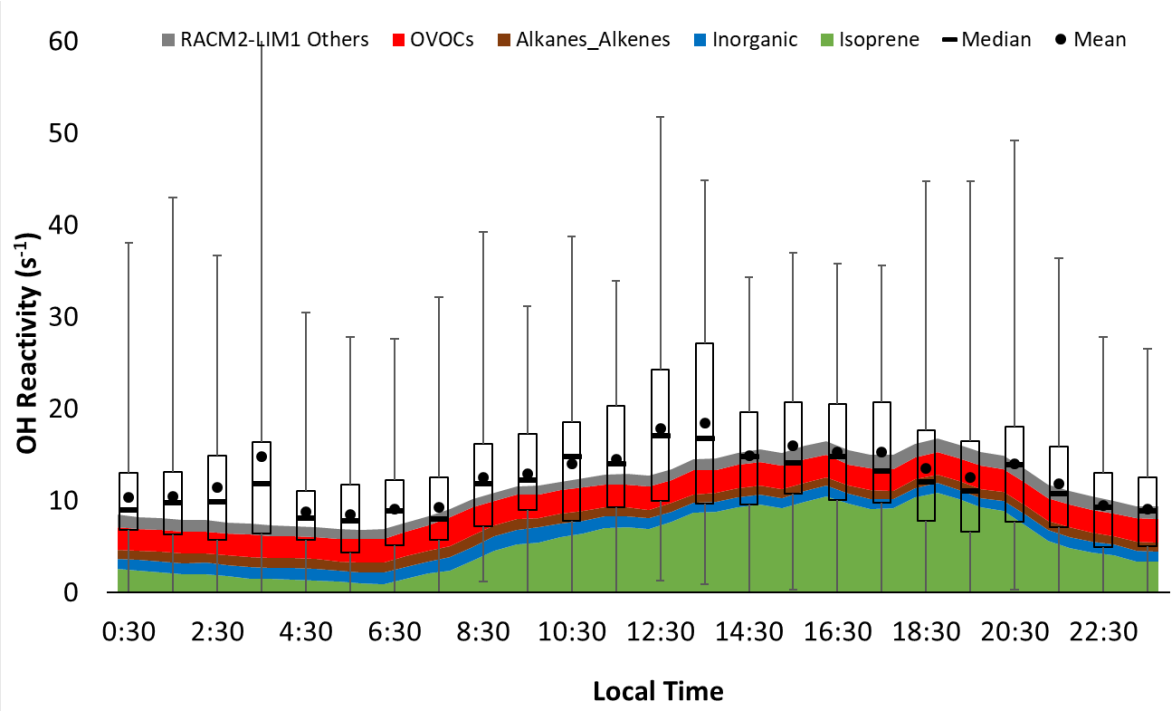

Figure S4. Diurnal box and whiskers plot of observed total OH reactivity showing the mean and median values for each hour with the mean calculated values from the measured OH sinks as well as the unmeasured oxidation products from the RACM2-LIM1 model results. Error bars show range of measurements and bars show Q1 and Q3 for the measured OH reactivity.

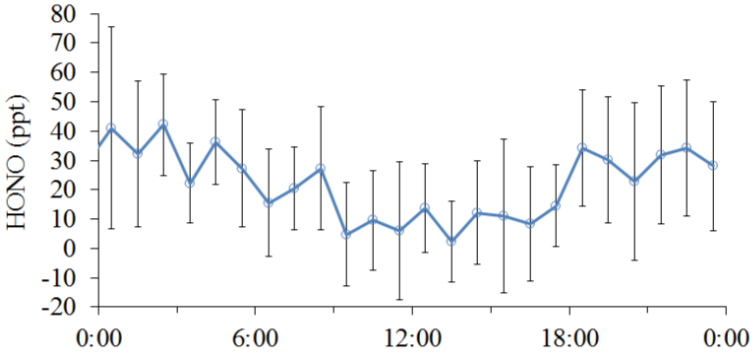

Figure S5. Diurnal average measurements of HONO during the IRRONIC 2015 campaign. Error bars represent the standard error of the measurements.

References

Apel, E. C.et al., Measurement and interpretation of isoprene fluxes and isoprene, methacrolein, and methyl vinyl ketone mixing ratios at the PROPHET site during the 1998 Intensive, J. Geophys. Res,, 107(D3), doi:10.1029/2000jd000225, 2002.

Warneke, C., et al., Determination of urban volatile organic compound emission ratios and comparison with an emissions database, J. Geophys. Res., 112, D10S47, doi:10.1029/2006JD007930, 2007.