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ACE – FTS

Atmospheric Chemistry Experiment

ACE-FTS Spectroscopy

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DOCUMENT CHANGE RECORD

Issue	Rev.	Date	Change Detail
1	-	Aug 31, 2010	First Issue of Document
	A		Added the Microwindow and Interferer information for COClF Changed title of document from "Microwindow List for ACE-FTS Retrievals – Version 3.0" Added spectral line parameters' reference table

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1. Introduction

Microwindow sets used for the ACE-FTS version 3.0 volume mixing ratio (VMR) retrievals are presented. Also reported are the molecules explicitly included as interferers in the retrieval of the target molecule. The VMR profiles for these interferences are fitted simultaneously with the target VMR profile. Note that the retrieval results for interferers are not stored; only the results for the target molecule/isotopologue are saved.

For some molecules, additional interferences exist that are not explicitly retrieved, in which case the VMR profile for the interferers are fixed to the results of previous retrievals. Different isotopologues of a given molecule are assumed to have different VMR profiles. Thus, when more than one isotopologue of a molecule serves as an interferer, each isotopologue gets its own retrieved VMR profile.

Some molecules (such as C_2H_6) have altitude limits that vary with latitude. For these molecules, the altitude limits are presented as a range (e.g., 7-10). The first value in the range corresponds to the altitude limit at the poles, while the second value corresponds to the altitude limit at the equator. The variation with latitude typically goes as the square of the sine of the latitude.

For HCl and HF, upper altitude limits for most microwindows are given in terms of atmospheric density, providing a variation with both latitude and season.

The CO_2 microwindow set employed for pressure/temperature retrievals is the same set used to retrieve the CO_2 VMR profile reported in the version 3.0 results.

Some microwindow sets include windows that do not contain information on the target molecule, but instead are meant to improve the results for the interferences, particularly for cases where the spectral features from the interferences in the main microwindow set are relatively weak.

In the tables describing interferers, an isotopologue number of 0 is used to indicate "all isotopologues of the given molecule" but typically means only the main isotopologue of the molecule is interfering in the microwindow set. A number greater than 0 indicates a particular isotopologue of the molecule.

The weighting factor used for the least squares process varies with wavenumber because the signal-to-noise ratio (SNR) in the spectrum varies with wavenumber. The table below details the assumed SNR used to calculate the fitting weights (the weighting goes as the square of the SNR). Note that the actual SNR performance of the instrument is typically underestimated by these effective values. The purpose of these values is to apply a relative fitting weight for microwindows from different wavenumber ranges for a given molecule.

Table 1: Signal-to-Noise Weighting of Wavenumber Ranges

Range (cm^{-1})	Effective SNR
< 800	50
800 – 900	75
900 – 1000	100
1000 – 1850	150
1850 – 2500	200

Range (cm^{-1})	Effective SNR
2500 – 2750	125
2750 – 3900	100
3900 – 4100	70
4100 – 4200	50
> 4200	35

2. Pressure and Temperature Microwindows

Table 2: Microwindow list for Pressure/Temperature

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
927.00	0.35	30	45
929.00	0.35	30	45
931.00	0.35	30	45
932.96	0.30	25	45
934.82	0.45	15	45
936.80	0.35	15	45
940.52	0.80	15	45
942.40	0.35	15	45
946.00	0.35	20	45
947.70	0.40	20	45
1899.17	0.30	30	58
1902.05	0.30	30	60
1905.16	0.40	35	45
1905.26	0.22	25	35
1906.48	0.30	30	65
1911.02	0.35	35	68
1911.12	0.30	30	35
1912.52	0.35	45	68
1914.12	0.30	30	70
1915.48	0.30	30	70
1917.06	0.35	30	70
1920.11	0.35	30	70
1924.71	0.35	40	65
1929.45	0.30	25	45
1930.90	0.27	15	45
1933.98	0.24	25	60
1934.78	0.24	22	45
1935.24	0.28	15	50
1936.44	0.30	25	50
1941.03	0.35	15	45
1950.68	0.30	15	45
1962.08	0.30	35	45
1968.64	0.30	35	45
1970.12	0.30	20	45
1975.10	0.30	15	40
2044.50	0.30	50	70
2045.97	0.30	53	73
2047.53	0.40	55	73
2049.05	0.40	53	75
2050.55	0.40	55	78
2052.10	0.30	50	79
2053.66	0.30	55	80
2055.11	0.35	60	80

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2056.72	0.30	55	85
2058.24	0.40	55	85
2061.33	0.35	60	85
2062.87	0.35	60	85
2066.03	0.35	60	85
2067.52	0.35	60	83
2070.65	0.40	62	80
2072.23	0.30	57	80
2289.20	0.35	105	125
2291.50	0.30	110	125
2293.90	0.35	78	125
2296.06	0.30	110	125
2298.24	0.30	105	125
2300.40	0.30	90	125
2306.85	0.30	95	125
2313.10	0.35	95	125
2319.14	0.26	90	125
2332.37	0.30	95	125
2354.37	0.26	90	125
2361.45	0.30	90	125
2364.10	0.30	90	125
2366.63	0.30	90	125
2367.88	0.30	90	125
2369.10	0.30	90	125
2370.27	0.35	90	125
2371.43	0.30	90	125
2372.56	0.30	90	125
2373.67	0.35	90	125
2374.23	0.28	50	65
2374.75	0.40	90	125
2375.40	0.28	50	60
2375.80	0.35	90	125
2376.84	0.35	90	125
2377.85	0.35	90	125
2378.83	0.35	75	125
2379.78	0.35	90	125
2380.72	0.35	85	125
2381.62	0.35	85	125
2382.48	0.40	82	125
2383.36	0.35	82	125
2384.20	0.35	90	125
2385.02	0.40	75	125
2385.79	0.35	73	125
2386.51	0.35	70	125
2387.26	0.35	65	125
2387.96	0.35	60	80
2388.64	0.35	55	77

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2389.29	0.35	50	71
2389.92	0.30	35	68
2390.52	0.35	35	65
2391.13	0.30	22	62
2391.70	0.30	22	60
2392.10	0.30	20	55
2392.62	0.30	20	50
2393.06	0.30	20	50
2399.05	0.24	20	40
2403.00	0.26	20	40
2408.77	0.20	15	46
2412.47	0.30	30	46
2419.60	0.30	35	45
2421.19	0.30	15	46
2422.88	0.30	15	46
2424.60	0.30	25	45
2433.12	0.30	30	40
2434.56	0.28	30	45
2439.00	0.30	35	46
2444.27	0.24	35	46

3. Microwindows for all Routine Version 3.0 Species

Table 3: Microwindow list for O_3

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
829.03 [1]	0.50	5	21
923.16 [2]	0.80	5	25
1027.00	0.60	60	95
1028.62	1.20	60	95
1029.98	0.50	55	95
1030.75	0.80	55	95
1032.10	0.80	60	95
1033.15	0.60	60	95
1034.55	0.80	60	95
1049.38	0.80	55	95
1050.30	0.60	70	95
1051.20	1.00	60	95
1053.25	1.20	55	95
1054.15	0.60	70	95
1054.92	0.50	45	95
1056.75	0.50	45	60
1057.75	0.50	45	55
1058.12	1.20	55	95
1058.56	0.30	45	55
1059.58	0.60	45	60

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1063.05	0.50	45	60
1063.90	0.45	40	60
1093.20	0.90	5	45
1097.58	0.85	5	45
1103.85	0.95	5	45
1105.20 [3]	1.22	8	20
1113.70	0.60	5	45
1123.00	0.60	5	40
1124.93	0.85	5	50
1125.80	0.80	45	55
1128.44	0.35	5	40
1129.10	1.00	35	55
1139.00	1.00	5	50
1142.17	0.70	5	50
1145.34	0.90	10	50
1168.35	0.50	5	45
2149.75 [4]	0.60	5	15
2566.22 [5]	0.26	12	21
2623.95 [6]	0.65	5	21
2672.6 [7]	0.40	12	21

[1] Included to improve results for interferer HCFC-22 (CHF_2Cl)
[2] Included to improve results for interferer CFC-12 (CCl_2F_2)
[3] Included to improve results for interferer HCOOH
[4] Included to improve results for interferer N_2O isotopologues 1,2 & 3 (N_2O, $N^{15}NO$ & ^{15}NNO)
[5] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NO$)
[6] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)
[7] Included to improve results for interferer H_2O isotopologue 4 (HDO)

Table 4: Interfering Molecule(s) for O_3

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CCl_2F_2	0 (CCl_2F_2)	5	25
CHF_2Cl	0 (CHF_2Cl)	5	21
CCl_3F	0 (CCl_3F)	5	25
N_2O	1 (N_2O)	5	40
CH_4	3 (CH_3D)	5	25
CH_4	1 (CH_4)	5	35
N_2O	4 ($N_2{}^{18}O$)	5	21
N_2O	3 (^{15}NNO)	5	22
N_2O	2 ($N^{15}NO$)	5	21
HCOOH	0 (HCOOH)	5	20
H_2O	4 (HDO)	5	21
CO_2	3 ($OC^{18}O$)	5	21
CO_2	1 (CO_2)	5	45

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	2 ($O_2{}^{18}O$)	5	35
O_3	3 ($O^{18}OO$)	5	30

Table 5: Microwindow list for H_2O

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
937.45	0.60	5	8
941.10	0.70	5	12
944.90	0.70	5	10
1195.34	0.35	5	8
1198.18	0.40	15	35
1207.28	0.50	5	15
1214.92	0.65	8	20
1227.13 [1]	0.30	12	20
1362.60	0.30	40	55
1375.06	0.35	45	60
1429.95	0.35	45	70
1446.50	0.35	30	50
1456.84	0.30	60	85
1501.55	0.30	20	35
1503.51 [2]	0.30	15	20
1505.57	0.35	55	101
1507.06	0.35	55	101
1539.06	0.35	70	101
1540.30	0.35	70	85
1553.00	0.35	25	40
1558.53	0.35	55	101
1560.26	0.35	60	101
1562.64	0.30	20	30
1568.94	0.35	55	70
1576.19	0.35	55	101
1616.71	0.35	75	101
1623.56	0.35	50	70
1635.65	0.35	55	85
1652.40	0.40	80	101
1653.20	0.30	55	101
1672.42	0.30	30	55
1684.84	0.35	55	101
1695.93	0.35	70	101
1699.94	0.35	70	85
1752.75	0.30	35	55
1805.13	0.30	35	55
1904.36	0.35	35	55
1945.34	0.35	40	60

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1946.31	0.30	35	55
1950.08	0.35	8	15
1959.52	0.50	8	25
1961.15	0.30	25	55
1966.26	0.35	30	55
1976.17	0.30	20	45
1987.44	0.35	15	35
1989.98	0.30	8	15
1997.70 [3]	0.30	8	20
2152.64	0.40	12	35
2620.81 [4]	0.45	5	20
2723.31 [5]	0.45	8	20
2933.76	0.35	12	30
2974.55	0.30	12	20
2987.94 [4]	0.40	14	20
2992.63	0.35	12	30

[1] Included to improve results for interferer N_2O isotopologue 4 ($NN^{18}O$)
[2] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)
[3] Included to improve results for interferer CO_2 isotopologue 2 ($O^{13}CO$)
[4] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)
[5] Included to improve results for interferer H_2O isotopologue 4 (HDO)

Table 6: Interfering Molecule(s) for H_2O

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	3 ($H^{17}OH$)	8	20
H_2O	4 (HDO)	5	20
CO_2	1 (CO_2)	5	35
CO_2	2 ($O^{13}CO$)	5	20
CO_2	3 ($OC^{18}O$)	5	20
O_3	0 (O_3)	5	42
N_2O	1 (N_2O)	5	25
N_2O	2 ($N^{15}NO$)	12	35
N_2O	4 ($N_2{}^{18}O$)	8	20
CH_4	1 (CH_4)	5	30
CH_4	2 ($^{13}CH_4$)	5	20
CH_4	3 (CH_3D)	8	22
COF_2	0 (COF_2)	8	25

Table 7: Microwindow list for CH_4

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1245.14	0.35	40	55

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1270.70	0.35	40	60
1283.55	0.40	45	75
1287.80	0.40	55	75
1302.10	0.40	45	75
1302.85	0.40	45	75
1303.65	0.40	45	75
1311.40	0.45	50	75
1316.85	0.50	45	75
1322.15	0.50	45	75
1327.25	0.70	40	75
1332.40	0.90	40	75
1341.80	0.60	40	75
1342.80	0.60	45	75
1364.65	0.40	30	45
1439.43	0.35	15	25
1672.42 [1]	0.30	35	45
1876.62 [1]	0.35	15	35
2610.20	0.35	10	25
2614.02	0.65	10	30
2614.85	0.50	20	30
2618.27	0.35	25	40
2620.84 [2]	0.50	10	20
2644.72	0.35	15	30
2650.67	0.40	5	20
2652.95	0.30	5	20
2653.85	0.40	5	20
2658.65	0.35	10	20
2664.50	0.35	15	30
2667.19	0.30	15	30
2667.85	0.45	5	20
2669.27	0.55	5	20
2670.28	0.40	5	20
2671.60	0.30	5	20
2691.25	0.30	25	35
2698.90	0.30	5	15
2700.28	0.35	5	15
2809.02	0.30	25	40
2820.80	0.35	25	40
2822.69	0.30	30	45
2825.05	0.30	30	40
2828.17	0.40	30	45
2835.61	0.35	20	30
2841.22	0.35	15	30
2847.73	0.35	30	45
2849.25	0.40	25	35
2857.50	0.35	15	25
2861.00 [3]	0.45	13	22

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2867.10	0.40	30	40
2900.10	0.26	35	45
2958.13	0.45	50	75
2978.83	0.60	55	75
2988.92	0.50	50	75
3028.70	0.50	55	75
3038.50	0.40	65	75
3048.15	0.40	60	75
3057.70	0.45	65	75
3067.30	0.45	65	75
3076.63	0.45	55	75
3085.97	0.60	55	75

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)
[3] Included to improve results for interferer CH_4 isotopologue 2 ($^{13}CH_4$) & O_2

