Measurement of Volatile Organic Compounds in samples collected in the areas surrounding the All American Asphalt facility

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Sample Collection

During sampling, evacuated 2 liter electropolished stainless steel canisters are filled by slightly opening a bellows valve, allowing about a 1 minute collection of an air sample





VOC Analysis

- ➤ After collection, cans are analyzed at UCI using a multicolumn/detector Gas Chromatography (GC) system;
- ➤ The first GC is equipped with two different column combinations output to an electron capture detector (ECD) and a flame ionization detector (FID);
- The second GC is output to an FID;
- ➤ The third GC is equipped with two different column combinations and output to a quadrupole mass spectrometer detector (working in SIM mode) and an ECD.
- ➤ The different combinations allow the identification and quantification of different classes of compounds.



- ➤ The measurement precision, detection limits and accuracy vary by compound: The limit of detection is 3 pptv for all hydrocarbons; The accuracy of our measurements is 5% for the non-methane hydrocarbons (30% for acetone); The measurement precision is 2%-5% NMHCs (30% for acetone).
- A complete description of the GC parameters and analytical methods are given elsewhere (Simpson et al., 2020)*

^{*}Simpson, I.J., Characterization, sources and reactivity of volatile organic compounds (VOCs) in Seoul and surrounding regions during KORUS-AQ. Elementa — Science of the antrhropocene, 2020, 8

