

# AWAS Status

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# Trace gases measured in whole air samples during HIPPO

	<u>NOAA</u>	<u>UM</u>		<u>NOAA</u>	<u>UM</u>		<u>NOAA</u>	<u>UM</u>
<b><u>Chlorofluorocarbons</u></b>			<b><u>Organic Nitrates</u></b>			<b><u>Non-Methane Hydrocarbons</u></b>		
CFC-11 (CCl <sub>3</sub> F)	✓	✓	Methyl nitrate(CH <sub>3</sub> ONO <sub>2</sub> )	✗	✓	Ethane (C <sub>2</sub> H <sub>6</sub> )	✓	✓
CFC-12 (CCl <sub>2</sub> F <sub>2</sub> )	✓	✓	Ethyl nitrate(C <sub>2</sub> H <sub>5</sub> ONO <sub>2</sub> )	✗	✓	Ethyne (C <sub>2</sub> H <sub>2</sub> )	✓	✓
CFC-13(CClF <sub>3</sub> )	✓	✓	Propyl nitrates(C <sub>3</sub> H <sub>7</sub> ONO <sub>2</sub> )	✗	✓	Propane(C <sub>3</sub> H <sub>8</sub> )	✓	✓
CFC-113 (CCl <sub>2</sub> FCClF <sub>2</sub> )	✓	✓	Butyl nitrates (C <sub>4</sub> H <sub>9</sub> ONO <sub>2</sub> )	✗	✓	Isobutane(C <sub>4</sub> H <sub>10</sub> )	✗	✓
CFC-114 (CClF <sub>2</sub> CClF <sub>2</sub> )	✓	✓	Pentyl nitrates (C <sub>5</sub> H <sub>11</sub> ONO <sub>2</sub> )	✗	✓	n-Butane (C <sub>4</sub> H <sub>10</sub> )	✓	✓
CFC-115 (CF <sub>2</sub> CICF <sub>3</sub> )	✓	✓	<b><u>Solvents</u></b>	✓	✓	Isopentane (C <sub>5</sub> H <sub>12</sub> )	✓	✓
<b><u>Halons</u></b>			Carbon Tetrachloride (CCl <sub>4</sub> )	✓	✓	n-Pentane (C <sub>5</sub> H <sub>12</sub> )	✓	✓
CFC-12b1 (Halon 1211,CF <sub>2</sub> ClBr)	✓	✓	Methyl Chloroform(CH <sub>3</sub> CCl <sub>3</sub> )	✓	✓	Isoprene (C <sub>5</sub> H <sub>10</sub> )	✓	✓
CFC-13b1 (Halon 1301, CF <sub>3</sub> Br)	✓	✓	Tetrachloroethylene (C <sub>2</sub> Cl <sub>4</sub> )	✓	✓	Benzene (C <sub>6</sub> H <sub>6</sub> )	✓	✓
CFC-114b2 (Halon 2402, C <sub>2</sub> F <sub>4</sub> Br <sub>2</sub> )	✓	✓	Methylene Chloride (CH <sub>2</sub> Cl <sub>2</sub> )	✓	✓	Toluene (C <sub>7</sub> H <sub>8</sub> )	✗	✓
<b><u>Hydrochlorofluorocarbons/</u></b>			Chloroform (CHCl <sub>3</sub> )	✓	✓	C2-Benzenes (C <sub>8</sub> H <sub>10</sub> )	✗	✓
<b><u>Hydrofluorocarbons</u></b>			Trichloroethylene(C <sub>2</sub> HCl <sub>3</sub> )	✗	✓	<b><u>Other</u></b>		
HCFC-22 (CHF <sub>2</sub> Cl)	✓	✓	1,2-Dichloroethane (C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub> )	✗	✓	Methane (CH <sub>4</sub> )	✓	✓
HCFC-141b (CH <sub>3</sub> CFCl <sub>2</sub> )	✓	✓	<b><u>Methyl Halides and related</u></b>			Carbon Monoxide (CO)	✓	✓
HCFC-142b (CH <sub>3</sub> CF <sub>2</sub> Cl)	✓	✓	Methyl Bromide(CH <sub>3</sub> Br)	✓	✓	Nitrous Oxide (N <sub>2</sub> O)	✓	✓
HFC-134a (C <sub>2</sub> H <sub>2</sub> F <sub>4</sub> )	✓	✓	Methyl Chloride (CH <sub>3</sub> Cl)	✓	✓	Carbonyl Sulfide (COS)	✓	✓
HFC-124 (C <sub>2</sub> HClF <sub>4</sub> )	✓	✓	Methyl Iodide (CH <sub>3</sub> I)	✓	✓	Dimethyl Sulfide (C <sub>2</sub> H <sub>6</sub> S)	✗	✓
HFC-123 (C <sub>2</sub> HCl <sub>2</sub> F <sub>3</sub> )	✗	✓	Methylene Bromide(CH <sub>2</sub> Br <sub>2</sub> )	✓	✓	Carbon disulphide (CS <sub>2</sub> )	✓	✗
HFC-125 (C <sub>2</sub> HF <sub>5</sub> )	✓	✓	CH <sub>x</sub> BryCl <sub>z</sub>	✗	✓	Methyl-t-butyl ether	✗	✓
HFC-143a (C <sub>2</sub> H <sub>3</sub> F <sub>3</sub> )	✓	✓	Bromoform (CHBr <sub>3</sub> )	✓	✓	Methyl Acetate/Ethyl Acetate	✗	✓
HFC-23 (CHF <sub>3</sub> )	✓	✓	<b><u>Perfluorocarbons</u></b>	✓	✓	Acetonitrile	✗	✓
HFC-227ea(C <sub>3</sub> HF <sub>7</sub> )(1,1,1,2,2,3,3,3- Heptafluoropropane)	✓	✓	Sulfur Hexafluoride (SF <sub>6</sub> )	✓	✓	1,2 Dichlorobenzene	✗	✓
HFC-365mfc (C <sub>4</sub> H <sub>3</sub> F <sub>5</sub> ) (1,1,1,3,3,3- pentafluorobutane)	✓	✓	PFC-116 (C <sub>2</sub> F <sub>6</sub> )	✗	✓			
			PFC-218 (C <sub>3</sub> F <sub>8</sub> )	✓	✓			
			PFC-318 (C <sub>4</sub> F <sub>8</sub> )(perfluorocyclobutane)	✗	✓			
			<b><u>Others</u></b>					
			CO <sub>2</sub> , H <sub>2</sub> , <sup>13</sup> CO <sub>2</sub> , <sup>18</sup> OCO	✓	✗			

