BUFR TABLES RELATIVE TO SECTION 3 *(Version 13) (updated 11 July 2007)*
(For full operational use on 7 November 2007)
BUFR Table B — Classification of elements

F	X	Class	Comments
0	00	BUFR table entries	
0	01	Identification	Identifies origin and type of data
0	02	Instrumentation	Defines instrument types used
0	03	Reserved	
0	04	Location (time)	Defines time and time derivatives
0	05	Location (horizontal – 1)	Defines geographical position, including horizontal derivatives, in association with class 06 (first dimension of horizontal space)
0	06	Location (horizontal – 2)	Defines geographical position, including horizontal derivatives, in association with class 05 (second dimension of horizontal space)
0	07	Location (vertical)	Defines height, altitude, pressure level, including vertical derivatives of position
0	08	Significance qualifiers	Defines special character of data
0	09	Reserved	
0	10	Vertical elements and pressure	Height, altitude, pressure and derivatives observed or measured, *not* defined as a vertical location
0	11	Wind and turbulence	Wind speed, direction, etc.
0	12	Temperature	
0	13	Hygrographic and hydrological elements	Humidity, rainfall, snowfall, etc.
0	14	Radiation and radiance	
0	15	Physical/chemical constituents	
0	19	Synoptic features	
0	20	Observed phenomena	Defines present/past weather, special phenomena, etc.
0	21	Radar data	
0	22	Oceanographic elements	
0	23	Dispersal and transport	
0	24	Radiological elements	
0	25	Processing information	
0	26	Non-coordinate location (time)	Defines time and time derivatives that are not coordinates
0	27	Non-coordinate location (horizontal – 1)	Defines geographical positions, in conjunction with class 28, that are not coordinates
0	28	Non-coordinate location (horizontal – 2)	Defines geographical positions, in conjunction with class 27, that are not coordinates
0	29	Map data	
0	30	Image	
0	31	Data description operator qualifiers	Elements used in conjunction with data description operators
0	33	Quality information	
0	35	Data monitoring	
0	40	Satellite data	

Notes:

(1) Where a code table or flag table is appropriate, "code table" or "flag table" respectively is entered in the UNITS column.

(2) The code tables and flag tables associated with Table B are numbered to correspond with the F, X and Y part of the table reference.

(3) To encode values into BUFR, the data (with units as specified in the UNITS column) must be multiplied by 10 to the power SCALE. Then subtract the REFERENCE VALUE to give the coded value found in Section 4 of the BUFR message. For example, a measured latitude is –45.76 degrees. The coarse accuracy descriptor is 0 05 002 and the encoded value is $-45.76 \times 10^2 - (-9000) = 4424$.

(4) Where UNITS are given as CCITT IA5, data shall be coded as character data left justified within the field width indicated using CCITT International Alphabet No. 5, and blank filled to the full field width indicated.

(5) Classes 48 to 63 are reserved for local use; all other classes are reserved for future development.

(6) Entries 192 to 255 within all classes are reserved for local use.

(7) The use of local descriptors, as defined in Notes (5) and (6), in messages intended for non-local or international exchange is strongly discouraged. They should be kept to the barest minimum possible and must also be by-passed by the use of descriptor 2 06 YYY.

(8) First-order statistics are included in Table B only when they are produced, as such, by the observing system.

(9)   In all flag tables within the BUFR specification, bits are numbered from 1 to N from the most significant to least significant within a data width of N bits, i.e. bit No.1 is the leftmost and bit No. N is the rightmost bit within the data width. The bit No. N (the least significant bit) is set to 1 only if all the bits are set to 1 within the data width of the flag table to represent a missing value.

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Class 00 - BUFR/CREX^(*) table entries

TABLE REFERENCE F X Y	TABLE ELEMENT NAME	BUFR				CREX		
		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0 00 001	Table A: entry	CCITT IA5	0	0	24	Character	0	3
0 00 002	Table A: data category description, line 1	CCITT IA5	0	0	256	Character	0	32
0 00 003	Table A: data category description, line 2	CCITT IA5	0	0	256	Character	0	32
0 00 004	BUFR/CREX Master table (see Note 2)	CCITT IA5	0	0	16	Character	0	2
0 00 005	BUFR/CREX edition number	CCITT IA5	0	0	24	Character	0	3
0 00 006	BUFR Master table Version number (see Note 3)	CCITT IA5	0	0	16	Character	0	2
0 00 007	CREX Master table Version number (see Note 4)	CCITT IA5	0	0	16	Character	0	2
0 00 008	BUFR Local table version number (see Note 5)	CCITT IA5	0	0	16	Character	0	2
0 00 010	F descriptor to be added or defined	CCITT IA5	0	0	8	Character	0	1
0 00 011	X descriptor to be added or defined	CCITT IA5	0	0	16	Character	0	2
0 00 012	Y descriptor to be added or defined	CCITT IA5	0	0	24	Character	0	3
0 00 013	Element name, line 1	CCITT IA5	0	0	256	Character	0	32
0 00 014	Element name, line 2	CCITT IA5	0	0	256	Character	0	32
0 00 015	Units name	CCITT IA5	0	0	192	Character	0	24
0 00 016	Units scale sign	CCITT IA5	0	0	8	Character	0	1
0 00 017	Units scale	CCITT IA5	0	0	24	Character	0	3
0 00 018	Units reference sign	CCITT IA5	0	0	8	Character	0	1
0 00 019	Units reference value	CCITT IA5	0	0	80	Character	0	10
0 00 020	Element data width	CCITT IA5	0	0	24	Character	0	3
0 00 030	Descriptor defining sequence	CCITT IA5	0	0	48	Character	0	6

Note : (1) For CREX descriptors F = B, not 0.
  (2) Master Tables are described in Note (2) to Section 1 of the BUFR regulations.
  (3) BUFR Master Table Version Numbers are described in Notes (2) and (4) to Section 1 of the BUFR regulations for edition 3, and in Notes (2) and (5) to Section 1 of the BUFR regulations for edition 4.
  (4) CREX Master Table Version Numbers are described in Note (1) to Section 1 of the CREX regulations.
  (5) Local Table version number (see Note (2) to Section 1 of the BUFR regulations.

Class 01 - Identification

TABLE REFERENCE F	X	Y	TABLE ELEMENT NAME	BUFR UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	CREX UNIT	SCALE	DATA WIDTH (Characters)
0	01	001	WMO block number	Numeric	0	0	7	Numeric	0	2
0	01	002	WMO station number	Numeric	0	0	10	Numeric	0	3
0	01	003	WMO Region number/geographical area	Code table	0	0	3	Code table	0	1
0	01	004	WMO Region sub-area (see Note 9)	Numeric	0	0	3	Numeric	0	1
0	01	005	Buoy/platform identifier	Numeric	0	0	17	Numeric	0	5
0	01	006	Aircraft flight number	CCITT IA5	0	0	64	Character	0	8
0	01	007	Satellite identifier	Code table	0	0	10	Code table	0	4
0	01	008	Aircraft registration number or other identification	CCITT IA5	0	0	64	Character	0	8
0	01	009	Type of commercial aircraft	CCITT IA5	0	0	64	Character	0	8
0	01	010	Stationary buoy platform identifier; e.g. C-MAN buoys	CCITT IA5	0	0	64	Character	0	8
0	01	011	Ship or mobile land station identifier	CCITT IA5	0	0	72	Character	0	9
0	01	012	Direction of motion of moving observing platform**	Degree true	0	0	9	Degree true	0	3
0	01	013	Speed of motion of moving observing platform**	m s^{-1}	0	0	10	m s^{-1}	0	3
0	01	014	Platform drift speed (high precision)	m s^{-1}	2	0	10	m s^{-1}	2	4
0	01	015	Station or site name	CCITT IA5	0	0	160	Character	0	20
0	01	018	Short station or site name	CCITT IA5	0	0	40	Character	0	5
0	01	019	Long Station or site name	CCITT IA5	0	0	256	Character	0	32
0	01	020	WMO Region sub-area	Numeric	0	0	4	Numeric	0	2
0	01	021	Synoptic feature identifier	Numeric	0	0	14	Numeric	0	4
0	01	022	Name of feature (see Note 11)	CCITT IA5	0	0	224	Character	0	28
0	01	023	Observation sequence number	Numeric	0	0	9	Numeric	0	3
0	01	025	Storm identifier	CCITT IA5	0	0	24	Character	0	3
0	01	026	WMO storm name*	CCITT IA5	0	0	64	Character	0	8

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* Descriptor 0 01 027 should be used instead of 0 01 026 to encode this element.

** Descriptors 0 01 012 and 0 01 013 may relate to parameters of various meanings and the corresponding values may be integrated on different periods.

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	01	027	WMO long storm name	CCITT IA5	0	0	80	Character	0	10
0	01	030	Numerical model identifier (see Note 13)	CCITT IA5	0	0	128	Character	0	16
0	01	031	Identification of originating/generating centre (see Note 10)	Code table	0	0	16	Code table	0	5
0	01	032	Generating application	Code table defined by originating/ generating centre (Notes (3), (4) and (5))	0	0	8	Code table	0	3
0	01	033	Identification of originating/generating centre	Code table	0	0	8	Code table	0	3
0	01	034	Identification of originating/generating sub-centre	Code table	0	0	8	Code table	0	3
0	01	035	Originating Centre	Common Code Table C-11	0	0	16	Common Code Table C-11	0	5
0	01	036	Agency in charge of operating the Observing platform	Code table	0	0	20	Code table	0	7
0	01	037	SIGMET sequence identifier	CCITT IA5	0	0	24	Character	0	3
0	01	041	Absolute platform velocity – first component (see Note 6)	m s^{-1}	5	–1073741824	31	m s^{-1}	5	10
0	01	042	Absolute platform velocity – second component (see Note 6)	m s^{-1}	5	–1073741824	31	m s^{-1}	5	10
0	01	043	Absolute platform velocity – third component (see Note 6)	m s^{-1}	5	–1073741824	31	m s^{-1}	5	10
0	01	050	Platform transmitter ID number	Numeric	0	0	17	Numeric	0	6
0	01	051	Platform transmitter ID number	CCITT IA5	0	0	96	Character	0	12
0	01	060	Aircraft reporting point (Beacon identifier)	CCITT IA5	0	0	64	Character	0	8
0	01	062	Short ICAO location indicator	CCITT IA5	0	0	32	Character	0	4
0	01	063	ICAO location indicator	CCITT IA5	0	0	64	Character	0	8
0	01	064	Runway designator	CCITT IA5	0	0	32	Character	0	4
0	01	065	ICAO region identifier	CCITT IA5	0	0	256	Character	0	32
0	01	075	Tide station identification	CCITT IA5	0	0	40	Character	0	5
0	01	080	Ship line number according to SOOP	CCITT IA5	0	0	32	Character	0	4
0	01	081	Radiosonde serial number	CCITT IA5	0	0	160	Character	0	20
0	01	082	Radiosonde ascension number (see Note 12)	Numeric	0	0	14	Numeric	0	4
0	01	083	Radiosonde release number (see Note 12)	Numeric	0	0	3	Numeric	0	1
0	01	085	Observing platform manufacturer's model	CCITT IA5	0	0	160	Character	0	20

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	01	086	Observing platform manufacturer's serial number	CCITT IA5	0	0	256	Character	0	32
0	01	087	WMO Marine observing platform extended identifier	Numeric	0	0	23	Numeric	0	7
0	01	090	Technique for making up initial perturbations	Code table	0	0	8	Code table	0	3
0	01	091	Ensemble member number	Numeric	0	0	10	Numeric	0	4
0	01	092	Type of ensemble forecast	Code table	0	0	8	Code table	0	3
0	01	093	Balloon lot number	CCITT IA5	0	0	96	Character	0	12
0	01	094	WBAN Number	Numeric	0	0	17	Numeric	0	5
0	01	095	Observer identification	CCITT IA5	0	0	32	Character	0	4
0	01	096	Station acquisition	CCITT IA5	0	0	160	Character	0	20

Notes:

(1)   The storm identifier (descriptor 0 01 025) has the following meaning: the first two characters shall be a numeric sequence number assigned by the originator of the message; the third character is a letter indicating the ocean basin where the storm is located, as follows:

W   NW Pacific Ocean
E   NE Pacific Ocean to 140°W
C   NE Pacific Ocean 140°W – 180°W
L   N Atlantic Ocean, including Caribbean and Gulf of Mexico
A   N Arabian Sea
B   Bay of Bengal
S   S Indian Ocean
P   S Pacific Ocean
F   RSMC Nadi's zone in South Pacific
U   Australia
O   South China Sea
T   East China Sea

There is no requirement that differing observers coordinate sequence numbers even though they both may be reporting the same storm.

(2)   WMO storm name (descriptor 0 01 027): the storm name NAMELESS shall be used in those cases where an identifiable tropical disturbance has not reached tropical storm strength and has not been assigned an official name.

(3)   Where a centre other than the originating centre generates quality information, replacement or substitute values, and/or statistical information, the centre may be indicated by using 0 01 033.

(4)   A generating centre may wish to indicate a reference to the application that generated quality information, etc.; it may use descriptor 0 01 032 for this purpose. However, the corresponding code tables will vary from centre to centre.

(5)   Code table 0 01 032 is to be generated by each centre.

(6)   The components of absolute platform velocity (0 01 041, 0 01 042, 0 01 043) are defined as follows:

–   First component: From the Earth's centre to 0 degree longitude at the Equator: velocity of the platform along this line relative to the Earth's centre.

–   Second component: From the Earth's centre to 90 degrees East longitude at the Equator: velocity of the platform along this line relative to the Earth's centre.

–   Third component: From the Earth's centre to the North Pole: velocity of the platform along this line relative to the Earth's centre.

(7)   The values for descriptors 0 01 041, 0 01 042 and 0 01 043 have been chosen to be suitable for polar orbiting satellites in approximately Sun-synchronous orbits. Geostationary orbits would require greater data widths for distance and slightly less for speed.

(8)   Left handed xyz axes have been chosen for descriptors 0 01 041, 0 01 042 and 0 01 043.

(9)   Descriptor 0 01 020 should be used instead of 0 01 004 for encoding this element.

(10)   Descriptor 0 01 033 shall be used instead of descriptor 0 01 031 for encoding originating/generating centre. Code table 0 01 034 is to be established by the associated originating/generating centre identified by descriptor 0 01 033 and provided to the Secretariat for publication.

(11)   For 0 01 022, the character string representing the "Name of feature" should be of the form: "Type of phenomenon" – "Location or geographical name" (e.g.: "volcano – Popocatepetl", "oil fire – Kuwait")

(12)   Descriptor 0-01-082 is to be used for reporting the sequential number of the current radiosonde reporting period (e.g. synoptic cycle) within a given year or other similar locally-defined length of time. Descriptor 0-01-083 is to be used in the case of multiple sequential radiosonde releases during a single reporting period (e.g. synoptic cycle), in order to indicate which particular release generated the corresponding data values.

(13)   The value of this feature could be a string of characters, which contains the name of the model and other useful elements such as the model mesh.

Class 02 - Instrumentation

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
				UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
F	X	Y								
0	02	001	Type of station	Code table	0	0	2	Code table	0	1
0	02	002	Type of instrumentation for wind measurement	Flag table	0	0	4	Flag table	0	2
0	02	003	Type of measuring equipment used	Code table	0	0	4	Code table	0	2
0	02	004	Type of instrumentation for evaporation measurement or type of crop for which evapotranspiration is reported	Code table	0	0	4	Code table	0	2
0	02	005	Precision of temperature observation	K	2	0	7	K	2	3
0	02	011	Radiosonde type	Code table	0	0	8	Code table	0	3
0	02	012	Radiosonde computational method	Code table	0	0	4	Code table	0	2
0	02	013	Solar and infrared radiation correction	Code table	0	0	4	Code table	0	2
0	02	014	Tracking technique/status of system used	Code table	0	0	7	Code table	0	3
0	02	015	Radiosonde completeness	Code table	0	0	4	Code table	0	2
0	02	016	Radiosonde configuration	Flag table	0	0	5	Flag table	0	2
0	02	019	Satellite instruments	Code table	0	0	11	Code table	0	4
0	02	020	Satellite classification	Code table	0	0	9	Code table	0	3
0	02	021	Satellite instrument data used in processing[*]	Flag table	0	0	9	Flag table	0	3
0	02	022	Satellite data-processing technique used	Flag table	0	0	8	Flag table	0	3
0	02	023	Satellite derived wind computation method	Code table	0	0	4	Code table	0	2
0	02	024	Integrated mean humidity computational method	Code table	0	0	4	Code table	0	2
0	02	025	Satellite channel(s) used in computation	Flag table	0	0	25	Flag table	0	9
0	02	026	Cross track resolution	m	2	0	12	m	2	4
0	02	027	Along track resolution	m	2	0	12	m	2	4
0	02	028	Segment size at nadir in X direction	m	0	0	18	m	0	6
0	02	029	Segment size at nadir in Y direction	m	0	0	18	m	0	6
0	02	030	Method of current measurement	Code table	0	0	3	Code table	0	1
0	02	031	Duration and time of current measurement	Code table	0	0	5	Code table	0	2
0	02	032	Indicator for digitization	Code table	0	0	2	Code table	0	1
0	02	033	Method of salinity/depth measurement	Code table	0	0	3	Code table	0	1
0	02	034	Drogue type	Code table	0	0	5	Code table	0	2
0	02	035	Cable length	m	0	0	9	m	0	3
0	02	036	Buoy type	Code table	0	0	2	Code table	0	1
0	02	037	Method of tidal observation	Code table	0	0	3	Code table	0	1
0	02	038	Method of water temperature and/or salinity measurement	Code table	0	0	4	Code table	0	2

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[*] Note: Descriptor 0 02 152 should be used instead of 0 02 021 for encoding this element.