Measured VOCs

Total of 93 species

Sulfur
Halogenated
Alkyl Nitrates
Alkanes
Alkyne
Alkenes
Aromatics

OVOC

OCS DMS CHBr2Cl DMS CHBr2Cl CFC-12 CHBr3 2-Methylpentane CFC-11 1,2-Dichloroethane CFC-113 Methyl Nitrate CFC-114 Ethyl Nitrate Halon-1211 Halon-1301 HFC-152a 2-Butyl Nitrate 2-Butyl Nitrate 2-Butyl Nitrate 2-Methylpentane CFC-142 BHC-134a CP-entyl Nitrate CFC-142 BHCFC-142b HCFC-142b HCFC-141b CHCFC-141b CHCFC-142b C				
CFC-12 CHBr3 2-Methylpentane CFC-11 1,2-Dichloroethane 3-Methylpentane CFC-113 Methyl Nitrate 2-Methylhexane CFC-114 Ethyl Nitrate 3-Methylpentane CFC-114 Ethyl Nitrate 3-Methylpentane CFC-114 Ethyl Nitrate 2,4-Dimethylpentane Halon-1211 i-Propyl Nitrate 2,3-Dimethylpentane Halon-1301 n-Propyl Nitrate 2,3-Dimethylpentane HFC-152a 2-Butyl Nitrate 2,3-Dimethylpentane HFC-134a 2-Pentyl Nitrate 2,3-Trimethylpentane HCFC-22 3-Pentyl Nitrate Cyclopentane HCFC-142b 3-Methyl-2-Butyl Nitrate HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclopentane CHCl3 i-Butane Ethyne n-Propylbenzene CHCl3 i-Butane Ethene 3-Ethyltoluene CCI4 i-Pentane Propene 4-Ethyltoluene CCI4 i-Pentane 1-Butene 1,3,5-Trimethylbenzene C2CI4 n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene CH3Cl n-Octane cis-2-Butene CH3Cl n-Decane 1-Pentene	OCS	CHBrCl ₂	2,2-Dimethylbutane	trans-2-Pentene
CFC-11 1,2-Dichloroethane 3-Methylpentane CFC-113 Methyl Nitrate 2-Methylhexane 2-Methyl-1-Butene CFC-114 Ethyl Nitrate 3-Methylhexane alpha-Pinene alpha-Pinene Benzene Benzene Benzene Benzene Toluene Ethylbentane Halon-1301 n-Propyl Nitrate 2,3-Dimethylpentane Benzene Toluene HFC-152a 2-Butyl Nitrate 2,3-Dimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane Ethylbenzene HCFC-22 3-Pentyl Nitrate Cyclopentane HCFC-142b 3-Methyl-2-Butyl Nitrate Cyclohexane O-Xylene HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclohexane i-Propylbenzene CHCl ₃ i-Butane Ethyne n-Propylbenzene CH ₃ CCl ₃ n-Butane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene C-2HCl ₃ n-Hexane i-Butene 1,3,5-Trimethylbenzene CH ₃ CCl ₄ n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene CH ₃ Cl n-Octane cis-2-Butene Acetone CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	DMS	CHBr ₂ Cl	2,3-Dimethylbutane	cis-2-Pentene
CFC-113 Methyl Nitrate 2-Methylhexane 3-Methyl-2-Butene CFC-114 Ethyl Nitrate 3-Methylhexane alpha-Pinene alpha-Pinene beta-Pinene beta-Pinene beta-Pinene Benzene Toluene Halon-1301 n-Propyl Nitrate 2,3-Dimethylpentane Benzene HFC-152a 2-Butyl Nitrate 2,3-Dimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane Ethylbenzene MCFC-22 3-Pentyl Nitrate Cyclopentane MCFC-142b 3-Methyl-2-Butyl Nitrate Cyclohexane O-Xylene HCFC-141b Ethane Methylcyclopentane Methylcyclopentane MFC-365mfc Propane Methylcyclohexane i-Propylbenzene CHCl ₃ i-Butane Ethyne n-Propylbenzene CH ₃ CCl ₄ i-Pentane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CH ₂ Cl ₂ n-Pentane 1-Butene 2-Ethyltoluene C ₂ Cl ₄ n-Hexane i-Butene 1,3,5-Trimethylbenzene CH ₃ Cl n-Octane cis-2-Butene 1,2,4-Trimethylbenzene CH ₃ Cl n-Octane cis-2-Butene Acetone CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	CFC-12	CHBr ₃	2-Methylpentane	3-Methyl-1-Butene
CFC-114 Ethyl Nitrate 3-Methylhexane alpha-Pinene Halon-1211 i-Propyl Nitrate 2,4-Dimethylpentane Halon-1301 n-Propyl Nitrate 2,3-Dimethylpentane HFC-152a 2-Butyl Nitrate 2,2,4-Trimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane HCFC-22 3-Pentyl Nitrate Cyclopentane HCFC-142b 3-Methyl-2-Butyl Nitrate HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclohexane CHCl ₃ i-Butane Ethyne n-Propylbenzene CHCl ₃ i-Butane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CCl ₄ i-Pentane 1-Butene 2-Ethyltoluene CH ₂ Cl ₂ n-Pentane i-Butene 1,3,5-Trimethylbenzene C ₂ HCl ₃ n-Hexane i-Butene 1,2,4-Trimethylbenzene CH ₃ CC n-Octane cis-2-Butene Acetone CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ CH n-Decane 1-Pentene	CFC-11	1,2-Dichloroethane	3-Methylpentane	2-Methyl-1-Butene
Halon-1211 i-Propyl Nitrate 2,4-Dimethylpentane Benzene Halon-1301 n-Propyl Nitrate 2,3-Dimethylpentane HFC-152a 2-Butyl Nitrate 2,2,4-Trimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane HCFC-22 3-Pentyl Nitrate Cyclopentane HCFC-142b 3-Methyl-2-Butyl Nitrate HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclopentane CHCl ₃ i-Butane Ethyne n-Propylbenzene CHCl ₄ i-Pentane Propene 4-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CH ₂ Cl ₂ n-Pentane i-Butene 2-Ethyltoluene C ₂ HCl ₃ n-Hexane i-Butene 1,3,5-Trimethylbenzene CH ₃ CCl n-Octane cis-2-Butene 1,2,4-Trimethylbenzene CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ Cl n-Decane 1-Pentene	CFC-113	Methyl Nitrate	2-Methylhexane	2-Methyl-2-Butene