Table 8: Interfering Molecule(s) for CH_4

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	0 (H_2O)	15	67
CO_2	3 ($OC^{18}O$)	5	30
CO_2	4 ($OC^{17}O$)	5	20
O_3	0 (O_3)	5	22
CH_4	2 ($^{13}CH_4$)	5	22

Table 9: Microwindow list for N_2O

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
829.03 [1]	0.50	5	25
1134.42	0.60	5	20
1139.78	0.60	5	20
1161.57	0.45	20	30
1163.23	0.55	20	30
1164.08	0.50	20	30
1167.93	0.40	5	15
1168.83	0.60	5	25
1169.74	0.50	15	25
1178.25	0.50	20	30
1180.85	0.60	20	30
1181.75	0.40	20	30
1182.60	0.40	20	30
1183.57	0.55	20	30
1186.05	0.50	20	30

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1187.90	0.40	20	30
1194.10	0.50	15	25
1195.80	0.40	15	25
1202.05	0.35	5	15
1202.85	0.60	5	20
1203.86	0.80	5	20
1204.70	0.50	5	21
1228.00 [2]	0.40	5	20
1264.68	0.35	30	40
1266.65	0.40	30	40
1270.10	0.50	30	40
1271.11	0.30	30	40
1272.80	0.40	30	40
1273.77	0.35	30	40
1274.55	0.40	30	40
1277.15	0.40	30	40
1354.15 [3]	0.45	20	30
1950.10 [4]	0.35	8-10	20
1977.60 [5]	0.50	5	21
2140.18 [6]	0.35	10	20
2195.00 [7]	0.35	20	35
2201.78	0.35	35	50
2203.25	1.20	53	95
2203.66	0.55	35	50
2205.65	0.40	35	53
2208.50	0.40	40	53
2209.05	1.20	53	95
2210.00	1.20	53	95
2210.50	0.45	35	53
2211.50	0.50	35	53
2212.75	1.20	53	95
2214.07	0.45	35	53
2215.20	0.40	40	53
2215.35	0.90	53	95
2216.29	1.25	53	95
2221.23	0.40	30	40
2230.50	0.90	53	70
2231.27	1.20	53	70
2232.90	1.20	53	80
2234.95	0.60	53	95
2235.67	1.20	65	95
2236.27	0.40	40	53
2236.75	1.20	53	95
2237.82	1.20	53	95
2239.20	0.60	53	95
2239.93	1.20	53	95
2241.25	0.80	53	88

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2241.97	1.20	53	88
2525.25 [8]	0.40	5-7	20
2566.22 [6]	0.26	5	10
2623.87 [9]	0.90	5	21

[1] Included to improve results for interferer CHF_2Cl
[2] Included to improve results for interferer N_2O isotopologue 4 ($NN^{18}O$)
[3] Included to improve results for interferer CH_4 isotopologue 1, 2 (CH_4, $^{13}CH_4$) & CO_2 isotopologue 3 ($OC^{18}O$)
[4] Included to improve results for interferer H_2O
[5] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[6] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NO$)
[7] Included to improve results for interferer N_2O isotopologue 2, 3, 4 ($N^{15}NO$, ^{15}NNO, $NN^{18}O$) & CO_2
[8] Included to improve results for interferer N_2O isotopologue 3 (^{15}NNO)
[9] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$) & H_2O isotopologue 4 (HDO)

Table 10: Interfering Molecule(s) for N_2O

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	3 ($OC^{18}O$)	5	40
CHF_2Cl	0 (CHF_2Cl)	5	25
CH_4	1 (CH_4)	5	40
CH_4	2 ($^{13}CH_4$)	5	40
N_2O	2 ($N^{15}NO$)	5	35
H_2O	1 (H_2O)	5	40
H_2O	4 (HDO)	5	21
O_3	0 (O_3)	5	42
CO_2	2 ($O^{13}CO$)	30	88
CO_2	5 ($O^{13}C^{18}O$)	35	75
CO	0 (CO)	53	95
N_2O	3 (^{15}NNO)	5	39
CO_2	1 (CO_2)	20	55
N_2O	4 ($N_2{}^{18}O$)	5	37
CH_4	3 (CH_3D)	5	27
HNO_3	0 (HNO_3)	5	21
H_2O	2 ($H^{18}OH$)	5	21

Table 11: Microwindow list for NO_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1204.38 [1]	0.28	8	15

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1584.45	1.00	10.5-12.5	15
1586.55	0.45	13	35
1588.60	0.40	15	40
1592.60	0.30	15	35
1596.60	1.50	35	52
1597.04	0.40	15	35
1597.95	0.70	14	35
1599.95	0.50	15	35
1600.55	1.50	35	52
1602.60	1.00	35	52
1603.95	1.50	35	52
1604.48	0.45	15	35
1605.30	0.50	13	35
1606.35	1.10	35	52
1607.65	1.50	35	52
1608.15	0.30	13	35
1611.75	0.04	13	35
1625.55	1.50	35	52
1629.75	1.50	35	52
1629.75	0.50	15	35
1630.50	0.80	13	35
1636.90	0.40	25	40
1788.36 [3]	0.30	23	35
1808.66 [3]	0.30	13	23
2623.87 [4]	0.90	7	20
2650.67 [5]	0.40	7	15
2652.95 [5]	0.30	7	15
2669.27 [5]	0.55	7	15
2670.28 [5]	0.40	7	15
2672.70 [4]	0.60	10	20
2698.90 [5]	0.30	7	15
2891.20	1.25	9	25
2892.62 [2]	0.35	7	20
2903.50 [6]	0.40	7	20
2913.28	0.55	7	25
2914.65	1.00	7	25
2919.95	0.90	7	25
2921.20	0.80	7	25
2950.86 [1]	0.26	7	21

[1] Included to improve results for interferer CH_4 isotopologue 3 (CH_3D)
[2] Included to improve results for interferer CH_4 isotopologue 2 ($^{13}CH_4$)
[3] Included to improve results for interferer H_2O
[4] Included to improve results for interferer H_2O isotopologue 4 (HDO)
[5] Included to improve results for interferer CH_4
[6] Included to improve results for interferer OCS

Table 12: Interfering Molecule(s) for NO_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	13	52
H_2O	2 ($H^{18}OH$)	35	52
CH_4	1 (CH_4)	7	35
H_2O	4 (HDO)	7	20
OCS	0 (OCS)	7	20
CO_2	3 ($OC^{18}O$)	7	20
CH_4	2 ($^{13}CH_4$)	7	25
CH_4	3 (CH_3D)	7	21

Table 13: Microwindow list for NO

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1649.34 [1]	0.30	20	30
1842.90	0.60	55	95
1846.60	0.40	12	95
1850.10	0.40	12	95
1853.80	0.50	35	55
1853.80	0.80	55	107
1857.08	0.60	30	55
1857.10	0.80	55	95
1860.95	0.70	30	95
1864.15	0.60	55	95
1867.70	0.60	75	95
1884.30	0.60	75	95
1887.50	0.80	50	95
1887.51	0.40	7.5-10	50
1890.20	1.60	55	95
1890.80	0.50	25	55
1893.90	0.70	30	107
1896.90	0.60	60	107
1896.92	0.35	6-9	60
1900.08	0.80	65	107
1900.30	0.80	40	65
1903.10	0.80	65	107
1903.15	0.40	6-9	65
1906.06	0.32	6-9	40
1906.10	0.80	70	107
1906.40	1.00	40	70
1906.82	0.35	6-9	40
1909.15	0.80	75	107
1909.20	0.40	25	40
1909.32	0.65	40	55
1909.55	1.10	55	75
1912.30	0.80	40	107

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1914.98	0.30	7-9	45
1915.35	1.00	45	95
1920.80	0.50	10-12	40
1929.00	0.30	6-9	45
1930.08	0.35	6-9	35
1950.10 [1]	0.35	6-9	20
1977.60 [2]	0.50	6-9	20

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)

Table 14: Interfering Molecules(s) for NO

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	6-9	75
O_3	0 (O_3)	6-9	45
CO_2	2 ($O^{13}CO$)	6-9	33
CO_2	3 ($OC^{18}O$)	6-9	20
CO_2	4 ($OC^{18}O$)	6-9	20
H_2O	1 (H_2O)	6-9	75
H_2O	2 ($H^{18}OH$)	6-9	20
H_2O	3 ($H^{17}OH$)	6-9	25
COF_2	0 (COF_2)	6-9	35

Table 15: Microwindow list for HNO_3

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
865.45 [1]	0.70	5	9
866.55	1.00	5	30
867.75	1.50	5	30
869.50	1.20	5	30
872.95	1.40	5	30
874.25	1.20	5	30
876.50	1.00	5	25
879.90	0.80	5	30
885.55	0.80	5	30
886.20	0.50	5	30
889.40	0.50	5	30
901.55	0.50	5	30
903.50	1.00	5	30
905.05	0.40	5	30
907.35	0.35	5	30
923.16 [2]	0.80	5	20
1484.92 [3]	0.30	20	30

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1649.34 [1]	0.30	20	30
1695.42	0.40	42	59-62
1697.10	0.40	25	42
1697.10	1.00	42	59-62
1698.00	1.20	42	59-62
1698.50	1.20	25	42
1699.47	0.40	25	59-62
1700.05	0.70	50	59-62
1701.60	1.20	42	59-62
1702.08	1.15	25	42
1702.85	0.40	25	59-62
1703.60	0.60	25	50
1715.85	1.00	25	42
1717.05	1.80	42	59-62
1719.00	1.80	42	59-62
1719.40	1.00	25	42
1720.50	1.00	25	42
1720.90	1.80	42	59-62
1722.40	1.00	25	42
1722.70	1.80	42	59-62
1723.07	0.35	25	42
1724.20	0.90	25	42
1950.10 [1]	0.35	9	20
1977.60 [3]	0.50	5-7	20

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer CO_2 & CCl_2F_2
[3] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)

Table 16: Interfering Molecule(s) for HNO_3

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CCl_2F_2	0 (CCl_2F_2)	5	20
H_2O	1 (H_2O)	5	62
CO_2	1 (CO_2)	5	20
CO_2	2 ($O^{13}CO$)	5	30
OCS	0 (OCS)	5	20
H_2O	2 ($H^{18}OH$)	5	45
H_2O	3 ($H^{17}OH$)	25	50
O_3	0 (O_3)	25	55

Table 17: Microwindow list for HCl

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (molecules/cm^3)
1950.10 [1]	0.35	6-7	20*
2624.07 [2]	1.30	6-7	15*
2703.03	0.30	11	3.00E+16
2727.77	0.35	6-7	1.50E+16
2752.05	0.45	6-7	9.00E+15
2775.73	0.30	6-7	6.00E+15
2798.95	0.35	40	4.50E+15
2821.52	0.40	16	4.50E+15
2843.66	0.28	6-7	4.50E+15
2865.06	0.45	30	4.50E+15
2906.22	0.45	30	4.50E+15
2925.87	0.30	6-7	4.50E+15
2942.67	0.40	15	1.00E+16
2944.95	0.35	14	4.50E+15
2951.30 [3]	0.35	6-7	17*
2963.14	0.50	14	4.50E+15
2981.00	0.50	17	4.50E+15
2998.50	1.30	40	6.50E+15

* *Upper Altitude given in kilometers*

[1] *Included to improve results for interferer H_2O*

[2] *Included to improve results for interferer H_2O isotopologue 4 (HDO) & CO_2 isotopologue 3 ($OC^{18}O$)*

[3] *Included to improve results for interferer CH_4 isotopologue 3 (CH_3D)*

Table 18: Interfering Molecule(s) for HCl

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	0 (O_3)	6-7	40
CH_4	1 (CH_4)	6-7	52
CH_4	2 ($^{13}CH_4$)	6-7	40
CH_4	3 (CH_3D)	6-7	23
H_2O	4 (HDO)	6-7	20
OCS	0 (OCS)	6-7	15-20
NO_2	0 (NO_2)	6-7	30
CO_2	3 ($OC^{18}O$)	6-7	25
N_2O	0 (N_2O)	6-7	28
H_2O	1 (H_2O)	6-7	40

Table 19: Microwindow list for HF

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (molecules/cm^3)
3787.60	1.60	40	2.00E+16
3788.28	0.60	12	40*
3792.65 [1]	0.40	20	4.00E+01
3833.70	0.80	16	40*
3834.30	1.60	40	9.00E+15
3877.60	0.80	12	9.00E+15
3920.15	0.70	25	9.00E+15
4000.87	0.65	12	9.00E+15
4038.82	1.00	12	9.00E+15
4075.35	0.80	25	9.00E+15
4109.75	0.80	25	2.00E+16

* *Upper Altitude given in kilometers*

[1] *Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)*

Table 20: Interfering Molecule(s) for HF

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	12	65
H_2O	2 ($H^{18}OH$)	12	50
H_2O	3 ($H^{17}OH$)	12	40
H_2O	4 (HDO)	12	25
CO_2	1 (CO_2)	12	40
O_3	0 (O_3)	12	38
CH_4	0 (CH_4)	12	30
CO_2	3 ($OC^{18}O$)	12	20
N_2O	0 (N_2O)	12	30

Table 21: Microwindow list for CO

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1950.10 [1]	0.35	7	15
1986.09 [2]	0.30	6-7	22
2033.08 [3]	0.30	5	8
2046.29	0.24	8	25
2050.90	0.30	20	45
2081.88	0.48	13-15	100
2083.05 [4]	0.70	5	15
2086.36	0.40	15	100
2094.76	0.40	70	110
2098.97	0.50	40	110
2107.46	0.40	60	110

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2115.50	0.60	40	110
2119.70	0.50	70	110
2131.65	0.50	18	105
2135.40	1.00	14-16	105
2139.35	1.00	13-15	105
2140.00	1.25	5	22
2140.80 [5]	0.60	5	22
2146.75	1.00	5	22
2147.05	0.90	13-15	105
2149.75 [6]	0.60	5	15
2150.90	0.70	16-17	105
2154.65	0.80	17-18	110
2158.30	0.50	19	110
2161.95	0.50	20	110
2164.00	0.50	10	20
2165.48	0.55	20	110
2169.13	0.55	20	110
2172.68	0.50	50	110
2176.25	0.45	20	110
2179.85	0.40	60	110
2183.20	0.40	40	110
2186.60	0.40	60	110
4209.38	0.40	5	15
4222.90	0.45	5	15
4227.37	0.70	5	15
4236.01	0.45	5	15
4248.34	0.40	5	15
4274.77	0.30	5	15
4285.10	0.55	5	15