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	02	039	Method of wet-bulb temperature measurement	Code table	0	0	3	Code table	0	1
0	02	040	Method of removing velocity and motion of platform from current	Code table	0	0	4	Code table	0	2
0	02	041	Method for estimating reports related to synoptic features	Code table	0	0	6	Code table	0	2
0	02	042	Indicator for sea surface current speed	Code table	0	0	2	Code table	0	1
0	02	044	Indicator for method of calculating spectral wave data	Code table	0	0	4	Code table	0	2
0	02	045	Indicator for type of platform	Code table	0	0	4	Code table	0	2
0	02	046	Wave measurement instrumentation	Code table	0	0	4	Code table	0	2
0	02	048	Satellite sensor indicator	Code table	0	0	4	Code table	0	2
0	02	049	Geostationary satellite data-processing technique used	Flag table	0	0	8	Flag table	0	3
0	02	050	Geostationary sounder satellite channels used	Flag table	0	0	20	Flag table	0	7
0	02	051	Indicator to specify observing method for extreme temperatures	Code table	0	0	4	Code table	0	2
0	02	052	Geostationary imager satellite channels used	Flag table	0	0	6	Flag table	0	2
0	02	053	GOES-I/M brightness temperature characteristics	Code table	0	0	4	Code table	0	2
0	02	054	GOES-I/M soundings parameter characteristics	Code table	0	0	4	Code table	0	2
0	02	055	Geostationary soundings statistical parameters	Code table	0	0	4	Code table	0	2
0	02	056	Geostationary soundings accuracy statistics	Code table	0	0	4	Code table	0	2
0	02	057	Origin of first guess information for GOES-I/M soundings	Code table	0	0	4	Code table	0	2
0	02	058	Valid times of first guess information for GOES-I/M soundings	Code table	0	0	4	Code table	0	2
0	02	059	Origin of analysis information for GOES-I/M soundings	Code table	0	0	4	Code table	0	2
0	02	060	Origin of surface information for GOES-I/M soundings	Code table	0	0	4	Code table	0	2
0	02	061	Aircraft navigational system	Code table	0	0	3	Code table	0	1
0	02	062	Type of aircraft data relay system	Code table	0	0	4	Code table	0	2
0	02	063	Aircraft roll angle	Degree	2	–18000	16	Degree	2	5
0	02	064	Aircraft roll angle quality	Code table	0	0	2	Code table	0	1
0	02	065	ACARS ground receiving station	CCITT IA5	0	0	40	Character	0	5
0	02	066	Radiosonde ground receiving system	Code table	0	0	6	Code table	0	2
0	02	067	Radiosonde operating frequency	Hz	-5	0	15	Hz	-5	5
0	02	070	Original specification of latitude/longitude	Code table	0	0	4	Code table	0	2
0	02	080	Balloon manufacturer	Code table	0	0	6	Code table	0	2
0	02	081	Type of balloon	Code table	0	0	5	Code table	0	2
0	02	082	Weight of balloon	Kg	3	0	12	Kg	3	4
0	02	083	Type of balloon shelter	Code table	0	0	4	Code table	0	2

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	CREX SCALE	DATA WIDTH (Characters)
0	02	084	Type of gas used in balloon	Code table	0	0	4	Code table	0	2
0	02	085	Amount of gas used in balloon	Kg	3	0	13	Kg	3	4
0	02	086	Balloon flight train length	m	1	0	10	m	1	4
0	02	091	Entry sensor 4/20 mA	A	4	0	10	A	4	3
0	02	095	Type of pressure sensor	Code table	0	0	5	Code table	0	2
0	02	096	Type of temperature sensor	Code table	0	0	5	Code table	0	2
0	02	097	Type of humidity sensor	Code table	0	0	5	Code table	0	2
0	02	100	Radar constant[*]	dB	1	0	12	dB	1	4
0	02	101	Type of antenna	Code table	0	0	4	Code table	0	2
0	02	102	Antenna height above tower base	m	0	0	8	m	0	3
0	02	103	Radome	Flag table	0	0	2	Flag table	0	1
0	02	104	Antenna polarisation	Code table	0	0	4	Code table	0	2
0	02	105	Maximum antenna gain	dB	0	0	6	dB	0	2
0	02	106	3-dB beamwidth	Degree	1	0	6	Degree	1	2
0	02	107	Sidelobe suppression	dB	0	0	6	dB	0	2
0	02	108	Crosspol discrimination (on axis)	dB	0	0	6	dB	0	2
0	02	109	Antenna speed (azimuth)	Degree s^{-1}	2	0	12	Degree s-1	2	4
0	02	110	Antenna speed (elevation)	Degree s^{-1}	2	0	12	Degree s-1	2	4
0	02	111	Radar incidence angle	Degree	1	0	10	Degree	1	4
0	02	112	Radar look angle	Degree	1	0	12	Degree	1	4
0	02	113	Number of azimuth looks	Numeric	0	0	4	Numeric	0	2
0	02	114	Antenna effective surface area	m^2	0	0	15	m^2	0	5
0	02	115	Type of surface observing equipment	Code table	0	0	5	Code table	0	2
0	02	116	Percentage of 320 MHZ band processed	%	0	0	7	%	0	3
0	02	117	Percentage of 80 MHZ band processed	%	0	0	7	%	0	3
0	02	118	Percentage of 20 MHZ band processed	%	0	0	7	%	0	3
0	02	119	RA-2 instrument operations	Code table	0	0	3	Code table	0	1
0	02	120	Ocean wave frequency	Hz	3	0	10	Hz	3	4
0	02	121	Mean frequency	Hz	–8	0	7	Hz	-8	3
0	02	122	Frequency agility range	Hz	–6	–128	8	Hz	-6	3
0	02	123	Peak power	W	–4	0	7	W	-4	3
0	02	124	Average power	W	–1	0	7	W	-1	3
0	02	125	Pulse repetition frequency	Hz	–1	0	8	Hz	-1	3
0	02	126	Pulse width	s	7	0	6	s	7	2
0	02	127	Receiver intermediate frequency	Hz	–6	0	7	Hz	-6	3

Note: ([*]) This constant is defined as follows: $Z = P$ + radar constant where Z = the reflectivity of target in beam direction (dBZ); P = the input receiver power above 1 mW (dBm). This constant is used to normalize the signal to the equivalent 100 km range.

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	02	128	Intermediate frequency bandwidth	Hz	–5	0	6	Hz	-5	2
0	02	129	Minimum detectable signal	dB	0	–150	5	dB	0	3
0	02	130	Dynamic range	dB	0	0	7	dB	0	3
0	02	131	Sensitivity time control (STC)	Flag table	0	0	2	Flag table	0	1
0	02	132	Azimuth pointing accuracy	Degree	2	0	6	Degree	2	2
0	02	133	Elevation pointing accuracy	Degree	2	0	6	Degree	2	2
0	02	134	Antenna beam azimuth	Degree	2	0	16	Degree	2	5
0	02	135	Antenna elevation	Degree	2	–9000	15	Degree	2	5
0	02	136	Range processed by range attenuation correction	m	–3	0	16	m	-3	5
0	02	140	Satellite radar beam azimuth angle	Degree	0	0	9	Degree	0	3
0	02	141	Measurement type	CCITT IA5	0	0	24	Character	0	3
0	02	142	Ozone instrument serial number/ identification	CCITT IA5	0	0	32	Character	0	4
0	02	143	Ozone instrument type	Code table	0	0	7	Code table	0	3
0	02	144	Light source type for Brewer spectro photometer	Code table	0	0	4	Code table	0	2
0	02	145	Wave length setting for Dobson instruments	Code table	0	0	4	Code table	0	2
0	02	146	Source conditions for Dobson instruments	Code table	0	0	4	Code table	0	2
0	02	148	Data collection and/or location system	Code table	0	0	5	Code table	0	2
0	02	149	Type of data buoy	Code table	0	0	6	Code table	0	2
0	02	150	TOVS/ATOVS/AVHRR instrumentation channel number	Code table	0	0	6	Code table	0	2
0	02	151	Radiometer identifier	Code table	0	0	11	Code table	0	4
0	02	152	Satellite instrument used in data processing[6]	Flag table	0	0	31	Flag table	0	10
0	02	153	Satellite channel centre frequency	Hz	–8	0	26	Hz	-8	8
0	02	154	Satellite channel band width	Hz	–8	0	26	Hz	-8	8
0	02	156	Percentage of valid KU ocean retracker measurements	%	0	0	7	%	0	3
0	02	157	Percentage of valid S ocean retracker measurements	%	0	0	7	%	0	3
0	02	158	RA-2 instrument	Flag table	0	0	9	Flag table	0	3
0	02	159	MWR instrument	Flag table	0	0	8	Flag table	0	3
0	02	160	Wave length of the radar	Code table	0	0	4	Code table	0	2
0	02	163	Height assignment method	Code table	0	0	4	Code table	0	2
0	02	164	Tracer correlation method	Code table	0	0	3	Code table	0	1
0	02	166	Radiance type	Code table	0	0	4	Code table	0	2
0	02	167	Radiance computational method	Code table	0	0	4	Code table	0	2
0	02	168	Hydrostatic pressure of lower end of cable (thermistor string)	Pa	-3	0	16	KPa	0	5
0	02	169	Anemometer type	Code table	0	0	4	Code table	0	2
0	02	173	Square of the off nadir angle [7]	Degree^2	4	0	10	Degree^2	4	4
0	02	174	Mean across track pixel number	Numeric	0	0	9	Numeric	0	3

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	02	175	Method of precipitation measurement	Code table	0	0	4	Code table	0	2
0	02	176	Method of state of ground measurement	Code table	0	0	4	Code table	0	2
0	02	177	Method of snow depth measurement	Code table	0	0	4	Code table	0	2
0	02	178	Method of liquid content measurement of precipitation	Code table	0	0	4	Code table	0	2
0	02	179	Type of sky condition algorithm	Code table	0	0	4	Code table	0	2
0	02	180	Main present weather detecting system	Code table	0	0	4	Code table	0	2
0	02	181	Supplementary present weather sensor	Flag table	0	0	21	Flag table	0	7
0	02	182	Visibility measurement system	Code table	0	0	4	Code table	0	2
0	02	183	Cloud detection system	Code table	0	0	4	Code table	0	2
0	02	184	Type of lightning detection sensor	Code table	0	0	4	Code table	0	2
0	02	185	Method of evaporation measurement	Code table	0	0	4	Code table	0	2
0	02	186	Capability to detect precipitation phenomena	Flag table	0	0	30	Flag table	0	10
0	02	187	Capability to detect other weather phenomena	Flag table	0	0	18	Flag table	0	6
0	02	188	Capability to detect obscuration	Flag table	0	0	21	Flag table	0	7
0	02	189	Capability to discriminate lightning strikes	Flag table	0	0	12	Flag table	0	4
0	02	172	Product type for retrieved atmospheric gases	Code table	0	0	8	Code table	0	3
0	02	190	Lagrangian drifter submergence (% time submerged)	%	0	0	7	%	0	3

Notes:

(1)   This class shall contain elements to describe the instrumentation used to obtain the meteorological elements reported.

(2)   This class may also contain elements relating to observational procedures.

(3)   Some indication of expected accuracy may be implied in conjunction with certain elements in this class.

(4)   Note that descriptor 0 02 140 is the Azimuth angle measured anticlockwise from satellite heading vector.

(5)   In descriptor 0 02 142: Ozone instrument serial number/identification is four characters long. For Japanese Dobsons instruments, omit the leading digit(s).

(6)   Descriptor 0 02 019 should be used instead of descriptor 0 02 152 for single satellite instrument identification.

Class 04 - Location (time)

| TABLE REFERENCE | | | TABLE ELEMENT NAME | BUFR | | | | CREX | | |
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	04	001	Year	Year	0	0	12	Year	0	4
0	04	002	Month	Month	0	0	4	Month	0	2
0	04	003	Day	Day	0	0	6	Day	0	2
0	04	004	Hour	Hour	0	0	5	Hour	0	2
0	04	005	Minute	Minute	0	0	6	Minute	0	2
0	04	006	Second	Second	0	0	6	Second	0	2
0	04	007	Seconds within a minute (microsecond accuracy)	Second	6	0	26	S	6	8
0	04	011	Time increment	Year	0	–1024	11	Year	0	4
0	04	012	Time increment	Month	0	–1024	11	Month	0	4
0	04	013	Time increment	Day	0	–1024	11	Day	0	4
0	04	014	Time increment	Hour	0	–1024	11	Hour	0	4
0	04	015	Time increment	Minute	0	–2048	12	Minute	0	4
0	04	016	Time increment	Second	0	–4096	13	Second	0	4
0	04	017	Reference time period for accumulated or extreme data	Minute	0	-1440	12	Minute	0	4
0	04	021	Time period or displacement	Year	0	–1024	11	Year	0	4
0	04	022	Time period or displacement	Month	0	–1024	11	Month	0	4
0	04	023	Time period or displacement	Day	0	–1024	11	Day	0	4
0	04	024	Time period or displacement	Hour	0	–2048	12	Hour	0	4
0	04	025	Time period or displacement	Minute	0	–2048	12	Minute	0	4
0	04	026	Time period or displacement	Second	0	–4096	13	Second	0	4
0	04	031	Duration of time relating to following value	Hour	0	0	8	Hour	0	3
0	04	032	Duration of time relating to following value	Minute	0	0	6	Minute	0	2
0	04	041	Time difference, UTC –LMT (see Note 6)	Minute	0	–1440	12	Minute	0	4
0	04	043	Day of the year	Day	0	0	9	Day	0	3
0	04	051	Principal time of daily reading of maximum temperature	Hour	0	0	5	Hour	0	2
0	04	052	Principal time of daily reading of minimum temperature	Hour	0	0	5	Hour	0	2
0	04	053	Number of days with precipitation equal to or more than 1 mm	Numeric	0	0	6	Numeric	0	2
0	04	059	Times of observation used to compute the reported mean values	Flag table	0	0	6	Flag table	0	2
0	04	065	Short time increment	Minute	0	-128	8	Minute	0	2
0	04	073	Short time period or displacement	Day	0	-128	8	Day	0	2

0	04	074	Short time period or displacement	Hour	0	-128	8	Hour	0	2
0	04	075	Short time period or displacement	Minute	0	-128	8	Minute	0	2
0	04	080	Averaging period for following value	Code table	0	0	4	Code table	0	2
0	04	086	Long time period or displacement	Second	0	-8192	15	Second	0	5

Notes:

(1)   The significance of time periods or displacements may be indicated using the time significance code corresponding to table reference 0 08 021.

(2)   Where more than one time period or displacement is required to define complex time structures, they shall be defined in immediate succession, and the following ordering shall apply: ensemble period (if required), followed by forecast period (if required), followed by period for averaging or accumulation (if required).

(3)   Time periods or displacements and time increments require an initial time location to be defined prior to their use, followed where appropriate by a time significance definition.

(4)   The time location, when used with forecast values, shall indicate the time of the initial state for the forecast, or the beginning of the forecast period; when used with ensemble means of forecast values, the time location shall indicate the initial state or the beginning of the first forecast over which ensemble means are derived.

(5)   Negative time periods or displacements shall be used to indicate time periods or displacements preceding the currently defined time.

(6)   Descriptor 0 04 041 has been replaced by the combination of 0 08 025 and 0 26 003 and should not be used for encoding this element.

(7)   All times are Universal Time Coordinated (UTC) unless otherwise noted.

Class 05 - Location (horizontal -1)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	05	001	Latitude (high accuracy)	Degree	5	–9000000	25	Degree	5	7
0	05	002	Latitude (coarse accuracy)	Degree	2	–9000	15	Degree	2	4
0	05	011	Latitude increment (high accuracy)	Degree	5	–9000000	25	Degree	5	7
0	05	012	Latitude increment (coarse accuracy)	Degree	2	–9000	15	Degree	2	4
0	05	015	Latitude displacement (high accuracy)	Degree	5	-9000000	25	Degree	5	7
0	05	016	Latitude displacement (coarse accuracy)	Degree	2	-9000	15	Degree	2	4
0	05	021	Bearing or azimuth	Degree true	2	0	16	Degree true	2	5
0	05	022	Solar azimuth	Degree true	2	0	16	Degree true	2	5
0	05	023	Sun to satellite azimuth difference	Degree	1	-1800	12	Degree	1	4
0	05	030	Direction (spectral)	Degree	0	0	12	Degree	0	4
0	05	031	Row number	Numeric	0	0	12	Numeric	0	4
0	05	033	Pixel size on horizontal – 1	m	–1	0	16	m	-1	5
0	05	034	Along track row number	Numeric	0	0	11	Numeric	0	4
0	05	036	Ship transect number according to SOOP	Numeric	0	0	7	Numeric	0	2
0	05	040	Orbit number	Numeric	0	0	24	Numeric	0	8
0	05	041	Scan line number	Numeric	0	0	8	Numeric	0	3
0	05	042	Channel number	Numeric	0	0	6	Numeric	0	2
0	05	043	Field of view number	Numeric	0	0	8	Numeric	0	3
0	05	044	Satellite cycle number	Numeric	0	0	11	Numeric	0	4
0	05	052	Channel number increment	Numeric	0	0	5	Numeric	0	2
0	05	053	Field of view number increment	Numeric	0	0	5	Numeric	0	2
0	05	060	Y angular position from centre of gravity	Degree	6	-8000000	24	Degree	6	8
0	05	061	Z angular position from centre of gravity	Degree	6	-8000000	24	Degree	6	8

Notes:

(1)   Values of latitude and latitude increments are limited to the range –90 degrees to +90 degrees.