Halon-1301 n-Propyl Nitrate 2,3-Dimethylpentane HFC-152a 2-Butyl Nitrate 2,2,4-Trimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane HCFC-22 3-Pentyl Nitrate Cyclopentane HCFC-142b 3-Methyl-2-Butyl Nitrate HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclopentane CHCl ₃ i-Butane Ethyne n-Propylbenzene CH ₃ CCl ₃ n-Butane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CCl ₄ i-Pentane 1-Butene 2-Ethyltoluene CH ₂ Cl ₂ n-Pentane i-Butene 1,3,5-Trimethylbenzene C ₂ Cl ₄ n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene CH ₃ CI n-Octane cis-2-Butene 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	CFC-114	Ethyl Nitrate	3-Methylhexane	alpha-Pinene
HFC-152a 2-Butyl Nitrate 2,2,4-Trimethylpentane HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane Ethylbenzene M-CFC-22 3-Pentyl Nitrate Cyclopentane M-Xylene + p-Xylene O-Xylene HCFC-142b 3-Methyl-2-Butyl Nitrate Cyclohexane O-Xylene HCFC-141b Ethane Methylcyclopentane Styrene i-Propylbenzene GHCFC-365mfc Propane Methylcyclohexane i-Propylbenzene GHCI3 i-Butane Ethyne n-Propylbenzene GH3CCI3 n-Butane Ethene 3-Ethyltoluene GCI4 i-Pentane Propene 4-Ethyltoluene GH2CI2 n-Pentane 1-Butene 2-Ethyltoluene GC2HCI3 n-Hexane i-Butene 1,3,5-Trimethylbenzene GC2CI4 n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene GH3CI n-Octane cis-2-Butene Acetone GH3Br n-Nonane 1,3-Butadiene GH3I n-Decane 1-Pentene	Halon-1211	i-Propyl Nitrate	2,4-Dimethylpentane	beta-Pinene
HFC-134a 2-Pentyl Nitrate 2,3,4-Trimethylpentane Ethylbenzene HCFC-22 3-Pentyl Nitrate Cyclopentane o-Xylene HCFC-142b 3-Methyl-2-Butyl Nitrate HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclohexane i-Propylbenzene CHCl ₃ i-Butane Ethyne n-Propylbenzene CH ₃ CCl ₃ n-Butane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CH ₂ Cl ₂ n-Pentane 1-Butene 2-Ethyltoluene C ₂ HCl ₃ n-Hexane i-Butene 1,3,5-Trimethylbenzene CH ₃ CCl ₄ n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene CH ₃ Cl n-Octane cis-2-Butene Acetone CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	Halon-1301	n-Propyl Nitrate	2,3-Dimethylpentane	Benzene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	HFC-152a	2-Butyl Nitrate	2,2,4-Trimethylpentane	Toluene
HCFC-142b 3-Methyl-2-Butyl Nitrate HCFC-141b Ethane Methylcyclopentane HFC-365mfc Propane Methylcyclohexane CHCl ₃ i-Butane Ethyne n-Propylbenzene CH ₃ CCl ₃ n-Butane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CH ₂ Cl ₂ n-Pentane 1-Butene 2-Ethyltoluene C ₂ HCl ₃ n-Hexane i-Butene 1,3,5-Trimethylbenzene CH ₃ CCl ₄ n-Heptane trans-2-Butene CH ₃ Cl n-Octane cis-2-Butene CH ₃ Cl n-Nonane 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	HFC-134a	2-Pentyl Nitrate	2,3,4-Trimethylpentane	Ethylbenzene
HCFC-141b Ethane Methylcyclopentane Styrene HFC-365mfc Propane Methylcyclohexane i-Propylbenzene CHCl ₃ i-Butane Ethyne n-Propylbenzene CH ₃ CCl ₃ n-Butane Ethene 3-Ethyltoluene CCl ₄ i-Pentane Propene 4-Ethyltoluene CH ₂ Cl ₂ n-Pentane 1-Butene 2-Ethyltoluene C ₂ HCl ₃ n-Hexane i-Butene 1,3,5-Trimethylbenzene C ₂ Cl ₄ n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene CH ₃ Cl n-Octane cis-2-Butene Acetone CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	HCFC-22	3-Pentyl Nitrate	Cyclopentane	m-Xylene + p-Xylene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	HCFC-142b	3-Methyl-2-Butyl Nitrate	Cyclohexane	o-Xylene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	HCFC-141b	Ethane	Methylcyclopentane	Styrene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	HFC-365mfc	Propane	Methylcyclohexane	i-Propylbenzene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	CHCl ₃	i-Butane	Ethyne	n-Propylbenzene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	CH ₃ CCl ₃	n-Butane	Ethene	3-Ethyltoluene
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	CCI ₄	i-Pentane	Propene	4-Ethyltoluene
C_2Cl_4 n-Heptane trans-2-Butene 1,2,4-Trimethylbenzene CH $_3Cl$ n-Octane cis-2-Butene Acetone CH $_3Br$ n-Nonane 1,3-Butadiene CH $_3I$ n-Decane 1-Pentene	CH_2CI_2	n-Pentane	1-Butene	2-Ethyltoluene
CH_3CI n-Octane cis-2-Butene Acetone CH_3Br n-Nonane 1,3-Butadiene CH_3I n-Decane 1-Pentene	C ₂ HCl ₃	n-Hexane	i-Butene	1,3,5-Trimethylbenzene
CH ₃ Br n-Nonane 1,3-Butadiene CH ₃ I n-Decane 1-Pentene	C_2CI_4	n-Heptane	trans-2-Butene	1,2,4-Trimethylbenzene
CH ₃ I n-Decane 1-Pentene	CH₃Cl	n-Octane	cis-2-Butene	Acetone
	CH ₃ Br	n-Nonane	1,3-Butadiene	
CH2Br ₂ n-Undecane Isoprene	CH ₃ I	n-Decane	1-Pentene	
	CH2Br ₂	n-Undecane	Isoprene	

