

*Governance and
Standardization*

WMO and METCE

Presented By: Steve Foreman

Date: August 25, 2015



Federal Aviation
Administration



AIR TRANSPORTATION INFORMATION EXCHANGE CONFERENCE

Global Information Management

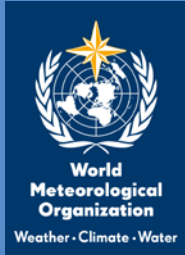
August 25-27, 2015

NOAA Auditorium and Science Center • Silver Spring, MD

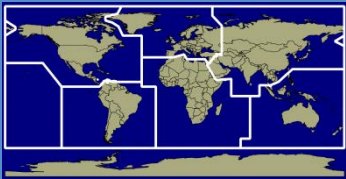
Contents

- World Meteorological Organization
- WMO data representations
- WMO Information System

WORLD METEOROLOGICAL ORGANIZATION



The World Meteorological Organization (WMO) is a specialized agency of the United Nations. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.



1873: International Meteorological Organization
1951: **World Meteorological Organization**
191 Member States and Territories



1963: **World Weather Watch**
Observations, telecommunications and forecasts
Underpins operational meteorology



Aeronautical Meteorology Programme
Worldwide, reliable provision of high quality, timely and cost-effective meteorological service to aviation users