(2)   South latitude shall be assigned negative values.

(3)   North to south increments shall be assigned negative values.

(4)   Bearing or azimuth shall only be used with respect to a stated location, and shall not redefine that location.

(5)   The Pixel size on horizontal – 1 is given at location where map scale factor is unity.

Class 06 - Location (horizontal - 2)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
				UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
F	X	Y								
0	06	001	Longitude (high accuracy)	Degree	5	–18000000	26	Degree	5	8
0	06	002	Longitude (coarse accuracy)	Degree	2	–18000	16	Degree	2	5
0	06	011	Longitude increment (high accuracy)	Degree	5	–18000000	26	Degree	5	8
0	06	012	Longitude increment (coarse accuracy)	Degree	2	–18000	16	Degree	2	5
0	06	015	Longitude displacement (high accuracy)	Degree	5	-18000000	26	Degree	5	8
0	06	016	Longitude displacement (coarse accuracy)	Degree	2	-18000	16	Degree	2	5
0	06	021	Distance	m	–1	0	13	m	-1	4
0	06	030	Wave number (spectral)	rad m^{-1}	5	0	13	rad m^{-1}	5	4
0	06	031	Column number	Numeric	0	0	12	Numeric	0	4
0	06	033	Pixel size on horizontal – 2	m	–1	0	16	m	-1	5
0	06	034	Cross-track cell number	Numeric	0	0	7	Numeric	0	3
0	06	040	Radius of confidence	m	0	0	13	m	0	4

Notes:
(1)   Values of longitude are limited to the range –180 degrees to +180 degrees.
(2)   West longitude shall be assigned negative values.
(3)   East to west increments shall be assigned negative values.
(4)   Distance shall only be used with respect to a stated location and a bearing, azimuth or elevation; it shall not redefine that location.
(5)   The Pixel size on horizontal – 2 is given at location where map scale factor is unity.

Class 07 - Location (vertical)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
				UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
F	X	Y								
0	07	001	Height of station (see Note 1)	m	0	–400	15	m	0	5
0	07	002	Height or altitude	m	–1	–40	16	m	-1	5
0	07	003	Geopotential	$m^2\,s^{-2}$	–1	–400	17	$m^2\,s^{-2}$	-1	6
0	07	004	Pressure	Pa	–1	0	14	Pa	-1	5
0	07	005	Height increment	m	0	–400	12	m	0	4
0	07	006	Height above station	m	0	0	15	m	0	5
0	07	007	Height	m	0	–1000	17	m	0	6
0	07	008	Geopotential	$m^2\,s^{-2}$	0	–10000	20	$m^2\,s^{-2}$	0	7
0	07	009	Geopotential height	gpm	0	–1000	17	gpm	0	5
0	07	010	Flight level	m	0	-1024	16	ft	-1	5
0	07	021	Elevation (see Note 2)	Degree	2	–9000	15	Degree	2	5
0	07	022	Solar elevation	Degree	2	–9000	15	Degree	2	5
0	07	024	Satellite zenith angle	Degree	2	–9000	15	Degree	2	5
0	07	025	Solar zenith angle	Degree	2	–9000	15	Degree	2	5
0	07	026	Satellite zenith angle	Degree	4	-900000	21	Degree	4	7
0	07	030	Height of station ground above mean sea level (see Note 3)	m	1	- 4000	17	m	1	5
0	07	031	Height of barometer above mean sea level (see Note 4)	m	1	- 4000	17	m	1	5
0	07	032	Height of sensor above local ground (or deck of marine platform) (see Note 5)	m	2	0	16	m	2	5
0	07	033	Height of sensor above water surface (see Note 6)	m	1	0	12	m	1	4
0	07	040	Impact parameter (see Note 8)	m	1	62000000	22	m	1	8
0	07	061	Depth below land surface	m	2	0	14	m	2	5
0	07	062	Depth below sea/water surface	m	1	0	17	m	1	6
0	07	063	Depth below sea/water surface (cm)	m	2	0	20	m	2	7
0	07	064	Representative height of sensor above station (see Note 7)	m	0	0	4	m	0	2
0	07	065	Water pressure	Pa	-3	0	17	Pa	-3	6
0	07	070	Drogue depth	m	0	0	10	m	0	4

Notes:

(1)   Regarding data from ground based stations, this descriptor should be used for archived data only. Descriptors 0 07 030 and 0 07 031 should be used and preferred to represent ground elevation and elevation of barometer, respectively, as defined in Observing Stations, WMO Publication No. 9, Volume A1. Regarding marine stations, this descriptor refers to the height above mean sea level of the deck of marine platform where the instruments stand.

(2)   Elevation shall only be used with respect to a stated location and a bearing, azimuth or distance; it shall not redefine that location.

(3)   Height of station ground above mean sea level is defined as the height above mean sea-level of the ground on which the raingauge stands or, if there is no raingauge, the ground beneath the thermometer screen. If there is neither raingauge nor screen, it is the average level of terrain in the vicinity of the station (Reference: Guide to Meteorological Instruments and Methods of Observation, WMO-No. 8. 1996).

(4)   Height of barometer above mean sea level, referring to the location of barometer of a station, does not redefine the descriptor 0 07 030.

(5)   Height of sensor above local ground (or deck of marine platform) is the actual height of sensor above ground (or deck of marine platform) at the point where the sensor is located. This descriptor does not redefine the descriptor either 0 07 030 or 0 07 033. Previously defined value of 0 07 032 may be cancelled by setting 0 07 032 to a "missing value".

(6)   Height of sensor above water surface is the height of sensor above water surface of sea or lake. This descriptor does not redefine the descriptor either 0 07 030 or 0 07 032. Previously defined value of 0 07 033 may be cancelled by setting 0 07 033 to a "missing value".

(7)   Representative height of sensor above station is the standard height of a sensor required by WMO documentation. Value of the following meteorological element should be adjusted using a formula. For example, standard height recommended in WMO documentation for surface wind sensors is 10 metres. If the sensor is placed at different height, the wind speed may be adjusted using a formula.

(8)   For an atmospheric limb sounder, the "impact parameter" is the distance between the ray asymptote and the centre of curvature of the Earth's surface at the tangent point.

Class 08 - Significance qualifiers

TABLE REFERENCE F	X	Y	TABLE ELEMENT NAME	BUFR UNIT	BUFR SCALE	BUFR REFERENCE VALUE	BUFR DATA WIDTH (Bits)	CREX UNIT	CREX SCALE	CREX DATA WIDTH (Characters)
0	08	001	Vertical sounding significance	Flag table	0	0	7	Flag table	0	3
0	08	002	Vertical significance (surface observations)	Code table	0	0	6	Code table	0	2
0	08	003	Vertical significance (satellite observations)	Code table	0	0	6	Code table	0	2
0	08	004	Phase of aircraft flight	Code table	0	0	3	Code table	0	1
0	08	005	Meteorological attribute significance	Code table	0	0	4	Code table	0	2
0	08	006	Ozone vertical sounding significance	Flag table	0	0	9	Flag table	0	3
0	08	007	Dimensional significance	Code table	0	0	4	Code table	0	2
0	08	008	Radiation vertical sounding significance	Flag table	0	0	9	Flag table	0	3
0	08	009	Detailed phase of flight	Code Table	0	0	4	Code table	0	2
0	08	010	Surface qualifier (temperature data)	Code table	0	0	5	Code table	0	2
0	08	011	Meteorological feature	Code table	0	0	6	Code table	0	2
0	08	012	Land/sea qualifier	Code table	0	0	2	Code table	0	1
0	08	013	Day/night qualifier	Code table	0	0	2	Code table	0	1
0	08	014	Qualifier for runway visual range	Code table	0	0	4	Code table	0	2
0	08	016	Change qualifier of a trend-type forecast or an aerodrome forecast	Code table	0	0	3	Code table	0	1
0	08	017	Qualifier of the time when the forecast change is expected	Code table	0	0	2	Code table	0	1
0	08	018	SEAWINDS land/ice surface type	Flag table	0	0	17	Flag table	0	6
0	08	019	Qualifier for following Centre identifier	Code table	0	0	4	Code table	0	2
0	08	020	Total number of missing entities (with respect to accumulation or average)	Numeric	0	0	16	Numeric	0	5
0	08	021	Time significance	Code table	0	0	5	Code table	0	2
0	08	022	Total number (with respect to accumulation or average)	Numeric	0	0	16	Numeric	0	5
0	08	023	First order statistics	Code table	0	0	6	Code table	0	2
0	08	024	Difference statistics	Code table	0	0	6	Code table	0	2
0	08	025	Time difference qualifier	Code table	0	0	4	Code table	0	2
0	08	029	Remotely sensed surface type	Code table	0	0	8	Code table	0	3
0	08	030	Manual on Codes (Volume I.1, Section C) Code table from which data are derived	Numeric	0	0	13	Numeric	0	4
0	08	031	Data category CREX table A	Numeric	0	0	8	Numeric	0	3
0	08	033	Method of derivation of percentage confidence	Code table	0	0	7	Code table	0	3

TABLE REFERENCE F	X	Y	TABLE ELEMENT NAME	BUFR UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	CREX UNIT	SCALE	DATA WIDTH (Characters)
0	08	035	Type of monitoring exercise	Code table	0	0	3	Code table	0	1
0	08	036	Type of centre or station performing monitoring	Code table	0	0	3	Code table	0	1
0	08	040	Flight Level significance	Code table	0	0	6	Code table	0	2
0	08	041	Data significance	Code table	0	0	5	Code table	0	2
0	08	042	Extended vertical sounding significance	Flag table	0	0	18	Flag table	0	6
0	08	049	Number of observations	Numeric	0	0	8	Numeric	0	3
0	08	050	Qualifier for number of missing values in calculation of statistic	Code table	0	0	4	Code table	0	2
0	08	051	Qualifier for number of missing values in calculation of statistic	Code table	0	0	3	Code table	0	1
0	08	052	Condition for which number of days of occurrence follows	Code table	0	0	5	Code table	0	2
0	08	053	Day of occurrence qualifier	Code table	0	0	2	Code table	0	1
0	08	060	Sample scanning mode significance	Code table	0	0	4	Code table	0	2
0	08	065	Sun-glint indicator	Code table	0	0	2	Code table	0	1
0	08	066	Semi-transparency indicator	Code table	0	0	2	Code table	0	1
0	08	070	TOVS/ATOVS product qualifier	Code table	0	0	4	Code table	0	2
0	08	072	Pixel(s) type	Code table	0	0	3	Code table	0	1
0	08	074	Altimeter echo type	Code table	0	0	2	Code table	0	1
0	08	075	Ascending/Descending Orbit Qualifier	Code table	0	0	2	Code table	0	1
0	08	076	Type of band	Code table	0	0	6	Code table	0	2
0	08	079	Product status	Code table	0	0	4	Code table	0	2
0	08	080	Qualifier for GTSPP quality flag	Code table	0	0	6	Code table	0	2
0	08	081	Type of equipment	Code table	0	0	6	Code table	0	2
0	08	082	Artificial correction of sensor height to another value	Code table	0	0	3	Code table	0	1
0	08	083	Nominal value indicator	Flag table	0	0	15	Flag table	0	5
0	08	085	Beam identifier	Code table	0	0	3	Code table	0	1

Notes:

(1)   Where values are accumulated or averaged (for example over a time period), the total number of values from which the accumulated or averaged values are obtained may be represented using reference 0 08 022.

(2)   A previously defined significance may be cancelled by transmitting a "missing" from the appropriate code or flag table.

(3)   First order statistics have values with a similar range and the same dimensions as the corresponding reported values (e.g., maxima, minima, means, etc.).

(4)   Difference statistics are difference values; they have dimensions similar to the corresponding reported values with respect to units, but assume a range centred on zero (e.g., the difference between reported and analysed values, the difference between reported and forecast values, etc.).

(5)   Descriptor 0 08 025 is to be used with 0 26 003 (time difference).

(6)   Descriptor 0 08 033 is to be used by preceding the element 0 33 007 as part of quality control information in order to specify the method used to calculate the percentage confidence.

(7)   When descriptor 0 08 043 is used to specify particulate matter under a given size threshold, descriptor 0 08 045 may also be used to further specify a subset of the PM population on the basis of ion composition.

(8)   Descriptor 0 08 090 is to be used to establish the decimal scale of one or more subsequent numerical element descriptors requiring a large dynamic range of values. The numerical element descriptor(s) will contain the scaled value of the measurement(s) with the required number of significant digits. The actual value will be obtained, at the application level, by multiplying the scaled value by the given decimal scale : (scaled value $* 10^{\text{decimal scale}}$).

Class 10 - Non-coordinate location (vertical)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	10	001	Height of land surface	m	0	−400	15	m	0	5
0	10	002	Height	m	−1	−40	16	m	-1	5
0	10	003	Geopotential	$m^2\,s^{-2}$	−1	−400	17	$m^2\,s^{-2}$	-1	6
0	10	004	Pressure	Pa	−1	0	14	Pa	-1	5
0	10	007	Height	m	0	−1000	17	m	0	6
0	10	008	Geopotential	$m^2\,s^{-2}$	0	−10000	20	$m^2\,s^{-2}$	0	7
0	10	009	Geopotential height	gpm	0	−1000	17	gpm	0	5
0	10	010	Minimum pressure reduced to mean sea level	Pa	-1	0	14	Pa	-1	5
0	10	011	Maximum pressure reduced to mean sea level	Pa	-1	0	14	Pa	-1	5
0	10	031	In direction of the North Pole, distance from the Earth's centre	m	2	−1073741824	31	m	2	10
0	10	032	Satellite distance to Earth's centre	m	1	0	27	m	2	9
0	10	033	Altitude (platform to Ellipsoid)	m	1	0	27	m	2	9
0	10	034	Earth radius	m	1	0	27	m	2	9
0	10	035	Earth's local radius of curvature	m	1	62000000	22	m	1	8
0	10	036	Geoid undulation (see Note 4)	m	2	-15000	15	m	2	6
0	10	040	Number of retrieved layers	Numeric	0	0	10	Numeric	0	4
0	10	050	Standard deviation altitude	m	2	0	16	m	2	5
0	10	051	Pressure reduced to mean sea level	Pa	−1	0	14	Pa	-1	5
0	10	052	Altimeter setting (QNH)	Pa	−1	0	14	Pa	-1	5
0	10	060	Pressure change	Pa	−1	−1024	11	Pa	-1	4
0	10	061	3-hour pressure change	Pa	−1	−500	10	Pa	-1	4
0	10	062	24-hour pressure change	Pa	−1	−1000	11	Pa	-1	4
0	10	063	Characteristic of pressure tendency	Code table	0	0	4	Code table	0	2
0	10	064	SIGMET cruising level	Code table	0	0	3	Code table	0	1
0	10	070	Indicated aircraft altitude	m	0	−400	16	m	0	5
0	10	080	Viewing Zenith angle	Degree	2	-9000	15	Degree	2	5
0	10	081	Altitude of COG above reference Ellipsoid	m	3	0	31	m	3	10
0	10	082	Instantaneous altitude rate	ms^{-1}	3	-65536	17	ms^{-1}	3	6
0	10	083	Squared off Nadir angle of the satellite from platform data	$Degree^2$	2	0	16	$Degree^2$	2	5
0	10	084	Squared off Nadir angle of the satellite from waveform data	$Degree^2$	2	0	16	$Degree^2$	2	5
0	10	085	Mean sea surface height	m	3	-131072	18	m	3	6
0	10	086	Geoid's height	m	3	-131072	18	m	3	6
0	10	087	Ocean depth/land elevation	m	1	-131072	18	m	1	6

0	10	088	Total geocentric ocean tide height solution 1	m	3	-32768	16	m	3	5
0	10	089	Total geocentric ocean tide height solution 2	m	3	-32768	16	m	3	5
0	10	090	Long period tide height	m	3	-32768	16	m	3	5
0	10	091	Tidal loading height	m	3	-32768	16	m	3	5
0	10	092	Solid Earth tide height	m	3	-32768	16	m	3	5
0	10	093	Geocentric pole tide height	m	3	-32768	16	m	3	5
0	10	095	Height of atmosphere used	m	0	0	16	m	0	5

Notes:

(1)   Vertical elements and pressure shall be used to define values of these elements independent of the element or variable denoting the vertical coordinate.

(2)   The value for descriptor 0 10 031 has been chosen to be suitable for polar orbiting satellites in approximately sun-synchronous orbits. Geostationary orbits would require greater data widths for distance and slightly less for speed.

(3)   Left handed xyz axes have been chosen for descriptor 0 10 031.

