Data and metadata exchange in WMO

Enrico Fucile
Chief Data Representation, Metadata and Monitoring Division
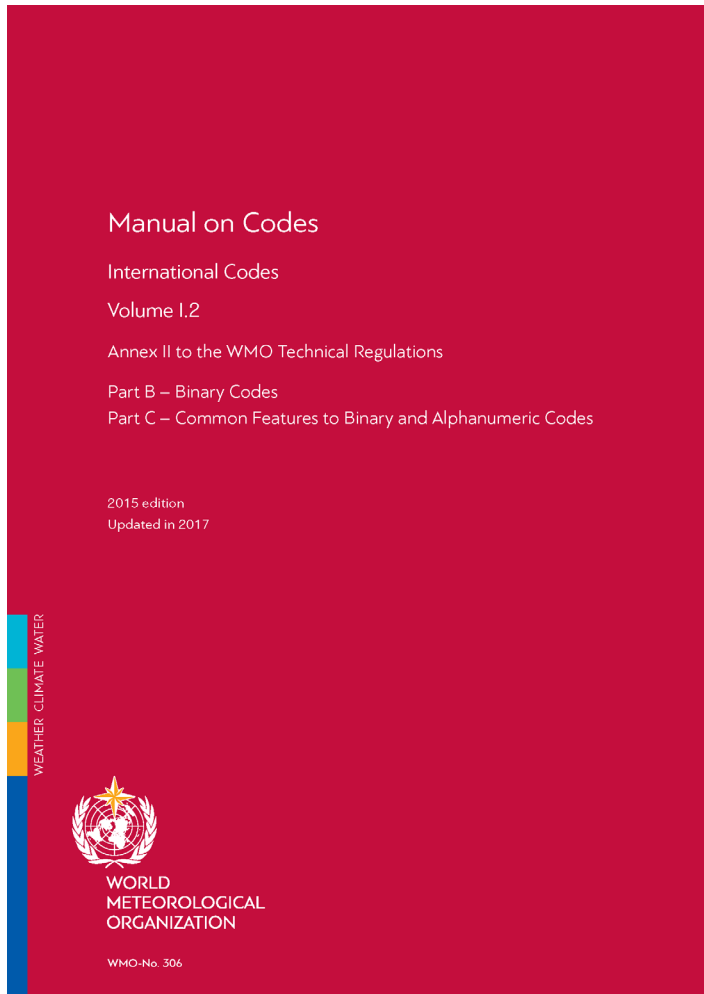
WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

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World Meteorological Organization
Organisation météorologique mondiale

WMO No. 306
Manual on Codes

Manual on Codes

International Codes

Volume I.2

Annex II to the WMO Technical Regulations

Part B – Binary Codes
Part C – Common Features to Binary and Alphanumeric Codes

2015 edition
Updated in 2017

WEATHER CLIMATE WATER

WORLD
METEOROLOGICAL
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WMO-No. 306

- **Volume I.1** **(Obsolete, frozen)** Alphanumeric Codes (metar, synop, temp ...)

- **Volume I.2 (Easy to maintain)** BUFR, GRIB **Table Driven** Code Forms

- **Volume I.3 (Sustainability problems)** XML **model driven, ISO, OGC**

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WMO CF-netCDF workshop
19-20 September 2019

