

Solar Backscattered Ultraviolet Radiometer (SBUV)
Operational Ozone Product System Version 8

Interface Control Document
(Documentation Version 1.0)

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National Environmental Satellite, Data, and Information Service,
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Information Processing Division

Prepared by:
Qiang Zhao (IMSG Inc.) and Joel Selekof (Science & Technology Corp)
NOAA/NESDIS/ORA & SSD
World Weather Building
Camp Springs, MD 20746-4304

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Summary of Changes

The following is a list of documented changes made to this document to reflect changes in the Version 8 software or processing methodology.

Version 1.1	01/05/07 – TEK	Description: Added Section 5 to describe new Monitoring routines added to Version 8 daily processing. Also added the Summary of Changes section to this document.
Version 1.2	05/30/07 – VRA	Description: Added Section 5.4.7 to describe daily zonal average V8 files (CCR 3142).
Version 1.3	10/30/07 – DXU	Description: Update description for SBUVPOQ and PCCF in SBUV V8 BUFR mnemonic table in Section 4.1.2 (PR1309).
Version 1.4	11/13/07 – V. Kapoor	Description: Updated BUFR surface category values to match the BUFR descriptor table values. Section: 1.3.9 (PR1312).
Version 1.5	01/28/09 – L.Chen	Description: New SBUV/2 V8 BUFR Table. Table 6 (CCR00357)

1.0 INPUT FILES

1.1 OOPS Version 6 daily Product Master File (PMF)

To produce the Version 8 daily PMF product, the SBUV Version 8 algorithm (V8) works as a follow-on processing system to the existing Version 6 algorithm (V6) and takes the V6 daily PMF as input. The V6 file is a sequential access binary data file, converted from the standard daily Product Master File (PMF) and containing only data records of the PMF.

Each V6 PMF data record has 207 4-byte words. The Table 1 lists the words used in V8 processing.

Table 1 V6 data record words used in V8 processing

Word.	Type	Content
1	I*4	Record ID (761 for data record)
2	R*4	Logical sequence number
3	R*4	Orbit number
4	R*4	Year at start of scan x 1000 + day of year at start of scan
5	R*4	Second of day
6	R*4	Sub-satellite latitude at beginning of scan
8	R*4	view latitude – Average for total ozone
9	R*4	View longitude – Average for total ozone
11-14	R*4	Photometer N-Value (340-313 nm)
15-18	R*4	Monochromator N-Value (340-313 nm)
19	R*4	Gain selection flag (340-306 nm)
20	R*4	Grating position error offsets for wavelengths 1-6
22	R*4	FOV average cloud top pressure (TOVS)
23	R*4	Pressure of reflective surface (TOVS)
42	R*4	Grating position error offsets for wavelengths 7-12
44	R*4	Terrain surface pressure
47	R*4	Dark current flag (n04 only)
48	R*4	view latitude – Average for profile
49	R*4	View longitude – Average for profile
50	R*4	Solar zenith angle – Average for profile
51-58	R*4	Photometer N-Value (252-306 nm)
59-66	R*4	Monochromator N-Value (252-306 nm)
67-68	R*8	Gain selection flags for each of eight wavelengths (252-306 nm)
156	R*4	Aerosol correction factor (n07 only)
206	R*4	Solar zenith angle at start of scan
207	R*4	Solar zenith angle at end of scan

For more information about the V6 output data files or daily PMF datasets, please see Section 9.7.2 of NOAA KLM User's Guide, or contact:

Donna McNamara
 Ozone Product Area Lead
 NOAA/NESDIS/OSDPD/SSD/PIB
 5200 Auth Rd., Rm 510 Camp Springs MD 20746
 Phone: (301)763-8142x145
 Fax: (301)899-9196
Donna.Mcnamara@noaa.gov

1.2 ROPES Version 6 orbital Product Master File (PMF)

To produce the Version 8 orbital PMF product, the SBUV Version 8 algorithm (V8) works as a follow-on processing system to the existing Version 6 algorithm (V6) and takes the V6 orbital PMF as input. The V6 file is a sequential access binary data file, converted from the standard orbital Product Master File (PMF) and containing only data records of the PMF.

Each V6 orbital PMF data record has 207 4-byte words. The Table 1 lists the words used in V8 processing.

1.3 Auxiliary input files

Besides the input observations from V6 PMF data file, V8 processing system also access multiple auxiliary input files.

1.3.1 Constants (**control/CONST.nxx**)

This file is in ASCII format and contains instrument calibration and algorithm constant parameters. A brief description to each line of data has been given in the file.

