

JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY
(JCOMM)
SHIP OBSERVATIONS TEAM (SOT)

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ITEM: 10.3

EIGHTH SESSION

CAPE TOWN, SOUTH AFRICA, 20-24 APRIL 2015

Original: ENGLISH

OPERATIONAL CODING REQUIREMENTS

*(Submitted by David Berry (United Kingdom), Chair JCOMM Task Team on Table Driven Codes
(TT-TDC))*

Summary and purpose of the document

This document provides information on coding requirements for ship-based observations including BUFR Template for VOS, XBT, and other types of data (e.g. TSG).

ACTION PROPOSED

The Team will review the information contained in this report, and comment and make decisions or recommendations as appropriate. See part A for the details of recommended actions.

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- Appendices:**
- A. VOS BUR Template
 - B. Mapping of WMO47 humidity metadata to BUFR
 - C. Status of BUFR templates for marine data

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT**10.3.1 BUFR Template for VOS data**

10.3.1.1 The Meeting reviewed the status of the migration to Table Driven Code (TDC) forms, and the status of the BUFR template for VOS data, and discussed the needs for its evolution.

10.3.1.2. The Meeting noted that a BUFR template suitable for the reporting of VOS data (TM308009) is currently operational and contains the same information as the previous TAC code (FM13). However, further changes are required to meet the needs of the forecasting and climate communities. Dr David Berry (United Kingdom), Chair of the JCOMM Task Team on Table Driven Codes (TT-TDC), presented an update on the latest VOS template (see Appendix A) presented to the Second Session (College Park, USA, 28 April-2 May 2014) of the Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM) of the WMO Commission for Basic Systems (CBS). A number of further proposed changes to the template and BUFR descriptors were presented, taking into account feedback from the IPET-DRMM II. These changes included a mapping of Pub47 metadata elements to BUFR descriptors and code table entries (Appendix B). An expected time scale for the validation of the template and its operational status was also presented.

10.3.1.3 Dr Berry reported on the status of the encryption of call signs with the VOS BUFR template. Before encrypted call signs can be used within BUFR a framework for the management of the encryption / decryption keys and their security requirements needs to be agreed (see SOT-8 / Doc. 7.6). However, Dr Berry reported that this does not prevent the new BUFR template for the VOS from being validated.

10.3.2 BUFR Template for XBT/XCTD/TSG data

10.3.2.1 The Meeting also reviewed the latest developments from the JCOMM Data Management Programme Area (DMPA) Task Team on Table Driven Codes (TT-TDC), and particularly the status of the BUFR templates for XBT, XCTD, and TSG data.

10.3.2.2. The meeting noted that the BUFR templates for XBT / XCTD (TM315004) data, TSG data (TM308010) and CTD (TM315007) data were now operational.

10.3.2.3 Dr Berry reported that, in addition to the ship based templates, the TT-TDC had proposed and subsequently validated BUFR templates for moored (TM315008) and drifting (TM315009) buoys. A proposed BUFR template for reporting observations from offshore platforms (TM308017) has been passed to the validation stage, although validation has yet to commence. The status of the BUFR templates for marine data is given in Appendix C. At DBCP-29, it was recognized that DBCP should take the lead, with the JCOMM TT-TDC, on developing suitable BUFR templates for the exchange of Autonomous Surface Vehicle data on GTS, and it is expected to progress this during the coming year.

The Team endorsed the proposed mapping of the Pub47 metadata entries for humidity to BUFR elements

10.3.4. The Team decided on the following action items:

- (i) To validate the revised VOS BUFR Template (**action; TT-TDC; IPET-DRMM III**); and
- (ii) To submit the revised VOS BUFR Template and validation results to the IPET-DRMM-III (**action; TT-TDC; IPET-DRMM-III**).