[1] Included to improve results for interferer H_2O

[2] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)

[3] Included to improve results for interferer CO_2 isotopologue 4 ($OC^{17}O$)

[4] Included to improve results for interferer O_3 isotopologue 2 ($OO^{18}O$), CO_2, OCS, O_3, CO_2 isotopologue 3 ($OC^{18}O$)

[5] Included to improve results for interferer CO isotopologue 2 (^{13}CO)

[6] Included to improve results for interferer N_2O isotopologue 1, 2 & 3 (N_2O, $N^{15}NO$ & ^{15}NNO)

Table 22: Interfering Molecule(s) for CO

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	5	60
H_2O	1 (H_2O)	5	45
O_3	1 (O_3)	5	63
OCS	0 (OCS)	5	22-30

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	4 ($OC^{17}O$)	5	30
CO_2	3 ($OC^{18}O$)	5	30
O_3	2 ($O_2{}^{18}O$)	5	35
N_2O	1 (N_2O)	5	40
N_2O	2 ($N^{15}NO$)	5	38
N_2O	3 (^{15}NNO)	5	35
CH_4	0 (CH_4)	5	15
CO	3 ($C^{18}O$)	5	22
CO	2 (^{13}CO)	5	22
H_2O	3 ($H^{17}OH$)	5	22

Table 23: Microwindow list for CCl_3F (CFC-11)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
844.00	28.00	5-6	23-28
1970.12 [1]	0.35	10	23-28
1977.60 [2]	0.50	6	21
2976.50 [3]	2.00	7	20

[1] Included to improve results for interferer CO2
[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[3] Included to improve results for interferer C_2H_6

Table 24: Interfering Molecule(s) for CCl_3F (CFC-11)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	0 (CO_2)	6-7	23-28
HNO_3	0 (HNO_3)	6-7	23-28
H_2O	1 (H_2O)	6-7	23-28
O_3	0 (O_3)	6-7	23-28
OCS	0 (OCS)	6-7	20
C_2H_6	0 (C_2H_6)	6-7	20
H_2O	2 ($H^{18}OH$)	6-7	21
$COCl_2$	0 ($COCl_2$)	6-7	23-28

Table 25: Microwindow list for CCl_2F_2 (CFC-12)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
921.90	3.80	5	28-36

Table 26: Interfering Molecule(s) for CCl_2F_2 (CFC-12)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	5	28-36
N_2O	1 (N_2O)	5	10
CO_2	2 ($O^{13}CO$)	5	28-33
H_2O	1 (H_2O)	5	23

Table 27: Microwindow list for N_2O_5

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1244.00	30.00	8	45

Table 28: Interfering Molecule(s) for N_2O_5

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	4 (HDO)	8	26
H_2O	2 ($H^{18}OH$)	8	20
CO_2	3 ($OC^{18}O$)	8	45
CO_2	4 ($OC^{17}O$)	8	25
O_3	0 (O_3)	8	35
CH_4	2 ($^{13}CH_4$)	8	45
CH_4	3 (CH_3D)	8	28
N_2O	2 ($N^{15}NO$)	8	32
N_2O	3 (^{15}NNO)	8	35
N_2O	4 ($N_2{}^{18}O$)	8	32
N_2O	5 ($N_2{}^{17}O$)	8	26

Table 29: Microwindow list for $ClONO_2$

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
780.15	0.60	10	20
1108.03 [1]	0.40	10	20
1250.50 [2]	3.00	10	15.5-19
1292.50	5.00	15.5-19	41-36*
2672.70 [3]	0.60	10	15.5-19

* *Upper altitude at the poles is 41 km and 36 km at the equator*

[1] *Included to improve results for interferer O_3*

[2] *Included to improve results for all interferers*

[3] *Included to improve results for interferer H_2O isotopologue 4 (HDO)*

Table 30: Interfering Molecules for $ClONO_2$

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	1 (N_2O)	10	31-36
CH_4	1 (CH_4)	10	31-36
CH_4	2 ($^{13}CH_4$)	10	31-36
O_3	0 (O_3)	10	20
HNO_3	0 (HNO_3)	10	32
N_2O	2 ($N^{15}NO$)	10	32
N_2O	3 (^{15}NNO)	10	30
CO_2	3 ($OC^{18}O$)	10	28
H_2O	4 (HDO)	10	25
CO_2	4 ($OC^{17}O$)	10	25
CH_4	3 (CH_3D)	10	25

Table 31: Microwindow list for COF_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1234.70	1.40	12	34-45
1236.90	1.40	25	34-45
1238.00	0.80	15	34-45
1239.90	1.00	15	34-45
1930.60	1.40	12-15	34-45
1936.48	0.65	12	34-45
1938.15	1.50	30	29-35
1939.55	1.20	30	29-35
1949.40	1.20	15	34-45
1950.70	0.50	12	34-45
1952.23	1.00	12	34-45
2672.70 [1]	0.60	12	20

[1] *Included to improve results for interferer H_2O isotopologue 4 (HDO)*

Table 32: Interfering Molecule(s) for COF_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	12	34-45
CO_2	1 (CO_2)	12	34-45
CH_4	1 (CH_4)	12	34-45
NO	1 (NO)	12	34-45
CH_4	2 ($^{13}CH_4$)	12	34-45
CO_2	3 ($OC^{18}O$)	12	34-45
N_2O	1 (N_2O)	12	34-45
N_2O	4 ($N_2{}^{18}O$)	12	30-32
N_2O	3 (^{15}NNO)	12	25-27

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	4 (HDO)	12	24
CH_4	3 (CH_3D)	12	23

Table 33: Microwindow list for CF_4

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1227.13 [1]	0.30	15	24
1266.17 [2]	0.35	15	26
1282.70	9.00	15	55
1292.65 [3]	1.70	19	30

[1] Included to improve results for interferer N_2O isotopologue 4 ($NN^{18}O$)
[2] Included to improve results for interferer CH_4 isotopologue 3 (CH_3D)
[3] Included to improve results for interferer $ClONO_2$

Table 34: Interfering Molecule(s) for CF_4

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CH_4	1 (CH_4)	15	55
CH_4	2 ($^{13}CH_4$)	15	47
CH_4	3 (CH_3D)	15	26
$ClONO_2$	0 ($ClONO_2$)	15	30
H_2O	1 (H_2O)	15	55
H_2O	4 (HDO)	15	26
N_2O	1 (N_2O)	15	50
N_2O	2 ($N^{15}NO$)	15	33
N_2O	3 (^{15}NNO)	15	33
N_2O	4 ($N_2{}^{18}O$)	15	24
N_2O	5 ($N_2{}^{17}O$)	15	22
CO_2	3 ($OC^{18}O$)	15	45
CO_2	4 ($OC^{17}O$)	15	26
HNO_3	0 (HNO_3)	15	30

Table 35: Microwindow list for CH_3Cl

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1459.75	0.60	22	40
1864.30 [1]	0.40	15	20
1977.60 [2]	0.50	9-12	20
1986.09 [1]	0.30	9-12	15
2617.63 [3]	0.30	9-12	20

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2624.07 [4]	1.30	9-12	13
2657.30 [4]	0.35	13	22
2966.35	2.50	13-15	40
2966.45	0.30	9-12	13-15
2967.17	0.45	9-12	13-15
2982.80 [5]	1.60	9-12	20

[1] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)
[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[3] Included to improve results for interferer CH_4 isotopologue 2 ($^{13}CH_3D$)
[4] Included to improve results for interferer H_2O isotopologue 4 (HDO)
[5] Included to improve results for interferer H_2O & C_2H_6

Table 36: Interfering Molecule(s) for CH_3Cl

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit(km)	Upper Altitude Limit (km)
O_3	0 (O_3)	9-12	40
CH_4	1 (CH_4)	9-12	40
CH_4	2 ($^{13}CH_4$)	9-12	30
CH_4	3 (CH_3D)	9-12	30
H_2O	1 (H_2O)	9-12	40
H_2O	2 ($H^{18}OH$)	9-12	20
H_2O	3 ($H^{17}OH$)	9-12	20
C_2H_6	0 (C_2H_6)	9-12	20
H_2O	4 (HDO)	9-12	30

Table 37: Microwindow list for C_2H_6

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1950.10 [1]	0.35	6-7	22
1977.60 [2]	0.50	6-7	22
2976.50	2.00	6-7	20

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)

Table 38: Interfering Molecule(s) for C_2H_6

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	0 (O_3)	6-7	20
CH_4	1 (CH_4)	6-7	20
H_2O	2 ($H^{18}OH$)	6-7	22
H_2O	1 (H_2O)	6-7	22
CH_4	3 (CH_3D)	6-7	20

Table 39: Microwindow list for SF_6

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
948.00	9.00	8-12	32

Table 40: Interfering Molecule(s) for SF_6

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	8-12	31
CO_2	1 (CO_2)	8-12	32
CO_2	3 ($OC^{18}O$)	8-12	14

Table 41: Microwindow list for OCS

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1950.10 [1]	0.35	6-8	17
2039.01	0.40	6-8	19-26
2040.50	0.50	8-10	20-26
2043.51	0.40	10-12	17
2044.01	1.40	17	22-31
2045.18	0.30	6-8	22-31
2048.03	0.40	6-8	23-31
2049.95	0.40	16-18	23-31
2051.30	0.40	6-8	23-31
2053.21	0.30	13-15	23-31
2054.45	0.50	12-15	23-31
2055.90	0.60	6-8	12-15
2057.52	0.45	6-8	12-15

[1] Included to improve results for interferer H_2O

Table 42: Interfering Molecule(s) for OCS

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit(km)	Upper Altitude Limit (km)
OCS	2 ($OC^{34}S$)	6-8	19-25
O_3	1 (O_3)	6-8	23-31
O_3	3 ($O^{18}OO$)	6-8	23-31
CO_2	3 ($OC^{18}O$)	6-8	23-31
CO_2	4 ($OC^{17}O$)	6-8	23-31
CO_2	1 (CO_2)	6-8	23-31
CO_2	2 ($O^{13}CO$)	6-8	23-31
H_2O	1 (H_2O)	6-8	23-31

Table 43: Microwindow list for HCN

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1396.95	0.50	10-13	25-30
1403.00	1.30	20	25-30
1426.65	0.55	9-12	35-42
1432.30	0.80	20	35-42
1437.90	1.90	30-35	35-42
1439.05	1.00	11-14	28-35
1441.60	0.70	30	35-42
1441.70	0.50	8-11	30
1445.00	0.70	9-12	35-42
1450.88	0.70	12-15	30
2624.07 [1]	1.30	6-8	20
2669.18 [2]	0.30	6-8	12
3268.25	0.80	6-8	15
3287.25	0.50	6-8	25
3287.85	1.50	25	35-42
3302.35	0.80	6-9.5	25
3302.90	1.10	25	35-42
3305.30	0.90	6-8	25
3305.90	1.10	25	35-42
3314.30	0.60	8-12	35-42
3317.33	0.45	19	35-42
3320.45	1.10	6-8	35-42
3323.05	0.40	17-20	35-42
3325.90	0.60	8-12	35-42
3328.70	1.00	6-8	35-42
3330.62	2.00	30	35-42
3331.55	0.60	6-8	30
3334.55	0.80	15-17	35-42
3336.85	0.90	20	35-42
3337.40	0.80	12-15	20
3339.90	0.35	10-13	35-42
3342.35	1.00	15	35-42

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
3348.00	0.80	15	35-42
3353.30	0.35	5	35-42
3423.63 [3]	0.35	10	20

[1] Included to improve results for interferer H_2O isotopologue 4 (HDO) & CO_2 isotopologue 3 ($O^{13}CO$)

[2] Included to improve results for interferer CH_4

[3] Included to improve results for interferer N_2O isotopologue 3 (^{15}NNO)

Table 44: Interfering Molecule(s) for HCN

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	6-8	35-42
H_2O	2 ($H^{18}OH$)	6-8	35-42
H_2O	3 ($H^{17}OH$)	6-8	35
H_2O	4 (HDO)	6-8	30
CO_2	1 (CO_2)	6-8	35-42
CO_2	3 ($OC^{18}O$)	6-8	20
N_2O	1 (N_2O)	6-8	35-45
N_2O	3 (^{15}NNO)	6-8	20
CH_4	0 (CH_4)	6-8	35-42
C_2H_2	0 (C_2H_2)	6-8	18

Table 45: Microwindow list for H_2CO

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1721.30	1.30	20	45
1723.65	1.70	20	45
1769.90	1.35	25	45
1775.95	0.90	30	45
2566.22 [1]	0.28	8-10	22
2623.87 [2]	0.90	6-8	15
2739.85	0.60	5	25
2754.27	0.70	15	45
2759.05	0.70	15	45
2765.65	0.45	5	25
2765.68	0.85	25	45
2778.40	1.00	5	45
2780.00	0.50	15	45
2781.20	0.80	5	45
2807.60	0.80	15	45
2812.25	0.70	5	15
2812.50	0.75	15	45
2814.60	0.70	15	45

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2817.00	0.80	20	45
2826.67	0.80	5	30

[1] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NO$)
[2] Included to improve results for interferer CH_4, H_2O isotopologue 4 (HDO) & CO_2 isotopologue 3 ($OC^{18}O$)

Table 46: Interfering Molecule(s) for H_2CO

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	4 (HDO)	5	30
H_2O	5 ($HD^{18}O$)	5	12
CO_2	3 ($OC^{18}O$)	5	30
O_3	0 (O_3)	5	45
N_2O	1 (N_2O)	5	35
N_2O	2 ($N^{15}NO$)	5	22
CH_4	1 (CH_4)	5	45
CH_4	2 ($^{13}CH_4$)	5	30
H_2O	1 (H_2O)	20	45
H_2O	2 ($H^{18}OH$)	20	45
HNO_3	0 (HNO_3)	20	35