This constant data file is instrument dependent, a dedicated file must be provided for each satellite or instrument. The following is a sample constants file.

```

N16
251.99,273.64,283.10,287.74                ss channels
292.29,297.57,301.96,305.90,312.59,317.59,331.23,339.87,378.6  msr channels
0.094,-0.110, 0.287, 0.353, 0.177,-0.531, 0.217,-0.313,-0.290, ring 80% 1.00 Atm
0.094,-0.110, 0.280, 0.301, 0.134,-0.393, 0.156,-0.222,-0.200, ring 80% 0.70 Atm
0.094,-0.110, 0.260, 0.211, 0.078,-0.223, 0.087,-0.124,-0.110, ring 80% 0.40 Atm
0.094,-0.110, 0.243, 0.153, 0.048,-0.135, 0.052,-0.075,-0.067, ring 80% 0.25 Atm
0.094,-0.110, 0.273, 0.285, 0.135,-0.407, 0.171,-0.255,-0.278, ring 15% 1.00 Atm
0.094,-0.110, 0.268, 0.257, 0.113,-0.337, 0.139,-0.205,-0.218, ring 15% 0.70 Atm
-0.0,0.00,-0.07,0.04                N Value adj. ss
0.23,-0.03,-0.0,0.21,0.16,0.09,0.0,-0.0,-1.10    N Value adj. msr
0.0195,0.0820,0.1445,0.2070                Interpolation Factors
0.2695,0.3320,0.3945,0.4570,0.5195,0.5820,0.6445,0.7070    Interpolation Factors
11                Refl Wavelength
12                Refl Wav for High SZA
10                Ozone Wavelength

```

11	Ozone Wav for High SZA
0.010, 0.5 , 12.0, 0.001	se, sa , corr len, iter thresh
9	imixr
4.223, -1.460, 0.145	f360 coefficients
-8.0	f331
-1.5	glint limit
10.0, 5.0, 99.0	flag 3 limit
3.5, 2.0, 5.0	flag 4 limit

1.3.2 N-value look-up tables (**data/v8sbtable_multi.nxx**)

This file is in sequential binary format consisting of 13 records of data, each of which contains four look-up tables for one grating position offset. The four look-up tables are for calculating total intensity due to the atmospheric backscatter, single scattering intensity due to the atmospheric backscatter, transmittance for ground reflected radiation and average of fraction of radiation scattered back from the atmosphere, respectively. All these tables except the last one have dimensionality of (10, 21, 9, 4) corresponding to (solar zenith angle, profile, wavelength, pressure). The last table is not dependent on solar zenith angle, thus has dimension (21, 9, 4).

This constant data file is instrument dependent, a dedicated file must be provided for each satellite or instrument.

1.3.3 N-value sensitivity look-up tables (**data/v8sbdndx.nxx**)

This file is in sequential binary format consisting of only one record of data, which contains four look-up tables for calculating N-value sensitivity. The four look-up tables are same as those for N-value except additional dimension of 12 is added for the unperturbed case followed by 11 cases perturbed in Umkehr layer 0-9 and 10, 11 and 12 combined.

This constant data file is instrument dependent, a dedicated file must be provided for each satellite or instrument.

1.3.4 A priori ozone profile climatology (**data/O3_CLIM13.DAT**)

This file is in sequential binary format consisting of only one record of data, which contains a priori ozone profiles in 13 Umkehr layers (12-0) for 18 10-degree latitude zones (from south to north) and 12 months.

1.3.5 A priori temperature profile climatology (**data/TM_CLIM13.DAT**)

This file is in sequential binary format consisting of only one record of data, which contains a priori temperature profiles in 13 Umkehr layers (12-0) for 18 10-degree latitude zones (from south to north) and 12 months.

1.3.6 Standard profiles in fine layers (**data/v8std81.dat**)

This file is in ASCII format and contains one standard temperature and 21 ozone profiles (3 for low latitude with total ozone from 225 to 275 DU; 8 for mid latitude with total ozone from 225 to 575 DU; and 10 for high latitude with total ozone from 125 to 575 DU) in 81 layers. The profile data consisting of 81 records, one for each layer, start from the third record. The records have format of (**f9.6, f7.2, 21f10.6**), corresponding to 1 scaled pressure (0 for the top of the atmosphere and 1 for the ground), 1 temperature and 21 layer ozone amounts.

1.3.7 Solar radiation reference look-up table (**data/solar_bass.dat**)

This file is in ASCII format and contains solar radiation reference data with high wavelength resolution (~0.05 nm). Each record is for one wavelength, including 7 parameters, i.e., wavelength, 3 ozone absorption coefficients, Rayleigh scattering coefficient, molecular anisotropy and solar flux.

1.3.8 Terrain height pressure data (**data/TERPRS.DAT**)

This file is in sequential binary format consisting of only one record of data, which contains 0.5 degree resolution terrain height pressure data with dimension (360, 720).

1.3.9 Surface category code (**data/SURFCAT.DAT**)

This file is in ASCII format consisting of 2160 records with 120 characters per record, which corresponds to a (360, 720) array of 0.5 degree resolution surface category codes (every 6 records hold data for one latitude zone).

