EUMETSAT

SSMIS SDR BUFR Format

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Document Change Record

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
V3A Draft	09/02/11		Remove LAS Scene Data Lower Temp Quality Flag and Lower Humidity Quality Flag from LAS BUFR product Remove UAS Scene Data Temp Quality Flag from UAS BUFR product Amend BUFR product descriptions accordingly Add Section 6 for GTS Information Add short overview on the BUFR products and that 4 BUFR products are produced per SSMIS SDR product.
V3b Draft	15/02/11		Link scan times in SDR to correct BUFR fields in BUFR products Adjust scale factor and width for 022080 WAVEBAND CENTRAL FREQUENCY
V4 Draft	06/04/11		Changed order of flags in ENV product to correct applicability Land/Sea qualifier within product
V4A Draft	06/04/11		Increase data width of “007004 Vertical Location: Pressure” in LAS product to allow 100,000 Pa value.
V4B Draft	16/06/11		Correct typo in 5.5.2 – number of descriptors to replicate 90 times corrected from 29 to 34 in X column Update usage of Scan Number field in all 4 BUFR products
V5A Draft	28/07/11		Update LAS BUR product. Terrain Height (010002) scale and reference value adjusted for SDR data range. Update other fields and values accordingly.
V6 Draft	27/09/11		Major reworking. Remove unnecessary section on other SSMIS BUFR formats. Separate BUFR format into current test format and future development. Increase width of Scan Number by an additional bit to 10 bits to account for numbers > 4095
V6A	11/01/12		EUM/MSG/AR/21840 – Additional “end time” field added to file name to prevent overlapping SSMIS SDR products producing BUFR files with identical names.

V7	12/01/02		Clarified BUFR edition Updated BUFR Section 1 description to BUFR Edition 4 standard and added further details

Table of Contents

1 INTRODUCTION

1.1 Purpose and Scope

The purpose of this document is to present the BUFR format for full resolution SSMIS SDR data.

It will also provide a mapping between the data fields in the SSMIS native format data and the fields in the defined BUFR format.

1.2 Reference Documents

[Ref1] WMO-No. 306, Manual on Code - International Codes Volume I.2, 2009 edition

[Ref2] NWPSAF-MO-UD-014, "A Preprocessor for SSMIS Radiances - Scientific Description", W. Bell, Met Office, UK, 1.0, 31.03.06

[Ref3] A Preprocessor for SSMIS Radiances - Technical Description", W. Bell, Met Office, UK, V1.1, July 2006

[Ref4] AE-26775E, 3.45 Sensor Data Records File (SDR), 7 November 2005

[Ref5] WMO-No. 386, Manual on the Global Telecommunication System Volume I, 2009 edition

2 OVERVIEW OF INSTRUMENT AND DATA

The Special Sensor Microwave Imager/Sounder (SSMIS) is a microwave instrument with conical scan geometry. It has 4 instrument subtypes each associated with a subset of the total of 24 SSMIS channels: the lower atmospheric sounding channels (LAS); the upper atmospheric sounding (UAS) channels; the imaging (IMA) channels and the environmental (ENV) channels. These data streams are produced from separate feeds on SSMIS and are not co-located.