APPENDIX A

MODIFICATIONS TO VOS TEMPLATE AS PROPOSED TO THE IPET-DRMM-II AND
SUBSEQUENT MODIFICATIONS (RED)**Add new entries:**

BUFR/CREX Table B

Table reference F XX YYYY	Element name	BUFR				CREX		
		Unit	Scale	Ref. value	Data width (bits)	Units	Scale	Data width (char)
0 01 114	Encrypted ship or mobile land station identifier	CCITT IA5	0	0	352	CCITT IA5	0	44
0 03 014	Type of marine hygrometer	Code table	0	0	4	Code table	0	2
0 03 015	Exposure of marine thermometer/hygrometer	Code table	0	0	4	Code table	0	2
0 03 013	Type of marine thermometer	Code table	0	0	3	Code table	0	1
0 10 015	Maximum height of deck cargo above summer load line	m	0	0	6	m	0	2
0 10 016	Departure of reference level (summer maximum load line) from actual sea level	m	0	-32	6	m	0	3
0 11 007	Relative wind direction (in degrees off bow)	°	0	0	9	°	0	3
0 11 008	Relative wind speed	m s ⁻¹	1	0	12	m s ⁻¹	1	4
0 25 185	Encryption method	Code table	0	0	8	Code table	0	3
0 25 186	Encryption key version	CCITT IA5	0	0	96	CCITT IA5	0	12

BUFR/CREX Table D

Table reference			Table references			Element name	Element description
F	XX	YYY	F	XX	YYY		
						(Encrypted ship's call sign and encryption method)	
3	01	018	0	01	114	Encrypted ship or mobile land station identifier	
			0	25	185	Encryption method	
			0	25	186	Encryption key version	

Table reference			Table references			Element name	Element description
F	XX	YYY	F	XX	YYY		
						(Ship "instantaneous" data)	
3	02	062	3	02	001	Pressure and 3-hour pressure change	
			3	02	093	Extended ship temperature and humidity data	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	053	Ship visibility data	
			0	07	033	Height of sensor above water surface	Set to missing (cancel)
			1	03	000	Delayed replication of 3 descriptors	
			0	31	000	Short delayed descriptor replication factor	
			3	02	004	General cloud information	
			3	02	005	Cloud layer	
			0	08	002	Vertical significance (surface observations)	Set to missing (cancel)
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	

			3	02	055	Icing and ice	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	056	Sea/water temperature	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	021	Waves	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	024	Wind and swell waves	

Table reference			Table references			Element name	Element description
F	XX	YYY	F	XX	YYY		
						(Ship "period" data)	
3	02	063	3	02	038	Present and past weather	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	040	Precipitation measurement	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	034	Precipitation past 24 hours	
			0	07	032	Height of sensor above local ground (or deck of marine platform)	Set to missing (cancel)
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	058	Ship extreme temperature data	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	064	Ship wind data	

Table reference			Table references			Element name	Element description
F	XX	YYY	F	XX	YYY		
						(Ship wind data)	
3	02	064	0	07	032	Height of sensor above local ground (or deck of marine platform)	
			0	07	033	Height of sensor above water surface	
			0	02	002	Type of instrumentation for wind measurement	
			0	08	021	Time significance	= 2 Time averaged
			0	04	025	Time period or displacement	
			0	11	001	Wind direction	
			0	11	002	Wind speed	
			0	08	021	Time significance	Set to missing (cancel)
			1	03	000	Delayed replication of 3 descriptors	
			0	31	000	Short delayed replication factor	
			0	31	001	Delayed descriptor replication factor	
			0	04	025	Time period or displacement	
			0	11	043	Maximum wind gust direction	
			0	11	041	Maximum wind gust speed	

Table reference			Table references			Element name	Element description
F	XX	YYY	F	XX	YYY		
						(VOSCLIM data elements)	
3	02	092	0	01	012	Direction of motion of moving observing platform	Ship's heading
			0	01	012	Direction of motion of moving observing platform	Ship's course over ground
			0	01	013	Speed of motion of moving observing platform	Ship's speed over ground
			0	10	038	Maximum height of deck cargo above summer load line	
			0	10	039	Departure of reference level (summer maximum load line) from actual sea level	
			0	11	007	Relative wind direction (in degrees off bow)	
			0	11	008	Relative wind speed	

Table reference			Table references			Element name	Element description
F	XX	YYY	F	X	YYY		
						(Extended ship temperature and humidity data)	
3	02	093	0	07	032	Height of sensor above local ground (or deck of marine platform)	
			0	07	033	Height of sensor above water surface	
			0	03	013	Type of marine thermometer	
			0	03	015	Exposure of marine thermometer/hygrometer	
			0	03	004	Type of shield or screen	
			0	03	008	Artificially ventilated screen or shield	
			0	12	101	Temperature/air temperature	
			0	02	039	Method of wet-bulb temperature measurement	
			0	03	014	Type of marine hygrometer	
			0	03	002	Generic type of humidity instrument	
			0	03	015	Exposure of marine thermometer/hygrometer	
			0	03	004	Type of shield or screen	
			0	03	008	Artificially ventilated screen or shield	
			0	12	102	Wet-bulb temperature	
			0	12	103	Dewpoint temperature	
			0	13	003	Relative humidity	
			0	03	015	Exposure of marine thermometer/hygrometer	Set to missing (cancel)
			0	03	004	Type of shield or screen	Set to missing (cancel)
			0	03	008	Artificially ventilated screen or shield	Set to missing (cancel)
			0	03	013	Type of marine thermometer	Set to missing (cancel)
			0	03	014	Type of marine hygrometer	Set to missing (cancel)
			0	03	002	Generic type of humidity instrument	Set to missing (cancel)