The V8 binary surface category values are mapped to match the BUFR descriptor table values as follows:

- 0 = 0 (ocean)
- 1 = 3 (land)
- 3 = 5 (water bodies)
- >=4 = 255
- 2 is missing

1.3.10 Snow-ice cover data (**data/v8snocld/v8snowice.mon**)

There are 12 snow-ice cover data files in total, one for each month. These files are in ASCII format consisting of 3600 records with 18 floating point numbers per record, corresponding to a (180, 360) array of 1 degree resolution snow-ice cover data (every 20 records hold data for one latitude zone).

1.3.11 Cloud pressure data (**data/v8snocld/v8cldpres.mon**)

There are totally 12 cloud pressure data files, one for each month. These files are in ASCII format consisting of 3600 records with 18 floating point numbers per record, corresponding to a (180, 360) array of 1 degree resolution cloud pressure data (every 20 records hold data for one latitude zone).

1.3.12 Merged a priori ozone climatology (**data/mrgapprf.dat**)

This file is in ASCII format consisting of 2160 (10 total ozone amounts * 18 latitude zones * 12 months) climatological 11-layer ozone profiles. The file is organized as a sequence of profile data blocks. Each block consists of a header record with month and latitude zone information and 10 data records of 12 floating point numbers. The first number represents the total ozone amount of the profile, ranging from 125 to 575 DU, followed by 11 layer ozone values.

2.0 INTERMEDIATE FILES

None

3.0 OUTPUT FILES

The SBUV V8 processing system generates both daily and orbital output files in binary format, as well as daily and orbital output files in BUFR format (see Section 4 for BUFR description).

3.1 Version 8 daily output file

The V8 daily output data files are in sequential binary format. For each file, there are two header records, followed by all data records (around 1250 normally), and concluded with a trailer record. All records have same length of 2000 4-byte words or equivalently 8000 bytes. Header and trailer records are character strings, while the data records are 4-byte floating point arrays.

3.1.1 Header record I

Header record I contains general processing information such as instrument name, algorithm version, processing date and time. It also lists all lines of input control file. See Table 2 for the Header Record I layout.

Table 2 Header record I layout

Byte	Description	Sample
1-5	Spare	
6-13	Satellite name and flight model identifier	'SBUV-N18'
14	Spare	
15-21	Data Level	'LEVEL-2'

Byte	Description	Sample
22-33	Algorithm	'BY V8SBUV '
34	Spare	
35-47	Version	'VERSION 8.100'
48	Spare	
49-62	Program date	'Feb, 26 2004 '
63	Spare	
64-86	Operating system	'ON OSUNIX GEN'
87	Spare	
88-90	Month of data processing	'APR'
91	Spare	
92-93	Day of data processing	'12'
94	Spare	
95-98	Year of data processing	'2006'
99	Spare	
100-101	Hour of data processing	'16'
102-103	Minute of data processing	'29'
104-105	Second of data processing	'48'
106	Spare	
107-114	'DATA FOR'	
115-116	Spare	
117-119	Month of data	'APR'
120	Spare	
121-122	Day of data	'11'
123	Spare	
124-127	Year of data	'2006'
128	Spare	
129-130	Hour of data	'00'
131-132	Minute of data	'55'
133-134	Second of data	'02'
135-140	Spare	
141-1980	input control file (80 characters per input line)	
1981-8000	Spare	

3.1.2 Header record II

Header record II lists all lines of input constants file. See Table 3 for the Header Record II layout.

Table 3 Header record II layout

Byte	Description	Sample
1-5	Spare	

Byte	Description	Sample
6-13	Satellite name and flight model identifier	'SBUV-N18'
14	Spare	
15-21	Level	'LEVEL-2'
22-33	Algorithm	'BY V8SBUV '
34	Spare	
35-47	Version	'VERSION 8.100'
48-60	Spare	
61-1900	Input constant file (80 characters per input line)	
1901-1968	Spare or the first 68 characters of the V6 PMF standard header record I	
1969-8000	Spare	

3.1.3 Data Record

The length of the data records was expanded to current 2000 4-byte words from original 500 words to accommodate averaging kernel and other information for retrieval error analysis. V6 data record is also included into V8 data record as a subset. See Table 4 for detailed data record layout.