Channel Number	Frequency GHz	RF Bandwidth MHz	Pol	3dB Footprint km	Sample Spacing km	NEΔT At 305K/K	Subtype
12	19.35	355.0	H	46.5x73.6	25	0.35	ENV
13	19.35	356.7	V	46.5x73.6	25	0.34	ENV
14	22.235	407.5	V	46.5x73.6	25	0.45	ENV
15	37.0	1615	H	31.2x45.0	25	0.26	ENV
16	37.0	1545	V	31.2x45.0	25	0.22	ENV
1	50.3	380.0	V	37.7x38.8	37.5	0.21	LAS
2	52.8	388.8	V	37.7x38.8	37.5	0.20	LAS
3	53.596	380.0	V	37.7x38.8	37.5	0.21	LAS
4	54.40	382.5	V	37.7x38.8	37.5	0.20	LAS
5	55.50	391.3	V	37.7x38.8	37.5	0.22	LAS
6	57.29	330.0	RC	37.7x38.8	37.5	0.26	LAS
7	59.4	238.8	RC	37.7x38.8	37.5	0.25	LAS
24	60.79±0.36±0.050	106.0	RC	37.7x38.8	37.5	0.38	LAS
23	60.79±0.36±0.016	29.28	RC	75.2x75.0	75	0.37	UAS
22	60.79±0.36±0.0055	10.48	RC	75.2x75.0	75	0.58	UAS
21	60.79±0.36±0.002	5.16	RC	75.2x75.0	75	0.86	UAS
19	63.28±0.28	2.72	RC	75.2x75.0	75	1.23	UAS
20	60.79±0.36	2.70	RC	75.2x75.0	75	1.18	UAS
17	91.655±0.9	2836	V	13.2x15.5	12.5	0.19	IMA
18	91.655±0.9	2822	H	13.2x15.5	12.5	0.19	IMA
8	150.0±1.25	3284	H	13.2x15.5	12.5	0.53	IMA
9	183.31±6.6	1025	H	13.2x15.5	12.5	0.56	IMA
10	183.31±3.0	2038	H	13.2x15.5	12.5	0.39	IMA
11	183.31±1.0	3052	H	13.2x15.5	12.5	0.38	IMA

Table 1 Channel specifications for F-16 SSMI [Ref2].

The ground footprints for the four SSMIS instrument subtypes are shown in Figure 1.

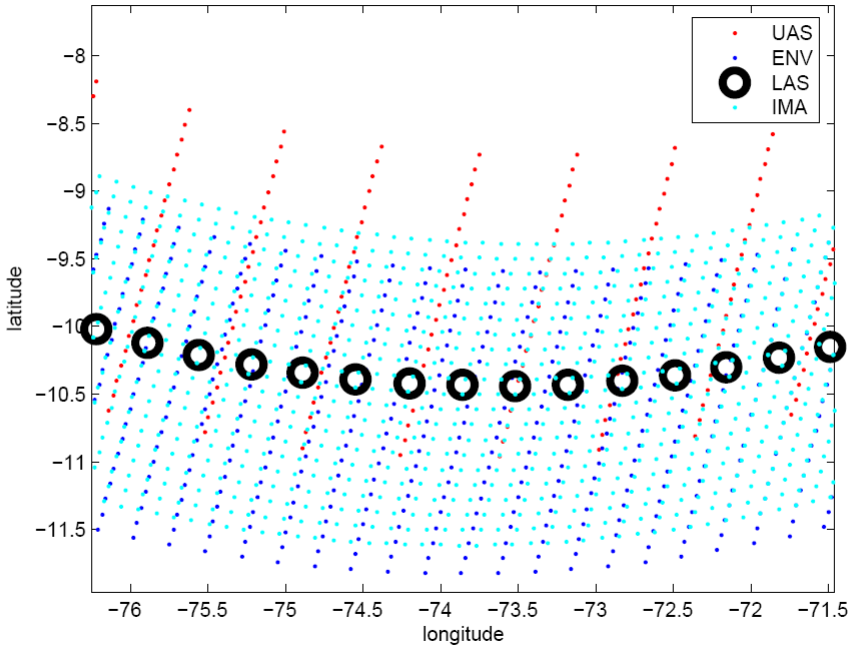

Figure 1 Centre positions of ground footprints for the four SSMIS instrument subtypes. A section of one scan line for the lower atmospheric sounding scans is shown enlarged and in bold. The distance between adjacent scan lines is equal and constant for all subtypes (12.5km). The radiance field is heavily oversampled in the along-track direction.[REF2]

3 SDR FILE CONTENTS DESCRIPTION

The following table is a description of the SDR format showing for each field minimum and maximum values, stored accuracy and data type. Also, an equivalent BUFR code is identified where possible. Where a BUFR field is marked as "Not needed in BUFR" this indicates that the field is not required in the BUFR product. Where a field is marked as "dropped from BUFR" this indicates a field that is not copied across to the BUFR product as no equivalent code has been defined in the WMO-No. 306 [Ref1].

