B/C32 – Regulations for reporting CLIMAT SHIP data in TDCF

TM 308013 - BUFR template for reports of monthly values from an ocean weather station suitable for CLIMAT SHIP data

3 08 013		**Sequence for representation of monthly values suitable for CLIMAT SHIP data**
	3 08 011	Monthly values from an ocean weather station
	3 08 012	Monthly normals for an ocean weather station

Monthly values from an ocean weather station (data of CLIMAT SHIP Section 1) Sequence BUFR descriptor **<3 08 011>** expands as shown in the leftmost column below.			
		Station identification, date/time, horizontal and vertical coordinates	Unit, scale
0 01 011		Ship's call sign	CCITT IA5, 0
0 02 001		Type of station	Code table, 0
3 01 011	0 04 001	Year (1)	Year, 0
	0 04 002	Month (1)	Month, 0
	0 04 003	Day (= 1) (1)	Day, 0
3 01 012	0 04 004	Hour (= 0) (1)	Hour, 0
	0 04 005	Minute (= 0) (1)	Minute, 0
3 01 023	0 05 002	Latitude (coarse accuracy) $L_aL_aL_a$	Degree, 2
	0 06 002	Longitude (coarse accuracy) $L_oL_oL_oL_o$	Degree, 2
0 07 030		Height of station platform above mean sea level	m, 1
0 07 031		Height of barometer above mean sea level	m, 1
		Monthly mean values of pressure, temperature, vapour pressure and sea/water temperature	
0 04 074		Short time displacement (= UTC - LST) (1)	Hour, 0
0 04 023		Time period (= number of days in the month)	Day, 0
0 08 023		First order statistics (= 4; mean value)	Code table, 0
0 10 051		Pressure reduced to msl $\overline{PPPP}$	Pa, –1
0 07 032		Height of sensor above marine deck platform (for temperature measurement) (3)	m, 2
0 07 033		Height of sensor above water surface (for temperature measurement) (3)	m, 1
0 12 101		Temperature/dry-bulb temperature $s_n\overline{TTT}$	K, 2
0 13 004		Vapour pressure $\overline{eee}$	Pa, -1
0 07 032		Height of sensor above marine deck platform (set to missing to cancel the previous value)	m, 2
0 07 033		Height of sensor above water surface (set to missing to cancel the previous value)	m, 1
3 02 056		Sea surface temperature, method of measurement, and depth below sea surface	
	0 02 038	Method of sea/water temperature measurement (3)	Code table, 0
	0 07 063	Depth below sea/water surface (for sea surface temperature measurement) (3)	m, 2
	0 22 043	Sea/water temperature $s_n\overline{T_wT_wT_w}$	K, 2
	0 07 063	Depth below sea/water surface	m, 2

		(set to missing to cancel the previous value)	
0 08 023		First order statistics (set to missing to cancel the previous value) **Monthly precipitation data**	Code table, 0
0 04 003		Day (= 1) (2)	Day, 0
0 04 004		Hour (= 6) (2)	Hour, 0
0 04 023		Time period (= number of days in the month) (2)	Day, 0
0 07 032		Height of sensor above marine deck platform (3)	m, 2
0 13 060		Total accumulated precipitation $\mathbf{R_1R_1R_1R_1}$	kg m^{-2}, 1
0 13 051		Frequency group; precipitation $\mathbf{R_d}$	Code table, 0
0 04 053		Number of days with precipitation equal to or more than 1 mm $\mathbf{n_rn_r}$	Numeric, 0
0 07 032		Height of sensor above marine deck platform (set to missing to cancel the previous value)	m, 2
Monthly normals for an ocean weather station (data of CLIMAT SHIP Section 2) Sequence BUFR descriptor **<3 08 012>** expands as shown in the leftmost column below.			
		Normals of pressure, temperature, vapour pressure and sea/water temperature	Unit, scale
0 04 001		Year (of beginning of the reference period)	Year, 0
0 04 001		Year (of ending of the reference period)	Year, 0
0 04 002		Month	Month, 0
0 04 003		Day (= 1) (1)	Day, 0
0 04 004		Hour (= 0) (1)	Hour, 0
0 04 074		Short time displacement (= UTC - LST) (1)	Hour, 0
0 04 022		Time period (= 1)	Month, 0
0 08 023		First order statistics (= 4; mean value)	Code table, 0
0 10 051		Pressure reduced to msl $\overline{\mathbf{PPPP}}$	Pa, –1
0 07 032		Height of sensor above marine deck platform (for temperature measurement) (3)	m, 2
0 07 033		Height of sensor above water surface (for temperature measurement) (3)	m, 1
0 12 101		Temperature/dry-bulb temperature $\mathbf{s_n\overline{TTT}}$	K, 2
0 13 004		Vapour pressure $\overline{\mathbf{eee}}$	Pa, -1
0 07 032		Height of sensor above marine deck platform (set to missing to cancel the previous value	m, 2
0 07 033		Height of sensor above water surface (set to missing to cancel the previous value)	m, 1
3 02 056		Sea surface temperature, method of measurement, and depth below sea surface	
	0 02 038	Method of sea/water temperature measurement (3)	Code table, 0
	0 07 063	Depth below sea/water surface (for sea surface temperature measurement) (3)	m, 2
	0 22 043	Sea/water temperature $\mathbf{s_n\overline{T_wT_wT_w}}$	K, 2
	0 07 063	Depth below sea/water surface (set to missing to cancel the previous value)	m, 2
0 08 023		First order statistics (set to missing to cancel the previous value)	Code table, 0
		Normals of precipitation	
0 04 001		Year (of beginning of the reference period)	Year, 0
0 04 001		Year (of ending of the reference period)	Year, 0