Table 4 Data record layout

Word (V6 Word No.)	Content	Sample
1	Orbit Number	4590.000000
2	Greenwich Mean Time seconds	4870.000000
3	Logical sequence number	50.00000000
4	Satellite ID	18.00000000
5	Day of year	101.00000000
6	Year	2006.000000
7	Latitude for Total Ozone (318 nm)	21.90064812
8	Longitude for Total Ozone (318 nm)	-177.2539978
9	Solar zenith angle	25.69408035
10	Solar zenith angle at start of scan	25.51954079
11	Solar zenith angle at end of scan	26.11541557
12-23	N252, N274, N283, N288, N292, N298, N302, N306, N313, N318, N331, N340 (Measured n-values from the monochromator)	353.0212097
24-35	N252, N274, N283, N288, N292, N298, N302, N306, N313, N318, N331, N340 (Measured n-values from the photometer)	112.6623688
36	Total Ozone	285.4809875
37	Error flag	0.0000000000E+00
38	Reflectivity	0.1248972490
39	Algorithm flag	1.000000000
40	Step one ozone	283.8000183
41	Step two ozone	284.5615845
42-49	(dN/d Ω)292, (dN/d Ω)298, (dN/d Ω)302, (dN/d Ω)306, (dN/d Ω)313, (dN/d Ω)318, (dN/d Ω)331, (dN/d Ω)340	0.9698080976E-04
50-57	(dN/dR)292, (dN/dR)298, (dN/dR)302, (dN/dR)306, (dN/dR)313, (dN/dR)318, (dN/dR)331, (dN/dR)340	-0.6654153112E-03

Word (V6 Word No.)	Content	Sample
58	(dN/dR)ccr (at 331 nm monochromator channel)	-119.6416702
59-66	Res(N292), Res(N298), Res(N302), Res(N306),Res(N313), Res(N318), Res(N331), Res(N340)	-2.646954060
67	Photometer Residual (CCR) at N331	0.3035485744
68	Terrain Pressure (atm)	1.000000000
69	Cloud top pressure (atm)	0.5330700874
70	Effective cloud fraction	0.000000000E+00
71	Ozone below cloud	0.000000000E+00
72	Surface category	0.000000000E+00
73-75	Gain12-9, Gain8-5, Gain4-1	33332.00000 0.000000000E+00 0.000000000E+00
76	Aerosol Index	-0.3035485744
77-86	Total ozone <i>a priori</i> profile layer 0-9 Ozone	19.70327759
87	Total ozone <i>a priori</i> profile for layer 10 and above	1.284301281
88-97	Total ozone algorithmic efficiency Layer 0-9	0.6234209538
98	Total ozone algorithmic efficiency for layer 10 and above	1.102117181
99	Latitude for Profile Ozone (292 nm)	21.31681824
100	Longitude for Profile Ozone (292 nm)	-177.1071472
101-121	21 layer A-priori ozone profile (DU)(Layer bottoms are: 1.0,0.631,0.398,0.251,0.158,0.100,0.0631,0.040,0.0251,0.0158,0.010 0,0.0063,0.0040,0.00251,0.00158,0.0010,0.00063,0.00040,0.00025,0. 000158,0.0001, with top layer extending to infinity)	13.76889515
122-142	21 layer First guess ozone profile (DU)	10.63301754
143-163	21 layer Retrieved ozone profile (DU)	13.92403889
164-183	Estimated error of retrieved profile (%) (top layer not included)	6.871080875
184	Profile total ozone (DU)	285.6116943
185	Estimated error of profile total ozone (%)	1.000248790
186-200	Ozone mixing ratio in prescribed levels (ppmv) (0.5, 0.7, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 7.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0)	1.507388115
201-215	Estimated errors in mixing ratio (%)	8.611349106
216-225	Initial residuals (n-value: short to long wavelength)	-3.654667854
226-235	Final residuals (n-value: short to long wavelength)	-0.4110307395
236-435	10 x 20 Total scattering kernel (top layer not included)	0.000000000E+00
436-445	Computed single-scattering n-values (short to long wavelength)	353.5621033
446-458	Input temperature profile in Umkehr layers 12 - 0	240.9932098
459	Number of iterations for solution convergence	3.000000000
460	Reflectivity Correction	0.3565867373E-03
461-472	Grating drive position for wavelengths of 252, 274, 283, 288, 292, 298, 302, 306, 313, 318, 331, 340	4.000000000
473-480	Photometer reflectivity for wavelengths of 292, 298, 302, 306, 313, 318, 331, 340	0.1403288096
481	Sigma	0.5608523488
482	Error code for profile ozone	0.000000000E+00
483	Index of longest profile channel used	7.000000000
484	TOVS Cloud Pressure (SBUV2 Only)	-77.00000000
485-492	Cloud fraction for wavelengths of 292, 298, 302, 306, 313, 318, 331, 340	0.000000000E+00
493	Quality of Fit Parameter (Average final residual)	0.2619659156E-01
494	Dark Current Flag (Nimbus-04 only)	0.000000000E+00
495	Snow/Ice Indicator	0.000000000E+00

