PEM-Tropics A
Nominal Measurement Characteristics of Instruments on the DC-8

Species Parameter	Investigator	Technique	Averaging Time	Accuracy	Nominal Precision	Nominal LOD
NO	J. Bradshaw	TP-LIF	9.6 sec (range 0.22 - 556 sec)	62.6 ±63.3 pptv (1)	6.0 ±5.5 pptv (1)	0.89 ±0.89 (range 0.14 - 5.09 pptv)
NO_2	J. Bradshaw	PF/TP-LIF	3 min	12 ±16 pptv (2)	2.6 ±2.24 pptv (2)	4.4 ±3.4 pptv
O_3	G. Gregory	Chemiluminescence	0.5 sec	3% or 2 ppbv	2% 0r 1 ppbv	1 ppbv
CO	G. Sachse	TDL	5 sec	1%	1 ppbv or 1%	NA
CH_4	G. Sachse	TDL	5 sec	1%	3 ppbv	NA
CO2	G. Sachse	Non-Dispersive IR	5 sec	1%	50 ppbv	NA
H_2O vapor	G. Sachse	Diode Laser, Specrometer	0.05 sec	±10%	±2% or 0.2 ppm	0.2 ppm
CO_2	S. Vay	NDIR	5 sec	300 ppbv	100 ppbv	NA
Remote O_3 Profile	E. Browell	UV DIAL	5 min (3)	10% or 2 ppbv	5% or 1 ppbv	<5 ppbv
Remote Aerosol Profile	E. Browell	UV DIAL (visible)	2 sec (4)	10%	1%	NA
H_2O	J. Barrick	Cryogenic Chilled Mirror Hygrometer	1 sec	±0.5 - 1.0 °C	±0.2 °C	-100 °C
H_2O_2	B. Heikes	Grab Samples/HPLC	2.5 min	±30%	10 pptv	15 pptv
CH_3OOH	B. Heikes	Grab Samples/HPLC	2.5 min	±30%	15 pptv	25 pptv
Condensation Nuclei (CN)	B. Anderson	Butanol CN Counter	10 sec	10%	5%	25.4 (Ultra-Fine)-0.547 (Fine)
DMS	A. Bandy	GC/GMS	3-5 min	<10%	1 pptv	2
SO_2	A. Bandy	GC/GMS	3-5 min	<10%	1pptv	1
PAN	H. Singh	GC/ECD	150 sec	±20%	±10% or ±1 pptv	1
PPN	H. Singh	GC/ECD	150 sec	±30%	±20% or ±1 pptv	1
C_2Cl_4	H. Singh	GC/ECD	150 sec	±10%	±10% or ±1 pptv	0.5
Methyl_Nitrate	H. Singh	GC/ECD	150 sec	±20%	±10%	1
Ethyl/i-Propyl_Nitrate	H. Singh	GC/ECD	150 sec	±20%	±10%	1
HNO_3	R. Talbot	Aqueous Scrub/IC	4-8 min	30-35% (5)	30-35%	<20 pptv
HCOOH	R. Talbot	Aqueous Scrub/IC	4-8 min	15%	15%	10-31 pptv
CH_3COOH	R. Talbot	Aqueous Scrub/IC	4-8 min	20%	20%	10-31 pptv
Chloride	R. Talbot	Filter/IC	10-20min	30%	35%	20
Nitrate	R. Talbot	Filter/IC	10-20 min	20%	10%	10
Oxalate	R. Talbot	Filter/IC	10-20 min	10%	15%	1
Sulfate	R. Talbot	Filter/IC	10-20 min	13%	10%	3.5
Methylsulfonate	R. Talbot	Filter/IC	10-20 min	10%	15%	0.5
Ammonium	R. Talbot	Filter/IC	10-20 min	15%	15%	20
Sodium	R. Talbot	Filter/IC	10-20 min	35%	35%	50
Potassium	R. Talbot	Filter/IC	10-20 min	20%	20%	15
Magnesium	R. Talbot	Filter/IC	10-20 min	10%	10%	6.5
Calcium	R. Talbot	Filter/IC	10-20 min	15%	15%	15
Be-7	R. Talbot	Filter/Gama Spectroscopy	10-20 min	20%	15%	100 fCi/scm
Pb-210	R. Talbot	Filter/Alpha Spectroscopy	10-20 min	20%	10%	0.1 fCi/scm
CFC-12	D. Blake	Grab Sample/GC	10-75 sec	2%	0.7%	1.0
CFC-11	D. Blake	Grab Sample/GC	10-75 sec	2%	0.8%	3