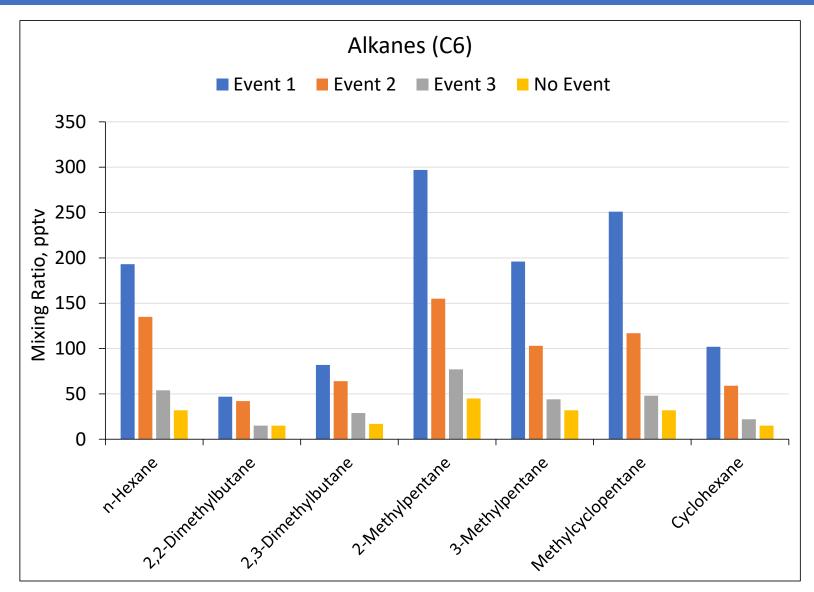
Samples collected

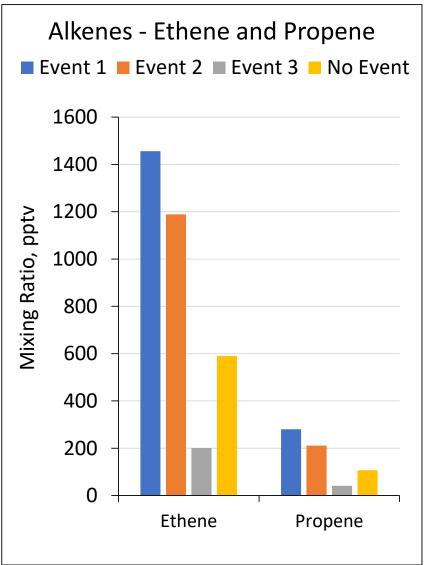
- 1. 12/16/2020 at 21:20; Eastwood (Irvine); sample collected during a "Chemical Odor" event (indicated as "Event 1");
- 2. 12/18/2020 at 21:20; Eastwood (Irvine); sample collected to be used as "Background" (indicated as "No event");
- 3. 1/9/2021 at 7:50; Eastwood (Irvine); sample collected during a "Asphalt Odor" event (indicated as "Event 2");
- 4. 1/21/2021; at 12:24; Orchard Hills (Irvine); sample collected when AtmoTube reading was about 5 ppm (indicated as "Event 3").

2 additional canisters have been collected but not analyzed yet

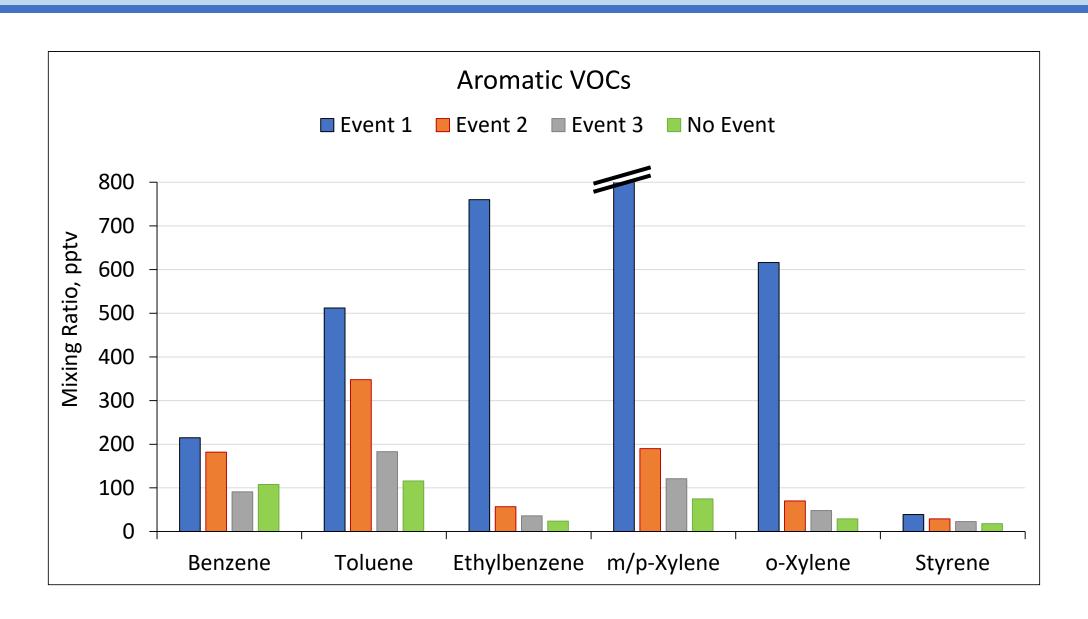
2 more canisters are available to the resident for further collection