0 04 002		Month	Month, 0
0 04 003		Day (= 1)[2]	Day, 0
0 04 004		Hour (= 6)[2]	Hour, 0
0 04 022		Time period (= 1)	Month, 0
0 07 032		Height of sensor above marine deck platform (for precipitation measurement)[3]	m, 2
0 08 023		First order statistics (= 4; mean value)	Code table, 0
0 13 060		Total accumulated precipitation **$R_1R_1R_1R_1$**	kg m^{-2}, 1
0 04 053		Number of days with precipitation equal to or more than 1 mm **n_rn_r**	Numeric, 0
0 08 023		First order statistics (set to missing to cancel the previous value)	Code table, 0

Notes:

(1) The time identification refers to the beginning of the one-month period. Except for precipitation measurements, the one-month period is recommended to correspond to the local standard time (LST) month [7].

(2) In case of precipitation measurements, the one-month period begins at 06 UTC on the first day of the month and ends at 06 UTC on the first day of the following month [5].

(3) If the heights/depth of sensors or method of sea/water temperature measurement were changed during the period specified, the value shall be that which existed for the greater part of the period.

Regulations:

B/C 32.1 Section 1 of BUFR or CREX

B/C 32.2 Monthly values from an ocean weather station
B/C 32.2.1 Station identification, date/time, horizontal and vertical coordinates
B/C 32.2.2 Monthly mean values of pressure, temperature, vapour pressure and sea/water temperature
B/C 32.2.3 Monthly precipitation data

B/C 32.3 Monthly normals for an ocean weather station
B/C 32.3.1 Normals of pressure, temperature, vapour pressure and sea/water temperature
B/C 32.3.2 Normals of precipitation

B/C 32.4 Data required by regional or national reporting practices

B/C 32.1 Section 1 of BUFR or CREX

B/C 32.1.1 Entries required in Section 1 of BUFR

The following entries shall be included in BUFR Section 1:
- BUFR master table,
- identification of originating/generating centre,
- identification of originating/generating sub-centre,
- update sequence number,
- identification of inclusion of optional section,
- data category (= 001 for CLIMAT SHIP data),
- international data sub-category (1), (2),
- local data subcategory,
- version number of master table,
- version number of local tables,
- year (year of the century up to BUFR edition 3)(3),
- month (for which the monthly values are reported) (3),
- day (= 1) (3),
- hour (= 0) (3),
- minute (= 0)(3).

Notes:
(1) Inclusion of this entry is required starting with BUFR edition 4.
(2) If required, the international data sub-category shall be included for CLIMAT SHIP data as 020.
(3) The time identification refers to the beginning of the month for which the monthly mean values are reported.

B/C 32.1.2 Entries required in Section 1 of CREX

The following entries shall be included in CREX Section 1:
- CREX master table,
- CREX edition number,
- CREX table version number,
- version number of BUFR master table (1),
- version number of local tables (1),
- data category (= 001 for CLIMAT SHIP data),
- international data sub-category (1), (2),
- identification of originating/generating centre (1),
- identification of originating/generating sub-centre (1),

- update sequence number (1),
- number of subsets (1),
- year (1), (3),
- month (for which the monthly values are reported)(1), (3),
- day (= 1) (1), (3),
- hour (= 0) (1), (3),
- minute (= 0) (1), (3).