Record	Field	Min	Max	Accuracy	Type	BUFR Field
Revolution Header						
	File Info Word	0	2147483647		INT	Dropped from BUFR
	Revolution (Orbit) Number	0	2147483647		INT	005040 ORBIT NUMBER
	Year Julian Date Hour Minute					004001 YEAR 004002 MONTH 004003 DAY 004004 HOUR 004005 MINUTE
	Satellite ID	1	3		INT	001007 SATELLITE IDENTIFIER
	Number of SDR Records	1	32767		INT	Not needed in BUFR
	Constants File ID	0	255		INT	Dropped from BUFR
	Constants File Checksum	1	65535		INT	Dropped from BUFR
	Processing Status Flags Bit0: warm load bias Bit1: residual Doppler Bit3: cross pol/APC Bit4: resampling Bit5: cal re-averaging Bit6: Moon intrusion Bit7: spike removal	0	1		BIT	Dropped from BUFR
	Processing Status Flags 2 Bit0-2: Sun intrusion Bit3-15: spare	0	5 [6]		BITS	Dropped from BUFR
	Spares					Not needed in BUFR
Scan Header						
	SDR Sync Word	0F0F0F hex			INT	Dropped from BUFR

Record	Field	Min	Max	Accuracy	Type	BUFR Field
	Year Julian Date Hour Minute					008021 TIME SIGNIFICANCE 004001 YEAR 004002 MONTH 004003 DAY 004004 HOUR 004005 MINUTE 004006 SECOND
	Scan Number	1	2147483647		INT	005041 SCAN LINE NUMBER
	IMG Scans	0	28		INT	Not needed in BUFR
	ENV Scans	0	24		INT	Not needed in BUFR
	INT LAS Scans	0	8		INT	Not needed in BUFR
	UAS Scans	0	4		INT	Not needed in BUFR
	IMG Scan Times	0	8640000	1msec	INT	004006 SECONDS
	IMG Scene Counts	0	180		INT	Not needed in BUFR
	ENV Scan Times	0	8640000	1msec	INT	004006 SECONDS
	ENV Scene Counts	0	90		INT	Not needed in BUFR
	LAS Scan Times	0	8640000	1msec	INT	004006 SECONDS
	LAS Scene Counts	0	60		INT	Not needed in BUFR
	UAS Scan Times	0	8640000	1msec	INT	004006 SECONDS
	UAS Scene Counts	0	30		INT	Not needed in BUFR
	Spare					Dropped from BUFR
IMG Scene Data						
	Lat	-9000	9000	100th deg	INT	005002 LATITUDE (COARSE ACCURACY)
	Long	-18000	18000	100th deg	INT	006002 LONGITUDE (COARSE ACCURACY)
	Scene Count	1	180		INT	005043 FIELD OF VIEW NUMBER
	Surface Tag -1 = unknown 0 = land 1 = spare 2 = near coast 3 = ice 4 = possible ice 5 = ocean 6 = coast 7 = spare		-1,0,1,2, 3,4,5,6,7		INT	013040 SURFACE FLAG
	Rain Flag -1 = indeterminate 0 = no rain 1 = rain		-1,0,1		INT	020029 RAIN FLAG

Record	Field	Min	Max	Accuracy	Type	BUFR Field
	Channel Brightness Temps	-19500	6000	100th deg	INT	005042 CHANNEL NUMBER 012163 BRIGHTNESS TEMPERATURE
ENV Scene Data						
	Lat	-9000	9000	100th deg	INT	005002 LATITUDE (COARSE ACCURACY)
	Long	-18000	18000	100th deg	INT	006002 LONGITUDE (COARSE ACCURACY)
	Scene Count	1	90		INT	005043 FIELD OF VIEW NUMBER
	Sea Ice Flag 0 = no ice 3 = ice 5 = ocean 6 = coast	-	0,3,5,6		INT	013040 SURFACE FLAG
	Surface Tag (as before)		-1,0,1,2, 3,4,5,6,7		INT	013040 SURFACE FLAG
	Channel Brightness Temps	-19500	6000	100th deg	INT	005042 CHANNEL NUMBER 022080 CENTRAL WAVEBAND FREQUENCY 012163 BRIGHTNESS TEMPERATURE
	Channel Brightness Temps (5x5, 5 x 4)	-19500	6000	100th deg	INT	005042 CHANNEL NUMBER 022080 CENTRAL WAVEBAND FREQUENCY 012163 BRIGHTNESS TEMPERATURE
	Rain Flag 1 (As before)		-1,0,1			020029 RAIN FLAG
	Rain Flag 2 (As before)		-1,0,1			020029 RAIN FLAG
	EDR Bit Flags (Environmental Data Record) –NOT CURRENTLY SET				INT	Dropped from BUFR