CFC-113	D. Blake	Grab Sample/GC	10-75 sec	2%	1.4%	3
CFC-114	D. Blake	Grab Sample/GC	10-75 sec	5%	1.5%	1
HCFC-22	D. Blake	Grab Sample/GC	10-75 sec	5%	1.5%	10
H-1301	D. Blake	Grab Sample/GC	10-75 sec	5%	2%	0.1
H-1211	D. Blake	Grab Sample/GC	10-75 sec	5%	2%	0.1
H-2402	D. Blake	Grab Sample/GC	10-75 sec	5%	5%	0.1
CH_3Cl	D. Blake	Grab Sample/GC	10-75 sec	5%	2%	100
CH_3Br	D. Blake	Grab Sample/GC	10-75 sec	5%	4%	1
CH_3I	D. Blake	Grab Sample/GC	10-75 sec	10%	5-10% (6)	0.05
$CHCl_3$	D. Blake	Grab Sample/GC	10-75 sec	5%	2%	2
CH_3CCl_3	D. Blake	Grab Sample/GC	10-75 sec	5%	1%	3
CCl_4	D. Blake	Grab Sample/GC	10-75 sec	5%	1%	3
C_2Cl_4	D. Blake	Grab Sample/GC	10-75 sec	10%	1-5% (6)	0.05
$CHBrCl_2$	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.05
CH_2Br_2	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.4
$CHClBr_2$	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.005
$CHBr_3$	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.005
Methyl Nitrate	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.05
Ethyl Nitrate	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.05
1-Propyl Nitrate	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.05
2-Propyl Nitrate	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.05
2-Butyl Nitrate	D. Blake	Grab Sample/GC	10-75 sec	10-20% (6)	5-10% (6)	0.05
Ethane	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	3
Ethene	D. Blake	Grab Sample/GC	10-75 sec	10%	3 pptv	2
Propane	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	3
Propene	D. Blake	Grab Sample/GC	10-75 sec	10%	3 pptv	2
i-Butane	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	2
n-Butane	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	2
Ethyne	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	2
Isoprene	D. Blake	Grab Sample/GC	10-75 sec	10%	3% or 3 pptv	2
n-Pentane	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	2
i-Pentane	D. Blake	Grab Sample/GC	10-75 sec	5%	1% or 2 pptv	2
CH_3ONO_2	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
$C_2H_5ONO_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
i-$C_3H_7ONO_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
n-$C_3H_7ONO_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
2-$C_4H_9ONO_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
3-CH_3-2-C_4H_9 ONO_2	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
3-$C_5H_{11}ONO_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
2-$C_5H_{11}ONO_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
CH_2Cl_2	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	<1 ppt (8)
HCFC$1_4$1B	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
HCFC$1_4$2B	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
HFC134A	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
CH_2Br_2	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
$CHBrCl_2$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
$CHBr_2Cl$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
$CHBr_3$	E. Atlas	(7)	10-75 sec	10-20% (6)	5-10% (6)	< 0.1 ppt (8)
J(NO_2) Zenith & Nadir	J. Barrick	Hemispherical Radiometer	1 sec	±5%	±1%	NA
Nadir & Zenith Spectroradiometer	R. Shetter	Actinic Flux Spectroradiometry	30 sec	±5%	±5%	(9)
Aircraft Ephemeris Data	DC-8	GPS	1 sec	±25m	±25m	1m
Surface Temperature	DC-8	Pyrometer	1 sec	±0.5 °C	±0.2 °C	-50 °C
Dew Point	DC-8	2 & 3 Stage Frost	1 sec	±0.5 - 1.0 °C	±0.2 °C	-100 °C

		Point Hygrometer				

NOTES:

1. Total uncertainty is 8.4 ±8.9 pptv
2. Total uncertainty is 3.7 ±4 pptv
3. The vertical resolution is 300 meters. Horizontal resolution is 5 minutes (approximately 70 kilometers). The data are archived at a vertical sampling interval of 300 meters and a horizontal sampling interval of 60 seconds (approximately 14 kilometers).
4. The vertical averaging interval is 60 meters. Horizontal averaging interval is 2 seconds (approximately 470 meters). The data are archived at a vertical sampling interval of 90 meters and a horizontal sampling interval of 60 seconds (approximately 14 kilometers).
5. 30-35 % @ LOD, 20% @ 25-100 pptv, 15% @ >100 pptv
6. Higher uncertainty for molecules with mixing ratios in the .001 - .1 pptv range.
7. Analysis was performed on whole air samples aquired by D. Blake. The analytical technique was gas chromatography with mass spectrometric (EI and NICI) detection.
8. For some molecules with mixing ratios near the limit of detection, null values were used to replace zero values for reasons of analytical problems or to indicate limit of detection.
9. The given lower limits of detection are the 2-sigma values of the flight period 02:50-03:10 on Oct. 6th (during total darkness).