Table 47: Microwindow list for CO_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
927.00	0.35	30	45
929.00	0.35	30	45
931.00	0.35	30	45
932.96	0.30	25	45
934.82	0.45	15	45
936.80	0.35	15	45
940.52	0.80	15	45
942.40	0.35	15	45
946.00	0.35	20	45
947.70	0.40	20	45
1899.17	0.30	30	58
1902.05	0.30	30	60
1905.16	0.40	35	45
1905.26	0.22	25	35
1906.48	0.30	30	65
1911.02	0.35	35	68
1911.12	0.30	30	35
1912.52	0.35	45	68
1914.12	0.30	30	70

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1915.48	0.30	30	70
1917.06	0.35	30	70
1920.11	0.35	30	70
1924.71	0.35	40	65
1929.45	0.30	25	45
1930.90	0.27	15	45
1933.98	0.24	25	60
1934.78	0.24	22	45
1935.24	0.28	15	50
1936.44	0.30	25	50
1941.03	0.35	15	45
1950.68	0.30	15	45
1962.08	0.30	35	45
1968.64	0.30	35	45
1970.12	0.30	20	45
1975.10	0.30	15	40
2044.50	0.30	50	70
2045.97	0.30	53	73
2047.53	0.40	55	73
2049.05	0.40	53	75
2050.55	0.40	55	78
2052.10	0.30	50	79
2053.66	0.30	55	80
2055.11	0.35	60	80
2056.72	0.30	55	85
2058.24	0.40	55	85
2061.33	0.35	60	85
2062.87	0.35	60	85
2066.03	0.35	60	85
2067.52	0.35	60	83
2070.65	0.40	62	80
2072.23	0.30	57	80
2289.20	0.35	105	125
2291.50	0.30	110	125
2293.90	0.35	78	125
2296.06	0.30	110	125
2298.24	0.30	105	125
2300.40	0.30	90	125
2306.85	0.30	95	125
2313.10	0.35	95	125
2319.14	0.26	90	125
2332.37	0.30	95	125
2354.37	0.26	90	125
2361.45	0.30	90	125
2364.10	0.30	90	125
2366.63	0.30	90	125
2367.88	0.30	90	125

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2369.10	0.30	90	125
2370.27	0.35	90	125
2371.43	0.30	90	125
2372.56	0.30	90	125
2373.67	0.35	90	125
2374.23	0.28	50	65
2374.75	0.40	90	125
2375.40	0.28	50	60
2375.80	0.35	90	125
2376.84	0.35	90	125
2377.85	0.35	90	125
2378.83	0.35	75	125
2379.78	0.35	90	125
2380.72	0.35	85	125
2381.62	0.35	85	125
2382.48	0.40	82	125
2383.36	0.35	82	125
2384.20	0.35	90	125
2385.02	0.40	75	125
2385.79	0.35	73	125
2386.51	0.35	70	125
2387.26	0.35	65	125
2387.96	0.35	60	80
2388.64	0.35	55	77
2389.29	0.35	50	71
2389.92	0.30	35	68
2390.52	0.35	35	65
2391.13	0.30	22	62
2391.70	0.30	22	60
2392.10	0.30	20	55
2392.62	0.30	20	50
2393.06	0.30	20	50
2399.05	0.24	20	40
2403.00	0.26	20	40
2408.77	0.20	15	46
2412.47	0.30	30	46
2419.60	0.30	35	45
2421.19	0.30	15	46
2422.88	0.30	15	46
2424.60	0.30	25	45
2433.12	0.30	30	40
2434.56	0.28	30	45
2439.00	0.30	35	46
2444.27	0.24	35	46

Table 48: Microwindow list for HO_2NO_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
802.89	2.08	10	30

Table 49: Interfering Molecule(s) for HO_2NO_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CHF_2Cl	0 (CHF_2Cl)	10	21
H_2O	0 (H_2O)	10	30
CO_2	0 (CO_2)	10	30
O_3	0 (O_3)	10	30

Table 50: Microwindow list for H_2O_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1231.81	1.50	5	25-39
1234.50	1.60	5	25-40
1237.92	0.60	15	25-40
1239.35	0.50	15	25-40
1240.15	0.50	15	25-40
1241.85	0.90	20	25-40
1246.96	0.60	15	25-40
1248.70	0.40	20	25-40
1950.10 [1]	0.35	6-7	15
2624.07 [2]	1.30	5	13
2657.30 [2]	0.35	13	21

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer H_2O isotopologue 4 (HDO)

Table 51: Interfering Molecule(s) for H_2O_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5	25-40
H_2O	4 (HDO)	5	21
CO_2	3 ($OC^{18}O$)	5	25-40
CO_2	5 ($O^{13}C^{18}O$)	5	13
O_3	0 (O_3)	5	32
N_2O	1 (N_2O)	5	25-40
N_2O	2 ($N^{15}NO$)	5	21-28
N_2O	3 (^{15}NNO)	5	23-32
N_2O	4 ($N_2{}^{18}O$)	5	23-32

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	5 ($N_2{}^{17}O$)	5	21-27
CH_4	1 (CH_4)	5	25-40
CH_4	2 ($^{13}CH_4$)	5	25-40
CH_4	3 (CH_3D)	5	21-25
COF_2	0 (COF_2)	5	24-32
H_2O	5 ($HD^{18}O$)	5	10

Table 52: Microwindow list for CCl_4

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
780.15 [1]	0.60	6-7	25-30
796.50	18.00	6-7	25-30
829.12 [2]	0.26	6-7	25
1864.30 [3]	0.40	15	20
1977.60 [4]	0.50	7-9	20
1986.09 [3]	0.30	7-9	15
2013.55 [5]	0.40	6-7	25
2620.84 [6]	0.50	6-7	21
2976.50 [7]	2.00	6-7	20
3304.60 [8]	1.30	6-7	18

[1] Included to improve results for interferer $ClONO_2$
[2] Included to improve results for interferer CHF_2Cl
[3] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)
[4] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[5] Included to improve results for interferer CO_2 isotopologue 2 ($O^{13}CO$)
[6] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)
[7] Included to improve results for interferer C_2H_6
[8] Included to improve results for interferer C_2H_2

Table 53: Interfering Molecule(s) for CCl_4

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
$ClONO_2$	0 ($ClONO_2$)	6-7	25-30
CHF_2Cl	0 (CHF_2Cl)	6-7	25
H_2O	1 (H_2O)	6-7	25-30
CO_2	1 (CO_2)	6-7	25-30
O_3	0 (O_3)	6-7	25-30
H_2O	2 ($H^{18}OH$)	6-7	21
CO_2	2 ($O^{13}CO$)	6-7	25
H_2O	3 ($H^{17}OH$)	6-7	21
C_2H_2	0 (C_2H_2)	6-7	18
CO_2	3 ($OC^{18}O$)	6-7	21

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
HO_2NO_2	0 (HO_2NO_2)	6-7	30
C_2H_6	0 (C_2H_6)	6-7	20
CH_4	0 (CH_4)	6-7	20

Table 54: Microwindow list for C_2H_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1962.00 [1]	0.45	11	20
2620.84 [2]	0.50	12	20
3268.30	0.80	5-8	20
3270.20	1.00	8-12	20
3278.45	1.00	12-14	20
3286.00	1.60	8-12	20
3287.45	0.90	7-10	20
3295.90	0.80	7-10	20
3300.40	0.80	12-15	20
3304.60	1.30	6-10	20
3304.95	0.80	5-8	6-10
3315.98	0.85	5-8	20
3317.80	0.60	10-14	20
3322.05	1.00	10	20
3331.40	0.80	5-8	20
3335.57	0.45	6-9	20

[1] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)
[2] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)

Table 55: Interfering Molecule(s) for C_2H_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5-8	20
H_2O	2 ($H^{18}OH$)	5-8	20
H_2O	3 ($H^{17}OH$)	5-8	20
N_2O	0 (N_2O)	5-8	20
CO_2	1 (CO_2)	5-8	20
CO_2	2 ($O^{13}CO$)	5-8	20
CO_2	3 ($OC^{18}O$)	5-8	20
O_3	0 (O_3)	5-8	20
HCN	0 (HCN)	5-8	20

Table 56: Microwindow list for $COCl_2$

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
844.00	28.00	8-10	23.5-28.5
1970.12 [1]	0.35	10	23.5-28.5
1977.60 [2]	0.50	8-10	21
2976.50 [3]	2.00	8-10	20

[1] Included to improve results for interferer CO_2
[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[3] Included to improve results for interferer C_2H_6

Table 57: Interfering Molecule(s) for $COCl_2$

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CCl_3F	0 (CCl_3F)	8-10	23.5-28.5
CO_2	0 (CO_2)	8-10	23.5-28.5
HNO_3	0 (HNO_3)	8-10	23.5-28.5
H_2O	1 (H_2O)	8-10	23.5-28.5
O_3	0 (O_3)	8-10	23.5-28.5
OCS	0 (OCS)	8-10	20
C_2H_6	0 (C_2H_6)	8-10	20
H_2O	2 ($H^{18}OH$)	8-10	21

Table 58: Microwindow list for COClF

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1553.00 [1]	0.35	13-15	24.2-32
1862.60	1.00	13-15	24.2-32
1864.40	0.60	13-15	24.2-32
1865.40	0.85	13-15	24.2-32
1866.82	0.35	13-15	24.2-32
1867.38	0.30	13-15	24.2-32
1869.98	0.35	13-15	24.2-32
1870.50	0.30	13-15	24.2-32
1881.65	0.70	13-15	24.2-32

[1] Included to improve results for interferer H_2O

Table 59: Interfering Molecule(s) for COClF

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	13-15	24.2-32
H_2O	3 ($H^{17}OH$)	13-15	24.2-32

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	13-15	21
CO_2	2 ($O^{13}CO$)	13-15	24.2-32
CO_2	3 ($OC^{18}O$)	13-15	24.2-32
O_3	0 (O_3)	13-15	24.2-32
N_2O	0 (N_2O)	13-15	24.2-32
NO	0 (NO)	13-15	24.2-32

Table 60: Microwindow list for HCOOH

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
829.03 [1]	0.50	5	20
1090.03 [2]	0.50	7-8	20
1105.60	10.00	5	20
1937.15 [3]	0.70	6-8	20
2624.07 [4]	1.30	5-7	13
2657.30 [5]	0.35	13	20

[1] Included to improve results for interferer CHF_2Cl
[2] Included to improve results for interferer CO_2
[3] Included to improve results for interferer H_2O isotopologue 2 & 3 ($H^{18}OH$ & $H^{17}OH$)
[4] Included to improve results for interferer H_2O isotopologue 4 (HDO)

Table 61: Interfering Molecule(s) for HCOOH

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CCl_2F_2	0 (CCl_2F_2)	5	20
CHF_2Cl	0 (CHF_2Cl)	5	20
H_2O	1 (H_2O)	5	20
CFH_2CF_3	0 (CFH_2CF_3)	5	20
H_2O	2 ($H^{18}OH$)	5	20
H_2O	3 ($H^{17}OH$)	5	20
H_2O	4 (HDO)	5	20
CO_2	0 (CO_2)	5	20
O_3	1 (O_3)	5	20
O_3	2 ($OO^{18}O$)	5	20
O_3	3 ($O^{18}OO$)	5	20
CH_4	1 (CH_4)	5	20
CH_4	3 (CH_3D)	5	20

Table 62: Microwindow list for CH_3OH

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
933.90 [1]	0.30	5-6	22
991.80	13.80	5-6	25
1001.90	6.40	5-6	25
1950.10 [2]	0.35	5-6	20

[1] Included to improve results for interferer CO_2 isotopologue 2 ($O^{13}CO$)
[2] Included to improve results for interferer H_2O

Table 63: Interfering Molecule(s) for CH_3OH

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	1 (O_3)	5-6	25
O_3	2 ($OO^{18}O$)	5-6	25
O_3	3 ($O^{18}OO$)	5-6	25
O_3	4 ($OO^{17}O$)	5-6	25
CO_2	1 (CO_2)	5-6	25
CO_2	2 ($O^{13}CO$)	5-6	22
H_2O	0 (H_2O)	5-6	20
O_3	5 ($O^{17}OO$)	5-6	25

Table 64: Microwindow list for O_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1470.20	0.60	15	30
1480.35	0.40	15	20
1482.50	0.30	15	30
1494.60	0.30	15	30
1518.60	0.30	15	30
1520.55	0.26	19	28
1530.30	0.40	15	30
1544.00	0.35	15	23
1549.05	0.30	17	27
1552.60	0.35	15	40
1553.47	0.30	15	40
1555.05	0.30	15	40
1555.52	0.35	15	40
1555.95	0.35	19	40
1556.28	0.30	15	40
1570.55	0.26	18	40
1572.53	0.35	15	35
1581.73	0.45	15	35
1592.88	0.30	15	35

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1603.86	0.40	15	35
1614.71	0.50	15	40
1876.62 [1]	0.35	15	35

[1] Included to improve results for interferer H_2O

Table 65: Interfering Molecule(s) for O_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	3 ($H^{17}OH$)	15	35
H_2O	2 ($H^{18}OH$)	15	30
H_2O	4 (HDO)	15	30
NO_2	0 (NO_2)	15	30
H_2O	1 (H_2O)	15	35

Table 66: Microwindow list for N_2

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2388.35	0.24	20	48
2395.96	0.28	15	45
2403.55	0.35	15	48
2411.13	0.35	15	48
2418.63	0.35	15	48
2426.14	0.40	15	43
2433.64	0.24	15	47

Table 67: Interfering Molecule(s) for N_2

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	0 (CO_2)	15	30
N_2O	1 (N_2O)	15	30
CH_4	0 (CH_4)	15	22
N_2O	4 ($N_2{}^{18}O$)	15	23

Table 68: Microwindow list for CH_3CClF_2 (HCFC-142b)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
829.03 [1]	0.50	5	21
904.00	8.00	5	21
923.16 [2]	0.80	5	21

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1134.35	4.30	5	21
1193.50	3.50	5	21
1937.15 [3]	0.70	8	21
2481.30 [4]	0.30	17	21
2523.50 [5]	0.35	12	21
2566.22 [6]	0.28	15	21
2657.30 [7]	0.35	13	21
2861.00 [8]	0.45	10	21