(4)   The "geoid undulation" is the difference between the reference ellipsoid (WGS-84) and the geoid height (EGM96) at the geographic location of the observation, both referenced to the centre of mass of the Earth.

Class 11 - Wind and turbulence

TABLE REFERENCE F	X	Y	TABLE ELEMENT NAME	BUFR UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	CREX UNIT	SCALE	DATA WIDTH (Characters)
0	11	001	Wind direction	Degree true	0	0	9	Degree true	0	3
0	11	002	Wind speed	$m\ s^{-1}$	1	0	12	$m\ s^{-1}$	1	4
0	11	003	u-component	$m\ s^{-1}$	1	–4096	13	$m\ s^{-1}$	1	4
0	11	004	v-component	$m\ s^{-1}$	1	–4096	13	$m\ s^{-1}$	1	4
0	11	005	w-component	$Pa\ s^{-1}$	1	–512	10	$Pa\ s^{-1}$	1	4
0	11	006	w-component	$m\ s^{-1}$	2	–4096	13	$m\ s^{-1}$	2	4
0	11	010	Wind direction associated with wind speed which follows	Degree true	0	0	9	Degree true	0	3
0	11	011	Wind direction at 10 m	Degree true	0	0	9	Degree true	0	3
0	11	012	Wind speed at 10 m	$m\ s^{-1}$	1	0	12	$m\ s^{-1}$	1	4
0	11	013	Wind direction at 5 m	Degree true	0	0	9	Degree true	0	3
0	11	014	Wind speed at 5 m	$m\ s^{-1}$	1	0	12	$m\ s^{-1}$	1	4
0	11	016	Extreme counterclockwise wind direction of a variable wind	Degree true	0	0	9	Degree true	0	3
0	11	017	Extreme clockwise wind direction of a variable wind	Degree true	0	0	9	Degree true	0	3
0	11	019	Steadiness of wind [6]	%	0	0	7	%	0	3
0	11	021	Relative vorticity	s^{-1}	9	–65536	17	s^{-1}	9	6
0	11	022	Divergence	s^{-1}	9	–65536	17	s^{-1}	9	6
0	11	023	Velocity potential	$m^2\ s^{-1}$	–2	–65536	17	$m^2\ s^{-1}$	-2	6
0	11	030	Extended degree of turbulence	Code table	0	0	6	Code table	0	2
0	11	031	Degree of turbulence	Code table	0	0	4	Code table	0	2
0	11	032	Height of base of turbulence	m	–1	–40	16	m	-1	5
0	11	033	Height of top of turbulence	m	–1	–40	16	m	-1	5
0	11	034	Vertical gust velocity	$m\ s^{-1}$	1	–1024	11	$m\ s^{-1}$	1	4
0	11	035	Vertical gust acceleration	$m\ s^{-2}$	2	–8192	14	$m\ s^{-2}$	2	5
0	11	036	Maximum derived equivalent vertical gust speed	$m\ s^{-1}$	1	0	10	$m\ s^{-1}$	1	4
0	11	037	Turbulence Index	Code table	0	0	6	Code table	0	2
0	11	038	Time of occurrence of Peak Eddy Dissipation Rate	Code table	0	0	5	Code table	0	2
0	11	039	Extended time of occurrence of peak Eddy Dissipation Rate	Code table	0	0	6	Code table	0	2
0	11	040	Maximum wind speed (mean wind)	$m\ s^{-1}$	1	0	12	$m\ s^{-1}$	1	4
0	11	041	Maximum wind gust speed	$m\ s^{-1}$	1	0	12	$m\ s^{-1}$	1	4
0	11	042	Maximum wind speed (10-min mean wind)	$m\ s^{-1}$	1	0	12	$m\ s^{-1}$	1	4
0	11	043	Maximum wind gust direction	Degree true	0	0	9	Degree true	0	3

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	11	044	Mean wind direction for surface – 1 500 m (5 000 feet)	Degree true	0	0	9	Degree true	0	3
0	11	045	Mean wind speed for surface – 1 500 m (5 000 feet)	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	046	Maximum instantaneous wind speed	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	047	Maximum instantaneous wind speed over 10 minutes	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	049	Standard deviation of wind direction	Degree true	0	0	9	Degree true	0	3
0	11	050	Standard deviation of horizontal wind speed	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	051	Standard deviation of vertical wind speed	m s^{-1}	1	0	8	m s^{-1}	1	3
0	11	052	Formal uncertainty in wind speed	m s^{-1}	2	0	13	m s^{-1}	2	5
0	11	053	Formal uncertainty in wind direction	Degree true	2	0	15	Degree true	2	5
0	11	054	Mean wind direction for 1500 m – 3000 m	Degree true	0	0	9	Degree true	0	3
0	11	055	Mean wind speed for 1500 m – 3000 m	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	061	Absolute wind shear in 1 km layer below	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	062	Absolute wind shear in 1 km layer above	m s^{-1}	1	0	12	m s^{-1}	1	4
0	11	070	Designator of the runway affected by wind shear (including ALL)	CCITT IA5	0	0	32	Character	0	4
0	11	071	Turbulent vertical momentum flux	m^2 s^{-2}	3	–128	14	m^2 s^{-2}	3	5
0	11	072	Turbulent vertical buoyancy flux	K m s^{-1}	3	–128	11	K m s^{-1}	3	4
0	11	073	Turbulent kinetic energy	m^2 s^{-2}	2	–1024	13	m^2 s^{-2}	2	4
0	11	074	Dissipation energy	m^2 s^{-2}	2	–1024	10	m^2 s^{-2}	2	4
0	11	075	Mean turbulence intensity (eddy dissipation rate)	m$^{2/3}$ s^{-1}	2	0	8	m$^{2/3}$ s^{-1}	2	3
0	11	076	Peak turbulence intensity (eddy dissipation rate)	m$^{2/3}$ s^{-1}	2	0	8	m$^{2/3}$ s^{-1}	2	3
0	11	077	Reporting interval or averaging time for Eddy Dissipation Rate	s	0	0	12	s	0	4
0	11	081	Model wind direction at 10m	Degree true	2	0	16	Degree true	2	5
0	11	082	Model wind speed at 10m	m s^{-1}	2	0	14	m s^{-1}	2	4
0	11	095	U component of the model wind vector	m s^{-1}	1	-4096	13	m s^{-1}	1	4
0	11	096	V component of the model wind vector	m s^{-1}	1	-4096	13	m s^{-1}	1	4

Notes:

(1)   West to east u-components shall be assigned positive values.

(2)   South to north v-components shall be assigned positive values.

(3)   Upward w-components shall be assigned positive values where units are m s^{-1}.

(4)   Downward w-components shall be assigned positive values where units are Pa s^{-1}.

(5)   Wind reporting standards:

	Speed	Direction
No observation	Missing	Missing
Calm	0	0
Normal observation	> 0	1° – 360°
Speed only	> 0	Missing
Direction only	Missing	1° – 360°
"Light and variable"	> 0	0

(6)   The steadiness factor (descriptor 0 11 019) is the ratio of speed of the monthly mean vector wind to the speed of the monthly mean scalar wind expressed as a percentage. It is reported to the nearest one percent.

Class 12 - Temperature

TABLE REFERENCE F	X	Y	TABLE ELEMENT NAME	BUFR UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	CREX UNIT	SCALE	DATA WIDTH (Characters)
0	12	001	Temperature/dry-bulb temperature	K	1	0	12	°C	1	3
0	12	002	Wet-bulb temperature	K	1	0	12	°C	1	3
0	12	003	Dew-point temperature	K	1	0	12	°C	1	3
0	12	004	Dry-bulb temperature at 2 m	K	1	0	12	°C	1	3
0	12	005	Wet-bulb temperature at 2 m	K	1	0	12	°C	1	3
0	12	006	Dew-point temperature at 2 m	K	1	0	12	°C	1	3
0	12	007	Virtual temperature	K	1	0	12	°C	1	3
0	12	011	Maximum temperature, at height and over period specified	K	1	0	12	°C	1	3
0	12	012	Minimum temperature, at height and over period specified	K	1	0	12	°C	1	3
0	12	013	Ground minimum temperature, past 12 hours	K	1	0	12	°C	1	3
0	12	014	Maximum temperature at 2 m, past 12 hours	K	1	0	12	°C	1	3
0	12	015	Minimum temperature at 2 m, past 12 hours	K	1	0	12	°C	1	3
0	12	016	Maximum temperature at 2 m, past 24 hours	K	1	0	12	°C	1	3
0	12	017	Minimum temperature at 2 m, past 24 hours	K	1	0	12	°C	1	3
0	12	021	Maximum temperature at 2m	K	2	0	16	°C	2	4
0	12	022	Minimum temperature at 2m	K	2	0	16	°C	2	4
0	12	030	Soil temperature	K	1	0	12	°C	1	3
0	12	049	Temperature change over specified period	K	0	-30	6	°C	0	2
0	12	051	Standard deviation temperature	K	1	0	10	°C	1	3
0	12	052	Highest daily mean temperature	K	1	0	12	°C	1	3
0	12	053	Lowest daily mean temperature	K	1	0	12	°C	1	3
0	12	061	Skin temperature	K	1	0	12	°C	1	3
0	12	062	Equivalent black body temperature	K	1	0	12	°C	1	3
0	12	063	Brightness temperature	K	1	0	12	°C	1	3
0	12	064	Instrument temperature	K	1	0	12	K	1	4
0	12	065	Standard deviation brightness temperature	K	1	0	12	K	1	4
0	12	070	Warm load temperature	K	2	0	16	K	2	5
0	12	071	Coldest cluster temperature	K	1	0	12	K	1	4
0	12	072	Radiance	$W\ m^{-2}\ sr^{-1}$	6	0	31	$W\ m^{-2}sr^{-1}$	6	9
0	12	075	Spectral radiance	$W\ m^{-3}\ sr^{-1}$	-3	0	16	$W\ m^{-3}sr^{-1}$	-3	5
0	12	076	Radiance	$W\ m^{-2}\ sr^{-1}$	3	0	16	$W\ m^{-2}sr^{-1}$	3	5
0	12	101	Temperature/dry-bulb temperature	K	2	0	16	°C	2	4

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	12	102	Wet-bulb temperature	K	2	0	16	°C	2	4
0	12	103	Dew-point temperature	K	2	0	16	°C	2	4
0	12	104	Dry-bulb temperature at 2m	K	2	0	16	°C	2	4
0	12	105	Web-bulb temperature at 2m	K	2	0	16	°C	2	4
0	12	106	Dew-point temperature at 2m	K	2	0	16	°C	2	4
0	12	107	Virtual temperature	K	2	0	16	°C	2	4
0	12	111	Maximum temperature, at height and over period specified	K	2	0	16	°C	2	4
0	12	112	Minimum temperature, at height and over period specified	K	2	0	16	°C	2	4
0	12	113	Ground minimum temperature, past 12 hours	K	2	0	16	°C	2	4
0	12	114	Maximum temperature at 2m, past 12 hours	K	2	0	16	°C	2	4
0	12	115	Minimum temperature at 2m, past 12 hours	K	2	0	16	°C	2	4
0	12	116	Maximum temperature at 2m, past 24 hours	K	2	0	16	°C	2	4
0	12	117	Minimum temperature at 2m, past 24 hours	K	2	0	16	°C	2	4
0	12	118	Maximum temperature at height specified, past 24 hours	K	2	0	16	°C	2	4
0	12	119	Minimum temperature at height specified, past 24 hours	K	2	0	16	°C	2	4
0	12	121	Ground minimum temperature	K	2	0	16	°C	2	4
0	12	122	Ground minimum temperature of the preceding night	K	2	0	16	°C	2	4
0	12	130	Soil temperature	K	2	0	16	°C	2	4
0	12	151	Standard deviation of daily mean temperature	K	2	0	12	°C	2	4
0	12	152	Highest daily mean temperature	K	2	0	16	°C	2	4
0	12	153	Lowest daily mean temperature	K	2	0	16	°C	2	4
0	12	161	Skin temperature	K	2	0	16	°C	2	4
0	12	162	Equivalent black body temperature	K	2	0	16	°C	2	4
0	12	163	Brightness temperature	K	2	0	16	°C	2	4
0	12	164	Instrument temperature	K	2	0	16	K	2	5
0	12	171	Coldest cluster temperature	K	2	0	16	K	2	5
0	12	180	Averaged 12 micron BT for all clear pixels at Nadir	K	2	0	16	K	2	5
0	12	181	Averaged 11 micron BT for all clear pixels at Nadir	K	2	0	16	K	2	5
0	12	182	Averaged 3.7 micron BT for all clear pixels at Nadir	K	2	0	16	K	2	5

0	12	183	Averaged 12 micron BT for all clear pixels, forward view	K	2	0	16	K	2	5
0	12	184	Averaged 11 micron BT for all clear pixels, forward view	K	2	0	16	K	2	5
0	12	185	Averaged 3.7 micron BT for all clear pixels, forward view	K	2	0	16	K	2	5
0	12	186	Mean Nadir sea surface temperature	K	2	0	16	K	2	5
0	12	187	Mean dual view sea surface temperature	K	2	0	16	K	2	5
0	12	188	Interpolated 23.8 GHz brightness T from MWR	K	2	0	16	K	2	5
0	12	189	Interpolated 36.5 GHz brightness T from MWR	K	2	0	16	K	2	5

Notes:

(1)   Where the expression "at height and over period specified" is entered under ELEMENT NAME, an appropriate vertical location shall be specified using descriptors from class 07, together with an appropriate period using descriptors from class 04.

(2)   Descriptor 0 12 076 should be used instead of descriptor 0 12 072 to encode radiance.

Class 13 - Hygrographic and hydrological elements

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	13	001	Specific humidity	kg kg^{-1}	5	0	14	kg kg^{-1}	5	5
0	13	002	Mixing ratio	kg kg^{-1}	5	0	14	kg kg^{-1}	5	5
0	13	003	Relative humidity	%	0	0	7	%	0	3
0	13	004	Vapour pressure	Pa	–1	0	10	Pa	-1	4
0	13	005	Vapour density	kg m^{-3}	3	0	7	kg m^{-3}	3	3
0	13	006	Mixing heights	M	–1	–40	16	m	-1	5
0	13	007	Minimum relative humidity	%	0	0	7	%	0	3
0	13	008	Maximum relative humidity	%	0	0	7	%	0	3
0	13	009	Relative humidity	%	1	-1000	12	%	1	4
0	13	011	Total precipitation/total water equivalent	kg m^{-2}	1	–1	14	kg m^{-2}	1	5
0	13	012	Depth of fresh snow	m	2	–2	12	m	2	4
0	13	013	Total snow depth	m	2	–2	16	m	2	5
0	13	014	Rainfall/water equivalent of snow (averaged rate)	kg m^{-2} s^{-1}	4	0	12	kg m^{-2} s^{-1}	4	4
0	13	015	Snowfall (averaged rate)	m s^{-1}	7	0	12	m s^{-1}	7	4
0	13	016	Precipitable water	kg m^{-2}	0	0	7	kg m^{-2}	0	3
0	13	019	Total precipitation past 1 hour	kg m^{-2}	1	–1	14	kg m^{-2}	1	4
0	13	020	Total precipitation past 3 hours	kg m^{-2}	1	–1	14	kg m^{-2}	1	5
0	13	021	Total precipitation past 6 hours	kg m^{-2}	1	–1	14	kg m^{-2}	1	5
0	13	022	Total precipitation past 12 hours	kg m^{-2}	1	–1	14	kg m^{-2}	1	5
0	13	023	Total precipitation past 24 hours	kg m^{-2}	1	–1	14	kg m^{-2}	1	5
0	13	031	Evapotranspiration	kg m^{-2}	0	0	7	kg m^{-2}	0	3
0	13	032	Evaporation/evapotranspiration	kg m^{-2}	1	0	8	kg m^{-2}	1	3
0	13	033	Evaporation/evapotranspiration	kg m^{-2}	1	0	10	kg m^{-2}	1	4
0	13	038	Superadiabatic indicator	Code table	0	0	2	Code table	0	1
0	13	039	Terrain type (ice/snow)	Code table	0	0	3	Code table	0	1
0	13	040	Surface flag	Code table	0	0	4	Code table	0	2
0	13	041	Pasquill-Gifford stability category	Code table	0	0	4	Code table	0	2
0	13	042	Parcel lifted index (to 500 hPa)	K	0	–20	6	K	0	2
0	13	043	Best lifted index (to 500 hPa)	K	0	–20	6	K	0	2
0	13	044	K index	K	0	-30	8	K	0	3
0	13	045	KO index	K	0	-30	8	K	0	3
0	13	046	Maximum buoyancy	K	0	-30	8	K	0	3
0	13	047	Modified Showalter stability index (see Note 7)	K	0	-60	6	°C	0	2
0	13	051	Frequency group, precipitation	Code table	0	0	4	Code table	0	2
0	13	052	Highest daily amount of precipitation	kg m^{-2}	1	–1	14	kg m^{-2}	1	5

0	13	055	Intensity of precipitation	Kg m^{-2} s^{-1}	4	0	8	mm h^{-1}	1	4
0	13	056	Character and intensity of precipitation	Code table	0	0	4	Code table	0	2
0	13	057	Time of beginning or end of precipitation	Code table	0	0	4	Code table	0	2
0	13	058	Size of precipitating element	m	4	0	7	mm	1	3
0	13	059	Number of flashes (thunderstorm)	Numeric	0	0	7	Numeric	0	3
0	13	060	Total accumulated precipitation	kg m^{-2}	1	-1	17	kg m^{-2}	1	5
0	13	071	Upstream water level	m	2	0	14	m	2	4
0	13	072	Downstream water level	m	2	0	14	m	2	4
0	13	073	Maximum water level	m	2	0	14	m	2	4
0	13	080	Water pH	pH unit	1	0	10	pH unit	1	3
0	13	081	Water conductivity	Siemens m^{-1}	3	0	14	Siemens m^{-1}	3	4
0	13	082	Water temperature	K	1	0	12	K	1	4
0	13	083	Dissolved oxygen	Kg m^{-3}	6	0	15	kg m^{-3}	6	5
0	13	084	Turbidity	Lumen	0	0	14	Lumen	0	4
0	13	085	Oxydation Reduction Potential (ORP)	V	3	0	14	V	3	4
0	13	090	Radiometer water vapour content	Kgm^{-2}	1	0	10	Kgm^{-2}	1	4
0	13	091	Radiometer liquid content	Kgm^{-2}	2	0	8	Kgm^{-2}	2	3
0	13	093	Cloud optical thickness	Numeric	0	0	8	Numeric	0	3
0	13	095	Total column water vapour	Kgm^{-2}	4	0	19	Kgm^{-2}	4	6
0	13	096	MWR water vapour content	Kgm^{-2}	2	0	14	Kgm^{-2}	2	5
0	13	097	MWR liquid water content	Kgm^{-2}	2	0	14	Kgm^{-2}	2	5
0	13	098	Integrated water vapour density	Kgm^{-2}	8	0	30	Kgm^{-2}	8	10

Notes:

(1)   A precipitation value of -0.1kg m^{-2} before scaling (-1 after scaling or in CREX) shall indicate a "trace" (non-measurable, less than 0.05 kg m^{-2}).