Record	Field	Min	Max	Accuracy	Type	BUFR Field
	Channel Brightness Temps					005042 CHANNEL NUMBER 022080 CENTRAL WAVEBAND FREQUENCY 012163 BRIGHTNESS TEMPERATURE
LAS Scene Data						
	Lat	-9000	9000	100th deg	INT	005002 LATITUDE (COARSE ACCURACY)
	Long	-18000	18000	100th deg	INT	006002 LONGITUDE (COARSE ACCURACY)
	Channel Brightness Temps	-19500	6000	100th deg	INT	005042 CHANNEL NUMBER 022080 CENTRAL WAVEBAND FREQUENCY 012163 BRIGHTNESS TEMPERATURE
	1000 mb Height -999 = undetermined	(-999) -500	500	1m	INT	008004 VERTICAL LOCATION PRESSURE 010002 HEIGHT
	Surface Tag (as before)		-1,0,1,2, 3,4,5,6,7		INT	013040 SURFACE FLAG
	Lower Temp Quality Flag	0	24		INT	Dropped from BUFR
	Lower Humidity Quality Flag.	0	137		INT	Dropped from BUFR
	Terrain Height -32768 = undetermined	(-32768) -400	7000	1m	INT	010001 HEIGHT OF LAND SURFACE
	Scene Number	1	60		INT	005043 FIELD OF VIEW NUMBER
UAS Scene Data						
	Lat	-9000	9000	100th deg	INT	005002 LATITUDE (COARSE ACCURACY)
	Long	-18000	18000	100th deg	INT	006002 LONGITUDE (COARSE ACCURACY)

Record	Field	Min	Max	Accuracy	Type	BUFR Field
	Channel Brightness Temps	-19500	6000	100th deg	INT	005042 CHANNEL NUMBER 022080 CENTRAL WAVEBAND FREQUENCY 012163 BRIGHTNESS TEMPERATURE
	Scene Number	1	30		INT	005043 FIELD OF VIEW NUMBER
	Temp Quality Flag	0	42		INT	Dropped from BUFR
	Geomagnetic Field	48400	450000	μTesla^2	INT	Dropped from BUFR
	B dot K (Dot product of geomagnetic field with propagation vector □Tesla^2 *100)	0	450000	μTesla^2	INT	Dropped from BUFR

4 BUFR FORMAT FOR FULL RESOLUTION SSMIS SDR PRODUCTS

4.1 Overview

There are four BUFR files produced per SSMIS SDR product, one for each of the four data streams – imager (IMG) channels, environmental (ENV) channels, lower atmospheric sounding channels (LAS) and upper atmospheric sounding (UAS) channels. This is due to the different information content in each of these streams.

Each message will contain the SDR data defined by 10 Scan Headers (the last message may contain less). This keeps the message sizes below the standard maximum size and also keeps the data from the 4 sub instruments aligned within the BUFR files e.g. message 15 in an IMAGER BUFR file will contain scan data that corresponds to the same set of 10 Scan Header Records as message 15 in the corresponding ENVIRO, LAS and UAS BUFR files.