[1] Included to improve results for interferer CHF_2Cl
[2] Included to improve results for interferer CO_2 & CCl_2F_2
[3] Included to improve results for interferer H_2O isotopologue 2 & 3 ($H^{18}OH$ & $H^{17}OH$)
[4] Included to improve results for interferer N_2O isotopologue 4 ($NN^{18}O$)
[5] Included to improve results for interferer N_2O isotopologue 3 (^{15}NNO)
[6] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NO$)
[7] Included to improve results for interferer H_2O isotopologue 4 (HDO)
[8] Included to improve results for interferer CH_4 isotopologue 2 ($^{13}CH_4$)

Table 69: Interfering Molecule(s) for CH_3CClF_2 (HCFC-142b)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CHF_2Cl	0 (CHF_2Cl)	5	21
CCl_2F_2	0 (CCl_2F_2)	5	21
H_2O	1 (H_2O)	5	21
H_2O	2 ($H^{18}OH$)	5	21
H_2O	3 ($H^{17}OH$)	5	21
H_2O	4 (HDO)	5	21
O_3	1 (O_3)	5	21
O_3	2 ($OO^{18}O$)	5	21
N_2O	1 (N_2O)	5	21
N_2O	2 ($N^{15}NO$)	5	21
N_2O	3 (^{15}NNO)	5	21
N_2O	4 ($N_2{}^{18}O$)	5	21
CH_4	1 (CH_4)	5	21
CH_4	2 ($^{13}CH_4$)	5	21
CH_4	3 (CH_3D)	5	21
CO_2	0 (CO_2)	5	21
HNO_3	0 (HNO_3)	5	21

Table 70: Microwindow list for CHF_2Cl (HCFC-22)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
817.50	25.00	5-7	30

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1114.00	27.00	5-7	30

Table 71: Interfering Molecule(s) for CHF_2Cl (HCFC-22)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CCl_2F_2	0 (CCl_2F_2)	5-7	25
$ClONO_2$	0 ($ClONO_2$)	5-7	30
$C_2Cl_3F_3$	0 ($C_2Cl_3F_3$)	5-7	20
CFH_2CF_3	0 (CFH_2CF_3)	5-7	20
H_2O	0 (H_2O)	5-7	30
CH_4	0 (CH_4)	5-7	30
C_2H_6	0 (C_2H_6)	5-7	15
N_2O	0 (N_2O)	5-7	25
HCOOH	0 (HCOOH)	5-7	20
CO_2	0 (CO_2)	5-7	30
O_3	0 (O_3)	5-7	30

Table 72: Microwindow list for $C_2Cl_3F_3$ (CFC-113)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
817.50	25.00	7	20
1977.60 [1]	0.50	7	20
2620.81 [2]	0.45	7	20

[1] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[2] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)

Table 73: Interfering Molecule(s) for $C_2Cl_3F_3$ (CFC-113)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	7	20
CO_2	1 (CO_2)	7	20
O_3	0 (O_3)	7	20
CHF_2Cl	0 (CHF_2Cl)	7	20
H_2O	2 ($H^{18}OH$)	7	20
CO_2	3 ($OC^{18}O$)	7	20

Table 74: Microwindow list for CH_3CCl_2F (HCFC-141b)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
926.50	6.00	6-8	22
1163.00	2.50	6-8	22
1202.85 [1]	0.60	6-8	22
1937.15 [2]	0.70	6-8	22
2723.31 [3]	0.45	10	22
2566.22 [4]	0.26	12	22

[1] Included to improve results for interferer N_2O, CH_4 isotopologue 1 & 3 (CH_4 & CH_3D)

[2] Included to improve results for interferer H_2O isotopologue 2 & 3 ($H^{18}OH$ & $H^{17}OH$)

[3] Included to improve results for interferer H_2O isotopologue 4 (HDO)

[4] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NNO$)

Table 75: Interfering Molecule(s) for CH_3CCl_2F (HCFC-141b)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	6-8	22
CCl_2F_2	0 (CCl_2F_2)	6-8	22
H_2O	2 ($O^{13}CO$	6-8	22
H_2O	3 ($OC^{18}O$)	6-8	22
H_2O	4 (HDO)	6-8	22
O_3	0 (O_3)	6-8	22
N_2O	1 (N_2O)	6-8	22
N_2O	2 ($N^{15}NO$)	6-8	22
N_2O	3 (^{15}NNO)	6-8	22
N_2O	4 ($N_2{}^{18}O$)	6-8	22
CH_4	1 (CH_4)	6-8	22
CH_4	3 (CH_3D)	6-8	22
CO_2	1 (CO_2)	6-8	22
CO_2	2 ($O^{13}CO$)	6-8	22

4. Microwindows for Subsidiary Isotopologues

Table 76: Microwindow list for H_2O isotopologue 2 ($H^{18}OH$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1389.98	0.70	10-14	45
1400.56	0.50	9-13	50
1414.70	0.30	12-15	45
1424.90	0.40	9-14	40
1442.80	0.40	8-13	45
1449.54	0.30	9-13	35
1466.72	0.30	22	50-55
1483.18	0.30	9-12	25
1485.02	0.40	10-15	45-50
1500.64	0.35	25	40
1501.50	1.00	40	65-75
1533.10	0.40	40	65-75
1551.84	0.80	40	60-70
1554.45	0.50	50	65-70
1563.52	0.30	22	55-65
1569.90	0.45	45	65-75
1609.75	0.80	50	65-75
1646.10	0.60	45	65-75
1658.80 [1]	0.45	12-15	25
1677.70	0.40	45	60-75
1688.78	1.00	50	65-75
1753.80	0.30	18	45-50
1783.12	0.35	8-12	40
1877.80	0.40	5-9	20
1902.60	0.50	5-9	25
1911.82	0.30	5-9	20
1930.84	0.60	5-8	9-12
1950.10 [2]	0.35	5-8	15
1950.70 [3]	0.50	9-12	34-45
1977.66	0.60	5-8	20
1980.74	0.35	7-9	30
1982.06	0.55	5-8	12-15
2029.88	0.50	5-8	20

[1] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)
[2] Included to improve results for interferer H_2O
[3] Included to improve results for interferers COF_2 & CO_2

Table 77: Interfering Molecule(s) for H_2O isotopologue 2 ($H^{18}OH$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5-8	65-75

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	5-8	34-45
CO_2	2 ($O^{13}CO$)	5-8	20
CO_2	3 ($OC^{18}O$)	5-8	40
CO_2	4 ($OC^{17}O$)	5-9	29
O_3	1 (O_3)	5-8	40
O_3	3 ($O^{18}OO$)	5-8	20
CO	3 ($C^{18}O$)	5-8	20
CH_4	1 (CH_4)	9-13	33
CH_4	2 ($^{13}CH_4$)	9-14	25
CH_4	3 (CH_3D)	10-14	22
OCS	0 (OCS)	5-8	20
COF_2	0 (COF_2)	5-8	34-45
H_2O	3 ($H^{17}OH$)	5-9	25

Table 78: Microwindow list for H_2O isotopologue 3 ($H^{17}OH$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1168.35 [1]	0.50	30	40
1402.70	0.60	8-12	25
1502.30	1.20	40	52-62
1502.70	0.40	17	40
1504.00	0.30	17	52-62
1535.70	0.80	35	52-62
1535.90	0.35	25	35
1536.70	0.60	20	52-62
1554.75	1.20	45	52-62
1555.20	0.30	20	45
1566.57	0.40	15	40
1572.90	0.40	20	52-62
1642.00	0.30	15-17	40-50
1649.30	0.80	20	52-62
1658.80	0.45	12-15	40
1680.80	0.80	40	52-62
1692.26	0.40	40	52-62
1713.86	0.60	40	52-62
1862.28	0.40	5-9	20
1862.82	0.60	5-9	20
1864.30	0.60	9-11	30
1906.10	0.40	5-9	15
1937.15	0.70	5-9	20
1986.09	0.30	5-9	20
2523.50 [2]	0.35	12	22
2950.86 [3]	0.26	8-12	21

[1] Included to improve results for interferer O_3
[2] Included to improve results for interferer N_2O isotopologue 3 (^{15}NNO)
[3] Included to improve results for interferer CH_4 isotopologue 3 ($^{13}CH_4$)

Table 79: Interfering Molecule(s) for H_2O isotopologue 3 ($H^{17}OH$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5-9	52-62
H_2O	2 ($H^{18}OH$)	5-9	52-62
H_2O	4 (HDO)	8-12	25
CH_4	1 (CH_4)	8-12	50
CO_2	3 ($OC^{18}O$)	5-9	25
CO_2	4 ($OC^{17}O$)	5-9	20
HCN	0 (HCN)	8-12	25
O_3	0 (O_3)	5-9	55
NO_2	0 (NO_2)	15-17	40
CO_2	2 ($O^{13}CO$)	5-9	20
N_2O	1 (N_2O)	5-9	20
N_2O	3 (^{15}NNO)	5-9	22
CO_2	1 (CO_2)	5-9	20
NO	0 (NO)	5-9	20
COF_2	0 (COF_2)	5-9	20
CH_4	3 (CH_4)	8-12	25

Table 80: Microwindow list for H_2O isotopologue 4 (HDO)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1383.65	0.40	13-15	42-50
1425.80	0.60	30	42-50
1431.50	0.40	10-14	30
1431.70	0.80	30	42-50
1453.52	0.60	20	42-50
1469.30	0.40	10-14	42-50
1470.00	0.40	20	42-50
1480.25	0.50	10-14	35
1480.80	1.20	35	42-50
1483.92	0.90	16-20	42-50
1497.80	0.50	20	42-50
1510.95	0.40	20	42-50
2493.07 [1]	0.45	15	22
2605.22	0.80	5	10-14
2606.30	0.90	5	15
2612.45	1.50	5	15
2619.85	1.50	5	15
2621.75	1.40	5-8	20

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2622.90	1.00	7-10	20
2624.08	1.40	5	15
2644.60	1.40	5-8	20
2657.40	1.20	5-8	20
2659.42	1.20	5-7	15
2660.60	1.20	5-8	20
2666.24	1.20	5-8	20
2672.52	1.40	5-8	20

[1] Included to improve results for interferer N_2O, CH_4, CO_2 isotopologue 3 ($OC^{18}O$)

Table 81: Interfering Molecule(s) for H_2O isotopologue 4 (HDO)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	10-14	42-50
H_2O	2 ($H^{18}OH$)	10-14	42-50
H_2O	3 ($H^{17}OH$)	10-14	42-50
H_2O	5 ($HD^{18}O$)	5	15
CO_2	3 ($OC^{18}O$)	5	40-45
CO_2	4 ($OC^{17}O$)	5	25-30
N_2O	0 (N_2O)	5	22
CH_4	1 (CH_4)	5	40-45
CH_4	2 ($^{13}CH_4$)	5	20-22

Table 82: Microwindow list for CO_2 isotopologue 2 ($O^{13}CO$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1183.57 [1]	0.55	25	35
1442.80 [2]	0.40	8-13	22
1862.28	0.40	5-10	20
1875.23	0.35	5-10	20
1881.02	0.60	5-10	40
1887.22	0.30	5-10	30
1898.20	0.28	5-10	20
1950.10 [3]	0.35	7-10	22
1999.22	0.30	20	35
2000.88	0.40	5-10	40
2002.55	0.50	5-10	40
2008.77	0.30	5-10	40
2010.40	0.40	5-10	45
2011.98	0.30	12	50
2013.60	0.35	12	50
2016.80	0.40	22	50

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2019.90	0.45	15	50-55
2024.53	0.40	15	50-55
2027.68	0.35	15	45
2037.94	0.50	15	45
2039.38	0.40	5-10	40
2040.93	0.40	15	40
2219.42	0.30	35	60
2226.63	0.30	30	60
2228.63	0.45	40	60
2239.00	0.30	35	70
2243.00	0.35	35	70
2244.78	0.35	40	75
2248.60	0.40	35	70
2250.20	0.30	30	60
2254.09	0.30	45	75
2267.88	0.35	40	75
2268.50	0.35	90	110
2270.30	0.35	85	110
2272.05	0.30	80	110
2273.70	0.35	75	110
2275.38	0.35	95	110
2277.08	0.35	60	110
2278.70	0.35	95	110
2280.30	0.35	90	110
2287.30	0.35	95	110
2288.80	0.35	95	110
2290.30	0.30	85	110
2291.60	0.30	80	110
2291.99	0.40	45	60
2293.03	0.30	60	110
2294.56	0.35	60	110
2295.77	0.30	60	110
2299.84	0.30	60	110
2302.30	0.30	80	105
2303.58	0.35	70	105
2306.00	0.40	75	100
2308.10	0.40	70	95
2309.32	0.30	50	95
2310.42	0.35	60	95
2311.38	0.35	50-55	90
2350.69 [4]	0.28	45	55

[1] Included to improve results for interferer N_2O

[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)

[3] Included to improve results for interferer H_2O

[4] Included to improve results for interferer CO_2 isotopologue 4 ($OC^{17}O$)

Table 83: Interfering Molecule(s) for CO_2 isotopologue 2 ($O^{13}CO$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5-10	40
H_2O	2 ($H^{18}OH$)	5-10	22
H_2O	3 ($H^{17}OH$)	5-10	20
CO_2	1 (CO_2)	5-10	100
CO_2	3 ($OC^{18}O$)	5-10	95
CO_2	4 ($OC^{17}O$)	45	80
CO_2	5 ($O^{13}C^{18}O$)	30	80
O_3	1 (O_3)	5-10	45
O_3	3 ($O^{18}OO$)	5-10	35
N_2O	0 (N_2O)	5-10	55
OCS	1 (OCS)	5-10	25
OCS	2 ($OC^{34}S$)	5-10	20
OCS	3 ($O^{13}CS$)	5-10	20
CO_2	6 ($O^{13}C^{17}O$)	35	70
CO_2	7 ($^{18}OC^{18}O$)	50-55	70
NO	0 (NO)	5-10	40