(2)   A snow depth value of -0.01 m before scaling (-1 after scaling or in CREX) shall indicate a little (less than 0.005 m) snow. A value of -0.02 m (-2 after scaling or in CREX) shall indicate "snow cover not continuous".

(3)   The "parcel lifted index" (as defined in the International Meteorological Vocabulary (WMO–No. 182) under the listing "lifted index") is defined as the temperature difference between the ambient 500 hPa temperature (T500) and that of a parcel of air lifted from the surface (Tparcel) following the dry and moist adiabatic process. Negative values of (T500 – Tparcel) suggest instability. The "best lifted index" is defined as the most unstable of a collection of parcel lifted indices, with parcel initial conditions defined for a collection of 30 hPa thick layers stacked one upon the other with the lowest resting on the ground. Commonly four to six such layers are used in the calculation.

(4)   Since the two lifted indices (042 and 043) are defined as temperature differences, they may take on negative values, even though the units are kelvin; hence the non-zero reference value.

(5)   Descriptor 0 13 033 should be used instead of descriptor 0 13 032 to encode evaporation/evapotranspiration.

(6)   Concerning descriptor 0 13 009, the originators of these data want to be able to retain the raw (i.e. unprocessed) relative humidity value reported by the sensor in order to be able to track, among other things, when a sensor begins to malfunction. The latter case is when a negative value might occur. For world-wide exchange with other countries, it is possible that only the processed data would ever be sent.

(7)   The "Modified Showalter stability index" is defined as the temperature difference between the ambient 500 hPa temperature and the temperature a parcel of air, initially at a selected base level, would have if brought from its condensation level to the 500 hPa surface by a moist adiabatic process. Positive values denote stable conditions, while negative values denote unstable conditions. The base level is 850 hPa, 800hPa or 750 hPa if the station elevation is less than 1000, 1000 to 1400 or 1401 to 2000 gpm above mean sea level, respectively.

Class 14 - Radiation and radiance

| TABLE REFERENCE | | | TABLE ELEMENT NAME | BUFR | | | | CREX | | |
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	14	001	Long-wave radiation, integrated over 24 hours	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	002	Long-wave radiation, integrated over period specified	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	003	Short-wave radiation, integrated over 24 hours	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	004	Short-wave radiation, integrated over period specified	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	011	Net long-wave radiation, integrated over 24 hours	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	012	Net long-wave radiation, integrated over period specified	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	013	Net short-wave radiation, integrated over 24 hours	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	014	Net short-wave radiation, integrated over period specified	$J\,m^{-2}$	–3	–2048	12	$J\,m^{-2}$	-3	4
0	14	015	Net radiation, integrated over 24 hours	$J\,m^{-2}$	–4	–16384	15	$J\,m^{-2}$	-4	5
0	14	016	Net radiation, integrated over period specified	$J\,m^{-2}$	–4	–16384	15	$J\,m^{-2}$	-4	5
0	14	017	Instantaneous long-wave radiation	$W\,m^{-2}$	–3	–2048	12	$W\,m^{-2}$	-3	4
0	14	018	Instantaneous short-wave radiation	$W\,m^{-2}$	–3	–2048	12	$W\,m^{-2}$	-3	4
0	14	019	Surface albedo	%	0	0	7	%	0	3
0	14	020	Global solar radiation, integrated over 24 hours	$J\,m^{-2}$	–4	0	15	$J\,m^{-2}$	-4	5
0	14	021	Global solar radiation, integrated over period specified	$J\,m^{-2}$	–4	0	15	$J\,m^{-2}$	-4	5
0	14	022	Diffuse solar radiation, integrated over 24 hours	$J\,m^{-2}$	–4	0	15	$J\,m^{-2}$	-4	5
0	14	023	Diffuse solar radiation, integrated over period specified	$J\,m^{-2}$	–4	0	15	$J\,m^{-2}$	-4	5
0	14	024	Direct solar radiation, integrated over 24 hours	$J\,m^{-2}$	–4	0	15	$J\,m^{-2}$	-4	5
0	14	025	Direct solar radiation, integrated over period specified	$J\,m^{-2}$	–4	0	15	$J\,m^{-2}$	-4	5
0	14	026	Albedo at the top of clouds	%	0	0	7	%	0	3
0	14	027	Albedo	%	0	0	7	%	0	3
0	14	028	Global solar radiation (high accuracy), integrated over period specified	$J\,m^{-2}$	-2	0	16	$J\,m^{-2}$	-2	5
0	14	029	Diffuse solar radiation (high accuracy), integrated over period specified	$J\,m^{-2}$	-2	0	16	$J\,m^{-2}$	-2	5
0	14	030	Direct solar radiation (high accuracy), integrated over period specified	$J\,m^{-2}$	-2	0	16	$J\,m^{-2}$	-2	5
0	14	031	Total sunshine	Minute	0	0	11	Minute	0	4
0	14	032	Total sunshine	Hour	0	0	10	Hour	0	4
0	14	033	Total sunshine	%	0	0	9	%	0	3
0	14	034	Sunshine over period specified	Minute	0	0	11	Minute	0	4
0	14	042	Bi-directional reflectance	%	0	0	7	%	0	3
0	14	045	Channel radiance	$Wm^{-2}sr^{-1}cm^{-1}$	0	0	11	$Wm^{-2}sr^{-1}cm^{-1}$	0	4
0	14	046	Scaled IASI radiance (see note 6)	$Wm^{-2}sr^{-1}m^{-1}$	0	-5000	16	$Wm^{-2}sr^{-1}m^{-1}$	0	5

0	14	047	Scaled mean AVHRR radiance	$Wm^{-2}sr^{-1}m^{-1}$	0	0	31	$Wm^{-2}sr^{-1}m^{-1}$	0	10
0	14	048	Scaled standard deviation AVHRR radiance	$Wm^{-2}sr^{-1}m^{-1}$	0	0	31	$Wm^{-2}sr^{-1}m^{-1}$	0	10
0	14	050	Emissivity (see note 5)	%	1	0	10	%	1	4
0	14	051	Direct solar radiation integrated over last hour	$J\,m^{-2}$	-3	0	14	Jm^{-2}	-3	4
0	14	055	Solar activity index	Numeric	0	-32768	16	Numeric	0	5

Notes:

(1)   Downward radiation shall be assigned negative values.

(2)   Upward radiation shall be assigned positive values.

(3)   Where the expression "period specified" is entered under ELEMENT NAME, an appropriate period shall be specified using descriptors from class 04.

(4)   Channel radiance (014045) uses cm to represent the wave number.

(5)   Emissivity is the ratio of the amount of energy emitted from a particular object compared to the amount that would be emitted by a blackbody at the same temperature (I.e. the Planck function). Multiplying by 100 gives a percent (and provides 2 digits of precision at the same time).

(6)   An offset has been introduced for the scaled IASI radiances (0-14-046). This is to accommodate the negative radiances which can be measured at some wave numbers, either due to effects of noise or remaining after apodisation. The offset is an order of magnitude larger than the expected maximum negative excursion based on instrument noise, and so would leave sufficient margin. At the same time the dynamic range is not significantly degraded.

Class 15 - Physical/chemical constituents

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	15	001	Total ozone	DU	0	0	10	DU	0	4
0	15	002	Air mass (slant path at 22 km)	Numeric	2	0	10	Numeric	2	3
0	15	003	Measured ozone partial pressure (sounding)	Pascal	4	0	9	nbar	0	3
0	15	004	Ozone sounding correction factor	Numeric	3	0	11	Numeric	3	4
0	15	005	Ozone p	DU	0	0	10	DU	0	3
0	15	011	Log 10 of integrated electron density	$\log (1/m^2)$	3	14000	13	$\log (m^{-2})$	3	4
0	15	015	Maximum image spectral component before normalization	Numeric	0	0	31	Numeric	0	10
0	15	020	Integrated 0_3 density	$kg\ m^{-2}$	8	0	21	$Kg\ m^{-2}$	8	7
0	15	025	Type of pollutant	Code table	0	0	4	Code table	0	2
0	15	026	Concentration of pollutant (mol mol^{-1})	mol mol^{-1}	9	0	9	mol mol^{-1}	9	3
0	15	027	Concentration of pollutant (kg m^{-3})	kg m^{-3}	9	0	10	kg m^{-3}	9	4
0	15	031	Atmospheric path delay in satellite signal	m	4	10000	15	m	4	5
0	15	032	Estimated error in atmospheric path delay	m	4	0	10	m	4	4
0	15	033	Difference in path delays for limb views at extremes of scan	m	5	-10000	15	m	5	5
0	15	034	Estimated error in path delay difference	m	5	0	14	m	5	5
0	15	035	Component of zenith path delay due to water vapour	m	4	0	14	m	4	5
0	15	036	Atmospheric refractivity (see Note 5)	N-units	3	0	19	N-units	3	6
0	15	037	Bending angle	Radians	8	-100000	23	Radians	8	7

Notes:

(1)   0 15 003 is partial pressur of ozone, measured at the pressure level identified by 0 07 004.

(2)   0 15 004 (CF) is defined as:

CF = TOI/TOS

where TOI is the integrated ozone value obtained "simultaneously to a sounding" from a Dobson or Brewer spectrophotometer at the site or "nearby" and TOS is the total ozone obtained from the sounding. TOS is sum of the integrated ozone below the lowest pressure level reached by the sounding and the estimate of the amount above. In the absence of any spectrophotometer measurement, CF = Missing value.

(3)   0 15 005 is the value obtained as the result of the vertical integration of the sounding values (0 15 003) measured below the lowest pressure level reached by the sonde, multiplied by 0 15 004.

(4)   DU = Dobson unit.

(5)   The refractivity, N, is related to the refractive index, n by the formula $N = 10^6 (n - 1)$. N is therefore dimensionless but values computed by the formula are by convention described as being in 'N-units'.

(6)   Scaled descriptors should be preceded by descriptor 0 08 090 which indicates the decimal magnitude of the scaled value. See note concerning descriptor 0 08 090 for further details.

Class 19 - Synoptic features

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	19	001	Type of synoptic feature	Code table	0	0	6	Code table	0	2
0	19	002	Effective radius of feature	m	−2	0	12	m	-2	4
0	19	003	Wind speed threshold	$m\ s^{-1}$	0	0	8	$m\ s^{-1}$	0	3
0	19	004	Effective radius with respect to wind speeds above threshold	m	−2	0	12	m	-2	4
0	19	005	Direction of motion of feature	Degree true	0	0	9	Degree true	0	3
0	19	006	Speed of motion of feature	$m\ s^{-1}$	2	0	14	$m\ s^{-1}$	2	5
0	19	007	Effective radius of feature	m	−3	0	12	m	-3	4
0	19	008	Vertical extent of circulation	Code table	0	0	3	Code table	0	1
0	19	009	Effective radius with respect to wind speeds above threshold (large storms)	m	−3	0	12	m	-3	4
0	19	010	Method for tracking the centre of synoptic feature	Code table	0	0	4	Code table	0	2
0	19	100	Time interval to calculate the movement of the tropical cyclone	Code table	0	0	4	Code table	0	2
0	19	101	Accuracy of the position of the centre of the tropical cyclone	Code table	0	0	4	Code table	0	2
0	19	102	Shape and definition of the eye of the tropical cyclone	Code table	0	0	3	Code table	0	1
0	19	103	Diameter of major axis of the eye of the tropical cyclone	Code table	0	0	4	Code table	0	2
0	19	104	Change in character of the eye during the 30 minutes	Code table	0	0	4	Code table	0	2
0	19	105	Distance between the end of spiral band and the centre	Code table	0	0	4	Code table	0	2
0	19	106	Identification number of tropical cyclone	Numeric	0	0	7	Numeric	0	3
0	19	107	Time interval over which the movement of the tropical cyclone has been calculated	Code table	0	0	4	Code table	0	2
0	19	108	Accuracy of geographical position of the tropical cyclone	Code table	0	0	3	Code table	0	1
0	19	109	Mean diameter of the overcast cloud of the tropical cyclone	Code table	0	0	4	Code table	0	2
0	19	110	Apparent 24-hour change in intensity of the tropical cyclone	Code table	0	0	4	Code table	0	2
0	19	111	Current Intensity (CI) number of the tropical cyclone	Numeric	1	0	7	Numeric	1	3
0	19	112	Data Tropical (DT) number of the tropical	Numeric	1	0	7	Numeric	1	3

0	19		cyclone							
0	19	113	Cloud pattern type of the DT-number	Code table	0	0	4	Code table	0	2
0	19	114	Model Expected Tropical (MET) number of the tropical cyclone	Numeric	1	0	7	Numeric	1	3
0	19	115	Trend of the past 24-hour change (+: Developed, -: Weakened)	Numeric	1	-30	6	Numeric	1	2
0	19	116	Pattern Tropical (PT) number of the tropical cyclone	Numeric	1	0	7	Numeric	1	3
0	19	117	Cloud picture type of the PT-number	Code table	0	0	3	Code table	0	1
0	19	118	Final Tropical (T) number of the tropical cyclone	Numeric	1	0	7	Numeric	1	3
0	19	119	Type of the final T-number	Code table	0	0	3	Code table	0	1
0	19	150	Typhoon International Common Number (Typhoon Committee)	CCITTIA5	0	0	32	Character	0	4

Notes:

(1)   The effective radius of feature shall be defined with respect to the radius of the 1000-hPa isobars at mean sea level.

(2)   Maximum wind and effective radius of maximum wind shall be indicated by means of the 0 19 003 and 0 19 004 entries.

(3)   For a stationary feature, both 019005 (Direction of motion of feature) and 019006 (Speed of motion of feature) shall be reported 0.