Sample Results – Selected Alkanes and Alkenes

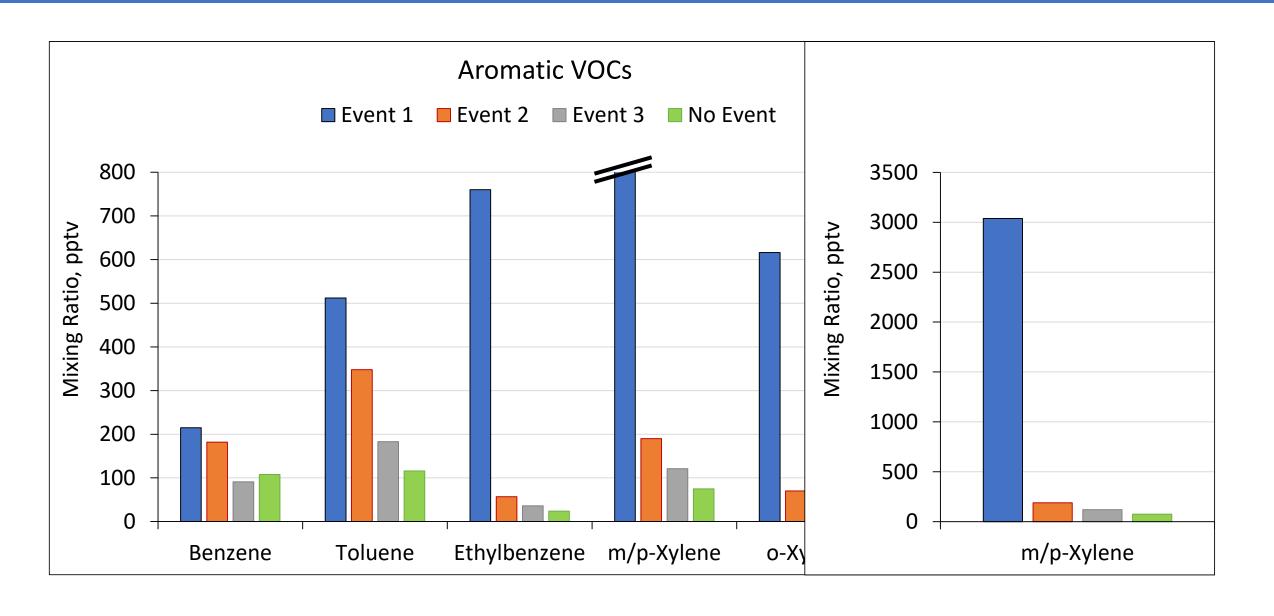




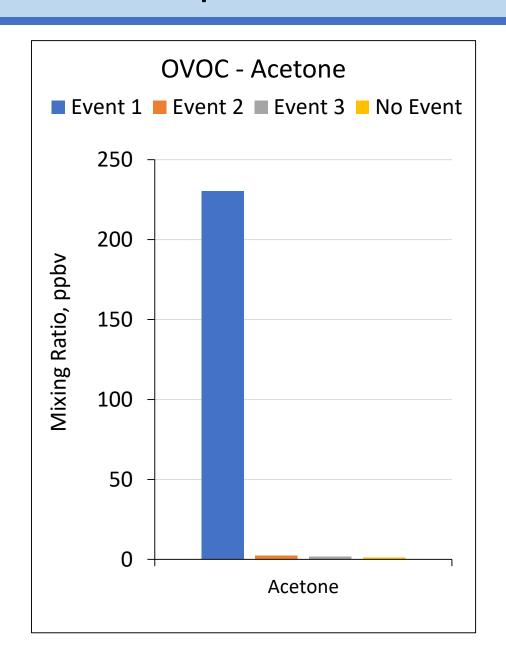
Sample Results – Aromatics



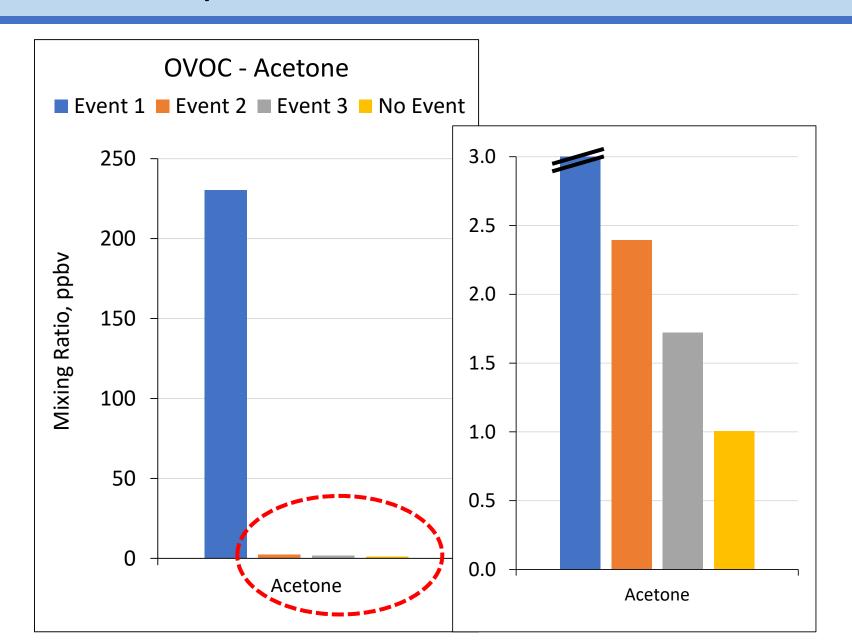
Sample Results – Aromatics

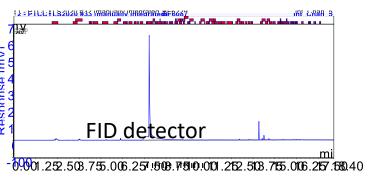


Sample Results – OVOC Acetone

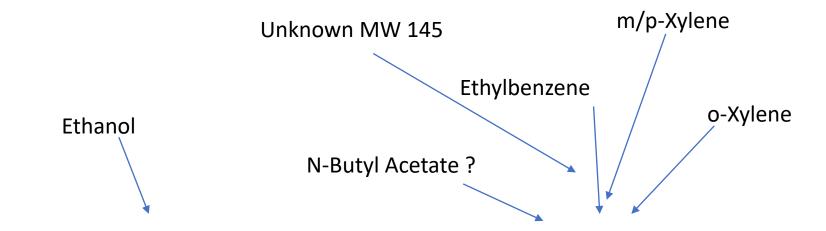


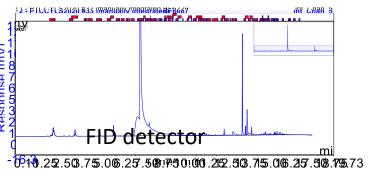
Sample Results – OVOC Acetone





Acetone





Comparison with other US urban centers

Table 2 (continued)												
City	Ethene	Propene	1-Butene ^c	<i>i</i> -Butene ^{a,b}	Isoprene	Ethyne	Benzene	Toluene	Ethylbenzene	o-Xylene	m-Xylene ^a	p-Xylene ^a
Baltimore	750 (230)	190 (57)	32 (8)		510 (230)	890 (220)	190 (45)	1540 (880)	130 (49)	210 (85)	200 (43)	100 (43)
Baton Rouge	570 (210)	81 (47)	19 (13)	53 (240)	1160 (710)	520 (170)	150 (30)	540 (150)	20 (9)	18 (11)	27 (20)	19 (12)
Birmingham	540 (380)	130 (130)	22 (14)	69 (37)	1070 (720)	610 (360)	170 (100)	460 (300)	39 (35)	37 (35)	71 (73)	40 (44)
Boston	330 (31)	73 (31)	19 (6)	72 (31)	1000 (720)	420 (82)	93 (24)	220 (61)	21 (7)	18 (7)	29 (13)	16 (7)
Charleston	380 (150)	90 (33)	15 (6)	38 (15)	1820 (850)	300 (95)	84 (33)	120 (55)	21 (10)	20 (7)	32 (12)	16 (16)
Charlotte	320 (130)	78 (36)	14 (27)	49 (27)	1310 (570)	260 (84)	60 (24)	210 (75)	28 (14)	21 (10)	38 (22)	21 (10)
Chicago	1290 (460)	340 (120)	15 (5)		370 (340)	920 (260)	230 (60)	1430 (860)	180 (130)	260 (210)		