Table 84: Microwindow list for CO_2 isotopologue 3 ($OC^{18}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1371.80	0.30	15	45
1372.52	0.30	20	45
1376.20	0.30	25	45
1379.25	0.30	15	45
1380.70	0.35	15	45
1383.65	0.40	17	45
1384.42	0.45	15	45
1385.28	0.45	30	45
1385.90	0.35	15	45
1950.10 [1]	0.35	5-7	21
2276.62	0.30	35	60
2281.08	0.40	35	60
2283.11 [2]	0.26	25	40
2283.17	0.40	35	60
2285.15	0.40	35	65
2287.78	0.40	40	60
2292.35	0.75	40	65
2307.63	0.40	55	95
2314.68	0.35	50	95
2316.25	0.40	90	105
2318.85	0.40	90	105
2319.74	0.40	90	105
2320.52	0.30	50	105

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2337.05	0.50	55	95
2338.50	0.30	95	105
2340.20	0.30	45	60
2340.50	0.30	60	105
2341.85	0.40	75	105
2342.60	0.50	95	105
2343.08	0.35	60	105
2343.60	0.60	95	105
2344.90	0.35	90	105
2345.55	0.40	60	105
2346.87	0.35	60	105
2348.00	0.40	45	100
2349.30	0.35	45	100
2353.60	0.40	60	95
2354.82	0.30	60	90
2355.22	0.30	60	85
2356.37	0.30	60	85
2356.68	0.35	45	85
2357.83	0.30	60	85
2359.45	0.60	60	85
2360.59	0.30	60	80
2604.50	0.80	5	40
2609.80	0.45	5	40
2610.73	0.70	5	35
2611.34	0.40	5	35
2617.20	0.40	5	35
2620.10	0.40	12	40
2620.82	0.40	5	40
2621.50	0.35	15	40
2623.75	0.30	15	40
2623.87 [3]	0.90	5	21
2624.45	0.40	15	40
2626.35	0.40	5	40
2627.35	0.50	5	40
2629.48	0.35	12	40
2636.63	0.35	5	35

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer CO_2 isotopologue 4 ($OC^{17}O$)
[3] Included to improve results for interferer H_2O isotopologue 4 (HDO)

Table 85: Interfering Molecule(s) for CO_2 isotopologue 3 ($OC^{18}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	25	105

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	2 ($O^{13}CO$)	25	65
CO_2	4 ($OC^{17}O$)	5	95
CO_2	5 ($O^{13}C^{18}O$)	25	65
CH_4	1 (CH_4)	5	40
CH_4	2 ($^{13}CH_4$)	5	20
N_2O	0 (N_2O)	5	25
H_2O	1 (H_2O)	5	21
H_2O	4 (HDO)	5	40
H_2O	3 ($H^{17}OH$)	15	35
O_3	0 (O_3)	15	30
CO_2	6 ($O^{13}C^{17}O$)	35	65
CO_2	7 ($^{18}OC^{18}O$)	35	65
CO_2	8 ($^{17}OC^{18}O$)	45	60

Table 86: Microwindow list for CO_2 isotopologue 4 ($OC^{17}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2329.55	0.50	90	100
2329.77	0.45	75	90
2347.05	0.30	90	100
2347.19	0.30	50	90
2348.02	0.40	50	90
2348.13	0.50	90	100
2349.15	0.50	90	100
2349.32	0.35	50	90
2350.64	0.30	50	90
2350.80	0.50	90	100
2351.22	0.30	70	90
2351.38	0.35	90	100
2352.03	0.30	50	90
2352.12	0.45	90	100
2353.11	0.45	90	100
2353.25	0.30	60	90
2353.80	0.35	50	90
2354.03	0.45	90	100
2355.15	0.30	50	90
2355.28	0.45	90	100
2359.30	0.30	50	85
2362.09	0.30	50	80
2385.02 [1]	0.40	75	92

[1] Included to improve results for interferer CO_2

Table 87: Interfering Molecule(s) for CO_2 isotopologue 4 ($OC^{17}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	50	100
CO_2	3 ($OC^{18}O$)	50	100

Table 88: Microwindow list for CO_2 isotopologue 5 ($O^{13}C^{18}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2228.27	0.30	50	55
2232.15	0.30	45	60
2250.22	0.30	45	65
2250.35	0.50	65	80
2252.40	0.60	55	80
2255.10	0.50	50	80
2258.45	0.35	45	80
2260.47	0.65	65	80
2260.70	0.40	45	65
2262.19	0.30	45	75
2264.15	0.30	45	55
2267.33	0.35	45	65
2274.70	0.80	70	80
2277.71	0.35	70	80
2279.40	0.50	65	80
2279.57	0.35	45	65
2280.25	0.40	60	80
2280.72	0.35	60	80
2282.50	0.35	45	70
2340.20 [1]	0.30	45	60

[1] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)

Table 89: Interfering Molecule(s) for CO_2 isotopologue 5 ($O^{13}C^{18}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO_2	1 (CO_2)	45	70
CO_2	2 ($O^{13}CO$)	45	80
CO_2	3 ($OC^{18}O$)	45	60
CO_2	4 ($OC^{17}O$)	45	60
CO_2	6 ($O^{13}C^{17}O$)	45	70

Table 90: Microwindow list for O_3 isotopologue 2 ($OO^{18}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
981.62	0.35	5	25
988.08	0.60	5	35
990.52 [1]	1.10	5	20
991.05	0.45	5	35
993.70	0.80	5	40
995.11	0.50	5	40
996.28	0.65	5	40
1006.55	0.70	35	45
1007.15	0.50	40	50
1007.56	0.35	35	45
1008.15	0.50	40	50
1009.20	0.60	40	50
1010.20	0.45	35	50
1011.05	0.35	40	50
1012.03	0.60	40	50
1012.63	0.70	35	45
1013.11	0.30	45	50
1013.83	0.55	40	50
1014.82	0.40	35	50
1015.78	0.50	40	50
1016.65	0.45	40	50
1090.40	0.40	5	45
1096.60	0.60	5	35
1098.23	0.45	5	35
1104.18	1.20	5-7	35
1105.20	0.85	5	30
1480.25 [2]	0.50	10-14	22
1930.90 [3]	0.27	12	45
1950.10 [4]	0.35	6-8	22
2623.87 [5]	0.90	5-7	22

[1] Included to improve results for interferer CH_3OH
[2] Included to improve results for interferer H_2O isotopologue 4 (HDO)
[3] Included to improve results for interferer CO_2
[4] Included to improve results for interferer H_2O
[5] Included to improve results for interferer H_2O Isotopologue 4 (HDO), CO_2 isotopologue 3 ($OC^{18}O$), & CH_4

Table 91: Interfering Molecule(s) for O_3 isotopologue 2 ($OO^{18}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CCl_2F_2	0 (CCl_2F_2)	5	25
CHF_2Cl	0 (CHF_2Cl)	5	22
O_3	1 (O_3)	5	50

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	3 ($O^{18}OO$)	5	45
O_3	4 ($OO^{17}O$)	5	40
O_3	5 ($O^{17}OO$)	5	40
H_2O	1 (H_2O)	5	22
H_2O	4 (HDO)	5	22
H_2O	1 (H_2O)	5	45
H_2O	2 ($H^{18}OH$)	5	25
H_2O	3 ($H^{17}OH$)	5	22
CH_4	1 (CH_4)	5	22
CH_4	3 (CH_3D)	5	20
HCOOH	0 (HCOOH)	5	20
CH_3OH	0 (CH_3OH)	5	20

Table 92: Microwindow list for O_3 isotopologue 3 ($O^{18}OO$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
979.12	0.45	5	40
980.32	0.75	5	40
981.46	0.65	7-12	40
985.04	0.45	5	40
988.13	0.70	5	50
989.79	0.50	5	40
990.52 [1]	1.10	5	20
991.08	0.40	5	50
991.90	0.80	35	50
993.59	0.50	5	40
995.11	0.50	5	50
996.24	6.00	5	45
996.92	0.65	35	50
999.53	0.50	35	50
1001.42	0.55	35	50
1003.22	0.50	40	50
1005.92	0.60	40	50
1018.65	0.65	40	50
1021.62	0.55	35	50
1024.49	0.50	40	50
1025.84	0.35	40	50
1950.10 [2]	0.35	5-7	22
2620.84 [3]	0.50	8	22

[1] Included to improve results for interferer CH_3OH
[2] Included to improve results for interferer H_2O
[3] Included to improve results for interferer CO_2 isotopologue 3 ($OC^{18}O$)

Table 93: Interfering Molecule(s) for O_3 isotopologue 3 ($O^{18}OO$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	1 (O_3)	5	50
O_3	2 ($OO^{18}O$)	5	50
O_3	4 ($OO^{17}O$)	5	40
O_3	5 ($O^{17}OO$)	5	40
H_2O	0 (H_2O)	5	22
CO_2	1 (CO_2)	5	45
CO_2	2 ($O^{13}CO$)	5	25
CO_2	3 ($OC^{18}O$)	5	22
CH_3OH	0 (CH_3OH)	5	40

Table 94: Microwindow list for O_3 isotopologue 5 ($O^{17}OO$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
987.62	0.95	5	30
989.80	0.50	5	30
990.52 [1]	1.10	5	20
990.70	0.48	5	30
991.28	0.50	5	35
992.48	0.45	5	35
993.72	0.75	5	35
995.10	0.55	5	35
996.25	0.60	5	40
997.59	0.45	5	35
998.94	0.72	7-12	40
1000.10	0.55	25	40
1002.29	0.62	25	50
1003.08	1.10	25	50
1003.78	0.35	25	40
1004.25	0.60	25	50
1006.60	0.60	30	50
1007.10	0.60	30	50
1007.59	0.30	30	50
1008.68	1.00	30	50
1009.50	0.60	30	50
1010.82	0.85	30	50
1012.50	0.40	35	50
1013.18	0.75	35	50
1013.80	0.60	35	50
1030.05	0.50	40	50
1032.82	0.40	40	45
1033.97	0.30	40	50
1034.75	0.45	40	50
1037.45	0.55	40	50

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1950.10 [2]	0.35	5-7	22

[1] Included to improve results for interferer CH_3OH
[2] Included to improve results for interferer H_2O

Table 95: Interfering Molecule(s) for O_3 isotopologue 5 ($O^{17}OO$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	1 (O_3)	5	50
O_3	2 ($OO^{18}O$)	5	50
O_3	3 ($O^{18}OO$)	5	50
O_3	4 ($OO^{17}O$)	5	40
H_2O	0 (H_2O)	5	22
CO_2	1 (CO_2)	5	35
CO_2	2 ($O^{13}CO$)	5	20
CH_3OH	0 (CH_3OH)	5	30

Table 96: Microwindow list for N_2O isotopologue 2 ($N^{15}NO$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
933.90 [1]	0.30	7	22
1950.10 [2]	0.35	5-8	20
2140.24	0.50	10	25
2141.15	0.30	5	25
2143.30	0.60	5	25
2144.25	0.70	8	30
2146.48	0.40	5	35
2148.12	0.65	10	20
2149.70	0.30	10	35
2153.74	0.40	10	35
2155.73	0.45	10	35
2156.70	0.50	20	35
2157.25	0.30	8	20
2158.05	0.90	35	42-45
2158.48	0.60	35	42-45
2159.60	0.45	35	42-45
2160.60	0.30	25	35
2161.70	0.80	35	42-45
2161.95 [3]	0.50	20	35
2162.28	0.80	35	42-45
2165.45	0.50	35	42-45
2166.00	1.00	35	42-45
2169.10	0.40	35	42-45

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2169.55	0.90	35	42-45
2187.20	0.40	30	35
2189.10	1.00	35	42-45
2190.45	1.10	35	42-45
2190.84	0.35	15	35
2191.50	0.40	35	42-45
2192.40	0.40	35	42-45
2193.08	0.35	20	35
2193.35	0.90	35	42-45
2195.40	0.90	35	42-45
2196.80	1.00	35	42-45
2513.70 [4]	0.40	9	20
2524.10	0.30	5-7	15
2527.32	0.40	5-8	20
2528.32	0.40	5-7	22
2543.80	0.35	5-7	20
2560.40	0.26	5	20
2566.22	0.26	5	20

[1] Included to improve results for interferer CO_2 isotopologue 2 ($O^{13}CO$) & CO_2
[2] Included to improve results for interferer H_2O
[3] Included to improve results for interferer CO, H_2O, O_3, N_2O & N_2O isotopologue 3 (^{15}NNO)
[4] Included to improve results for interferer N_2O isotopologue 4 ($NN^{18}O$), N_2O isotopologue 5 ($NN^{17}O$), CH_4 isotopologue 2 ($^{13}CH_4$) & CO_2 isotopologue 4 ($OC^{17}O$)

Table 97: Interfering Molecule(s) for N_2O isotopologue 2 ($N^{15}NO$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	1 (N_2O)	5	42-45
N_2O	3 (^{15}NNO)	5	40
N_2O	4 ($NN^{18}O$)	9	35
N_2O	5 ($NN^{17}O$)	7	35
H_2O	0 (H_2O)	5	42-45
CO_2	1 (CO_2)	5	42-45
CO_2	2 ($O^{13}CO$)	5	22
CO_2	3 ($OC^{18}O$)	5-7	22
O_3	0 (O_3)	5	42-45
CO	1 (CO)	20	42-45
CO	2 (^{13}CO)	8	30
CO	3 ($C^{18}O$)	5	20
CH_4	1 (CH_4)	5-7	22
CH_4	2 ($^{13}CH_4$)	5	20
CH_4	3 (CH_3D)	8	22

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO	4 ($C^{17}O$)	10	20
CO_2	4 ($OC^{17}O$)	9	20

Table 98: Microwindow list for N_2O isotopologue 3 (^{15}NNO)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1231.37	0.45	7-9	15
1232.23	0.56	7-9	15
1234.25	0.50	7-9	20
1239.90	1.00	7-9	25
1241.00	1.30	7-9	25
1242.65	0.65	10	20
1250.65	0.70	10	30
1480.25 [1]	0.50	10-14	22
1501.55 [2]	0.30	20	35
2160.63	0.75	7-9	20
2163.98	0.50	7-9	20
2174.35	0.45	15	30-35
2175.45	0.35	15	30-35
2177.88	1.20	30-35	45
2181.76	1.20	30-35	45
2183.64	1.20	30-35	45
2185.14	0.30	20	45
2187.04	0.40	30-35	45
2187.82	0.40	15	35
2188.02	0.50	30-35	45
2188.80	0.40	15-20	35
2189.50	0.60	30-35	45
2189.72	0.30	20	30-35
2190.48	0.40	30-35	45
2195.00	0.35	20	35
2195.14	0.60	30-35	45
2210.42	1.00	30-35	45
2211.15	1.00	30-35	45
2212.80	0.50	25	45
2214.00	1.10	30-35	45
2216.70	0.90	30-35	45
2218.65	1.00	30-35	45
2219.48	0.50	30	45
2220.56	1.00	30-35	45
2220.88	0.30	20	35