Word (V6 Word No.)	Content	Sample
496-499	Photometer reflectivity for wavelengths of 252, 274, 283, 288	0.1389459223
500	Spare	99999.00000
501-900	20 layer averaging kernel	0.2918600850E-01
901	fractional error in radiance/flux	0.9999999776E-02
902	fractional error in profile	0.5000000000
903-1793	Spare	99999.00000
1794 (1)	Record ID (integer)	0.1066388131E-41 (761)
1795 (2)	Logical Sequence Number	55.00000000
1796 (3)	SBUV/2 Orbit Number	4590.000000
1797 (4)	Year at Start of Scan x 1000 + Day of Year at Start of Scan	2006101.000
1798 (5)	Seconds of Day	4870.000000
1799 (6)	Subsatellite Latitude at the Beginning of Scan (Degrees)	20.76972771
1800 (7)	Subsatellite Longitude at the Beginning of Scan (Degrees)	-176.9695282
1801 (8)	View Latitude - Average for Total Ozone Wavelengths (Degrees)	21.90064812
1802 (9)	View Longitude - Average for Total Ozone Wavelengths (Degrees)	-177.2539978
1803 (10)	Solar Zenith Angle - Average for Total Ozone Wavelengths (Degrees)	25.88033295
1804-1807 (11-14)	N-Values (CCR Coincident with 339.8, 331.2, 317.5, 312.5 nm)	114.7022018
1808-1811 (15-18)	N-Values (Monochromator 339.8, 331.2, 317.5, 312.5, 305 nm)	104.7198639
1812 (19)	Gain Selection code for each of five wavelengths (339.8, 331.2, 317.5, 312.5, 305 nm) (Ex: Integer #33322)	33332.00000
1813 (20)	Grating Position Error Offsets for wavelengths 1-6	444444.0000
1814 (21)	Total Ozone - Best Estimate based on TOVS Cloud Height. (m-atm-cm)	-77.00000000
1815 (22)	FOV Average Cloud Top Pressure (atm) (Reported by TOVS)	-77.00000000
1816 (23)	Pressure of Reflective Surface (atm) (Estimated using TOVS)	-77.00000000
1817 (24)	Reflectivity-Average(Estimated using TOVS)	-77.00000000
1818 (25)	Percent Cloud from CCR	-77.00000000
1819(26)	Ozone Error Flag for TOVS Total Ozone	-77.00000000
1820(27)	Total A-Pair Ozone (m-atm-cm)	281.7537842
1821 (28)	Ozone A-Pair sensitivity (N-Value/m-atm-cm)	0.1266763657
1822 (29)	Reflectivity average for A-Pair	0.1436941475
1823 (30)	Ozone Weight A-Pair	0.6520434618
1824 (31)	Total Ozone B-Pair (m-atm-cm)	289.5964661
1825 (32)	Ozone Sensitivity B-Pair (N-Value/m-atm-cm)	0.6523291767E-01
1826 (33)	Reflectivity average for B-Pair	0.1426741332
1827 (34)	Ozone Weight B-Pair	0.3479565382
1828 (35)	Total Ozone-Best Estimate Based on Climatological Cloud Height (m-atm-cm)	282.6184998
1829 (36)	Total Ozone C-Pair (m-atm-cm)	-77.00000000
1830 (37)	Pressure of reflecting Surface (Estimated Without TOVS) (atm)	0.8969467282
1831 (38)	Reflectivity Average	0.1431841403
1832 (39)	Ozone Sensitivity C-Pair (N-Value/m-atm-cm)	-77.00000000
1833 (40)	Ozone Error Flag for Best Ozone	0.0000000000E+00
1834 (41)	FOV Snow Flag * 10 + Table Selection Index 1 = Snow 1=Low Latitude 0 = No Snow 2 = Mid Latitude -1=No Info. 3 = High Latitude	1.230021596
1835 (42)	Grating Position Error Offset for wavelength's 7-12	444444.0000