4.2 Section 0 – Indicator Section

Octet Number	Description	Content
1-4	Start of message	BUFR
5-7	Length of message	-
8	BUFR edition	4

4.3 Section 1 – Identification Section

Octet Number	Description	Content
1 – 3	Length of section	-
4	BUFR master table	0
5 – 6	Originating centre	254 (EUMETSAT)
7 – 8	Originating sub-centre	0
9	Update sequence number	-
10	Presence of section 2 flag	0
11	Data category	3 (Vertical Soundings)
12	International data sub-category	255
13	Local data sub-category	222
14	Version number of master table	13
15	Version number of local tables	0
16 – 17	Year	-
18	Month	-
19	Day	-
20	Hour	-
21	Minute	-
22	Second	-
23 –	Reserved	-

4.4 Section 2 – Optional Section

Not used

4.5 Section 3 – Data Description Section

Octet Number	Description	Content
1 – 3	Length of section	-
4	Set to zero (reserved)	0
5 – 6	Number of data subsets	-
7	Flag (compression)	Bit 1 set (observed data) Bit 2 set (compressed data) Bit 6 – 8 unset
8 –	Collection of data descriptors	

4.5.1 Data Descriptors Section – IMG

F	X	Y	#	Data	Description	Notes
0	01	007	1	X	Satellite identification	
0	05	040	2	X	Orbit Number	
0	08	021	3	X	Time Significance	Start of Scan = 28
0	04	001	4	X	Year	
0	04	002	5	X	Month	
0	04	003	6	X	Day	
0	04	004	7	X	Hour	
0	04	005	8	X	Minute	
2	01	138	9		Change Data Width	Add Y-128 bits = +10 bits
2	02	131	10		Change Scale	Add Y-128 = +3
0	04	006	11	X	Milliseconds	Changed seconds to milliseconds
2	01	000	12		Reset Data Width	
2	02	000	13		Reset scale	
2	01	133	14		Change Data Width	Add Y-128 bits = +5 bits
0	05	041	15	X	Scan Number	Initialised from Scan Header Record and incremented by 1 for each Imager scan
2	01	000	16		Reset Data Width	
1	15	180	17		Replicate Next 15 Descriptors 180 times	
2	01	129	18		Change Data Width	Add Y-128 bits = +1 bits
0	05	043	19	X	Scene Number	
2	01	000	20		Reset Data Width	
0	05	002	21	X	Latitude	
0	06	002	22	X	Longitude	
0	13	040	23	X	Surface Flag	
0	20	029	24	X	Rain Flag	
1	07	006	25		Replicate Next 7 Descriptors 6 times	(1 x 1) Channels 8, 9, 10, 11, 17, 18

0	05	042	26	X	Channel Number	
2	01	136	27		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	28		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	29	X	Waveband Central Frequency	
2	02	000	30		Reset scale	
2	01	000	31		Reset Data Width	
0	12	163	32	X	Brightness Temperature	

Total Number Descriptors = 32
Total Data Elements in Message = 10 + (180*(5+(3*6)) = 4150

4.5.2 Data Descriptors Section – ENV

The format used will be the same for odd and even scans, with missing channel data being flagged

F	X	Y	#	Data	Description	Notes
0	01	007	1	X	Satellite identification	
0	05	040	2	X	Orbit Number	
0	08	021	3	X	Time Significance	Start of Scan = 28
0	04	001	4	X	Year	
0	04	002	5	X	Month	
0	04	003	6	X	Day	
0	04	004	7	X	Hour	
0	04	005	8	X	Minute	
2	01	138	9		Change Data Width	Add Y-128 bits = +10 bits
2	02	131	10		Change Scale	Add Y-128 = +3
0	04	006	11	X	Milliseconds	Changed seconds to milliseconds
2	01	000	12		Reset Data Width	
2	02	000	13		Reset scale	
2	01	133	14		Change Data Width	Add Y-128 bits = +5 bits
0	05	041	15	X	Scan Number	Initialised from Scan Header Record and incremented by 1 for each Enviro scan
2	01	000	16		Reset Data Width	
1	34	90	17		Replicate Next 34 Descriptors 90 times	
0	05	043	18	X	Scene Number	
0	05	002	19	X	Latitude	
0	06	002	20	X	Longitude	
0	08	012	21	X	Land/Sea Qualifier	Land = 0
0	13	040	22	X	Surface Flag	
0	08	012	25	X	Land/Sea Qualifier	Sea = 1
0	13	040	26	X	Sea Ice Flag	Uses same values as Surface Flag
0	08	012	27	X	Land/Sea Qualifier	Missing = 3
0	20	029	23	X	Rain Flag 1	
0	20	029	24	X	Rain Flag 2	
1	07	005	28		Replicate Next 7 Descriptors 5 times	(1 x 2) Channels 12, 13, 14, 15, 16
0	05	042	29	X	Channel Number	
2	01	136	30		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	31		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	32	X	Waveband Central Frequency	
2	02	000	33		Reset scale	
2	01	000	34		Reset Data Width	
0	12	163	35	X	Brightness Temperature	