Notes:
(1) Inclusion of these entries is required starting with CREX edition 2.
(2) If inclusion of international data sub-category is required, Note (2) under B/C 32.1.1 applies.
(3) Note (3) under B/C 32.1.1 applies.

B/C 32.2 Monthly values from an ocean weather station <3 08 011>

B/C 32.2.1 Station identification, date/time, horizontal and vertical coordinates

B/C 32.2.1.1 Station identification

Ship identifier (0 01 011) shall be always reported as a non-missing value.

Type of station (0 02 001) shall be reported to indicate the type of the station operation (manned, automatic or hybrid).

B/C 32.2.1.2 Date/time (of beginning of the month)

Date <3 01 011> and time <3 01 012> shall be reported, i.e. year (0 04 001), month (0 04 002), day (0 04 003) and hour (0 04 004), minute (0 04 005) of beginning of the month for which the monthly values are reported. Day (0 04 003) shall be set to 1 and both hour (0 04 004) and minute (0 04 005) shall be set to 0.

B/C 32.2.1.3 Horizontal and vertical coordinates

Latitude (0 05 002) and longitude (0 06 002) of the station shall be reported in degrees with precision in hundredths of a degree.

Height of station platform above mean sea level (0 07 030) and height of barometer above mean sea level (0 07 031) shall be reported in meters with precision in tenths of a meter.

B/C 32.2.2 Monthly mean values of pressure, temperature, vapour pressure and sea/water temperature

The monthly mean values of pressure reduced to mean sea level, temperature, vapour pressure and sea/water temperature shall be reported. Any missing element shall be reported as a missing value.

B/C 32.2.2.1 Reference period for the data of the month

Monthly data (with the exception of precipitation data) are recommended to be reported for one-month period, corresponding to the local standard time (LST) month. In that case, short time displacement (0 04 074) shall specify the difference between UTC and LST (set to *non-positive values in the eastern hemisphere, non-negative values in the western hemisphere*).

Time period (0 04 023) represents the number of days in the month for which the data are reported, and shall be expressed as a *positive value* in days.

Note:
(1) A BUFR (or CREX) message shall contain reports for one specific month only. [72.1.3]

B/C 32.2.2.2 First order statistics – Code table 0 08 023

This datum shall be set to 4 (mean value) to indicate that the following entries represent mean values of the elements (pressure reduced to mean sea level, temperature, vapour pressure and sea/water temperature) averaged over the one-month period.

B/C 32.2.2.3 Monthly mean value of pressure reduced to mean sea level

Monthly mean value of pressure reduced to mean sea level shall be reported using 0 10 051 (Pressure reduced to mean sea level) in pascals (with precision in tens of a pascal).

B/C 32.2.2.4 Height of sensor above marine deck platform and height of sensor above water surface

Height of sensor above marine deck platform (0 07 032) for temperature and humidity measurement shall be reported in meters (with precision in hundredths of a meter). This datum represents the actual height of temperature and humidity sensors above marine deck platform at the point where the sensors are located.

Height of sensor above water surface (0 07 033) for temperature and humidity measurement shall be reported in meters (with precision in hundredths of a meter). This datum represents the actual height of temperature and humidity sensors above water surface of sea or lake.

Note:

(1) If the heights of the sensors were changed during the period specified, the value shall be that which existed for the greater part of the period.

B/C 32.2.2.5 Monthly mean value of temperature

Monthly mean value of temperature shall be reported using 0 12 101 (Temperature/dry bulb temperature) in degrees Kelvin (with precision in hundredths of a degree Kelvin); if produced in CREX, in degrees Celsius (with precision in hundredths of a degree Celsius). Temperature data shall be reported with precision in hundredths of a degree even if they are available with the accuracy in tenths of a degree.

Notes:

(1) This requirement is based on the fact that conversion from the Kelvin to the Celsius scale has often resulted into distortion of the data values.

(2) Temperature t (in degrees Celsius) shall be converted into temperature T (in degrees Kelvin) using equation: $T = t + 273.15$.

B/C 32.2.2.6 Monthly mean value of vapour pressure

Monthly mean value of vapour pressure shall be reported using 0 13 004 (Vapour pressure) in pascals (with precision in tens of a pascal).