# HIPPO Procedures

- Sampling
  - H1
    - Forward facing inlet in HIMIL
    - Water interference problems, esp. tropics
  - H2/H3
    - Flat stub inlet in HIMIL
    - Modified flow path + water removal using heat exchangers (2 stages)

# HIPPO Procedures

- Analytical

- H1

- Agilent 5973 MSD : 1) DB-1 ; 2) GasPro
    - HP 5890 GC/FID: C<sub>2</sub> – C<sub>5</sub> NMHC
    - HP 5890 GC/FID + RGD: CH<sub>4</sub> + CO
    - HP 5890 GC/ECD: N<sub>2</sub>O, SF<sub>6</sub>

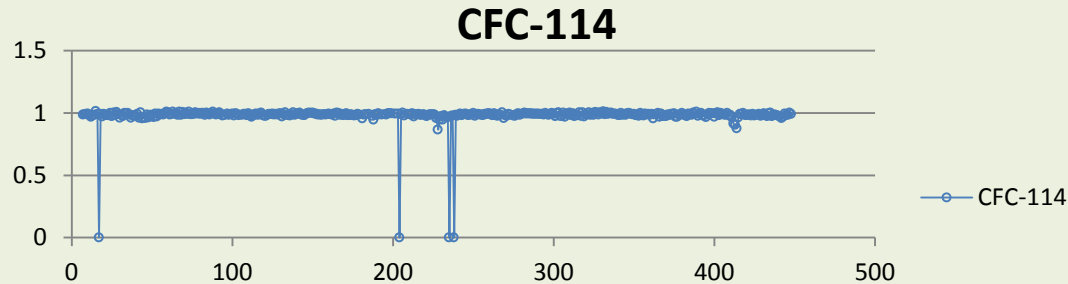
- H2/H3

- Agilent 5973 MSD: GasPro
    - Agilent 5971 MSD: DB-1
    - HP 5890 GC/FID: C<sub>2</sub> – C<sub>5</sub> NMHC
    - HP 5890 GC/FID + RGD: CH<sub>4</sub> + CO
    - No ECD

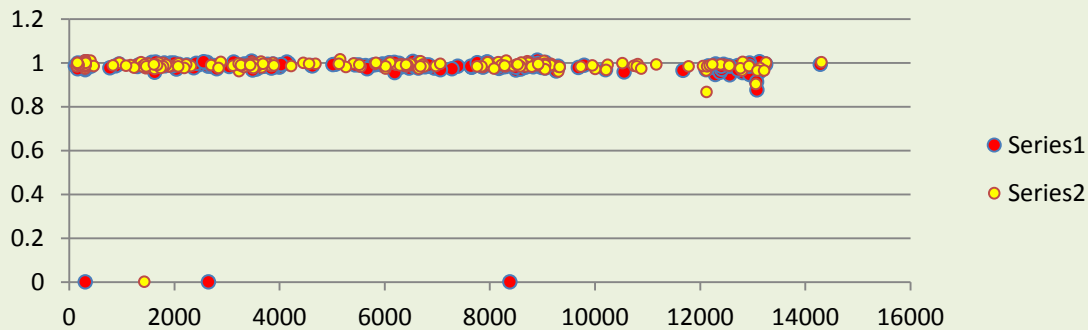
# HIPPO DATA STATUS

- H1
  - Final data reported
  - Whole air data merged, calibration offsets normalized, includes PANTHER MSD
- H2, H3
  - Analyses completed, but not yet in archive
  - Whole air data merged, available NWAS + AWAS