Word (V6 Word No.)	Content	Sample
1836 (43)	Reflectivity difference (Photometer/monochromator)	-0.8263364434E-02
1837 (44)	Terrain Surface Pressure (atm)	1.000000000
1838 (45)	Total Ozone D-Pair (m-atm-cm)	288.6121521
1839 (46)	SOI Index	3.594287157
1840 (47)	Total Ozone B'-Pair (m-atm-cm)	283.5286865
1841 (48)	View latitude – Average for profile (degrees)	21.31681824
1842 (49)	View longitude - Average for profile (degrees)	-177.1071472
1843 (50)	Solar Zenith Angle - Average for profile (degrees)	25.69408035
1844-1851 (51-58)	N-Values (CCR coincident with Profile wavelengths 252.2, 275.3, 283.0, 287.6, 292.2, 297.5, 301.9, and 305.8 nm)	112.6623688
1852-1859 (59-66)	N-Values (monochromator profile wavelengths)	353.0212097
1860-1861 (67-68)	Gain Selection Flags for Each of Eight Wavelengths	15.32454681
1862-1873 (69-80)	Layer Ozone-first Guess Amounts in 12 Pressure Layers (m-atm-cm)	0.9603615850E-01
1874 (81)	Total Ozone for A Priori profile (m-atm-cm)	282.6184998
1875-1884 (82-91)	Q-Values Corrected for Multiple Scattering and Surface Reflectivity (252.2 through 317.5 nm)	0.1054719673E-02
1885-1894 (92-101)	Initial Residues (252.2 through 317.5 nm) (%)	-2.375382423
1895-1899 (102-106)	Multiple-Scattering correction to Q for Five Longer Wavelengths Channels (297.5 through 317.5 nm)	0.2912611817E-03
1900-1904 (107-111)	Reflectivities for Five Longer Wavelengths (297.5 through 317.5 nm)	0.1532480419
1905-1909 (112-116)	Multiple-Scattering Sensitivity for Five Longer Wavelengths (297.5 through 317.5 nm) (Q-Value/m-atm-cm)	-0.3800403094E-02
1910-1914 (117-121)	Multiple-Scattering Mixing Fraction for Five Longer Wavelengths (297.5 through 317.5 nm)	1.873179913
1915-1924 (122-131)	Final Residues (252.2 through 317.5 nm) (%)	-0.1078700796
1925-1936 (132-143)	Layer Ozone Amounts for Solution Profile in 12 Pressure Layers (m-atm-cm)	0.9808807075E-01
1937-1948 (144-155)	Layer Ozone Standard Deviations for Solution Profile in 12 Pressure Layers (%)	11.56864834
1949 (156)	Total Ozone for solution profile (m-atm-cm)	280.3361206
1950 (157)	Ozone Error Flag for Profile	0.0000000000E+00
1951-1952 (158-159)	Upper Level Profile parameters C (m-atm-cm) and Sigma	1.130160093 0.5665833950
1953-1971 (160-178)	Ozone Mixing Ratio at 19 Pressure Levels (micro gm/gm)	1.708832741
1972-1983 (179-190)	Layer Ozone Standard Deviations for First Guess in 12 Pressure Layers (%)	11.99999905
1984-1993 (191-200)	Standard Deviations of Q-Values Corrected for Multiple Scattering and Reflectivity (252.2 through 317.5 nm) (%)	1.039469957
1994 (201)	Number of Iterations for Profile Solution	2.000000000
1995 (202)	VCI (Volcano Contamination Index)	0.2916399837
1996 (203)	Spare (-77.0) or Solar Azimuth Angle at Field of View at start of scan (degrees)	-20265.00000
1997 (204)	Ozone Sensitivity D-Pair (N value/m-atm-cm)	0.1641995311
1998 (205)	Ozone Sensitivity B'-Pair (N value/m-atm-cm)	0.7568971068E-01
1999 (206)	Solar Zenith Angle at Start of Scan (Radians x 10 ⁴)	4454.000000

Word (V6 Word No.)	Content	Sample
2000 (207)	Solar Zenith Angle at End of Scan (Radians x 10 ⁴)	4558.000000

3.1.4 Trailer record

The trailer record contains basic processing statistics. See Table 5 for the trailer record layout.

Table 5 Trailer record layout

Word	Description	Sample
1	Orbit number	4603.000000
2	GMT of first scan	3302.000000
3	Logical sequence number (negative)	-1206.000000
4	Day of year of first scan	101.0000000
5	GMT of first scan	3302.000000
6	Nadir view latitude of first scan	-68.95317078
7	Nadir view longitude of first scan	-143.5602875
8	Day of year of last scan	101.0000000
9	GMT of last scan	85862.00000
10	Latitude of last scan	76.30832672
11	Longitude of last scan	68.10655975
12	Local equator crossing time	-77.00000000
13	Local day of year at equator crossing	0.0000000000E+00
14	Local year at equator crossing	0.0000000000E+00
15	not used	-77.00000000
16	not used	0.0000000000E+00
17	not used	0.0000000000E+00
18	not used	-77777.00000
19	Ozone minimum for orbit	233.4052734
20	Ozone maximum for orbit	518.6837158
21-41	Daily processing counters	1112.000000
42-60	Spare	99999.00000
61-73	Instrument wavelengths	252.0399933
74-86	N-Value adjustment factors	0.0000000000E+00
87-98	Interpolation factor	0.4289999977E-01
99-152	Raman scattering correction factors	0.5600000173E-01
153	Reflectivity wavelength index	11.00000000
154	Reflectivity wavelength index for hi SZA	12.00000000
155	Ozone wavelength index	10.00000000
156	Ozone wavelength index for high SZA	11.00000000
157	Profile mixing wavelength index	9.000000000
158	F313 coefficient	-8.000000000
159-161	F360 coefficients	4.223000050
162-164	Flag 3 limit	10.00000000
165-167	Flag 4 limit	3.500000000
168	Fractional error in radiance/flux	0.9999999776E-02
169	Fractional error in profile	0.5000000000
170	Correlation length of a priori covariance	12.00000000

171	Ozone interpolation tolerance value	0.1000000047E-02
172-2000	Spare	99999.00000

3.2 Version 8 orbital output file

The V8 orbital output files have the same format as the V8 daily output files, but they are much smaller in size. The V8 orbital output data files are in sequential binary format. For each file, there are two header records, followed by all data records (around 90 normally), and concluded with a trailer record. All records have same length of 2000 4-byte words or equivalently 8000 bytes. Header and trailer records are character strings, while the data records are 4-byte floating point arrays. (See tables above).