[1] Included to improve results for interferer H_2O isotopologue 4 (HDO), H_2O & O_2
[2] Included to improve results for interferer H_2O

Table 99: Interfering Molecule(s) for N_2O isotopologue 3 (^{15}NNO)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	1 (N_2O)	7-9	45
N_2O	2 ($N^{15}NO$)	7-9	40
N_2O	4 ($NN^{18}O$)	7-9	35
N_2O	5 ($NN^{17}O$)	7-9	30
H_2O	1 (H_2O)	7-9	35
H_2O	4 (HDO)	7-9	22
CO_2	1 (CO_2)	7-9	45
CO_2	2 ($O^{13}CO$)	20	45
CO_2	3 ($OC^{18}O$)	7-9	30
CO_2	5 ($O^{13}C^{18}O$)	25	45
O_3	0 (O_3)	7-9	45
CO	0 (CO)	25	45
CH_4	1 (CH_4)	7-9	25
CH_4	2 ($^{13}CH_4$)	7-9	25
CH_4	3 (CH_3D)	7-9	25
H_2O_2	0 (H_2O_2)	7-9	30
COF_2	0 (COF_2)	7-9	30

Table 100: Microwindow list for N_2O isotopologue 4 ($NN^{18}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1223.67	0.30	5-7	15
1224.49	0.45	10	20
1226.99	0.45	12	20
1228.00	0.40	5	25
1231.38	0.45	5	25
1232.10	0.40	5	25
1232.82	0.60	5	25
1233.07	0.35	5-8	25
1233.88	0.40	5	25
1234.27 [1]	0.45	8	15
1234.70	0.45	5-8	25
1235.50	0.30	5-8	25
1480.25 [2]	0.50	10-14	22
1950.10 [3]	0.35	7-8	15
1950.70 [4]	0.50	15	34-45
2177.88	0.35	12	25
2178.90	0.40	12	25
2185.26	0.30	15	25
2192.83 [1]	0.26	15	20
2195.00	0.35	17-20	35
2195.98	0.30	20	35
2197.60	0.60	30	45

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2200.48	0.30	25	35
2200.70	0.40	35	45
2201.70	0.60	30	45
2202.85	1.10	35	45
2203.20	0.40	17-20	35
2204.62	1.10	35	45
2205.06	0.30	20	35
2205.75	0.60	30	45
2206.67	0.50	30	45
2210.12	0.30	25	35
2210.98	0.30	17-20	35
2222.80	0.40	30	45
2224.96	0.40	20	45
2226.30	0.50	30	45
2229.83	0.35	20	35
2230.30	0.60	35	45
2333.63	0.35	25	35
2560.40 [5]	0.26	5	12

[1] Included to improve results for interferer N_2O isotopologue 5 ($NN^{17}O$)
[2] Included to improve results for interferer H_2O isotopologue 4 (HDO), H_2O & O_2
[3] Included to improve results for interferer H_2O
[4] Included to improve results for interferer COF_2 & CO_2
[5] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NO$)

Table 101: Interfering Molecule(s) for N_2O isotopologue 4 ($NN^{18}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	1 (N_2O)	5	45
N_2O	2 ($N^{15}NO$)	5	40
N_2O	3 (^{15}NNO)	5	40
N_2O	5 ($NN^{17}O$)	5	33
H_2O	1 (H_2O)	5	25
H_2O	4 (HDO)	5	22
CO_2	2 ($O^{13}CO$)	20	45
CO_2	3 ($OC^{18}O$)	5	25
CO_2	5 ($O^{13}C^{18}O$)	17-20	45
CO_2	6 ($O^{13}C^{17}O$)	20	45
O_3	0 (O_3)	5	45
CO	0 (CO)	17-20	45
CH_4	1 (CH_4)	5	25
CH_4	2 ($^{13}CH_4$)	5	25
CH_4	3 (CH_3D)	5	25
H_2O_2	0 (H_2O_2)	5	25
COF_2	0 (COF_2)	5	34-45

Table 102: Microwindow list for N_2O isotopologue 5 ($NN^{17}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1231.55	0.80	10-14	12
1232.45	0.35	10-14	15
1234.27	0.35	10-14	15
1234.95	1.00	10-14	20
1241.58	0.40	10-14	20
1242.66	0.60	10-14	20
1244.43	0.35	15	25
1246.12	0.30	15	25
1246.85	0.50	10-14	25
1250.67	0.65	10-14	25
1251.22	0.40	15	25
1252.10	0.35	10-14	25
1252.95	0.40	13-14	25
1254.45	0.70	12-14	25
1255.55	0.70	12-14	25
1258.20	0.80	14	22
1950.10 [1]	0.35	10-14	15
1950.70 [2]	0.50	15	34-35
2202.75	0.65	25	35
2204.44	0.28	25	35
2205.29	0.30	20	35
2206.20	0.40	20	35
2207.10	0.40	20	35
2208.09	0.30	20	35
2208.98	0.30	20	35
2210.00	0.35	20	35
2210.12 [3]	0.30	25	35
2210.85	0.30	25	35
2212.35	0.50	25	35
2623.87 [4]	0.90	10-14	12

[1] Included to improve results for interferer H_2O

[2] Included to improve results for interferer COF_2 & CO_2

[3] Included to improve results for interferer N_2O isotopologues 1, 2, 3 & 4, (N_2O, $N^{15}NO$, ^{15}NNO, & $NN^{18}O$) and O_3

[4] Included to improve results for interferer H_2O isotopologue 4 (HDO) & CO_2 isotopologue 3 ($OC^{18}O$)

Table 103: Interfering Molecule(s) for N_2O isotopologue 5 ($NN^{17}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	1 (N_2O)	10-14	35
N_2O	2 ($N^{15}NO$)	10-14	35
N_2O_5	0 (N_2O_5)	10-14	25

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	3 (^{15}NNO)	10-14	35
N_2O	4 ($NN^{18}O$)	10-14	35
H_2O	1 (H_2O)	10-14	35
H_2O	4 (HDO)	10-14	25
CO_2	2 ($O^{13}CO$)	20	35
CO_2	3 ($OC^{18}O$)	10-14	25
CO_2	4 ($OC^{17}O$)	10-14	25
CO_2	5 ($O^{13}C^{18}O$)	10-14	35
O_3	0 (O_3)	10-14	35
CH_4	1 (CH_4)	10-14	25
CH_4	2 ($^{13}CH_4$)	10-14	25
CH_4	3 (CH_3D)	10-14	22
H_2O_2	0 (H_2O_2)	10-14	25
COF_2	0 (COF_2)	10-14	34-35

Table 104: Microwindow list for CO isotopologue 2 (^{13}CO)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1446.50 [1]	0.35	30	50
1649.34 [1]	0.30	20	30
1950.10 [1]	0.35	5-7	20
1977.66 [2]	0.60	5-7	22
1986.09 [3]	0.30	5-7	22
2020.90	0.40	5-8	12
2024.90	0.40	5	12
2033.37	0.30	5	15
2045.67	0.35	12	20
2045.90	0.40	50	85
2049.42	1.00	50	85
2049.92	0.40	12	50
2053.74	0.40	50	85
2057.80	0.30	15	50
2058.05	0.50	50	90
2061.57	0.70	50	90
2061.87	0.35	12	50
2065.82	0.40	50	90
2069.60	0.26	20	90
2073.38	0.55	50	90
2077.45	0.50	60	90
2081.60	1.00	45	90
2084.98	0.40	10	90
2088.77	0.40	45	90
2092.43	0.30	12	20
2103.32	0.40	45	90

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
2107.15	0.70	55	90
2111.00	1.25	50	90
2113.95	0.40	50	90
2117.35	0.35	55	90
2120.90	0.35	55	90
2124.00	0.80	60	90
2127.65	0.30	60	90
2131.34	1.00	40	90
2134.35	0.35	45	90
2137.60	0.30	5-9	85
2140.80	0.60	5	40
2144.10	0.40	5	45
2147.10	0.40	20	40
2153.28	0.45	5	12
2159.60	0.40	5-7	12

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[3] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)

Table 105: Interfering Molecule(s) for CO isotopologue 2 (^{13}CO)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5	60
N_2O	2 ($N^{15}NO$)	5	22
N_2O	3 (^{15}NNO)	5	22
CO_2	1 (CO_2)	5	80
CO_2	2 ($O^{13}CO$)	5-8	22
CO_2	3 ($OC^{18}O$)	5	40
CO_2	4 ($OC^{17}O$)	12	30
O_3	1 (O_3)	5	65
O_3	2 ($OO^{18}O$)	10	40
O_3	3 ($O^{18}OO$)	5	40
O_3	4 ($OO^{17}O$)	12	30
O_3	5 ($O^{17}OO$)	10	30
N_2O	0 (N_2O)	5	25
CO	1 (CO)	20	90
CO	3 ($C^{18}O$)	10	60
CH_4	0 (CH_4)	5	20
OCS	0 (OCS)	5	22-31

Table 106: Microwindow list for CO isotopologue 3 ($C^{18}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1442.80 [1]	0.40	8-13	22
1977.60 [1]	0.50	7-9	8-13
2013.55 [2]	0.40	12	22
2025.53	0.35	5-6	15
2029.95	0.90	5-6	15
2050.00	0.50	10	25
2061.87	0.35	10	30
2069.77	0.30	15	30
2084.80	0.50	8	30
2095.85	0.45	8	15
2106.37	0.50	12	30
2113.34	0.40	12	30
2116.80	0.60	10	30
2130.18	0.40	8	30
2133.50	0.50	5-6	30
2136.67	0.45	12	30
2140.10	0.80	8-9	30
2143.30	0.60	5-6	30
2146.25	0.35	5-6	20
2149.13	0.50	5-6	20
2161.95 [3]	0.50	15	30
2492.37 [1]	0.35	10	22

[1] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[2] Included to improve results for interferer CO_2 isotopologue 2 ($H^{18}OH$)
[3] Included to improve results for interferer CO, H_2O, O_3, N_2O & N_2O isotopologue 3 (^{15}NNO)

Table 107: Interfering Molecule(s) for CO isotopologue 3 ($C^{18}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	5-6	30
H_2O	2 ($H^{18}OH$)	5-6	22
CO_2	1 (CO_2)	5-6	30
CO_2	2 ($O^{13}CO$)	5-6	22
CO_2	3 ($OC^{18}O$)	5-6	25
CO_2	4 ($OC^{17}O$)	5-6	25
O_3	1 (O_3)	5-6	30
O_3	2 ($OO^{18}O$)	8	30
O_3	3 ($O^{18}OO$)	5-6	30
O_3	4 ($OO^{17}O$)	8	30
O_3	5 ($O^{17}OO$)	8	30
N_2O	1 (N_2O)	5-6	22
N_2O	2 ($N^{15}NO$)	5-6	30

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
CO	1 (CO)	8	30
CO	2 (^{13}CO)	8	30
OCS	0 (OCS)	5-6	30

Table 108: Microwindow list for CO isotopologue 4 ($C^{17}O$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
933.90 [1]	0.30	8	22
1950.10 [2]	0.35	8-10	22
1977.66 [3]	0.60	8-9	22
2081.35	0.30	8	22
2137.98	0.30	10-12	25
2140.80 [4]	0.60	8	22
2141.45	0.80	8	25
2145.00	0.60	8	25
2148.49	0.60	8	25
2151.96	0.40	8	25
2950.86 [5]	0.26	8-12	22

[1] Included to improve results for interferer CO_2 & CO_2 isotopologue 2 ($O^{13}CO$)
[2] Included to improve results for interferer H_2O
[3] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[4] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[5] Included to improve results for interferer CH_4 isotopologue 3 (CH_3D)

Table 109: Interfering Molecule(s) for CO isotopologue 4 ($C^{17}O$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	8	22
H_2O	2 ($H^{18}OH$)	8	22
CO_2	1 (CO_2)	8	25
CO_2	2 ($O^{13}CO$)	8	22
O_3	1 (O_3)	8	25
O_3	2 ($OO^{18}O$)	8	22
N_2O	1 (N_2O)	8	25
N_2O	2 ($N^{15}NO$)	8	25
N_2O	3 (^{15}NNO)	8	22
CO	2 (^{13}CO)	8	22
CH_4	3 (CH_3D)	8	22
OCS	0 (OCS)	8	22

Table 110: Microwindow list for CH_4 isotopologue 2 ($^{13}CH_4$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1202.85 [1]	0.60	7	20
1219.17	0.35	12	25
1231.37	0.45	5	35
1234.25	0.50	5	35
1234.50 [2]	1.60	10	25-40
1235.05	0.30	15	30
1239.12	0.35	15	30
1244.43 [3]	0.35	15	25
1260.70	0.50	30	50
1263.40	0.40	40	50
1274.15	0.40	25	40
1275.55	0.60	40	50
1275.90	0.40	25	40
1280.20	0.40	25	50
1294.30	0.40	30	50
1295.85	0.30	25	50
1298.15	0.40	30	50
1318.80	0.60	35	50
1324.05	0.60	35	50
1329.43	1.10	35	50
1332.90	0.60	35	50
1334.10	0.60	20	50
1338.50	0.60	35	50
1339.17	0.55	17	30
1950.70 [4]	0.50	19-25	34-45
2566.22 [5]	0.26	7	22
2617.51	0.30	5-8	20
2623.87 [6]	0.90	5-7	20
2688.80	0.40	5	20
2700.00	0.45	5	15
2703.33	0.35	5	20
2733.10	0.60	5-8	25
2748.47	0.35	5	25
2817.50	0.30	5	25
2896.55	0.30	15	30
2938.90	0.40	15	30