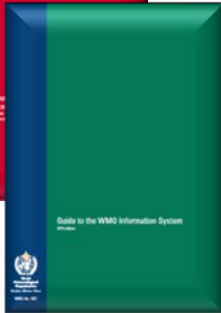
WMO Standards



WMO-No 49 – Technical Regulations



WMO-No 1060 – Manual on WIS



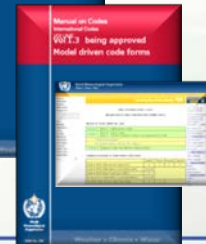
WMO-No 1061 – Guide to WIS



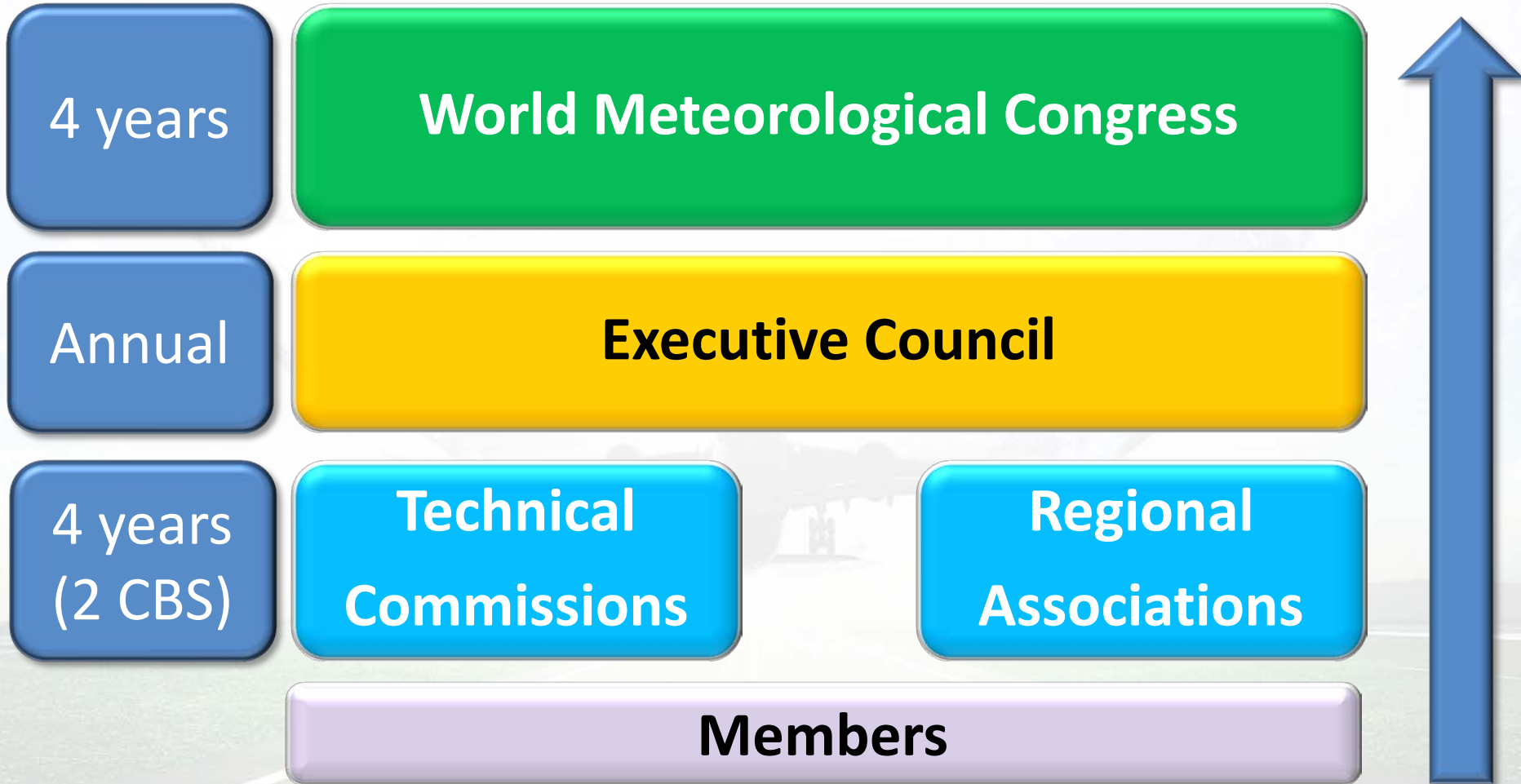
WMO-No 386 – Manual on GTS



WMO-No 306 –
Manual on Codes



Governance of Standards



Governing changes

“Simple”
(6 month cycle)



“Standard”
(at least six month
duration)



“Complex”
(two year cycle)



WMO DATA REPRESENTATIONS

Data representations

TAC

Traditional Alphanumeric Codes

- Original codes – for Morse/Teleprinter
- Inflexible
- METAR/TAF/SIGMET

TDCF

Table Driven Code Forms

- Flexible
- Compact for large data
- GRIB/BUFR/CREX

MDCF

Model Driven Code Forms

- Based on ISO/OGC standards
- Map to different representations – XML/GML
- IWXXM/METCE/SAF/OPM/COLLECT

Traditional Alphanumeric

FM 15–XV METAR

Aerodrome routine meteorological report (with or without trend forecast)

FM 16–XV SPECI

Aerodrome special meteorological report (with or without trend forecast)

CODE FORM:

{ METAR or SPECI }	COR	CCCC	YYGGggZ	NIL	AUTO	ddfffG _{f_mf_m}	{ KT or MPS }	d _n d _n d _n Vd _x d _x d _x
	{ VVVV or CAVOK }	V _N V _N V _N V _N D _v	RD _R DR/V _R V _R V _R V _R i		w'w'	{ N _s N _s N _s h _s h _s h _s or VVh _s h _s h _s or NSC or NCD }		
T'T'T'dT'd		QP _H P _H P _H P _H	REw'w'	{ WS RD _R DR or WS ALL RWY }	{ (WT _s T _s /SS') or (WT _s T _s /HH _s H _s H _s) }		(RD _R DR/ERCRERERBRBR)	
{ (TTTTT or NOSIG) }	TTGGgg	ddfffG _{f_mf_m}	{ KT or MPS }	{ VVVV or CAVOK }	{ w'w' or NSW }	{ N _s N _s N _s h _s h _s h _s or VVh _s h _s h _s or NSC }		

(RMK)