4.0 VERSION 8 BUFR PROCESSING

4.1 Input Files

4.1.1 V8 Product Master File (PMF) file

The Version 8 BUFR encoder program, 'pmfbufrv8.x', takes a V8 binary file (daily or orbital) and converts it into a WMO standard BUFR format file.

4.1.2 BUFR Table

The program requires an input BUFR table that describes the layout of the BUFR subsets. These subsets are combined into BUFR messages of up to 10,000 bytes. Table 6 contains the BUFR input table, made up of three sections: Table A, Table B, and Table D.

Table 6. BUFR input table

----- USER DEFINITIONS FOR TABLE A, TABLE B, TABLE D -----		
MNEMONIC	NUMBER	DESCRIPTION
NC012201	A10019	SBUV/2 OZONE
YYMMDD	301011	DATE
HHMMSS	301013	TIME
WAVCLDSQ	352015	SPECTROGRAPHIC WAVELENGTH & CORRESPONDING CLOUD AMT SEQ
MIXRVQSQ	352016	SCALED VOLUMETRIC MIXING RATIO AND QUALITY SEQUENCE
LINCOFSQ	352017	LINEAR COEFFICIENT SEQUENCE
OZOPQLSQ	352018	OZONE P, QUALITY, LINEAR COEFF. AND MATRIX SIG SEQUENCE
SAID	001007	SATELLITE IDENTIFIER
SIID	002019	SATELLITE INSTRUMENT 624=SBUV/2

CLAT	005002	LATITUDE (COARSE ACCURACY) FOR TOTAL OZONE
CLON	006002	LONGITUDE
SOZA	007025	SOLAR ZENITH ANGLE
*		SOLAR ZENITH ANGLE AT START OF SCAN
*		SOLAR ZENITH ANGLE AT END OF SCAN
TSIG	008021	TIME SIGNIFIANCE
RSST	008029	SURFACE CATEGORY
ORBN	005040	ORBIT NUMBER
STKO	008075	ASCENDING/DESCENDING ORBIT QUALIFIER
OZON	015001	TOTAL OZONE
SBUVTOQ	033070	ERROR CODE FOR PROFILE OZONE
PRES	010004	TERRAIN PRESSURE (PA)
VSAT	008003	VERTICAL SIGNIFIANCE 0=SURFACE
ACIDX	015030	AEROSOL CONTAMINATION INDEX
CLDMNT	020081	CLOUD FRACTION FOR WAVELENGTHS 292,298,302,306,313,318, 331,340
*		EFFECTIVE CLOUD FRACTION
*		OZONE BELOW CLOUD - SAME AS TOTAL OZONE
TLRFV	033042	TYPE OF LIMIT REPRESENTED
PRLC	007004	CLOUD TOP PRESSURE (PA)
OZOP	015005	21 LAYER A-PRIORI OZONE PROFILE (DU) (21 VALUES)
*		21 LAYER RETRIEVED OZONE PROFILE (DU) (21 VALUES)
MTXSIG	008026	MATRIX SIGNIFICANCE
LINCOF	025143	20 LAYER AVERAGING KERNEL (400 VALUES)
ATCT	008043	ATMOSPHERIC CHEMICAL TYPE
DSFTV	008090	DECIMAL SCALE
MIXRV	015008	OZONE MIXING RATIO IN PRESCRIBED LEVELS (PPMV) (15 VALUE
SBUVPOQ	033071	SBUV PROFILE OZONE QUALITY
PCCF	033007	ESTIMATED ERRORS IN MIXING RATIO (15 VALUES)
WAVL	002071	FINAL RESIDUALS (N-VALUE: SHORT TO LONG WAVELENGTH)
YEAR	004001	YEAR
MNTH	004002	MONTH
DAYS	004003	DAYS
HOURL	004004	HOUR
MINU	004005	MINUTE
SECO	004006	SECOND

MNEMONIC | SEQUENCE

DEFINITION OF OZONE BUFR FILE

NC012201	SAID SIID YYMMDD HHMMSS CLAT CLON SOZA TSIG SOZA TSIG SOZA TSIG
NC012201	RSST ORBN STKO VSAT PRES VSAT 207002 OZON 207000 SBUVTOQ
NC012201	ACIDX 207002 CLDMNT 207000 VSAT TLRV PRLC 207002 OZON 207000
NC012201	VSAT "OZOPQLSQ"21 ATCT "MIXRVQSQ"15 ATCT SBUVPOQ "WAVCLDSQ"8
OZOPQLSQ	PRLC PRLC 207002 TSIG OZOP TSIG OZOP PCCF 207000 MTXSIG
OZOPQLSQ	"LINCQFSQ"20 MTXSIG
LINCQFSQ	LINCOF