CF panel and **WMO** representatives of programmes and Data and Metadata Expert Teams agree that a **WMO Expert Team on CF Conventions** can benefit both CF community and WMO.
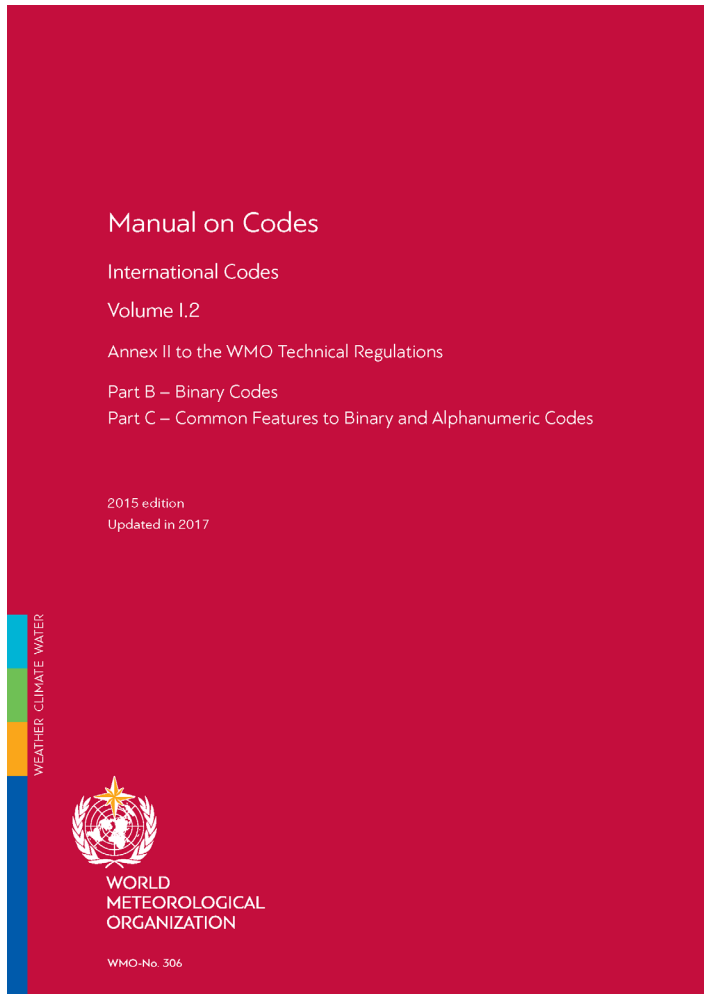
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WMO Expert Team on CF Convetions

1. To consider specific requirements by WMO Programmes for the implementation of CF-netCDF data profiles and extensions, and evaluate the particular choice of data format in consultation with other expert teams [ET-TDCF] [ET-XML].

2. To ensure that new proposals are harmonized with existing WMO CF data profiles and extension and coordinate with other Programmes in their further development.

3. To collaborate with [ET-TDCF] on parallel implementation or mapping using BUFR or GRIB of the WMO CF data profile and extension developed by the team.

4. To collaborate with the CF community through CF processes to participate in the enhancement of the CF conventions and enlargement of CF controlled vocabularies to meet the need of WMO Programmes and avoid nonconformance to CF conventions or CF data model,   by evaluating all candidate CF extensions as possible CF enhancements before accepting them as WMO CF extensions.

5. To avoid the need to create forks of the CF convetions by collaborating with the CF community and considering alternative options.

6. To provide a technical reference implementation of data validation tools for profiles and extensions proposed.

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- **Volume I.4 (to be drafted)**
  CF-NetCDF

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Amendment of Manuals
Simple procedure (fast-track)

How to publish
new BUFR elements and sequences

- Step 1: Proposal submitted to WMO Inter-Programme Expert Team on Codes and Maintenance (IPET-CM)

- Step 2: Proposals reviewed and either accepted for validation or revised and resubmitted

- Step 3: Template validated and result of validation reported to IPET-CM

- Step 4: Following successful validation, WMO focal points (national, JCOMM etc) notified of changes for comment

- Step 5: If no objections changes implemented in subsequent update (~ 6 monthly)

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Validation of the proposal

- Encoding / decoding of test data using proposed elements / sequences by two different centres, using different software

- Tests whether templates / elements suitable for observations to be encoded

- Flags whether any problems likely with encoding / decoding the data

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Case study: JCOMM

- JCOMM nominated Mr. David Berry (NOC) as coordinator to be part of the IPET-CM to
  1. Propose new BUFR element and sequences
  2. Validate and refine the proposal with the help of IPET-CM members

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BUFR Sequences approved and operational

Table 1: Summary of BUFR Table D sequences / BUFR templates in use for marine data