F	X	Y	#	Data	Description	Notes
1	07	004	36		Replicate Next 7 Descriptors 4 times	(5x5) Channels 15, 16, 17 , 18
0	05	042	37	X	Channel Number	
2	01	136	38		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	39		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	40	X	Waveband Central Frequency	
2	02	000	41		Reset scale	
2	01	000	42		Reset Data Width	
0	12	163	43	X	Brightness Temperature	
1	07	002	44		Replicate Next 7 Descriptors 2 times	(5 x 4) Channels 17, 18
0	05	042	45	X	Channel Number	
2	01	136	46		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	47		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	48	X	Waveband Central Frequency	
2	02	000	49		Reset scale	
2	01	000	50		Reset Data Width	
0	12	163	51	X	Brightness Temperature	

Total Number Descriptors = 51
Total Data Elements in Message = 10+ 90*(10+(5x3)+(4x3)+(2x3)) = 3880

4.5.3 Data Descriptors Section – LAS

F	X	Y	#	Data	Description	Notes
0	01	007	1	X	Satellite identification	
0	05	040	2	X	Orbit Number	
0	08	021	3	X	Time Significance	Start of Scan = 28
0	04	001	4	X	Year	
0	04	002	5	X	Month	
0	04	003	6	X	Day	
0	04	004	7	X	Hour	
0	04	005	8	X	Minute	
2	01	138	9		Change Data Width	Add Y-128 bits = +10 bits
2	02	131	10		Change Scale	Add Y-128 = +3
0	04	006	11	X	Milliseconds	Changed seconds to milliseconds
2	01	000	12		Reset Data Width	
2	02	000	13		Reset scale	
2	01	133	14		Change Data Width	Add Y-128 bits = +5 bits
0	05	041	15	X	Scan Number	Initialised from Scan Header Record and incremented by 3 for each LAS scan
2	01	000	16		Reset Data Width	
1	25	60	17		Replicate Next 25 Descriptors 60 times	
0	05	043	18	X	Scene Number	
0	05	002	19	X	Latitude	
0	06	002	20	X	Longitude	
0	13	040	21	X	Surface Flag	
0	10	001	22	X	Height of Land Surface	
2	01	131	23		Change Data Width	Add Y-128 bits = +3 bits
0	07	004	24	X	Vertical Location - Pressure	100,000 = 1,000 hPa (mbar)
2	01	000	25		Reset Data Width	

0	10	002	26	X	Height of 1000 mb pressure level	
1	07	008	27		Replicate Next 7 Descriptors 8 times	(3 x 3) Channels 1, 2, 3, 4, 5, 6, 7, 24
0	05	042	28	X	Channel Number	
2	01	136	29		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	30		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	31	X	Waveband Central Frequency	
2	02	000	32		Reset scale	
2	01	000	33		Reset Data Width	
0	12	163	34	X	Brightness Temperature	
1	07	005	35		Replicate Next 7 Descriptors 5 times	(5x5) Channels 8, 9, 10, 11, 18
0	05	042	36	X	Channel Number	
2	01	136	37		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	38		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	39	X	Waveband Central Frequency	
2	02	000	40		Reset scale	
2	01	000	41		Reset Data Width	
0	12	163	42	X	Brightness Temperature	

Total Number Descriptors = 42
Total Data Elements in Message = 10+ 60*(7+(8x3)+(5x3))= 2770