Table reference			Table References			Element name	Element description
F	XX	YYY	F	XX	YYY		
						(Synoptic reports from sea stations suitable for VOS observation data)	
3	08	014	1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	01	018	Encrypted ship's call sign and encryption method	
			3	01	093	Ship identification, movement, date/time, horizontal and vertical coordinates	
			3	02	062	Ship "instantaneous" data	
			3	02	063	Ship "period" data	
			1	01	000	Delayed replication of 1 descriptor	
			0	31	000	Short delayed descriptor replication factor	
			3	02	092	VOSclim data elements	

Add new code tables:**0 03 013****Type of marine thermometer**

Code Figure	Meaning
0	Alcohol thermometer
1	Dry bulb mercury thermometer
2	Electric (resistance) thermometer
3 – 7	Reserved

0-03-014**Type of marine hygrometer**

Code Figure	Meaning
0	Capacitance
1	Chilled mirror
2	Electric
3	Hair hygrometer
4	Hygrieter
5	Psychrometer
6	Torsion
7	Other
8 – 15	Reserved

0-03-015**Exposure of marine thermometer / hygrometer**

Code Figure	Meaning
0	Aspirated (Assmann type)
1	Screen (non-ventilated, i.e. natural ventilation)
2	Screen (ventilated, i.e. assisted ventilation)
3	Ship's screen (property of the ship)
4	Ship's sling (property of the ship)
5	Unscreened
6	Whirling or sling psychrometer
7 – 15	Reserved

0 25 185		
Code Figure	Encryption method	Meaning
0	AES 256	
1 – 254	Reserved	
255	Missing value	

APPENDIX B

PROPOSED MAPPING OF WMO47 HUMIDITY METADATA TO BUFR AND ASSOCIATED BUFR CODE TABLES

Table B.1: Proposed mapping of exposure of thermometer (thmE) / hygrometer (hgrE) from WMO Publication 47 to BUFR

Exposure of marine thermometer / hygrometer	Pub47 code	BUFR	
		Type of shield or screen (003004)	Artificially ventilated screen or shield (003008)
Aspirated (Assman type)	A	24 (Within Assman psychrometer)	1 (Artificial aspiration, constant flow)
Screen (non ventilated, i.e. natural ventilation)	S	25 (Within marine screen, unspecified)	0 (Natural ventilation)
Screen (ventilated, i.e. assisted ventilation)	VS	25 (Within marine screen, unspecified)	1 (Artificial aspiration, constant flow)
Ship's screen (property of ship)	SN	26 (Within marine screen, owned by ship)	0 (Natural ventilation)
Ship's sling (property of ship)	SG	23 (Within whirling or sling psychrometer)	2 (Artificial ventilation, variable flow)
Unscreened	US	27 (Unscreened)	0 (Natural ventilation)
Whirling or sling psychrometer	W	23 (Within whirling or sling psychrometer)	22 (Artificial ventilation, variable flow)

Table B.2: Proposed mapping of type of hygrometer (hygr) from WMO Publication 47 to BUFR

Type of marine hygrometer	Pub47 code	BUFR
		Generic type of humidity instrument (003002)
Capacitance	C	10 (Capacitive, unspecified)
Chilled mirror	CM	7 (Chilled mirror hygrometer)
Electric	E	3 (Resistive sensor)
Hair hygrometer	H	4 (Ordinary human hair)
Hygristor	HG	3 (Resistive sensor)?
Psychrometer	P	0 (Psychrometer)
Torsion	T	5 (Rolled human hair)
Other (specify in footnote)	OT	15 (Missing value)

0 03 002 (under validation)
Generic type of humidity instrument (proposed entries in red)