B/C 32.2.2.7 Monthly mean value of sea surface temperature, method of its measurement and depth below sea/water surface

Method of sea/water temperature measurement shall be reported by Code table 0 02 038; depth below sea/water surface (0 07 063) shall be reported in meters (with precision in hundredths of a meter).

Monthly mean value of sea surface temperature shall be reported using 0 22 043 (Sea/water temperature) in degrees Kelvin (with precision in hundredths of a degree Kelvin); if produced in CREX, in degrees Celsius (with precision in hundredths of a degree Celsius). Sea/water temperature data shall be reported with precision in hundredths of a degree even if they are available with the accuracy in tenths of a degree.

Notes:

(1) If the method of sea/water temperature measurement or the depth of the sensor below sea/water surface was changed during the period specified, the value shall be that which existed for the greater part of the period.

(2) Notes (1) and (2) under Regulation B/C 32.2.2.5 shall apply.

B/C 32.2.2.8 First order statistics – Code table 0 08 023

This datum shall be set to missing to indicate that the following entries do not represent the monthly mean values.

B/C 32.2.3 Monthly precipitation data

B/C 32.2.3.1 Date/time (of beginning of the one-month period for precipitation data)

Day (0 04 003) and hour (0 04 004) of the beginning of the one-month period for monthly precipitation data are reported. Day (0 04 003) shall be set to 1 and hour (0 04 004) *shall be set to 6*.

Notes:

(1) In case of precipitation measurements, a month begins at 0600 hours UTC on the first day of the month and ends at 0600 hours UTC on the first day of the following month *[Guide to Climatoligical Practices, WMO-No. 100].*

(2) Year (0 04 001), month (0 04 002) and minute (0 04 005) of the beginning of the month specified in the Regulations B/C 32.2.1.2 apply.

B/C 32.2.3.2 Period of reference for precipitation data of the month

Time period (0 04 023) represents the number of days in the month for which the monthly mean data are reported, and shall be expressed as a *positive value* in days.

Note:

(1) A BUFR (or CREX) message shall contain reports for one specific month only. [72.1.3]

B/C 32.2.3.3 Height of sensor above marine deck platform

Height of sensor above marine deck platform (0 07 032) for precipitation measurement shall be reported in meters (with precision in hundredths of a meter).

This datum represents the actual height of the rain gauge rim above marine deck platform at the point where the rain gauge is located.

Note:

(1) If the height of the sensor was changed during the period specified, the value shall be that which existed for the greater part of the period.

B/C 32.2.3.4 Total amount of precipitation of the month

Total accumulated precipitation (0 13 060) which has fallen during the month shall be reported in kilograms per square meter (with precision in tenths of a kilogram per square meter).

Note:

(1) Trace shall be reported as "- 0.1 kg m^{-2} ".

B/C 32.2.3.5 Indication of frequency group

Frequency group in which the total amount of precipitation of the month falls shall be reported using Code table 0 13 051 (Frequency group; precipitation).

Note:

(1) If for a particular month the total amount of precipitation is zero, the code figure for 0 13 051 shall be given by the highest number of quintile which has 0.0 as lower limit (e.g. in months with no rainfall in the 30-year period, 0 13 051 shall be set to 5). [72.1.4.2]

B/C 32.2.3.6 Number of days with precipitation equal to or greater than 1 mm

Number of days in the month with precipitation equal to or greater than 1 kilogram per square meter shall be reported using 0 04 053 (Number of days in the month with precipitation equal to or greater than 1 mm).

Note:

(1) When the monthly total precipitation is not available, both 0 13 060 and 0 04 053 shall be set to missing. [72.1.4.1]

B/C 32.3 Monthly normals for an ocean weather station <3 08 012>

Meteorological Services shall submit to the Secretariat complete normal data of the elements for stations to be included in the CLIMAT bulletins. The same shall apply when Services consider it necessary to make amendments to previously published normal values. [72.2.1]

B/C 32.3.1 Normals of pressure, temperature, vapour pressure and sea/water temperature

Normal values of pressure reduced to mean sea level, temperature, vapour pressure and sea/water temperature shall be reported. Any missing element shall be reported as a missing value.

B/C 32.3.1.1 Reference period for normal data

Reference period for calculation of the normal values of the elements shall be reported using two consecutive entries 0 04 001 (Year). The first 0 04 001 shall express the year of beginning of the reference period and the second 0 04 001 shall express the year of ending of the reference period.