Cleveland	370 (170)	76 (38)	20 (10)	46 (17)	760 (480)	500 (210)	130 (41)	250 (140)	33 (20)	31 (20)	48 (38)	33 (26)
Denver	540 (350)	130 (92)	22 (13)	54 (33)	570 (330)	430 (310)	130 (67)	280 (180)	26 (17)	22 (12)	39 (26)	18 (11)
Detroit	1660 (1050)	430 (300)	76 (43)	110 (58)	170 (150)	1510 (950)	470 (270)	1190 (740)	160 (130)	170 (140)	280 (200)	150 (140)
El Paso	370 (250)	96 (65)	24 (13)	62 (18)	47 (75)	430 (250)	150 (71)	330 (200)	34 (27)	34 (32)	51 (50)	29 (27)
Fresno	860 (690)	170 (150)	39 (23)	120 (110)	710 (800)	1260 (650)	210 (86)	500 (390)	45 (34)	49 (44)	67 (54)	46 (46)
Houston	840 (680)	190 (92)	13 (11)		1240 (550)	500 (260)	160 (71)	660 (340)	110 (120)	210 (200)		
Knoxville	740 (370)	170 (99)	22 (8)	46 (21)	920 (1110)	690 (330)	140 (55)	300 (140)	79 (31)	58 (51)	88 (91)	44 (40)
Las Vegas	520 (400)	200 (120)	46 (19)		84 (79)	540 (420)	150 (76)	330 (190)	47 (39)	85 (72)	89 (87)	37 (30)
Los Angeles	2430 (1360)	490 (280)	65 (35)	130 (99)	270 (130)	2380 (1480)	480 (240)	1380 (720)	210 (140)	200 (130)	410 (290)	210 (170)
Milwaukee	560 (300)	140 (75)	27 (9)	74 (23)	120 (160)	630 (240)	180 (63)	630 (220)	33 (18)	32 (20)	59 (40)	31 (21)
New York City (1999)	1090 (550)	320 (160)	27 (24)		350 (430)	1050 (560)	210 (110)	1240 (760)	260 (250)	370 (370)		
New York City (2003)	750 (430)	250 (140)	41 (28)	120 (93)	740 (440)	640 (250)	190 (93)	880 (680)	370 (220)	260 (220)	550 (530)	270 (260)