Class 20 - Observed phenomena

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	20	001	Horizontal visibility	m	–1	0	13	m	-1	4
0	20	002	Vertical visibility	m	–1	0	7	m	-1	3
0	20	003	Present weather (see note 1)	Code table	0	0	9	Code table	0	3
0	20	004	Past weather (1) (see note 2)	Code table	0	0	5	Code table	0	2
0	20	005	Past weather (2) (see note 2)	Code table	0	0	5	Code table	0	2
0	20	008	Cloud distribution for aviation	Code table	0	0	5	Code table	0	2
0	20	009	General Weather Indicator (TAF/METAR)	Code table	0	0	4	Code table	0	2
0	20	010	Cloud cover (total) (see note 5)	%	0	0	7	%	0	3
0	20	011	Cloud amount	Code table	0	0	4	Code table	0	2
0	20	012	Cloud type	Code table	0	0	6	Code table	0	2
0	20	013	Height of base of cloud	m	–1	–40	11	m	-1	4
0	20	014	Height of top of cloud	m	–1	–40	11	m	-1	4
0	20	015	Pressure at base of cloud	Pa	–1	0	14	Pa	-1	5
0	20	016	Pressure at top of cloud	Pa	–1	0	14	Pa	-1	5
0	20	017	Cloud top description	Code table	0	0	4	Code table	0	2
0	20	018	Tendency of runway visual range	Code table	0	0	2	Code table	0	1
0	20	019	Significant present or forecast weather	CCITT IA5	0	0	72	Character	0	9
0	20	020	Significant recent weather phenomena	CCITT IA5	0	0	32	Character	0	4
0	20	021	Type of precipitation	Flag table	0	0	30	Flag table	0	10
0	20	022	Character of precipitation	Code table	0	0	4	Code table	0	2
0	20	023	Other weather phenomena	Flag table	0	0	18	Flag table	0	6
0	20	024	Intensity of phenomena	Code table	0	0	3	Code table	0	1
0	20	025	Obscuration	Flag table	0	0	21	Flag table	0	7
0	20	026	Character of obscuration	Code table	0	0	4	Code table	0	2
0	20	027	Phenomena occurrence	Flag table	0	0	9	Flag table	0	3
0	20	028	Expected change in intensity	Code table	0	0	3	Code table	0	1
0	20	029	Rain flag	Code table	0	0	2	Code table	0	1
0	20	031	Ice deposit (thickness)	m	2	0	7	m	2	3
0	20	032	Rate of ice accretion	Code table	0	0	3	Code table	0	1
0	20	033	Cause of ice accretion	Flag table	0	0	4	Flag table	0	2
0	20	034	Sea ice concentration	Code table	0	0	5	Code table	0	2
0	20	035	Amount and type of ice	Code table	0	0	4	Code table	0	2
0	20	036	Ice situation	Code table	0	0	5	Code table	0	2
0	20	037	Ice development	Code table	0	0	5	Code table	0	2
0	20	038	Bearing of ice edge (see note 3)	Degree true	0	0	12*	Degree true	0	3

TABLE REFERENCE			TALBE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	20	039	Ice distance	m	–1	0	13	m	-1	4
0	20	040	Evolution of drift snow	Code table	0	0	4	Code table	0	2
0	20	041	Airframe icing	Code table	0	0	4	Code table	0	2
0	20	042	Airframe icing present	Code table	0	0	2	Code table	0	1
0	20	043	Peak liquid water content	Kg m^{-3}	4	0	7	Kg m^{-3}	4	2
0	20	044	Average liquid water content	Kg m^{-3}	4	0	7	Kg m^{-3}	4	2
0	20	045	Supercooled large droplet (SLD) conditions	Code table	0	0	2	Code table	0	2
0	20	048	Evolution of feature	Code table	0	0	4	Code table	0	2
0	20	050	Cloud index	Code table	0	0	8	Code table	0	3
0	20	051	Amount of low clouds	%	0	0	7	%	0	3
0	20	052	Amount of middle clouds	%	0	0	7	%	0	3
0	20	053	Amount of high clouds	%	0	0	7	%	0	3
0	20	054	True direction from which a phenomenon or clouds are moving	Degree true	0	0	9	Degree true	0	3
0	20	055	State of sky in the tropics	Code table	0	0	4	Code table	0	2
0	20	056	Cloud phase	Code table	0	0	3	Code table	0	1
0	20	061	Runway visual range (RVR)	m	0	0	12	m	0	4
0	20	062	State of the ground (with or without snow)	Code table	0	0	5	Code table	0	2
0	20	063	Special phenomena	Code table	0	0	10	Code table	0	4
0	20	065	Snow cover (see note 4)	%	0	0	7	%	0	3
0	20	066	Maximum diameter of hailstones	m	3	0	8	m	3	3
0	20	067	Diameter of deposit	m	3	0	9	m	3	3
0	20	070	Minimum number of atmospherics	Numeric	0	0	7	Numeric	0	3
0	20	071	Accuracy of fix and rate of atmospherics	Code table	0	0	4	Code table	0	2
0	20	081	Cloud amount in segment	%	0	0	7	%	0	3
0	20	082	Amount segment cloud free	%	0	0	7	%	0	3
0	20	083	Amount of segment covered by scene	%	0	0	7	%	0	3
0	20	090	Special clouds	Code table	0	0	4	Code table	0	2
0	20	095	Ice probability	Numeric	3	0	10	Numeric	3	4
0	20	096	Ice age ("A" parameter)	dB	2	-4096	13	dB	2	4
0	20	101	Locust (acridian) name	Code table	0	0	4	Code table	0	2
0	20	102	Locust (maturity) color	Code table	0	0	4	Code table	0	2
0	20	103	Stage of development of locusts	Code table	0	0	4	Code table	0	2
0	20	104	Organization state of swarm or band of locusts	Code table	0	0	4	Code table	0	2
0	20	105	Size of swarm or band of locusts and duration of passage of swarm	Code table	0	0	4	Code table	0	2
0	20	106	Locust population density	Code table	0	0	4	Code table	0	2
0	20	107	Direction of movements of locust swarm	Code table	0	0	4	Code table	0	2

| 0 | 20 | 108 | Extent of vegetation | Code table | 0 | 0 | 4 | Code table | 0 | 2 |

Notes:

(1)   When encoding present weather reported from an automatic weather station, the appropriate combination of descriptors 0-20-021, 0-20-022, 0-20-023, 0-20-024, 0-20-025, 0-20-026 and 0-20-027 should be used and preferred. A descriptor 0-20-003 should be used only when descriptors mentioned above are not applicable.

(2)   When encoding past weather reported from an automatic weather station, the appropriate combination of descriptors 0-20-021, 0-20-022, 0-20-023, 0-20-024, 0-20-025, 0-20-026 and 0-20-027 should be used and preferred. Descriptors 0-20-004 or 0-20-005 should be used only when descriptors mentioned above are not applicable.

(3)   The data width for descriptor 0 20 038 originally defined to be 12 is wrong. Nine bits are sufficient as for all the other "degree true" quantities. However, the 12-bit width is maintained for historical consistency. Also: A bearing of ice edge value 0 shall indicate "Ship in shore or flaw lead".

(4)   Snow cover will be reported for each satellite pixel as a percentage of coverage of the pixel. It does not seem feasible to try to use existing descriptor 0 20 062 for such a purpose because the use of that descriptor additionally implies details on, e.g. snow drifts, wet compared to dry snow, etc. that a satellite obviously cannot accurately detect.

(5)   A cloud cover (total) value 113 shall indicate "Sky obscured by fog and/other meteorological phenomena.

Class 21 - Radar data

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	21	001	Horizontal reflectivity	dB	0	–64	7	dB	0	3
0	21	002	Vertical reflectivity	dB	0	–64	7	dB	0	3
0	21	003	Differential reflectivity	dB	1	–5	7	dB	1	3
0	21	005	Linear depolarisation ratio	dB	0	–65	6	dB	0	2
0	21	006	Circular depolarisation ratio	dB	0	–65	6	dB	0	2
0	21	011	Doppler mean velocity in X-direction	$m\ s^{-1}$	0	–128	8	$m\ s^{-1}$	0	3
0	21	012	Doppler mean velocity in Y-direction	$m\ s^{-1}$	0	–128	8	$m\ s^{-1}$	0	3
0	21	013	Doppler mean velocity in Z-direction	$m\ s^{-1}$	0	–128	8	$m\ s^{-1}$	0	3
0	21	014	Doppler mean velocity (radial)	$m\ s^{-1}$	1	–4096	13	$m\ s^{-1}$	1	4
0	21	017	Doppler velocity spectral width	$m\ s^{-1}$	1	0	8	$m\ s^{-1}$	1	3
0	21	021	Echo tops	m	–3	0	4	m	-3	2
0	21	030	Signal to noise ratio	dB	0	–32	8	dB	0	3
0	21	031	Vertically integrated liquid-water content	$kg\ m^{-2}$	0	0	7	$kg\ m^{-2}$	0	3
0	21	036	Radar rainfall intensity	$m\ s^{-1}$	7	0	12	$m\ s^{-1}$	7	4
0	21	041	Bright-band height	m	–2	0	8	m	-2	3
0	21	051	Signal power above 1 mW	dB	0	–256	8	dB	0	3
0	21	062	Backscatter	dB	2	–5000	13	dB	2	4
0	21	063	Radiometric resolution (noise value)	%	1	0	10	%	1	4
0	21	064	Clutter noise estimate	Numeric	0	0	8	Numeric	0	3
0	21	065	Missing packet counter	Numeric	0	–127	8	Numeric	0	3
0	21	066	Wave scatterometer product confidence data	Flag table	0	0	12	Flag table	0	4
0	21	067	Wind product confidence data	Flag table	0	0	13	Flag table	0	5
0	21	068	Radar altimeter product confidence data	Flag table	0	0	8	Flag table	0	3
0	21	069	SST product confidence data	Flag table	0	0	10	Flag table	0	4
0	21	070	SST product confidence data (SADIST-2)	Flag table	0	0	23	Flag table	0	6
0	21	071	Peakiness	Numeric	0	0	16	Numeric	0	5
0	21	072	Satellite altimeter calibration status	Flag table	0	0	4	Flag table	0	2
0	21	073	Satelllite altimeter instrument mode	Flag table	0	0	9	Flag table	0	3
0	21	075	Image spectrum intensity	Numeric	0	0	8	Numeric	0	3
0	21	076	Representation of intensities	Code table	0	0	3	Code table	0	1
0	21	077	Altitude correction (ionosphere)	m	3	0	14	m	3	5
0	21	078	Altitude correction (dry troposphere)	m	3	0	9	m	3	3

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	21	079	Altitude correction (wet troposphere)	m	3	2000	10	m	3	4
0	21	080	Altitude correction (calibration constant)	m	3	0	11	m	3	4
0	21	081	Open loop correction (height-time loop)	m	3	0	10	m	3	4
0	21	082	Open loop correction (auto gain control)	dB	3	–3000	14	dB	3	5
0	21	083	Warm target calibration	Numeric	0	0	16	Numeric	0	5
0	21	084	Cold target calibration	Numeric	0	0	16	Numeric	0	5
0	21	085	ATSR sea surface temperature across- track band number	Numeric	0	0	4	Numeric	0	2
0	21	086	Number of pixels in Nadir only, average	Numeric	0	0	9	Numeric	0	3
0	21	087	Number of pixels in dual view, average	Numeric	0	0	9	Numeric	0	3
0	21	088	Wet backscatter	dB	2	-5000	13	dB	2	4
0	21	091	Radar signal Doppler spectrum 0th moment	dB	0	-100	8	dB	0	3
0	21	092	RASS signal Doppler spectrum 0th moment, referring to RASS signal	dB	0	-100	8	dB	0	3
0	21	093	Ku band peakiness	Numeric	3	0	16	Numeric	3	5
0	21	094	S band peakiness	Numeric	3	0	16	Numeric	3	5
0	21	101	Number of vector ambiguities	Numeric	0	0	3	Numeric	0	1
0	21	102	Index of selected wind vector	Numeric	0	0	3	Numeric	0	1
0	21	103	Total number of sigma-0 measurements	Numeric	0	0	5	Numeric	0	2
0	21	104	Likelihood computed for solution	Numeric	3	-30000	15	Numeric	3	5
0	21	105	Normalized radar cross-section	dB	2	-10000	14	dB	2	5
0	21	106	Kp variance coefficient (Alpha)	Numeric	3	0	14	Numeric	3	5
0	21	107	Kp variance coefficient (Beta)	Numeric	8	0	16	Numeric	8	5
0	21	109	SEAWINDS wind vector cell quality	Flag table	0	0	17	Flag table	0	6
0	21	110	Number of inner-beam Sigma-0 (forward of satellite)	Numeric	0	0	6	Numeric	0	2
0	21	111	Number of outer-beam Sigma-0 (forward of satellite)	Numeric	0	0	6	Numeric	0	2
0	21	112	Number of inner-beam Sigma-0 (aft of satellite)	Numeric	0	0	6	Numeric	0	2
0	21	113	Number of outer-beam Sigma-0 (aft of satellite)	Numeric	0	0	6	Numeric	0	2
0	21	114	Kp variance coefficent (Gamma)	dB	3	-140000	18	dB	3	6
0	21	115	SEAWINDS sigma-0 quality	Flag table	0	0	17	Flag table	0	6
0	21	116	SEAWINDS sigma-0 mode	Flag table	0	0	17	Flag table	0	6
0	21	117	Sigma-0 variance quality control	Numeric	2	0	16	Numeric	2	5
0	21	118	Attenuation correction on sigma-0	dB	2	-10000	14	dB	2	5
0	21	119	Wind scatterometer geophysical model function	Code table	0	0	6	Code table	0	2
0	21	120	Probability of rain	Numeric	3	0	10	Numeric	3	4

0	21	121	SEAWINDS NOF* rain index	Numeric	0	0	8	Numeric	0	3
0	21	122	Attenuation correction of sigma-0 (from tB)	dB	2	-10000	14	dB	2	5
0	21	123	SEAWINDS normalized radar cross section	dB	2	-30000	15	dB	2	5
0	21	128	Number of valid points per second used to derive previous parameters	Numeric	0	0	8	Numeric	0	3
0	21	130	Spectrum total energy	Numeric	6	0	28	Numeric	6	9
0	21	131	Spectrum max energy	Numeric	6	0	28	Numeric	6	9
0	21	132	Direction of spectrum max on higher resolution grid	Degree	3	0	19	Degree	3	6
0	21	133	Wave-length of spectrum max on higher resolution grid	m	3	0	29	m	3	9
0	21	134	Range resolution of cress covariance spectrum	Rad m^{-1}	3	0	19	Rad m^{-1}	3	6
0	21	135	Real part of cross spectra polar grid number of bins	Numeric	3	-524288	20	Numeric	3	7
0	21	136	Imaginary part of cross spectra polar grid number of bins	Numeric	3	-524288	20	Numeric	3	7
0	21	137	KU band corrected ocean backscatter coefficient	dB	2	-32768	16	dB	2	5
0	21	138	Std KU band corrected ocean backscatter coefficient	dB	2	-32768	16	dB	2	5
0	21	139	KU band net instrumental correction for ACG	dB	2	-2048	12	dB	2	4
0	21	140	S band corrected ocean backscatter coefficient	dB	2	-32768	16	dB	2	5
0	21	141	Std S band corrected ocean backscatter coefficient	dB	2	-32768	16	dB	2	5
0	21	142	S band net instrumental correction for ACG	dB	2	-1024	11	dB	2	4
0	21	143	KU band rain attenuation	dB	2	-1073741824	31	dB	2	10
0	21	144	Altimeter rain flag	Flag table	0	0	2	Flag table	0	1
0	21	150	Beam collocation	Code table	0	0	2	Code table	0	1
0	21	151	Estimated error in sigma-0 at 40 deg. incidence angle	dB	2	0	9	dB	2	3
0	21	152	Slope at 40 deg. incidence angle	dB/Deg	2	-80	7	dB/Deg	2	2
0	21	153	Estimated error in slope at 40 deg. incidence angle	dB/Deg	2	-40	6	dB/Deg	2	2
0	21	154	Soil moisture sensitivity	dB	2	0	12	dB	2	4
0	21	155	Wind vector cell quality	Flag table	0	0	24	Flag table	0	8
0	21	156	Backscatter distance	Numeric	1	-4096	13	Numeric	1	4
0	21	157	Loss per unit length of atmosphere used	dB m^{-1}	10	0	22	dB m^{-1}	10	7
0	21	158	ASCAT kp estimate quality	Code table	0	0	2	Code table	0	1
0	21	159	ASCAT sigma-0 usability	Code table	0	0	2	Code table	0	1
0	21	160	ASCAT use of synthetic data	Numeric	3	0	10	Numeric	3	4
0	21	161	ASCAT synthetic data quality	Numeric	3	0	10	Numeric	3	4
0	21	162	ASCAT satellite orbit and attitude quality	Numeric	3	0	10	Numeric	3	4
0	21	163	ASCAT solar array reflection contamination	Numeric	3	0	10	Numeric	3	4
0	21	164	ASCAT telemetry presence and quality	Numeric	3	0	10	Numeric	3	4

| 0 | 21 | 165 | ASCAT extrapolated reference function presence | Numeric | 3 | 0 | 10 | Numeric | 3 | 4 |
| 0 | 21 | 166 | ASCAT land fraction | Numeric | 3 | 0 | 10 | Numeric | 3 | 4 |

Note: NOF = Normalized Objective Function

Class 22 - Oceanographic elements

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNITS	SCALE	DATA WIDTH (Characters)
0	22	001	Direction of waves	Degree true	0	0	9	Degree true	0	3
0	22	002	Direction of wind waves	Degree true	0	0	9	Degree true	0	3
0	22	003	Direction of swell waves	Degree true	0	0	9	Degree true	0	3
0	22	004	Direction of current	Degree true	0	0	9	Degree true	0	3
0	22	005	Direction of sea surface current	Degree true	0	0	9	Degree true	0	3
0	22	011	Period of waves	s	0	0	6	s	0	2
0	22	012	Period of wind waves	s	0	0	6	s	0	2
0	22	013	Period of swell waves	s	0	0	6	s	0	2
0	22	021	Height of waves	m	1	0	10	m	1	4
0	22	022	Height of wind waves	m	1	0	10	m	1	4
0	22	023	Height of swell waves	m	1	0	10	m	1	4
0	22	025	Standard deviation wave height	m	2	0	10	m	2	4
0	22	026	Standard deviation of significant wave height	m	2	0	10	m	2	4
0	22	031	Speed of current	m s^{-1}	2	0	13	m s^{-1}	2	4
0	22	032	Speed of sea surface current	m s^{-1}	2	0	13	m s^{-1}	2	4
0	22	035	Tidal elevation with respect to local chart datum	m	2	0	14	m	2	4
0	22	036	Meteorological residual tidal elevation (surge or offset)	m	2	0	14	m	2	4
0	22	037	Tidal elevation with respect to national land datum	m	3	−10000	15	m	3	5
0	22	038	Tidal elevation with respect to local chart datum	m	3	−10000	15	m	3	5
0	22	039	Meteorological residual tidal elevation (surge or offset)	m	3	−5000	12	m	3	4
0	22	040	Meteorological residual tidal elevation (surge or offset)	m	3	−5000	14	m	3	5
0	22	041	Sea-surface temperature (15-day running mean)	K	1	0	12	K	1	4
0	22	042	Sea/water temperature	K	1	0	12	K	1	4
0	22	043	Sea/water temperature	K	2	0	15	K	2	5
0	22	044	Sound velocity	m s^{-1}	1	0	14	m s^{-1}	1	5
0	22	045	Sea/water temperature	K	3	0	19	K	3	6
0	22	049	Sea surface temperature	K	2	0	15	K	2	5
0	22	050	Standard deviation sea-surface temperature	K	2	0	8	K	2	3
0	22	055	Float cycle number	Numeric	0	0	10	Numeric	0	3
0	22	056	Direction of profile	Code table	0	0	2	Code table	0	1
0	22	059	Sea surface salinity	Part per thousand	2	0	14	Part per thousand	2	5