# Merging procedure example

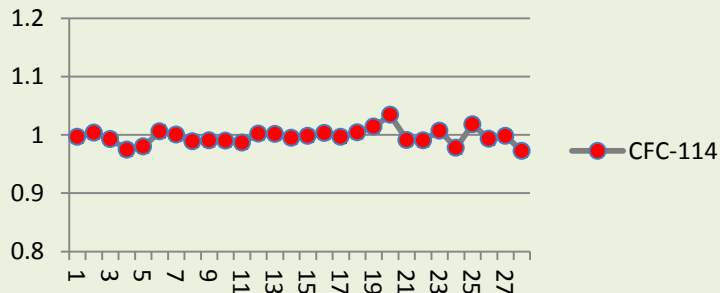


Samples merged in sequence



Measurements:  
Alt or Lat profile

CFC-114



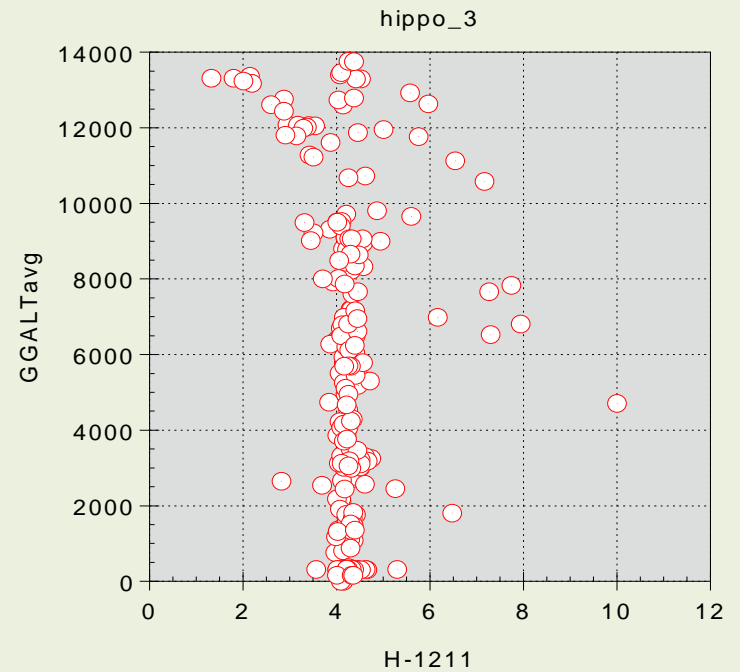
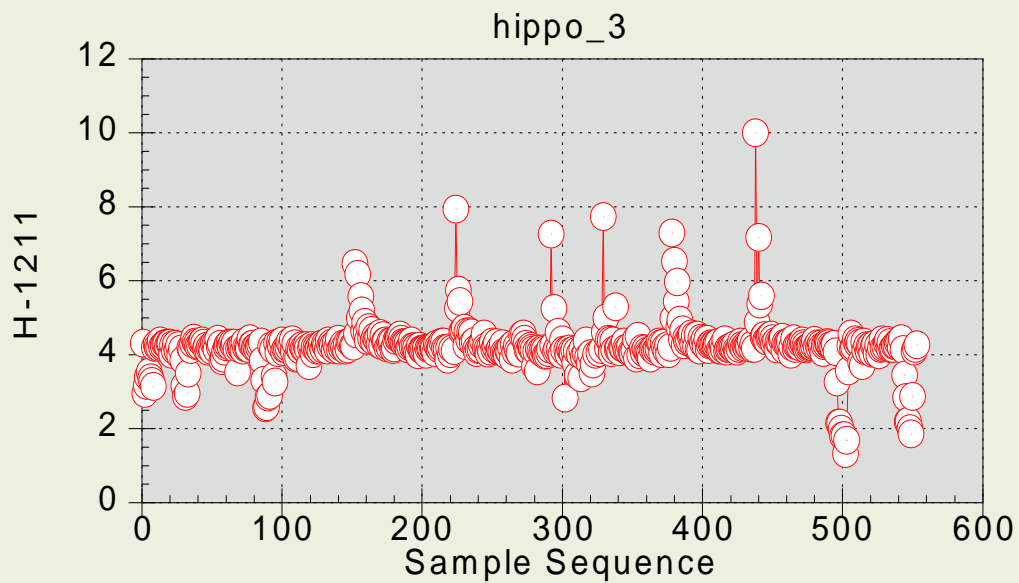
mean	0.997
median	0.996
max	1.034
min	0.972

Sample "Pair" Ratio after calibration adjustment

# Data issues

- High altitude
  - HFC 227ea
  - Halon 1211 (occasional)
- Other (canister prep artifact)
  - Batch problem (HFC152a)
  - Analytical issues
    - Ethane on GasPro/Wet ascarite
    - System leak not identified: GC/FID, propane
    - Occasional water problem

# Halon 1211 (HIPPO3)





# HIPPO Calibrations

- Working Standard
  - New working standard(s) for H<sub>2</sub>/H<sub>3</sub>
- Comparisons to archived standards and dilution of high concentration primary standards
  - Reanalysis of high concentration mixtures using GC/Atomic Emission Detector.
- Most calibration adjustments minor; some need further examination (e.g. CH<sub>3</sub>I)