Note:

(1) The normal data of pressure, temperature and sea/water temperature reported shall be deduced from observations made over a 30-year normal period. [72.2.2]

B/C 32.3.1.2 Specification of the one-month period for which normals are reported

The one-month period for which the normal values are reported shall be specified by month (0 04 002), day (0 04 003) being set to 1, hour (0 04 004) being set to 0, short time displacement (0 04 074) and time period (0 04 022) being set to 1, i.e. 1 month.

Short time displacement (0 04 074) shall be set to *non-positive values in the eastern hemisphere, non-negative values in the western hemisphere*.

B/C 32.3.1.3 First order statistics – Code table 0 08 023

This datum shall be set to 4 (mean value) to indicate that the following entries represent mean values of the elements (pressure reduced to mean sea level, temperature, vapour pressure and sea/water temperature) averaged over the reference period specified in Regulation B/C 32.3.1.1.

B/C 32.3.1.4 Normal value of pressure reduced to mean sea level

Normal value of pressure reduced to mean sea level shall be reported using 0 10 051 (Pressure reduced to mean sea level) in pascals (with precision in tens of a pascal).

B/C 32.3.1.5 Height of sensor above marine deck platform and height of sensor above water surface

Regulation B/C 32.2.2.4 shall apply.

B/C 32.3.1.6 Normal value of temperature

Normal value of temperature shall be reported using 0 12 101 (Temperature/dry bulb temperature) in degrees Kelvin (with precision in hundredths of a degree Kelvin); if produced in CREX, in degrees Celsius (with precision in hundredths of a degree Celsius).

Note:

(1) Notes (1) and (2) under Regulation B/C 3 2.2.2.5 shall apply.

B/C 32.3.1.7 Normal value of vapour pressure

Normal value of vapour pressure shall be reported using 0 13 004 (Vapour pressure) in pascals (with precision in tens of a pascal).

B/C 32.3.1.8 Normal value of sea surface temperature, method of measurement and depth below sea/water surface

Method of sea/water temperature measurement shall be reported by Code table 0 02 038; depth below sea/water surface (0 07 063) shall be reported in meters (with precision in hundredths of a meter).

Normal value of sea surface temperature shall be reported using 0 22 043 (Sea/water temperature) in degrees Kelvin (with precision in hundredths of a degree Kelvin); if produced in CREX, in degrees Celsius (with precision in hundredths of a degree Celsius).

Notes:

(1) Note (1) under Regulation B/C 32.2.2.7 shall apply.

(2) Notes (1) and (2) under Regulation B/C 32.2.2.5 shall apply.

B/C 32.3.2 Normals of precipitation

Normal values of monthly amount of precipitation and of number of days in the month with precipitation equal to or greater than 1 mm, shall be reported. Any missing element shall be reported as a missing value.

B/C 32.3.2.1 Reference period for normal values of precipitation

Reference period for calculation of the normal values of precipitation shall be reported using two consecutive entries 0 04 001 (Year). The first 0 04 001 shall express the year of beginning of the reference period and the second 0 04 001 shall express the year of ending of the reference period.

B/C 32.3.2.2 Specification of the one-month period for which normals are reported

The one-month period for which the normals of precipitation are reported shall be specified by month (0 04 002), day (0 04 003) being set to 1, hour (0 04 004) *being set to 6* and time period (0 04 022) being set to 1, i.e. 1 month.

Note:

(1) Note (1) under Regulation B/C 32.2.3.1 shall apply.

B/C 32.3.2.3 Height of sensor above local marine deck platform

Regulation B/C 32.2.3.3 shall apply.

B/C 32.3.2.4 First order statistics – Code table 0 08 023

This datum shall be set to 4 (mean value) to indicate that the following entries represent mean values of precipitation data, averaged over the reference period specified in Regulation B/C 32.3.2.1.

B/C 32.3.2.5 Normal value of monthly amount of precipitation

Normal value of monthly amount of precipitation shall be reported in kilograms per square meter (with precision in tenths of a kilogram per square meter) using 0 13 060 (Total accumulated precipitation).

Note:

(1) Trace shall be reported as "- 0.1 kg m^{-2}".

B/C 32.3.2.6 Normal value of number of days with precipitation = 1 mm

Normal value of number of days in the month with precipitation equal to or greater than 1 kilogram per square meter shall be reported using 0 04 053 (Number of days in the month with precipitation equal to or greater than 1 mm).

B/C 32.4 Data required by regional or national reporting practices

No additional data are currently required by regional or national reporting practices for CLIMAT SHIP data in Manual on Codes, WMO-No. 306, Volume II.