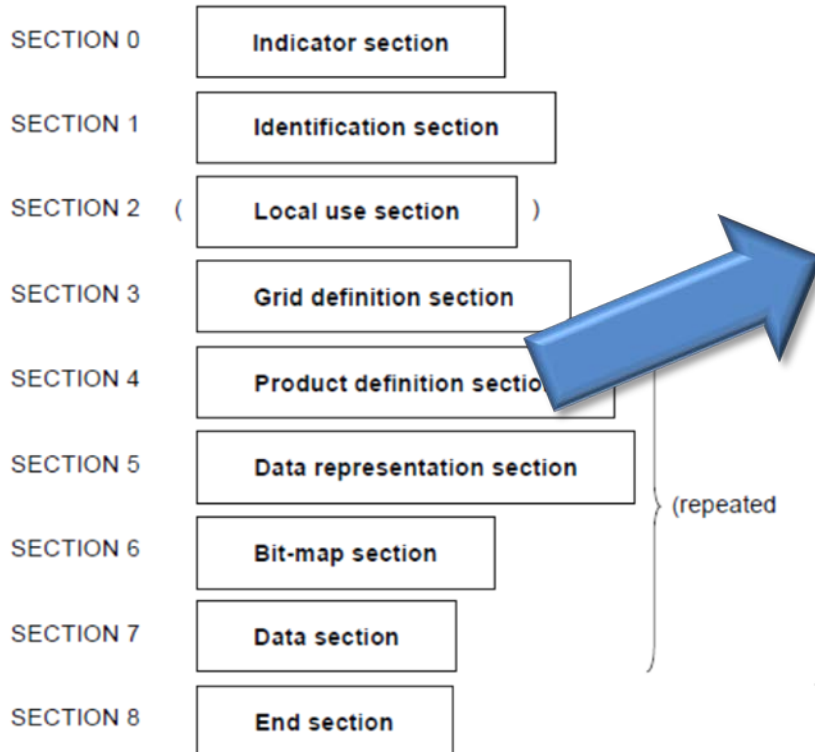
METAR EGLL 181350Z 26009KT CAVOK 19/09 Q1014 NOSIG=

Table Driven

FM 92–XIV GRIB

General regularly distributed information in binary form

CODE FORM :



Code table 4.2 – Parameter number by product discipline and parameter category

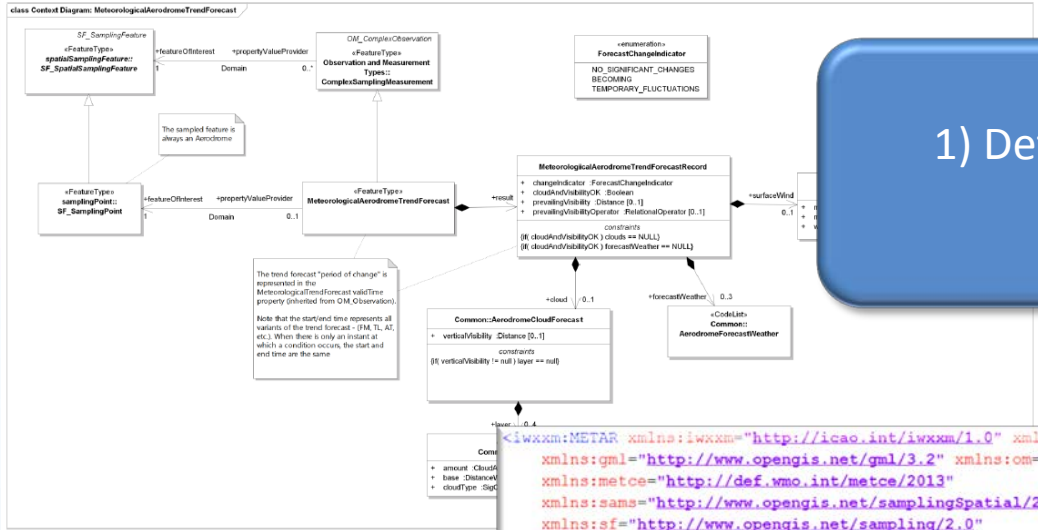
Notes:

- (1) By convention, the flux sign is positive if downwards.
- (2) When a new parameter is to be added to Code table 4.2 and more than one category applies, the choice of category should be made based on the intended use of the product. The discipline and category are an important part of any product definition, so it is possible to have the same parameter name in more than one category. For example, "water temperature" in discipline 10 (oceanographic products), category 4 (subsurface properties) is used for reporting water temperature in the ocean or open sea, and is not the same as "water temperature" in discipline 1 (hydrological products), category 2 (inland water and sediment properties), which is used for reporting water temperature in freshwater lakes and rivers.