4.5.4 Data Descriptors Section – UAS

F	X	Y	#	Data	Description	Notes
0	01	007	1	X	Satellite identification	
0	05	040	2	X	Orbit Number	
0	08	021	3	X	Time Significance	Start of Scan = 28
0	04	001	4	X	Year	
0	04	002	5	X	Month	
0	04	003	6	X	Day	
0	04	004	7	X	Hour	
0	04	005	8	X	Minute	
2	01	138	9		Change Data Width	Add Y-128 bits = +10 bits
2	02	131	10		Change Scale	Add Y-128 = +3
0	04	006	11	X	Milliseconds	Changed seconds to milliseconds
2	01	000	12		Reset Data Width	
2	02	000	13		Reset scale	
2	01	133	14		Change Data Width	Add Y-128 bits = +5 bits
0	05	041	15	X	Scan Number	Initialised from Scan Header Record and incremented by 6 for each UAS scan
2	01	000	16		Reset Data Width	
1	11	030	17		Replicate Next 11 Descriptors 30 times	
0	05	043	18	X	Scene Number	
0	05	002	19	X	Latitude	
0	06	002	20	X	Longitude	
1	07	006	21		Replicate Next 7 Descriptors 6 times	(6 x 6) Channels 19, 20, 21, 22, 23, 24
0	05	042	22	X	Channel Number	
2	01	136	23		Change Data Width	Add Y-128 bits = +8 bits. Width = 18
2	02	119	24		Change Scale	Add Y-128 = -9. Scale = -6
0	22	080	25	X	Waveband Central Frequency	
2	02	000	26		Reset scale	
2	01	000	27		Reset Data Width	
0	12	163	28	X	Brightness Temperature	

Total Number Descriptors = 28
Total Data Elements in Message = 10+ 30*(3+(6x3)) = 640

4.6 Section 4 – Data Section

Octet Number	Description	Content
1 – 3	Length of Data Section	-
4	Reserved	0
5 –	Binary data defined by sequence descriptors	-

4.7 Section 5 – End Section

Octet Number	Description	Content
1 – 4	End marker	7777

5 CURRENT LIMITATIONS

5.1 Limitations on Data Encoding

The default reference value for field 010002 “Height of 1000 mb pressure level” only allows the encoding of values down to -40m. The SSMIS SDR file format has a range down to -500m. Currently, values lower than -40m are flagged in the BUFR file as a missing data value.

5.2 Missing Data

The following data fields that appear in the SDR product are currently not in the BUFR product as there are no official WMO codes defined for them:

- Geomagnetic Field
- B dot K

6 BUFR FILE NAME CONVENTION

The SSMIS SDR product will produce four BUFR products for the four sub-instruments, IMAGER. ENVIRO, LAS and UAS.

The file names will follow the conventions for the Global Telecommunication System (GTS) specified in WMO 386 [Ref5] and be of the form:

```
W_XX-EUMETSAT-
Darmstadt,SOUNDING+SATELLITE,<sat_ID>+SSMIS_C_EUMS_<YYYYMMDDhhmmss>_<Ehhmm>_<sub_instrument>.bin
```

Where:

`<sat_ID>` is a string that identifies the satellite and will take the values `DMSPF16, DMSPF17`, etc.

`<YYYYMMDDhhmmss>` is the time of the first observation as year, month, day, hours, minutes and seconds. Information not available will be replaced by --.

`<Ehhmm>` is the end time of the SSMIS SDR product in hours and minutes (copied directly from the SDR product filename)

`<sub_instrument>` indicates which sub-instrument observations are in the message and will take the values `IMAGER, ENVIRO, LAS` or `UAS.`

Example file names:

```
W_XX-EUMETSAT-Darmstadt,SOUNDING+SATELLITE,DMSPF17+SSMIS_C_EUMS_201010111200--_E1230_IMAGER.bin

W_XX-EUMETSAT-Darmstadt,SOUNDING+SATELLITE,DMSPF17+SSMIS_C_EUMS_201010111200--_E1230_ENVIRO.bin

W_XX-EUMETSAT-Darmstadt,SOUNDING+SATELLITE,DMSPF17+SSMIS_C_EUMS_201010111200--_E1230_UAS.bin

W_XX-EUMETSAT-Darmstadt,SOUNDING+SATELLITE,DMSPF17+SSMIS_C_EUMS_201010111200--_E1230_LAS.bin
```