MIXRVQSQ	PRLC DSFTV 207006 MIXRV 207000 DSFTV 207002 PCCF 207000				
WAVCLDSQ	202124 201107 WAVL 201000 202000 207002 CLDMNT 207000				
YYMMDD	YEAR MNTH DAYS				
HHMMSS	HOUR MINU SECO				
MNEMONIC	SCAL	REFERENCE	BIT	UNITS	
SAID	0	0	10	CODE TABLE	
SIID	0	0	11	CODE TABLE	
CLAT	2	-9000	15	DEGREE	
CLON	2	-18000	16	DEGREE	
SOZA	2	-9000	15	DEGREE	
RSST	0	0	8	CODE TABLE	
ORBN	0	0	24	NUMERIC	
STKO	0	0	2	CODE TABLE	
OZON	0	0	10	DU	
SBUVTOQ	0	0	4	CODE TABLE	
PRES	-1	0	14	PA	
ACIDX	2	-1000	12	NUMERIC	
CLDMNT	0	0	7	%	
VSAT	0	0	6	CODE TABLE	
PRLC	-1	0	14	PA	
OZOP	0	0	10	DU	
PCCF	0	0	7	%	
LINCOF	6	-5000000	24	NUMERIC	
MIXRV	0	0	10	PT/PT BY VOL	
SBUVPOQ	0	0	4	CODE TABLE	
WAVL	13	0	30	M	
YEAR	0	0	12	YEAR	
MNTH	0	0	4	MONTH	
DAYS	0	0	6	DAYS	
HOUR	0	0	5	HOUR	
MINU	0	0	6	MINUTES	
SECO	0	0	6	SECONDS	
TSIG	0	0	5	CODE TABLE	
TLRFV	0	0	3	CODE TABLE	
MTXSIG	0	0	6	CODE TABLE	
ATCT	0	0	8	CODE TABLE	
DSFTV	0	-127	8	NUMERIC	

4.2 Auxiliary input file

None.

4.3 Intermediate files

None.

4.4 Output files

The 'pmfbufrv8.x' program creates one output file with multiple BUFR messages in it. Each message consists of a number of subsets where each subset equates to one input record from the Version 8 binary file.

4.4.1 Daily V8 BUFR file

If the V8 input to the BUFR program was a daily binary V8 file, then the V8 BUFR output file will be a daily BUFR file, containing a whole day of data (typically about 1250 data records).

4.4.2 Orbital V8 BUFR file

If the V8 input to the BUFR program was an orbital binary V8 file, then the V8 BUFR output file will be an orbital BUFR file, containing one orbit of data (typically about 90 data records).

5.0 VERSION 8 Daily Monitoring Processing

5.1 Input Files

5.1.1 V8 Product Master File (PMF) file

The five programs run for monitoring (pmfv8pct.x, pmfv8laymon.x, pmfv8sbuvoz.x, pmfv8zone.x, pmfv8zstat.x) use the PMF file as input to update the necessary monitoring files.

5.2 Auxiliary input file

None.

5.3 Intermediate files

None.

5.4 Output files

Several output products are updated daily from the monitoring scripts that are run after the V8 daily processing.

5.4.1 Layer Monitoring file (**data/LAYMON[1,2,4]**)

File contains ozone values for the 21 layers for 3 different latitude regions (Northern Hemisphere, Tropical, and Southern Hemisphere). The file is appended to for each new day and is used as input for the layer monitoring webpage graphics.

5.4.2 PMF Percentages Monitoring file (**data/PCPMFD[1,2,4]**)

File contains the percentage of total and profile ozone products produced (percentage of good products made for all input data received) for the day.

5.4.3 SBUV Zonal Averages file (**N[1,2,4]ZONE.SBUV**)

File contains total ozone statistics for 12 different latitude ranges for SBUV for each day.

5.4.4 Zonal Averages file (**N[1,2,4]ZONE**)

File contains zonal averages and sample sizes for three different latitude regions for each day.

5.4.5 Latitude Coverage file (**LATCOV[1,2,4]**)

File contains the SBUV maximum and minimum latitude coverage for each day.

5.4.6 TOVS Zonal Statistics file (**TOTOZ[1,2,4]**)

File contains zonal averages for TOVS data for each day.

5.4.7 SBUV /2 Zonal Averages files (**data/PMF[1,2,4]V8TODY,** **data/PMF[1,2,4]V8YEST**)

File contains total ozone, 21 layer retrieved ozone profile averages and sample sizes for 18 different latitude ranges for SBUV/2 each day.