Product discipline 0 – Meteorological products, parameter category 0: temperature

Number	Parameter	Units
0	Temperature	K
1	Virtual temperature	K
2	Potential temperature	K
3	Pseudo-adiabatic potential temperature or equivalent potential temperature	K
4	Maximum temperature*	K
5	Minimum temperature*	K
6	Dewpoint temperature	K
7	Dewpoint depression (or deficit)	K
8	Lapse rate	K m ⁻¹
9	Temperature anomaly	K
10	Latent heat net flux	W m ⁻²
11	Sensible heat net flux	W m ⁻²
12	Heat index	K
13	Wind chill factor	K
14	Minimum dewpoint depression*	K
15	Virtual potential temperature	K
16	Snow phase change heat flux	W m ⁻²
17	Skin temperature	K
18	Snow temperature (top of snow)	K
19	Turbulent transfer coefficient for heat	Numeric
20	Turbulent diffusion coefficient for heat	m ² s ⁻¹
21	Apparent temperature**	K
22–191	Reserved	
192–254	Reserved for local use	
255	Missing	

Model Driven



1) Define the structure of the information

```

<iwxxm:METAR xmlns:iwxxm="http://icao.int/iwxxm/1.0" xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:om="http://www.opengis.net/om/2.0"
  xmlns:metce="http://def.wmo.int/metce/2013"
  xmlns:sams="http://www.opengis.net/samplingSpatial/2.0"
  xmlns:sf="http://www.opengis.net/sampling/2.0"
  xmlns:saf="http://icao.int/saf/1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://icao.int/iwxxm/1.0 http://schemas.wmo.int/iwxxm/1.0/iwxxm.xsd
  http://def.wmo.int/metce/2013 http://schemas.wmo.int/metce/1.0/metce.xsd"

  gml:id="metar-YUDO-20120822163000Z"
  status="NORMAL"
  automatedStation="false">

  <om:resultTime>
    <gml:TimeInstant gml:id="ti-20120822163000Z">
      <gml:timePosition>2012-08-22T16:30:00Z</gml:timePosition>
    </gml:TimeInstant>
  </om:resultTime>

  <om:resultTime>
    <gml:TimeInstant gml:id="ti-201208221640Z">
      <gml:timePosition>2012-08-22T16:40:00Z</gml:timePosition>
    </gml:TimeInstant>
  </om:resultTime>
  </iwxxm:METAR>
  