Oklahoma City	560 (210)	180 (57)	22 (11)		870 (610)	520 (200)	190 (66)	1070 (950)	260 (470)	370 (700)		
Philadelphia (2000)	1150 (990)	390 (330)	53 (32)		330 (200)	990 (760)	190 (130)	730 (660)	130 (72)	210 (120)	230 (140)	100 (58)
Philadelphia (2004)	1310 (840)	500 (370)	110 (81)	230 (140)	270 (94)	820 (390)	230 (120)	470 (220)	68 (43)	83 (57)	130 (110)	76 (53)
Phoenix	260 (190)	68 (49)	15 (8)	65 (39)	270 (270)	330 (150)	77 (32)	160 (96)	13 (7)	16 (12)	23 (19)	15 (10)
Pittsburgh	400 (200)	81 (41)	18 (6)	33 (11)	1410 (910)	450 (150)	96 (37)	260 (140)	23 (14)	28 (20)	46 (32)	28 (21)
Providence	390 (280)	98 (63)	21 (12)	61 (30)	2590 (1610)	520 (270)	120 (51)	300 (220)	28 (23)	32 (29)	54 (49)	15 (14)
Richmond	390 (300)	100 (73)	22 (11)	96 (60)	740 (360)	390 (300)	110 (63)	190 (160)	30 (26)	26 (25)	34 (31)	29 (30)
Saint Louis	430 (170)	110 (55)	23 (9)	100 (57)	1250 (1060)	430 (110)	120 (28)	370 (110)	34 (16)	39 (13)	76 (32)	33 (12)
Salt Lake City (1999)	1060 (890)	310 (270)	470 (420)	1360 (1070)	340 (240)	1170 (1110)	130 (99)	190 (150)				
Salt Lake City (2004)	1110 (720)	220 (150)	59 (22)	120 (49)	400 (430)	930 (600)	290 (180)	890 (700)	97 (80)	110 (90)	120 (100)	94 (61)
San Diego	1570 (950)	390 (240)	580 (700)	1550 (760)	250 (140)	680 (430)	120 (75)	200 (130)	160 (140)	91 (82)		
Washington, D.C.	930 (830)	250 (220)	38 (31)	140 (110)	1630 (1290)	910 (680)	190 (130)	420 (420)	53 (54)	51 (58)	86 (100)	45 (53)