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNITS	CREX SCALE	DATA WIDTH (Characters)
0	22	060	Lagrangian drifter drogue status	Code table	0	0	3	Code table	0	1
0	22	061	State of the sea	Code table	0	0	4	Code table	0	2
0	22	062	Salinity	Part per thousand	2	0	14	Part per thousand	2	5
0	22	063	Total water depth	m	0	0	14	m	0	5
0	22	064	Salinity	Part per thousand	3	0	17	Part per thousand	3	6
0	22	065	Water pressure	Pa	-3	0	17	Pa	-3	6
0	22	066	Water conductivity	$s\ m^{-1}$	6	0	26	$S\ m^{-1}$	6	8
0	22	067	Instrument type for water temperature profile measurement	Code table	0	0	10	Code table	0	4
0	22	068	Water temperature profile recorder types	Code table	0	0	7	Code table	0	3
0	22	069	Spectral wave density	m^2Hz^{-1}	3	0	22	m^2Hz^{-1}	3	7
0	22	070	Significant wave height	m	2	0	13	m	2	4
0	22	071	Spectral peak wave period	s	1	0	9	s	1	3
0	22	072	Spectral peak wave length	m	0	0	13	m	0	4
0	22	073	Maximum wave height	m	2	0	13	m	2	4
0	22	074	Average wave period	s	1	0	9	s	1	3
0	22	075	Average wave length	m	0	0	13	m	0	4
0	22	076	Direction from which dominant waves are coming	Degree true	0	0	9	Degree true	0	3
0	22	077	Directional spread of dominant wave	Degree	0	0	9	Degree	0	3
0	22	078	Duration of wave record	s	0	0	12	s	0	4
0	22	079	Length of wave record	m	0	0	16	m	0	5
0	22	080	Waveband central frequency	Hz	3	0	10	Hz	3	4
0	22	081	Waveband central wave number	m^{-1}	5	0	13	m^{-1}	5	4
0	22	082	Maximum non-directional spectral wave density	$m^2\ s$	2	0	20	$m^2\ s$	2	7
0	22	083	Maximum non-directional spectral wave number	m^3	2	0	20	m^3	2	7
0	22	084	Band containing maximum non- directional spectral wave density	Numeric	0	0	7	Numeric	0	3
0	22	085	Spectral wave density ratio	Numeric	0	0	7	Numeric	0	3
0	22	086	Mean direction from which waves are coming	Degree true	0	0	9	Degree true	0	3
0	22	087	Principal direction from which waves are coming	Degree true	0	0	9	Degree true	0	3
0	22	088	First normalized polar coordinate from Fourier coefficients	Numeric	2	0	7	Numeric	2	3
0	22	089	Second normalized polar coordinate from Fourier coefficients	Numeric	2	0	7	Numeric	2	3
0	22	090	Non-directional spectral estimate by wave frequency	$m^2\ s$	2	0	20	$m^2\ s$	2	7

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNITS	SCALE	DATA WIDTH (Characters)
0	22	091	Non-directional spectral estimate by wave number	m^3	2	0	20	m^3	2	7
0	22	092	Directional spectral estimate by wave frequency	$m^2\,rad^{-1}\,s$	2	0	20	$m^2\,rad^{-1}\,s$	2	7
0	22	093	Directional spectral estimate by wave number	m^4	2	0	20	m^4	2	7
0	22	094	Total number of wave bands	Numeric	0	0	7	Numeric	0	3
0	22	095	Directional spread of individual waves	Degree	0	0	8	Degree	0	3
0	22	096	Spectral band width	s^{-1}	3	0	4	s^{-1}	3	2
0	22	097	Mean wavelength > 731 m of image spectrum at low wave numbers	m	0	0	14	m	0	5
0	22	098	Wavelength spread (wavelength > 731 m) at low wave numbers	m	0	0	14	m	0	5
0	22	099	Mean direction at low wave numbers (wavelength > 731 m)	Degree true	0	0	9	Degree true	0	3
0	22	100	Direction spread at low wave numbers(wavelength > 731 m)	Degree	0	0	9	Degree	0	3
0	22	101	Total energy (wavelength > 731m) at low wave numbers	Numeric	0	0	31	Numeric	0	10
0	22	120	Tide station automated water level check	Code table	0	0	5	Code table	0	2
0	22	121	Tide station manual water level check	Code table	0	0	5	Code table	0	2
0	22	122	Tide station automated meteorological data check	Code table	0	0	5	Code table	0	2
0	22	123	Tide station manual meteorological data check	Code table	0	0	5	Code table	0	2
0	22	141	Sea-surface temperature (15-day running mean)	K	2	0	15	K	2	5
0	22	150	Number of 18 Hz valid points for KU band	Numeric	0	0	10	Numeric	0	4
0	22	151	KU band ocean range	m	3	0	31	m	3	10
0	22	152	STD of 18 Hz KU band ocean range	m	3	0	16	m	3	5
0	22	153	Number of 18 Hz valid points for S band	Numeric	0	0	10	Numeric	0	4
0	22	154	S band ocean range	m	3	0	31	m	3	10
0	22	155	STD of 18 Hz S band ocean range	m	3	0	16	m	3	5
0	22	156	KU band significant wave height	m	3	0	16	m	3	5
0	22	157	STD 18Hz KU band significant wave height	m	3	0	16	m	3	5
0	22	158	S band significant wave height	m	3	0	16	m	3	5
0	22	159	STD 18Hz S band significant wave height	m	3	0	16	m	3	5
0	22	160	Normalized inverse wave age	Numeric	6	0	21	Numeric	6	7
0	22	161	Wave spectra	m^4	4	0	27	m^4	4	9

Notes:

(1)   The significant wave height is defined as four times the square root of the energy spectrum integrated over direction and frequency. It corresponds to about the height that one-third of all waves exceed.

(2)   The dominant wave is the one that has the maximum energy in the energy spectrum.

(3)   Mean Wave Direction is the angle alpha 1 and Principal Wave Direction is the angle alpha 2, in the expression S(f, alpha) approximately equals:
c_{11} x (0.5 + r_1 x cos (alpha-alpha 1) + r_2 x cos (2 (alpha-alpha 2))) / pi
in which S(f, alpha) is the wave directional spectrum and c_{11} is the non directional spectrum, and the right hand side of this expression is the first two terms of the Fourier series expansion of S(f, alpha). If the mean and principal directions differ significantly (e.g, more than 15 degrees) for a given frequency, crossing seas are indicated.

(4)   Descriptor 0 22 040 should be used instead of 0 22 039 for encoding meteorological residual tidal elevation (surge or offset).

(5)   Additional information:
0 22 097 nominal input range 0 – 10000
0 22 098 nominal input range 0 – 10000
0 22 099 nominal input range 0 – 359
0 22 100 nominal input range 0 – 359
0 22 101 nominal input range $0 – 2 \times 10^6$, but may be greater because of uncertainty.

(6)   Descriptors 0 22 001, 0 22 002, 0 22 003: the direction given in these entries is the direction which waves are coming from.

(7)   Descriptor 0 22 004: the direction given in this entry is the direction towards which the current is flowing.

(8)   Wind waves and waves reporting standards

Observation	Speed	Direction
No observation	Missing	Missing
Calm	0	0
Normal observation	>0	1-360
Speed only	>0	Missing
Direction only	Missing	1-360
"Light and variable"	>0	0

Class 23 - Dispersal and transport

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNITS	SCALE	DATA WIDTH (Characters)
0	23	001	Accident early notification — article applicable	Code table	0	0	3	Code table	0	1
0	23	002	Activity or facility involved in incident	Code table	0	0	5	Code table	0	2
0	23	003	Type of release	Code table	0	0	3	Code table	0	1
0	23	004	Countermeasures taken near border	Code table	0	0	3	Code table	0	1
0	23	005	Cause of incident	Code table	0	0	2	Code table	0	1
0	23	006	Incident situation	Code table	0	0	3	Code table	0	1
0	23	007	Characteristics of release	Code table	0	0	3	Code table	0	1
0	23	008	State of current release	Code table	0	0	2	Code table	0	1
0	23	009	State of expected release	Code table	0	0	2	Code table	0	1
0	23	016	Possibility of significant chemical toxic health effect	Code table	0	0	2	Code table	0	1
0	23	017	Flow discharge of major recipient	$m^3 s^{-1}$	6	0	20	$m^3 s^{-1}$	6	7
0	23	018	Release behaviour over time	Code table	0	0	3	Code table	0	1
0	23	019	Actual release height	M	0	−15000	17	m	0	6
0	23	021	Effective release height	M	0	−15000	17	m	0	6
0	23	022	Distance of release point or site of incident	M	0	0	24	m	0	8
0	23	023	Main transport speed in the atmosphere	$m s^{-1}$	1	0	12	$m s^{-1}$	1	4
0	23	024	Main transport speed in water	$m s^{-1}$	2	0	13	$m s^{-1}$	2	4
0	23	025	Main transport speed in ground water	$m s^{-1}$	2	0	13	$m s^{-1}$	2	4
0	23	027	Main transport direction in the atmosphere	Degree true	0	0	9	Degree true	0	3
0	23	028	Main transport direction in water	Degree true	0	0	9	Degree true	0	3
0	23	029	Main transport direction in ground water	Degree true	0	0	9	Degree true	0	3
0	23	031	Possibility that plume will encounter precipitation in State in which incident occurred	Code table	0	0	2	Code table	0	1
0	23	032	Plume will encounter change in wind direction and/or speed flag	Code table	0	0	2	Code table	0	1

Class 24 - Radiological elements

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	24	001	Estimate of amount of radioactivity released up to specified time	Bq*	-11	0	28	Bq*	-11	9
0	24	002	Estimated maximum potential release	Bq	-11	0	28	Bq	-11	9
0	24	003	Composition of release	Code table	0	0	5	Code table	0	2
0	24	004	Element name	CCITT IA5	0	0	16	Character	0	2
0	24	005	Isotope mass	Numeric	0	0	9	Numeric	0	3
0	24	011	Dose	mSv*/**	2	0	32	mSv*/**	2	10
0	24	012	Trajectory dose (defined location and expected time of arrival)	MSv	2	0	32	mSv	2	10
0	24	013	Gamma dose in air along the main transport path (defined location and time period)	MSv	2	0	32	mSv	2	10
0	24	021	Air concentration (of named isotope type including gross beta)	Bq m^{-3}	2	0	32	Bq m^{-3}	2	10
0	24	022	Concentration in precipitation (of names isotope type)	Bq l^{-1}	2	0	32	Bq l^{-1}	2	10
0	24	023	Pulse rate of beta radiation	s^{-1}	1	0	14	s^{-1}	1	4
0	24	024	Pulse rate of gamma radiation	s^{-1}	1	0	14	s^{-1}	1	4

Note: Useful ranges used above:
10^{11} Bq to 10^{19} Bq for releases;
10^{-2} Bq to 10^7 Bq and 10^{-2} mSv to 10^7 mSv for concentration and doses.

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*	New named unit and symbol	In other SI units	Old special unit and symbol	Relationship, old to new units
	becquerel (Bq)	s^{-1}	curie (Ci)	1 Ci = 3.7 x 10^{10} Bq
	sievert (Sv)	J kg^{-1}	rem (rem)	1 rem = 0.01 Sv
**	Millisievert			

Class 25 - Processing information

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	25	001	Range-gate length	m	–1	0	6	m	-1	2
0	25	002	Number of gates averaged	Numeric	0	0	4	Numeric	0	2
0	25	003	Number of integrated pulses	Numeric	0	0	8	Numeric	0	3
0	25	004	Echo processing	Code table	0	0	2	Code table	0	1
0	25	005	Echo integration	Code table	0	0	2	Code table	0	1
0	25	006	Z to R conversion	Code table	0	0	3	Code table	0	1
0	25	007	Z to R conversion factor	Numeric	0	0	12	Numeric	0	4
0	25	008	Z to R conversion exponent	Numeric	2	0	9	Numeric	2	3
0	25	009	Calibration method (see Note 4)	Flag table	0	0	4	Flag table	0	2
0	25	010	Clutter treatment	Code table	0	0	4	Code table	0	2
0	25	011	Ground occultation correction (screening)	Code table	0	0	2	Code table	0	1
0	25	012	Range attenuation correction	Code table	0	0	2	Code table	0	1
0	25	013	Bright-band correction	Flag table	0	0	2	Flag table	0	1
0	25	014	Azimuth clutter cut-off (see Note 1)	Numeric	0	0	12	Numeric	0	4
0	25	015	Radome attenuation correction	Flag table	0	0	2	Flag table	0	1
0	25	016	Clear-air attenuation correction	dB m^{-1}	5	0	6	dB m^{-1}	5	2
0	25	017	Precipitation attenuation correction	Flag table	0	0	2	Flag table	0	1
0	25	018	A to Z law for attenuation factor	Numeric	7	0	6	Numeric	7	2
0	25	019	A to Z law for attenuation exponent	Numeric	2	0	7	Numeric	2	3
0	25	020	Mean speed estimation	Code table	0	0	2	Code table	0	1
0	25	021	Wind computation enhancement	Flag table	0	0	8	Flag table	0	3
0	25	025	Battery voltage	V	1	0	9	V	1	3
0	25	026	Battery voltage (large range)	V	1	0	12	V	1	4
0	25	028	Operator or manufacturer defined parameter	Numeric	1	-16384	15	Numeric	1	5
0	25	029	Calibration method	Flag table	0	0	6	Flag table	0	2
0	25	030	Running mean sea-surface temperature usage	Code table	0	0	2	Code table	0	1

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	25	032	Wind profiler mode information*	Code table	0	0	2	Code table	0	1
0	25	033	Wind profiler submode information*	Code table	0	0	2	Code table	0	1
0	25	034	Wind profiler quality control test results*	Flag table	0	0	4	Flag table	0	2
0	25	036	Atmospherics location method	Code table	0	0	4	Code table	0	2
0	25	040	CO_2 wind product derivation	Code table	0	0	4	Code table	0	2
0	25	041	Moving platform direction reporting method	Code table	0	0	2	Code table	0	1
0	25	042	Moving platform speed reporting method	Code table	0	0	2	Code table	0	1
0	25	043	Wave sampling interval (time)	s	4	0	15	s	4	5
0	25	044	Wave sampling interval (space)	m	2	0	14	m	2	5
0	25	045	HIRS channel combination	Flag table	0	0	21	Flag table	0	7
0	25	046	MSU channel combination	Flag table	0	0	5	Flag table	0	2
0	25	047	SSU channel combination	Flag table	0	0	4	Flag table	0	2
0	25	048	AMSU-A channel combination	Flag table	0	0	16	Flag table	0	6
0	25	049	AMSU-B channel combination	Flag table	0	0	6	Flag table	0	2
0	25	050	Principal component score	Numeric	4	-131072	18	Numeric	4	6
0	25	051	AVHRR channel combination	Flag table	0	0	7	Flag table	0	3
0	25	052	Log-10 of principal components normalized fit to data	Numeric	4	0	15	Numeric	4	5
0	25	053	Observation quality	Flag table	0	0	12	Flag table	0	4
0	25	054	SSMIS Subframe ID nember	Numeric	0	0	5	Numeric	0	2
0	25	055	Multiplexer housekeeping	K	2	0	16	K	2	5
0	25	060	Software identification (see Note 2)	Numeric	0	0	14	Numeric	0	5
0	25	061	Software identification and version number	CCITT IA5	0	0	96	Character	0	12
0	25	062	Database identification	Numeric	0	0	14	Numeric	0	5
0	25	065	Orientation correction (azimuth)	Degree	2	-1000	11	Degree	2	4
0	25	066	Orientation correction (elevation)	Degree	2	-1000	11	Degree	2	4
0	25	067	Radiosonde release point pressure correction	Pa	0	-8000	14	Pa	0	4
0	25	068	Number of archive recomputes	Numeric	0	0	7	Numeric	0	3
0	25	069	Flight level pressure corrections	Flag table	0	0	8	Flag table	0	3

* The meaning of these quantities may be obtained from the originator of the data.