0	Psychrometer
1	Capacitive sensor (unheated)
2	Capacitive sensor (heated)
3	Resistive sensor
4	Ordinary human hair
5	Rolled hair
6	Goldbeater's skin
7	Chilled mirror hygrometer
8	Dew cell
9	Optical absorption sensor
10	Capacitive (unspecified)
11-14	Reserved
15	Missing value

003004 (under validation)
Type of shield or screen (proposed entries in red)

0	Within Stevenson screen (Wooden)
1	Within Stevenson screen (plastic)
2	Within marine Stevenson screen (wooden)
3	Within marine Stevenson screen (plastic)
4	Within cylindrical section plate shield (metal)
5	Within cylindrical section plate shield (wooden)
6	Within cylindrical section plate shield (plastic)
7	Within concentric tube (metal)
8	Within concentric tube (wooden)
9	Within concentric tube (plastic)
10	Within rectangular section shield (metal)
11	Within rectangular section shield (wooden)
12	Within rectangular section shield (plastic)
13	Within Square section shield (wooden)
14	Within Square section shield (plastic)
15	Within Square section shield (metal)
16	Within Triangular section shield (wooden)
17	Within Triangular section shield (plastic)
18	Within Triangular section shield (metal)
19	Within open covered lean-to (reed/grass/leaf)
20	within open covered inverted v rood (reed/grass/leaf)
21	Ship's sling
22	Aspirated (Assman type)
23	Within marine screen (unspecified)
24	Within marine screen (property of the SHIP)
25	Unscreened
26-61	Reserved
62	Not applicable (e.g. Chilled mirror manufactureres enclosure)
63	Missing value

003008 (under validation)

Artificially ventilated screen or shield

0	Natural ventilation in use
1	Artificial aspiration in use: constant flow at time of reading
2	Artificial aspiration in use: variable flow at time of reading
3-6	Reserved
7	Missing value

APPENDIX C

STATUS OF BUFR TEMPLATES FOR MARINE DATA AS REPORTED TO THE IPET-DRMM-II

	<i>Current template(s)</i>	<i>Status</i>	<i>Plans/comments</i>
Drifting buoy data	Template for the representation from drifting buoys	Operational May 2014 (TM 315009)	Simplified template specific to drifting buoys
Moored buoy data	Template for the representation of data from moored buoys	Operational May 2014 (TM 315008)	Simplified template specific to moored buoys, including directional and non-directional wave data
Wave buoy data	Template for the representation of data from moored buoys Templates for the wave observations from different platforms suitable for WAVEOB data	Operational May 2014 (TM 315008) Validation	Simplified template specific to moored buoys, including directional and non-directional wave data Template should be imminently validated and operational
VOS data	B/C10 - Regulations for reporting SHIP data in TDCF Synoptic reports from sea stations suitable for SHIP observation data from VOS stations (see Appendix B)	Operational (TM308009) Validation	To be deprecated by “Synoptic reports from sea stations suitable for SHIP observation data from VOS stations” Template should be revised to allow for the encryption of the ship’s call sign (proposed at IPET-DRMM-II).
ASAP data	B/C25 - Regulations for reporting TEMP, TEMP SHIP, TEMP MOBIL data in TDCF UKMO template for representation of radiosonde data with geopotential height as the vertical coordinate	Operational (TM309052) Operational (revisited in July 2010)	No specific plan for this template
XBT data	New BUFR template for XBT Temperature Profile data	Operational (TM315004) as from 7 Nov. 2012	
Argo data	Sub-surface profiling floats	Operational (TM315003)	Operational sequence 306037 can be used when the floats also report dissolved oxygen profiles. New additional sequences 306017 and 306018, which can be used for secondary temperature and temperature and salinity profiles are presently being validated
TRACKOB data	TRACKOB data – ThermoSalinoGraph (TSG) data and metadata	Operational (TM308010)	No specific plan for this template
CTD / TESAC	Template for the representation of data derived from a ship based lowered instrument measuring subsurface seawater temperature, salinity and current profiles.	Operational May 2014 (TM 315007)	
Sea-level data	BUFR/CREX templates for tsunameter data and dart buoy system messages BUFR/CREX templates for reporting time series of tide data	Operational (TM306027) Operational (TM306011)	No specific plan for this template
Offshore platform data	Template for reporting observations from offshore platforms	Validation (TM 308017)	For use with data from offshore oil and gas platforms, light vessels and other fixed installations. Validation has yet to commence