| TAC	Description	Current template(s)	Status	Plans/comments
FM13-XIV SHIP	VOS data	B/C10 - Regulations for reporting SHIP data in TDCF	Operational (TM308009)	Deprecated, use TM0308014
	VOS data	Synoptic reports from sea stations suitable for SHIP observation data from VOS stations	Operational (TM308014)	Replaces / supersedes TM308009. Simplified version under development for UK VOS AWS systems.
	Offshore platforms	Template for the representation of observations from offshore platforms	Operational (TM308017)	
FM18-XII BUOY	Drifting buoy data	Template for the representation from drifting buoys	Operational (TM315009)	Simplified template specific to drifting buoys
	Moored buoy data	Template for the representation of data from moored buoys	Operational (TM315008)	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	Operational (TM315008)	Sequence to report 'first 5' spectral wave coefficients in development
	Argo data	Sub-surface profiling floats	Operational (TM315003)	Additional sequences defined to extend template and may be present in reports
FM36-XI Ext. TEMP SHIP	ASAP data	B/C25 - Regulations for reporting TEMP, TEMP SHIP, TEMP MOBIL data in TDCF	Operational (TM309052)	
	ASAP data	UKMO template for representation of radiosonde data with geopotential height as the vertical coordinate	Operational (revisited in July 2010)	
FM62-VIII Ext. TRACKOB	TRACKOB data	TRACKOB data – ThermoSalinoGraph (TSG) data and metadata	Operational (TM308010)	Plans to update template to include additional metadata.
FM63-XI Ext. BATHY	XBT data	New BUFR template for XBT Temperature Profile data	Operational (TM315004)	
FM64-XI Ext. TESAC	CTD / TESAC	Template for the representation of data derived from a ship based lowered instrument measuring subsurface seawater temperature, salinity and current profiles.	Operational (TM 315007)	
FM65-XI Ext. WAVEOB	Wave buoy data	Templates for the wave observations from different platforms suitable for WAVEOB data	Operational (TM308015) and (TM308016)	
N/A	Sea-level data	BUFR/CREX templates for tsunameter data and dart buoy system messages	Operational (TM306027)	

Example – first 5 Fourier coefficients for wave data (original proposal)

Table Reference F XX YYY	Element name	BUFR			
		Unit	Scale	Reference value	Data width (bits)
0 42 011	a1 coefficient of the directional Fourier series	Numeric	4	-2	15
0 42 012	b1 coefficient of the directional Fourier series	Numeric	4	-2	15
0 42 013	a2 coefficient of the directional Fourier series	Numeric	4	-2	15
0 42 014	b2 coefficient of the directional Fourier series	Numeric	4	-2	15
0 42 015	Check factor K	Numeric	2	0	12

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Table Reference F XX YYY	Element name	BUFR			
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0 42 015	Check factor K	Numeric	2	0	12
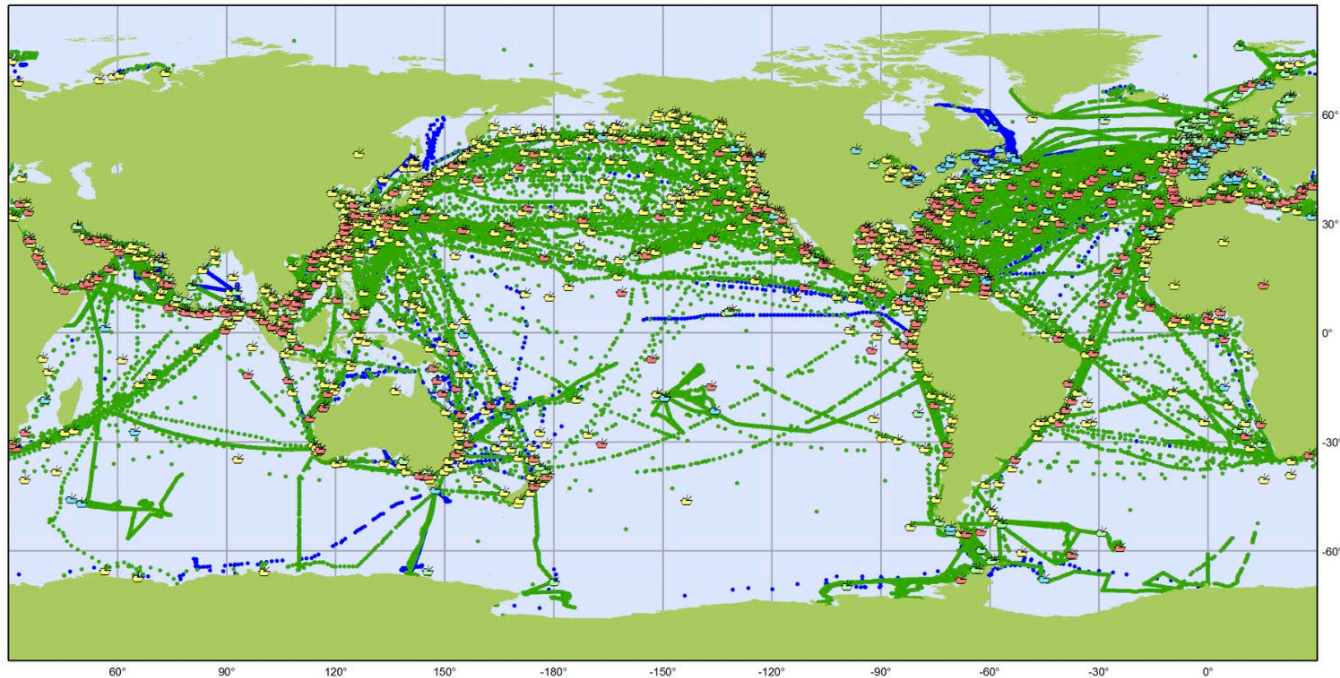
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VOS BUFR coverage