Baker, A.K., Beyersdorf, A.J., Doezema, L.A., Katzenstein, A., Meinardi, S., Simpson, I.J., Blake, D.R., Rowland, F.S.: Measurements of nonmethane hydrocarbons in 28 United States cities. Atmospheric Environment, 42, 170-182 (2008). http://dx.doi.org/10.1016/j.atmosenv.2007.09.007.

Comparison with other US urban centers

ity	Ethene	Propene	1-Butene ^c	<i>i</i> -Butene ^{a,b}	Isoprene	Ethyne	Benzene	Toluene	Ethylbenzene	o-Xylene	m-Xylene ^a	p-Xylen
altimore aton Rouge rmingham oston harleston	750 (230) 570 (210) 540 (380) 330 (31) 380 (150)	190 (57) 81 (47) 130 (130) 73 (31) 90 (33)	32 (8) 19 (13) 22 (14) 19 (6) 15 (6)	53 (240) 69 (37) 72 (31) 38 (15)	510 (230) 1160 (710) 1070 (720) 1000 (720) 1820 (850)	890 (220) 520 (170) 610 (360) 420 (82) 300 (95)	190 (45) 150 (30) 170 (100) 93 (24) 84 (33)	1540 (880) 540 (150) 460 (300) 220 (61) 120 (55)	130 (49) 20 (9) 39 (35) 21 (7) 21 (10)	210 (85) 18 (11) 37 (35) 18 (7) 20 (7)	200 (43) 27 (20) 71 (73) 29 (13) 32 (12)	100 (43) 19 (12) 40 (44) 16 (7) 16 (16)
arlotte iicago eveland	VOC		Event	t 1 Ev	ent 2	Event 3	No E	Event	Phoenix	k Ne	w York	21 (10) 33 (26)
nver troit Paso	Ethylbenzene		760)	57	36	4	24	13		370	18 (11) 50 (140
esno uston	m+p-Xyl	n+p-Xylene		88	190	121	75		38		820	29 (27) 46 (46)
oxville s Vegas s Angeles	o-Xylene		616		70	48	29		16		260	
waukee v York City (199 v York City (200 ahoma City	Data in of 21 an		•			nix and N	New Yo	ork are	calculate	ed as r	nean	210 (170 31 (21) 270 (260
adelphia (2000) adelphia (2004) enix	1150 (990) 1310 (840) 260 (190) 400 (200)	390 (330) 500 (370) 68 (49) 81 (41)	53 (32) 110 (81) 15 (8) 18 (6) 21 (12)	230 (140) 65 (39) 33 (11) 61 (30)	330 (200) 270 (94) 270 (270) 1410 (910) 2590 (1610)		190 (130) 230 (120) 77 (32) 96 (37) 120 (51) 110 (63)	730 (660) 470 (220) 160 (96) 260 (140) 300 (220) 190 (160)	130 (72) 68 (43) 13 (7) 23 (14) 28 (23) 30 (26)	210 (120) 83 (57) 16 (12) 28 (20) 32 (29) 26 (25)	230 (140) 130 (110) 23 (19) 46 (32) 54 (49) 34 (31)	100 (58) 76 (53) 15 (10) 28 (21) 15 (14)
sburgh vidence hmond at Louis Lake City (1999)	390 (280) 390 (300) 430 (170) 1060 (890)	98 (63) 100 (73) 110 (55) 310 (270)	22 (11) 23 (9) 470 (420)	96 (60) 100 (57) 1360 (1070)	740 (360) 1250 (1060) 340 (240)	390 (300) 430 (110) 1170 (1110)	120 (28) 130 (99)	370 (110) 190 (150)	34 (16)	39 (13)	76 (32)	29 (30) 33 (12)

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Conclusions

- ➤ More samples are needed to characterize the composition of the air surrounding of the All American Asphalt area;
- Sampling should include both "event" episodes AND "non-event" (i.e. local background) episodes;
- ➤ Preliminary results looking at 3 samples collected during some "event" episodes show enhanced levels on one samples while the other two samples were overall typical of urban areas;
- > All data are available at:

https://sites.uci.edu/rowlandblakelab/all-american-asphalt-uci-whole-air-sampling/