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	25	070	Major frame count	Numeric	0	0	4	Numeric	0	2
0	25	071	Frame count	Numeric	0	0	5	Numeric	0	2
0	25	075	Satellite antenna corrections version number	Numeric	0	0	5	Numeric	0	2
0	25	076	Log–10 of (Temperature-radiance central wavenumber) for ATOVS	Log m^{-1}	8	0	30	log m^{-1}	8	10
0	25	077	Bandwidth correction coefficient 1 for ATOVS	Numeric	5	–100000	18	Numeric	5	7
0	25	078	Bandwidth correction coefficient 2 for ATOVS	Numeric	5	0	17	Numeric	5	6
0	25	079	Albedo-radiance solar filtered irradiance for ATOVS	W m^{-2}	4	0	24	W m^{-2}	4	8
0	25	080	Albedo-radiance equivalent filter width for ATOVS	m	10	0	14	m	10	5
0	25	085	Fraction of clear pixels in HIRS FOV	Numeric	0	0	7	Numeric	0	3
0	25	086	Depth correction indicator	Code table	0	0	2	Code table	0	1
0	25	091	Structure constant of the refraction index (C_n^2)	dB	3	-18192	13	dB	3	5
0	25	092	Acoustic propagation velocity	$m\ s^{-1}$	2	28000	14	$m\ s^{-1}$	2	5
0	25	093	RASS computation correction	Flag table	0	0	8	Flag table	0	3
0	25	095	Altimeter state flag	Flag table	0	0	2	Flag table	0	1
0	25	096	Radiometer state flag	Flag table	0	0	5	Flag table	0	2
0	25	097	Three dimensional error estimate of the navigator orbit	Code table	0	0	4	Code table	0	2
0	25	100	XBT/XCTD fall rate equation coefficient a	Numeric	5	0	20	Numeric	5	6
0	25	101	XBT/XCTD fall rate equation coefficient b	Numeric	5	-500000	21	Numeric	5	6
0	25	102	Number of missing lines excluding data gaps	Numeric	0	0	8	Numeric	0	3
0	25	103	Number of directional bins	Numeric	0	0	8	Numeric	0	3
0	25	104	Number of wave-length bins	Numeric	0	0	8	Numeric	0	3
0	25	105	First directional bin	Degree	3	0	19	Degree	3	6
0	25	106	Directional bin step	Degree	3	0	19	Degree	3	6
0	25	107	First wave-length bin	m	3	0	29	m	3	9
0	25	108	Last wave-length bin	m	3	0	29	m	3	9
0	25	110	Image processing summary	Flag table	0	0	10	Flag table	0	4
0	25	111	Number of input data gaps	Numeric	0	0	8	Numeric	0	3
0	25	120	RA2-L2-processing flag	Code table	0	0	2	Code table	0	1
0	25	121	RA2-L2-processing quality	%	0	0	7	%	0	3
0	25	122	Hardware configuration for RF	Code table	0	0	2	Code table	0	1
0	25	123	Hardware configuration for HPA	Code table	0	0	2	Code table	0	1
0	25	124	MWR L2 Processing flag	Code	0	0	2	Code table	0	1

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
				table						
0	25	125	MWR L2-processing quality	%	0	0	7	%	0	3
0	25	126	Model dry tropospheric correction	m	3	-32768	16	m	3	5
0	25	127	Inverted barometer correction	m	3	-32768	16	m	3	5
0	25	128	Model wet tropospheric correction	m	3	-32768	16	m	3	5
0	25	129	MWR derived wet tropospheric correction	m	3	-32768	16	m	3	5
0	25	130	RA2 ionospheric correction on KU band	m	3	-32768	16	m	3	5
0	25	131	Ionospheric correction from Doris on KU band	m	3	-32768	16	m	3	5
0	25	132	Ionospheric correction from model on KU band	m	3	-32768	16	m	3	5
0	25	133	Sea state bias correction on KU band	m	3	-32768	16	m	3	5
0	25	134	RA2 ionospheric correction on S band	m	3	-32768	16	m	3	5
0	25	135	Ionospheric correction from Doris on S band	m	3	-32768	16	m	3	5
0	25	136	Ionospheric correction from model on S band	m	3	-32768	16	m	3	5
0	25	137	Sea state bias correction on S band	m	3	-32768	16	m	3	5
0	25	138	Average signal to noise ration	Numeric	0	-2048	12	Numeric	0	4
0	25	140	Start channel	Numeric	0	0	14	Numeric	0	5
0	25	141	End channel	Numeric	0	0	14	Numeric	0	5
0	25	142	Channel scale factor	Numeric	0	0	6	Numeric	0	2
0	25	150	Method of tropical cyclone intensity analysis using satellite data	Code table	0	0	4	Code table	0	2

Notes: (1) 0 25 014 nominal input range 0 - 2300

(2) The actual meaning may be obtained from the originator of the data.

(3) Descriptor 0 25 143 is intended for numerical, non-dimensional values to be used as coefficients in statistical or linear processing. Each instance of 0 25 143 should be characterized by using an appropriate significance qualifier, such as 0 08 026.

(4) Descriptor 0 25 009 is deprecated. 0 25 029 should be used instead.

Class 26 - Non-coordinate location (time)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	26	001	Principal time of daily reading in UTC of maximum temperature	Hour	1	0	12	Hour	1	3
0	26	002	Principal time of daily reading in UTC of minimum temperature	Hour	1	0	12	Hour	1	3
0	26	003	Time difference	Minute	0	–1440	12	Minute	0	4
0	26	010	Hours included	Flag table	0	0	26	Flag table	0	9
0	26	020	Duration of precipitation	Minute	0	0	11	Minute	0	4

Note: Descriptor 0 26 003 is to be used with 0 08 025 (time difference qualifier).

Class 27 - Non-coordinate location (horizontal - 1)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	27	001	Latitude (high accuracy)	Degree	5	–9000000	25	Degree	5	7
0	27	002	Latitude (coarse accuracy)	Degree	2	–9000	15	Degree	2	4
0	27	003	Alternate latitude (coarse accuracy)	Degree	2	–9000	15	Degree	2	4
0	27	004	Alternate latitude (high accuracy)	Degree	5	-9000000	25	Degree	5	7
0	27	020	Satellite location counter	Numeric	0	0	16	Numeric	0	5
0	27	021	Satellite sublocation dimension	Numeric	0	0	16	Numeric	0	5
0	27	031	In direction of 0 degrees longitude, distance from the Earth's centre	m	2	–1073741824	31	m	2	10
0	27	080	Viewing Azimuth angle	Degree true	2	0	16	Degree true	0	5

Notes:

(1)   The alternate latitude may be used when the computation of the position yields multiple solutions and there is no a priori way to distinguish between them.

(2)   The satellite location counter is calculated as:
counter = superswath no. x 1000 + box no. x 10 + minibox no.

(3)   The satellite sublocation dimension is calculated as:
dimension = minibox dimension + box dimension
  where: minibox dimension   = lines x 1000   + spots x 100
            box dimension   = lines x 10   + spots

(4)   The value for descriptor 0 27 031 has been chosen to be suitable for polar orbiting satellites in approximately sun-synchronous orbits. Geostationary orbits would require greater data widths for distance and slightly less for speed.

(5)   Left handed xyz axes have been chosen for descriptor 0 27 031.

Class 28 - Non-coordinate location (horizontal - 2)

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	28	001	Longitude (high accuracy)	Degree	5	–18000000	26	Degree	5	8
0	28	002	Longitude (coarse accuracy)	Degree	2	–18000	16	Degree	2	5
0	28	003	Alternate longitude (coarse accuracy)	Degree	2	–18000	16	Degree	2	5
0	28	004	Alternate longitude (high accuracy)	Degree	5	-18000000	26	Degree	5	8
0	28	031	In direction 90 degrees East, distance from the Earth's centre	m	2	–1073741824	31	m	2	10

Notes:

(1)   The alternate longitude may be used when the computation of the position yields multiple solutions and there is no a priori way to distinguish between them.

(2)   The value for descriptor 0 28 031 has been chosen to be suitable for polar orbiting satellites in approximately sun-synchronous orbits. Geostationary orbits would require greater data widths for distance and slightly less for speed.

(3)   Left handed xyz axes have been chosen for descriptor 0 28 031.

Class 29 - Map data

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	29	001	Projection type	Code table	0	0	3	Code table	0	1
0	29	002	Co-ordinate grid type	Code table	0	0	3	Code table	0	1

Class 30 - Image

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	CREX SCALE	DATA WIDTH (Characters)
0	30	001	Pixel value (4 bits)	Numeric	0	0	4	Numeric	0	2
0	30	002	Pixel value (8 bits)	Numeric	0	0	8	Numeric	0	3
0	30	004	Pixel value (16 bits)	Numeric	0	0	16	Numeric	0	5
0	30	021	Number of pixels per row	Numeric	0	0	12	Numeric	0	4
0	30	022	Number of pixels per column	Numeric	0	0	12	Numeric	0	4
0	30	031	Picture type	Code table	0	0	4	Code table	0	2
0	30	032	Combination with other data	Flag table	0	0	16	Flag table	0	6

Notes:

(1)   Pixel data width can be changed with descriptor 2 01 YYY.

(2)   In order to distinguish unambiguously the cases of missing data and saturated pixels, n-bit image data should be encoded using a data width of n+1. Where such a descriptor is not already available in Class 30, operator descriptor 2 01 YYY should be used to modify the data width of the existing entry as required.

Class 31 - Data description operator qualifiers *(this class does not exist in CREX)*

TABLE REFERENCE F	X	Y	TABLE ELEMENT NAME	UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)
0	31	000	Short delayed descriptor replication factor	Numeric	0	0	1
0	31	001	Delayed descriptor replication factor	Numeric	0	0	8
0	31	002	Extended delayed descriptor replication factor	Numeric	0	0	16
0	31	011	Delayed descriptor and data repetition factor	Numeric	0	0	8
0	31	012	Extended delayed descriptor and data repetition factor	Numeric	0	0	16
0	31	021	Associated field significance	Code table	0	0	6
0	31	031	Data present indicator	Flag table	0	0	1

Notes:

(1)   The "delayed descriptor and data repetition factor" is intended for run-length encoding (e.g. scanning an image). It specifies a count N which applies to both descriptor and data, i.e. the value of the single element defined by the following descriptor is repeated N times (at intervals already specified).

(2)   Descriptor 0 31 031, used in conjunction with quality control or statistics operators 2 22 YYY through 2 32 YYY, shall indicate the presence of quality control information when the indicator value is set to zero. It may be used, in conjunction with the replication operator 1 01 YYY, to construct a table of data present/not present indicators, forming a data present bit-map as defined in Regulation 94.5.5.3. This makes it possible to present quality control information and statistical information for selected data corresponding to element descriptors which precede the 2 22 to 32 YYY operators.

(3)   Other applications of the data present indicator may be developed.

Class 33 - Quality information

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	33	001	Reserved							
0	33	002	Quality information	Code table	0	0	2	Code table	0	1
0	33	003	Quality information	Code table	0	0	3	Code table	0	1
0	33	004	Reserved							
0	33	005	Quality information (AWS data)	Flag table	0	0	30	Flag table	0	10
0	33	006	Internal measurement status information (AWS)	Code table	0	0	3	Code table	0	1
0	33	007	Per cent confidence	%	0	0	7	%	0	3
0	33	015	Data quality check indicator	Code table	0	0	6	Code table	0	2
0	33	020	Quality control indication of following value	Code table	0	0	3	Code table	0	1
0	33	021	Quality of following value	Code table	0	0	2	Code table	0	1
0	33	022	Quality of buoy satellite transmission	Code table	0	0	2	Code table	0	1
0	33	023	Quality of buoy location	Code table	0	0	2	Code table	0	1
0	33	024	Station elevation quality mark (for mobile stations)	Code table	0	0	4	Code table	0	2
0	33	025	ACARS interpolated values	Code table	0	0	3	Code table	0	1
0	33	026	Moisture quality	Code table	0	0	6	Code table	0	2
0	33	027	Location quality class (range of radius of 66 % confidence)	Code table	0	0	3	Code table	0	1
0	33	030	Scan line status flags for ATOVS	Flag table	0	0	24	Flag table	0	8
0	33	031	Scan line quality flags for ATOVS	Flag table	0	0	24	Flag table	0	8
0	33	032	Channel quality flags for ATOVS	Flag table	0	0	24	Flag table	0	8
0	33	033	Field of view quality flags for ATOVS	Flag table	0	0	24	Flag table	0	8
0	33	035	Manual/automatic quality control	Code table	0	0	4	Code table	0	2
0	33	036	Nominal confidence threshold	%	0	0	7	%	0	3
0	33	037	Wind correlation error	Flag table	0	0	20	Flag table	0	7
0	33	038	Quality flags for ground-based GNSS data	Flag table	0	0	10	Flag table	0	4
0	33	039	Quality flags for Radio Occultation data	Flag table	0	0	16	Flag table	0	6
0	33	040	Confidence interval	%	0	0	7	Percent	0	3
0	33	041	Attribute of following value	Code table	0	0	2	Code table	0	1
0	33	042	Type of limit represented by following value	Code table	0	0	3	Code table	0	1
0	33	043	AST confidence	Flag table	0	0	8	Flag table	0	3
0	33	044	ASAR quality information	Flag table	0	0	15	Flag table	0	5
0	33	045	Probability of following event	%	0	0	7	%	0	3
0	33	046	Conditional probability of following event with respect to specified conditioning event	%	0	0	7	%	0	3

0	33	047	Measurement confidence data	Flag table	0	0	31	Flag table	0	11
0	33	048	Confidence measure of SAR inversion	Code table	0	0	2	Code table	0	1
0	33	049	Confidence measure of wind retrieval	Code table	0	0	2	Code table	0	1
0	33	050	Global GTSPP quality flag	Code table	0	0	4	Code table	0	2
0	33	052	S band ocean retracking quality	Flag table	0	0	21	Flag table	0	7
0	33	053	KU band ocean retracking quality	Flag table	0	0	21	Flag table	0	7
0	33	060	GqisFlagQual - individual IASI-System quality flag	Code Table	0	0	2	Code Table	0	1
0	33	061	GqisQualIndex - indicator for instrument noise performance (contributions from spectral and radiometric)	%	0	0	7	%	0	3
0	33	062	GqisQualIndexLoc - indicator for geometric quality index	%	0	0	7	%	0	3
0	33	063	GqisQualIndexRad - indicator for instrument noise performance (contributions from radiometric calibration)	%	0	0	7	%	0	3
0	33	064	GqisQualIndexSpect - indicator for instrument noise performance (contributions from spectral calibration)	%	0	0	7	%	0	3
0	33	065	GqisSysTecSondQual - output of system TEC (Technical Expertise Centre) quality function	Numeric	0	0	24	Numeric	0	8

Notes:

(1) When using descriptor 0-33-045 or 0-33-046, operator 2-41-000 shall be used in order to define the following event to which the reported probability value applies.

(2) When using descriptor 0-33-046, operator 2-42-000 shall precede the occurrence of this descriptor in order to define the event upon which the reported probability value is conditioned.

(3) When defining an event for use with descriptor 0-33-045 or 0-33-046, descriptor 0-33-042 may be employed in order to indicate that the following value is actually a bound for a range of values.

Class 35 - Data monitoring information

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	35	000	FM and regional code number	Code table	0	0	10	Code table	0	3
0	35	001	Time-frame for monitoring	Code table	0	0	3	Code table	0	1
0	35	011	Number of reports actually received	Numeric	0	0	14	Numeric	0	4
0	35	021	Bulletin being monitored (TTAAii)	CCITT IA5	0	0	48	Character	0	6
0	35	022	Bulletin being monitored (YYGGgg)	CCITT IA5	0	0	48	Character	0	6
0	35	023	Bulletin being monitored (CCCC)	CCITT IA5	0	0	32	Character	0	4
0	35	024	Bulletin being monitored (BBB)	CCITT IA5	0	0	24	Character	0	3
0	35	030	Discrepancies in the availability of expected data	Code table	0	0	4	Code table	0	1
0	35	031	Qualifier on monitoring results	Code table	0	0	7	Code table	0	2
0	35	032	Cause of missing data	Code table	0	0	4	Code table	0	1
0	35	033	Observation and collection deficiencies	Code table	0	0	7	Code table	0	2
0	35	034	Statistical trends for availability of data (during the survey period(s))	Code table	0	0	3	Code table	0	1
0	35	035	Reason for termination	Code table	0	0	5	Code table	0	2

Class 40 – Satellite data

TABLE REFERENCE			TABLE ELEMENT NAME	BUFR				CREX		
F	X	Y		UNIT	SCALE	REFERENCE VALUE	DATA WIDTH (Bits)	UNIT	SCALE	DATA WIDTH (Characters)
0	40	001	Surface soil moisture (ms)	%	1	0	10	%	1	4
0	40	002	Estimated error in surface soil moisture	%	1	0	10	%	1	4
0	40	003	Mean surface soil moisture	Numeric	3	0	10	Numeric	3	4
0	40	004	Rain fall detection	Numeric	3	0	10	Numeric	3	4
0	40	005	Soil moisture correction flag	Flag table	0	0	8	Flag table	0	3
0	40	006	Soil moisture processing flag	Flag table	0	0	16	Flag table	0	6
0	40	007	Soil moisture quality	%	1	0	10	%	1	4
0	40	008	Frozen land surface fraction	%	1	0	10	%	1	4
0	40	009	Inundation and wetland fraction	%	1	0	10	%	1	4
0	40	010	Topographic complexity	%	1	0	10	%	1	4