[1] Included to improve results for interferer N_2O, CH_4 & O_3
[2] Included to improve results for interferer H_2O_2
[3] Included to improve results for interferer N_2O isotopologue 5 ($NN^{17}O$)
[4] Included to improve results for interferer COF_2 & CO_2
[5] Included to improve results for interferer N_2O isotopologue 2 ($N^{15}NO$)
[6] Included to improve results for interferer H_2O isotopologue 4 (HDO), CO_2 isotopologue 3 ($OC^{18}O$) & CH_4

Table 111: Interfering Molecule(s) for CH_4 isotopologue 2 ($^{13}CH_4$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	20	50
H_2O	2 ($H^{18}OH$)	18	35
H_2O	4 (HDO)	5	35
CO_2	3 ($OC^{18}O$)	5	45
O_3	0 (O_3)	5	30
N_2O	1 (N_2O)	5	50
N_2O	2 ($N^{15}NO$)	5	22
N_2O	3 (^{15}NNO)	5	35
N_2O	4 ($NN^{18}O$)	5	30
N_2O	5 ($NN^{17}O$)	5	30
CH_4	1 (CH_4)	5	50
CH_4	3 (CH_3D)	5	25
HNO_3	0 (HNO_3)	17	40
H_2O_2	0 (H_2O_2)	5	25-40
COF_2	0 (COF_2)	5	34-45

Table 112: Microwindow list for CH_4 isotopologue 3 (CH_3D)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
923.16 [1]	0.80	6	22
1109.60	0.50	6	15
1113.88	0.40	6	20
1118.97	0.50	6	22
1122.90	0.40	6	20
1123.50	0.40	6	15
1126.60	0.40	6	20
1130.84	0.40	6	20
1134.80	0.35	8	20
1139.15	0.40	6	20
1143.35	0.35	6	20
1157.77	0.30	6	15
1159.39	0.28	6	12
1167.95	0.40	6	15
1171.90	0.32	5-8	15
1176.99	0.30	10	20
1181.34	0.26	5-8	15
1183.15	0.30	6	15
1188.70	0.40	6	25
1194.45	0.30	6	12
1200.22	0.60	5-8	20
1201.99	0.35	6	22
1204.38	0.30	6	20
1206.90	0.30	5-9	20

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1231.13 [2]	0.30	6	25
1231.37	0.50	6	25
1480.25 [3]	0.50	10-14	22
1950.10 [4]	0.35	6	20
1950.70 [5]	0.50	20	30-35
1986.09 [6]	0.30	6-7	22
2623.87 [7]	0.90	6-7	10-14
2950.70	0.50	20	30-35
2972.20	0.50	25	30-35
2972.40	0.40	10	25
2980.30	0.40	25	30-35
2987.93	0.55	17	30-35
3061.30	0.60	20	30-35
3063.35	0.40	12	30-35
3069.05	0.50	25	30-35
3072.66	0.60	15	30-35
3082.00	0.60	15	30-35
3083.80	0.40	30	30-35
3089.60	0.45	25	30-35
3091.30	0.55	25	30-35
3096.95	0.40	20	30-35

[1] Included to improve results for interferer CO_2 & CCl_2F_2
[2] Included to improve results for interferer H_2O_2
[3] Included to improve results for interferer H_2O isotopologue 4 (HDO)
[4] Included to improve results for interferer H_2O
[5] Included to improve results for interferer COF_2 & CO_2
[6] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)
[7] Included to improve results for interferer H_2O isotopologue 4 (HDO), CO_2 isotopologue 3 ($OC^{18}O$) & CH_4

Table 113: Interfering Molecule(s) for CH_4 isotopologue 3 (CH_3D)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	6	30-35
H_2O	3 ($H^{17}OH$)	6	22
CCl_2F_2	0 (CCl_2F_2)	6	22
CHF_2Cl	0 (CHF_2Cl)	6	25
H_2O	4 (HDO)	6	22
CO_2	3 ($OC^{18}O$)	6	25
O_3	1 (O_3)	6	30-35
O_3	2 ($OO^{18}O$)	6	22
O_3	3 ($O^{18}OO$)	6	22
N_2O	1 (N_2O)	6	25
N_2O	3 (^{15}NNO)	6	25

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
N_2O	4 ($NN^{18}O$)	6	25
CH_4	1 (CH_4)	6	30-35
CH_4	2 ($^{13}CH_4$)	6	30
H_2O_2	0 (H_2O_2)	6	25
COF_2	0 (COF_2)	6	30-35
HCOOH	0 (HCOOH)	6	20

Table 114: Microwindow list for OCS isotopologue 2 ($OC^{34}S$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1950.10 [1]	0.35	8-10	22
2040.31	0.35	8-10	23-31
2042.33	0.30	8-10	23-31
2042.93	1.05	8-10	23-31
2045.35	0.35	8-10	23-31
2048.06	0.40	8-10	23-31
2048.50	0.30	12	23-31
2049.92 [2]	0.40	15	23-31
2051.31	0.30	8-10	23-31
2052.88	0.85	8-10	23-31
2054.05	0.30	15	23-31
2054.47	0.45	8-10	23-31
2054.73	0.30	12	23-31
2055.90	0.55	8-12	23-31
2068.26	0.40	10	23-31
2070.02	0.60	12	23-31
2141.60 [3]	0.35	8-10	20

[1] Included to improve results for interferer H_2O
[2] Included to improve results for interferer CO isotopologue 2 (^{13}CO)
[3] Included to improve results for interferer CO isotopologue 4 ($C^{17}O$)

Table 115: Interfering Molecule(s) for OCS isotopologue 2 ($OC^{34}S$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	8-10	22
H_2O	2 ($H^{18}OH$)	8-10	22
CO_2	1 (CO_2)	8-10	23-31
CO_2	2 ($O^{13}CO$)	8-10	23-31
CO_2	3 ($OC^{18}O$)	8-10	23-31
CO_2	4 ($OC^{17}O$)	8-10	23-31
O_3	1 (O_3)	8-10	23-31
O_3	2 ($OO^{18}O$)	8-10	23-31

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
O_3	3 ($O^{18}OO$)	8-10	23-31
O_3	4 ($OO^{17}O$)	12	23-31
O_3	5 ($O^{17}OO$)	12	23-31
CO	2 (^{13}CO)	12	23-31
CO	3 ($C^{18}O$)	8-10	23-31
CO	4 ($C^{17}O$)	8-10	20
OCS	1 (OCS)	8-10	23-31
OCS	4 ($OC^{33}S$)	8-10	20

Table 116: Microwindow list for OCS isotopologue 3 ($O^{13}CS$)

Centre Frequency (cm^{-1})	Microwindow Width (cm^{-1})	Lower Altitude (km)	Upper Altitude (km)
1930.90 [1]	0.27	12	22
1950.10 [2]	0.35	7-9	22
1977.66 [3]	0.60	7-9	22
1986.09 [4]	0.30	7-9	22
1996.20	0.30	7-9	23-31
1996.91	0.35	7-9	23-31
1998.30	0.40	12	23-31
1999.73	0.30	12	23-31
2000.37	0.45	7-9	23-31
2000.87	0.50	7-9	23-31
2001.75	0.50	7-9	23-31
2002.55	0.50	7-9	23-31
2003.45	0.40	15	23-31
2004.59	0.35	7-9	15
2006.23	0.35	7-9	15
2012.47	0.30	7-9	15
2013.12	0.30	7-9	15
2013.93	0.35	7-9	23-31
2014.50	0.70	10	23-31
2015.53	0.60	15	23-31
2016.21	0.30	12	23-31
2017.60	0.40	10	23-31
2017.83	0.35	12	23-31
2018.73	0.50	15	23-31
2019.30	0.30	15	23-31
2019.57	0.30	7-9	23-31
2020.23	0.30	7-9	23-31
2021.06	0.30	7-9	23-31
2022.00	0.40	7-9	23-31

[1] Included to improve results for interferer CO_2
[2] Included to improve results for interferer H_2O
[3] Included to improve results for interferer H_2O isotopologue 2 ($H^{18}OH$)
[4] Included to improve results for interferer H_2O isotopologue 3 ($H^{17}OH$)

Table 117: Interfering Molecule(s) for OCS isotopologue 3 ($O^{13}CS$)

Molecule	Isotopologue No. (Molecular Formula)	Lower Altitude Limit (km)	Upper Altitude Limit (km)
H_2O	1 (H_2O)	7-9	22
H_2O	2 ($H^{18}OH$)	7-9	22
H_2O	3 ($H^{17}OH$)	7-9	22
CO_2	1 (CO_2)	7-9	22
CO_2	2 ($O^{13}CO$)	7-9	23-31
CO_2	3 ($OC^{18}O$)	7-9	23-31
O_3	1 (O_3)	7-9	23-31
O_3	3 ($O^{18}OO$)	7-9	23-31

5. Line Parameters

Table 118: Sources of spectral line parameters

Molecule	Source
O_3	L.S. Rothman et al., The HITRAN 2008 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 110 (2009) 533–572
H_2O	L.S. Rothman et al., The HITRAN 2008 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 110 (2009) 533–572
CH_4	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2O	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204 ***Adjustments:*** 1206.48614 cm^{-1} changed to 1206.48382 cm^{-1} 1207.38207 cm^{-1} changed to 1207.377 cm^{-1} 1208.26319 cm^{-1} changed to 1208.267 cm^{-1} 1209.15774 cm^{-1} changed to 1209.167 cm^{-1}
NO_2	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
NO	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
HNO_3	**HITRAN 2004 Update #12:** J.-M. Flaud et al., MIPAS database: Validation of HNO_3 line parameters using MIPAS satellite measurements, *Atmospheric Chemistry & Physics*, 6 (2006) 5037-5048
HCl	J.A. Coxon et al., The Radial Hamiltonians for the $X^1\Sigma^+$ and $B^1\Sigma^+$ States of HCl, *Journal of Molecular Spectroscopy*, 203 (2000) 49-64
HF	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204

Molecule	Source
CO	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CCl_3F (CFC-11)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CCl_2F_2 (CFC-12)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2O_5	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
$ClONO_2$	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
COF_2	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CF_4	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CH_3Cl	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
C_2H_6	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
SF_6	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
OCS	**HITRAN 2004 Update #19:** L. Régalia-Jarlot et al., Line intensities of the: ν_3, $4\nu_2$, $\nu_1+\nu_3$, $3\nu_1$ and $2\nu_1+2\nu_2$ bands of $^{16}O^{12}C^{32}S$ molecule, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 74 (2002) 455–470

Molecule	Source
HCN	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
H_2CO	L.S. Rothman et al., The HITRAN 2008 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 110 (2009) 533–572
CO_2	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
HO_2NO_2	Brown, L.R. et al., The 1995 ATMOS linelist, *Applied Optics*, 35 (1996) 2828-2848
H_2O_2	A. Perrin et al., The 7.9-μm Band of Hydrogen peroxide: Line Positions and Intensities, *Journal of Molecular Spectroscopy*, 171, (1995) 358-373 S. Klee et al., Absolute Line Intensities for the v6 Band of H_2O_2, *Journal of Molecular Spectroscopy*, 195, (1999) 154-161
CCl_4	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
C_2H_2	**HITRAN 2004 Update #26:** O.M. Lyulin et al., Line intensities of acetylene: Measurements in the 2.5-μm spectral region and global modeling in the Δp=4 and 6 series, *Journal of Quantitative Spectroscopy and Radiative Transfer*, 103 (2007) 496-523 D. Jacquemart et al., Multispectrum fitting of line parameters for $^{12}C_2H_2$ in the 3.8-μm spectral region, *Journal of Quantitative Spectroscopy and Radiative Transfer*, 103 (2007) 478-495
$COCl_2$	Brown, L.R. et al., The 1995 ATMOS linelist, *Applied Optics*, 35 (1996) 2828-2848
COClF	Brown, L.R. et al., The 1995 ATMOS linelist, *Applied Optics*, 35 (1996) 2828-2848
HCOOH	A. Perrin et al., An improved database for the 9μm region of the formic acid spectrum, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 108 (2007) 363–370

Molecule	Source
CH_3OH	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
O_2	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204 ***Adjustments:*** Line strengths scaled by a factor of 1.039
CH_3CClF_2 (HCFC-142b)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CHF_2Cl (HCFC-22)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
$C_2Cl_3F_3$ (CFC-113)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CH_3CCl_2F (HCFC-141b)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
H_2O isotopologue 2 ($H^{18}OH$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
H_2O isotopologue 3 ($H^{17}OH$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
H_2O isotopologue 4 (HDO)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204

Molecule	Source
CO_2 isotopologue 2 ($O^{13}CO$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CO_2 isotopologue 3 ($OC^{18}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CO_2 isotopologue 4 ($OC^{17}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CO_2 isotopologue 5 ($O^{13}C^{18}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
O_3 isotopologue 2 ($OO^{18}O$)	L.S. Rothman et al., The HITRAN 2008 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 110 (2009) 533–572
O_3 isotopologue 3 ($O^{18}OO$)	L.S. Rothman et al., The HITRAN 2008 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 110 (2009) 533–572
O_3 isotopologue 5 ($O^{17}OO$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2O isotopologue 2 ($N^{15}NO$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2O isotopologue 3 (^{15}NNO)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2O isotopologue 4 ($NN^{18}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
N_2O isotopologue 5 ($NN^{17}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204

Molecule	Source
CO isotopologue 2 (^{13}CO)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CO isotopologue 3 ($C^{18}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CO isotopologue 4 ($C^{17}O$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CH_4 isotopologue 2 ($^{13}CH_4$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
CH_4 isotopologue 3 (CH_3D)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204
OCS isotopologue 2 ($OC^{34}S$)	**HITRAN 2004 Update #19:** L. Régalia-Jarlot et al., Line intensities of the: ν_3, $4\nu_2$, $\nu_1+\nu_3$, $3\nu_1$ and $2\nu_1+2\nu_2$ bands of $^{16}O^{12}C^{32}S$ molecule, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 74 (2002) 455–470
OCS isotopologue 3 ($O^{13}CS$)	L.S. Rothman et al., The HITRAN 2004 molecular spectroscopic database, *Journal of Quantitative Spectroscopy & Radiative Transfer*, 96 (2005) 139–204