```

2) Map onto a particular representation

IWXXM Structure

COLLECT Allows several reports to be combined

IWXXM Defines required elements for OPMET reports

METCE Meteorological
features

SAF Aeronautical
features

OPM Groups O&M
properties

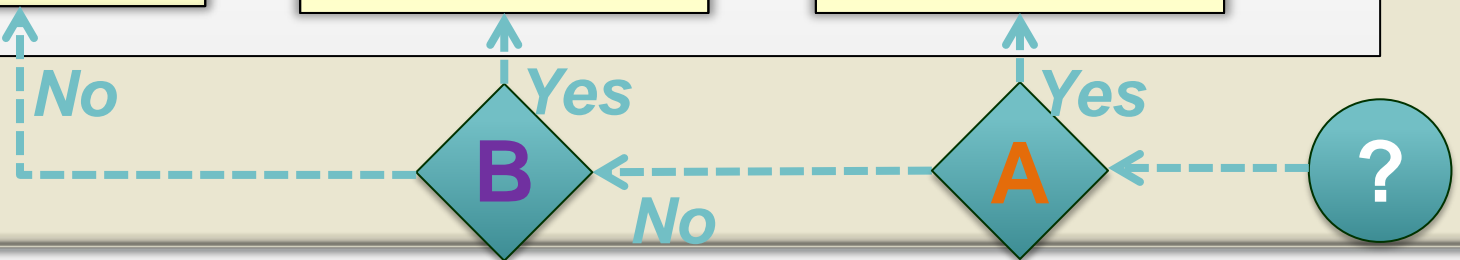
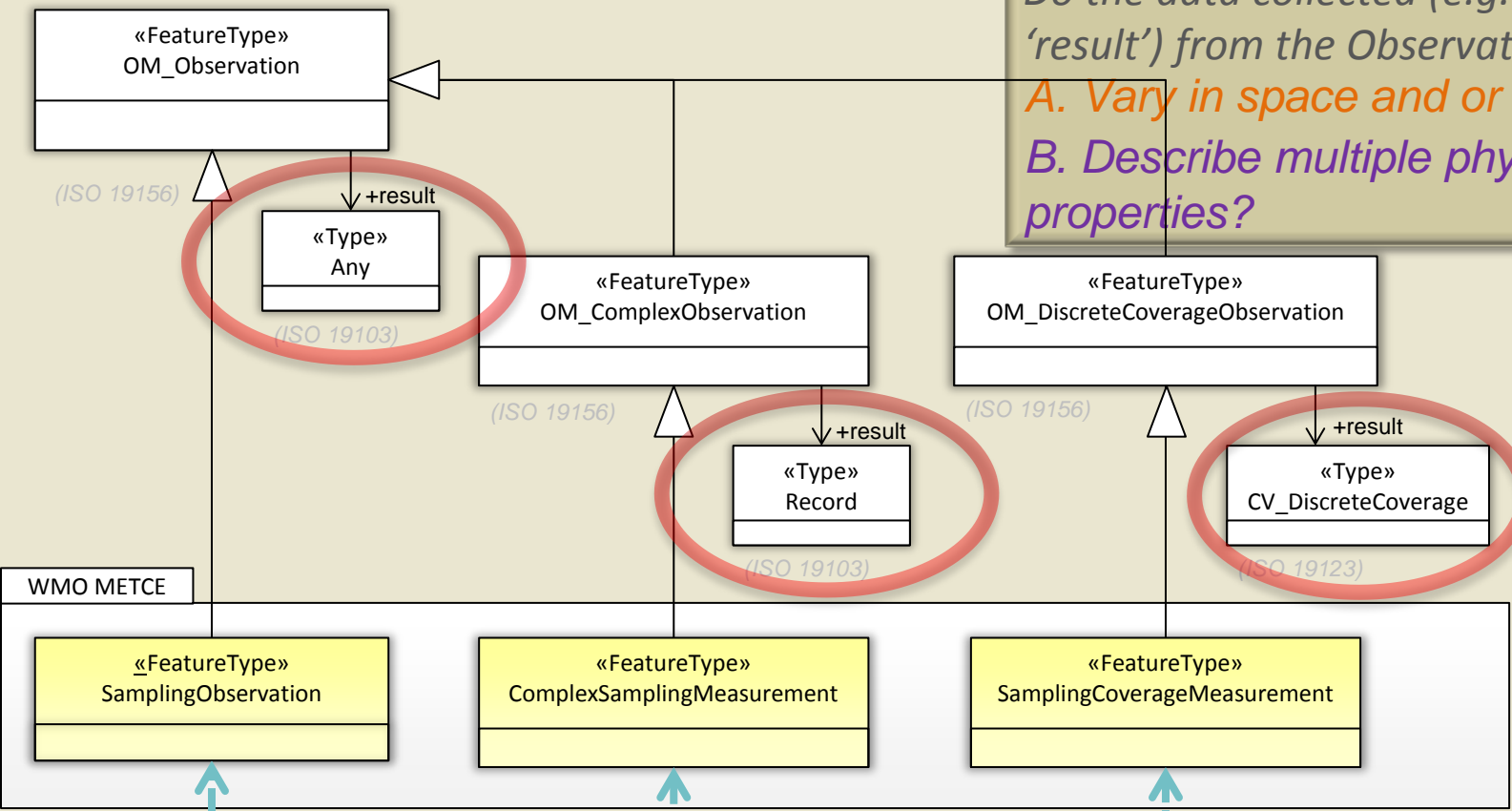
**O&M
GML** Observations and
measurements

Code
Lists

TDCF The code lists are based on those for TDCF

Modèle pur l'Échange des Informations sur le Temps, le Climat et l'Eau

Do the data collected (e.g. the 'result') from the Observation event:
A. Vary in space and or time?
B. Describe multiple physical properties?



WMO INFORMATION SYSTEM

National Centre:

- Contributes information to WIS
- Distributes WIS information to national users

National
Centre

Data Collection or Production Centre:

- Collects, prepares or analyses information, *or*
- Manages sub-regional exchange of information

Data
Collection
or
Production
Centre

Global Information System Centre:

- Holds catalogue of all information available through WIS
- Manages global exchange of information

Global
Information
System
Centre

WMO Standards
WMO Data Representations
WMO Information System