Figure 1: Format and spatial distribution of VOS observations on the GTS in 2019.

Saildrones

WMO Designated Global Data-processing and Forecasting System Centres

Updated on 24 August 2018

Open-GTS Collection and conversion to BUFR

Legend
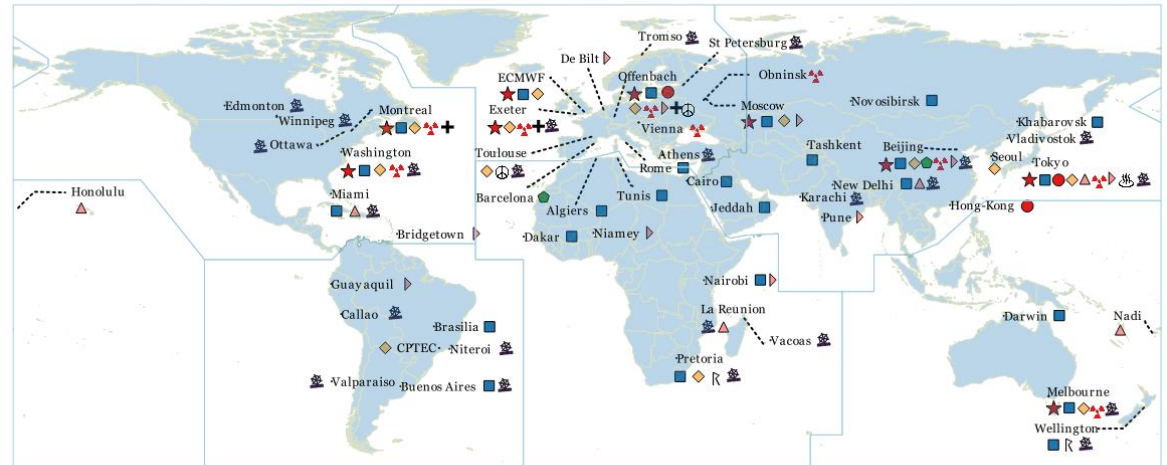
Symbol	Description
★	World Meteorological Centres* (9)
⊙	Atmospheric Transport Modelling (10)
◇	Global Producing Centres for Long-Range Forecasts (13)
✚	Global Producing Centres for Annual to Decadal Climate Prediction (3)
■	RSMCs Geographic (25)
●	RSMC Nowcasting (3)
△	RSMCs TC (6)
⬠	RSMCs Sand/Dust (2)
▷	Regional Climate Centres (11)
☢	RSMCs Nuclear Emergency Response (9)
⊕	RSMCs Non-Nuclear Emergency Response (2)
⛰	RSMCs Volcano watch services for international air navigation (1)
R	RSMCs Severe Weather Forecasting (2)
⚓	RSMCs marine meteorological services (24)

*World Meteorological Centres are also Global Producing Centres for a) Deterministic Numerical Weather Prediction, b) Ensemble Numerical Weather Prediction, and c) Long-Range Forecasts.

DESIGNATIONS USED
The depiction and use of boundaries, geographic names and related data shown on maps and included in lists, tables, documents, and databases on this web site are not warranted to be error free nor do they necessarily imply official endorsement or acceptance by the WMO.

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Thank you
Merci

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