

1.4.2 **General responsibilities of Members**

In addition to the responsibilities stated explicitly in the *Technical Regulations* (WMO-No. 49), Volume I, Part I, 3.4.1, the following principles shall apply:

- (a) Members shall ensure that their national collecting system for observational reports allows both national and international needs to be met;
- (b) When adopting international and regional telecommunication plans, Members shall ensure that technical characteristics and operational methods are compatible with the regional telecommunication networks.

Note: The contents and schedules of meteorological transmission programmes are published in *Weather Reporting* (WMO-No. 9), Volume C.

2. **FUNCTIONS AND RESPONSIBILITIES OF THE METEOROLOGICAL TELECOMMUNICATION CENTRES**

2.1 The WMCs (as regards telecommunications) and the RTHs shall be responsible for:

- (a) Collecting the bulletins from their associated NMCs and transmitting them in the appropriate form on the MTN, either directly or through the appropriate WMC/RTH;
- (b) Transmitting on the MTN, either directly or through the appropriate RTH, as internationally agreed and in the appropriate form, the processed meteorological information produced by the WMC or RSMC associated with them;
- (c) Relaying selectively on the circuits of the MTN, as agreed, the bulletins which they receive from these circuits and/or from RTHs not situated on the MTN;
- (d) Ensuring the selective distribution of bulletins to the associated NMCs and to the RTHs not situated on the MTN which they serve;
- (e) Before relaying a message issued from their zones of responsibility (as an RTH in a Region and/or as an RTH located on the MTN) on the GTS, checking the parts related to the telecommunications of the message in order to maintain standard telecommunication procedures. The RTH informs the associated centre originating or compiling the message of any correction to be made to the message. The RTH and its associated centres make arrangements for the insertion of the message without telecommunication errors on the GTS. Messages issued from outside the zone of responsibility of an RTH shall not be corrected by the RTH except in case of special arrangements for inserting data into the GTS;
- (f) Establishing data dissemination systems (terrestrial and/or via satellite) as required in accordance with regional plans;
- (g) Carrying out the monitoring of the operation of the GTS of the WWW;
- (h) For WMCs/RTHs on the MTN, maintaining the Catalogue of Meteorological Bulletins as regards bulletins issued from the zone for which they are responsible for the collection, exchange and distribution of data, as given in paragraph 1, Attachment I-3, and also including data from the Antarctica, as appropriate. WMCs/RTHs on the MTN may share their responsibility with the RTHs (not on the MTN) included in their zone of responsibility through regional arrangements.

Note: The plan for monitoring the operation of the WWW is given in Attachment I-5.

2.2 RSMCs not combined with RTHs should ensure distribution of their products by agreement with an appropriate GTS centre or centres.

2.3 With regard to telecommunications, the NMCs shall be responsible for:

- (a) Collecting observational data from their own territory or that of one or more Members according to bilateral agreements, as well as observational data from aircraft and ships

ATTACHMENT II-5. DATA DESIGNATORS $T_1T_2A_1A_2ii$ IN ABBREVIATED HEADINGS

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Table D1	:	Level designator ii (when $T_1 = O$)
Table D2	:	Level designator ii (when $T_1 = D, G, H, J, P, Q, X$ or Y)
Table D3	:	Level designator ii (when $T_1T_2 = FA$ or UA)

Table A. Data type designator T_1 Matrix Table for $T_2A_1A_2ii$ definitions

T_1	Data type	T_2	A_1	A_2	ii	Priority
A	Analyses	B1	C1	C1	**	3
B	Addressed message	***	***	***	***	1/2/4*
C	Climatic data	B1	C1	C1	**	4
D	Grid point information (GRID)	B2	C3	C4	D2	3
E	Satellite imagery	B5	C1	C1	**	3
F	Forecasts	B1	C1	C1	**	3
G	Grid point information (GRID)	B2	C3	C4	D2	3
H	Grid point information (GRIB)	B2	C3	C4	D2	3
I	Observational data (Binary coded) – BUFR	B3	C6	C3	**	2
J	Forecast information (Binary coded) – BUFR	B3	C6	C4	D2	3
K	CREX	B3	C7	C3	**	2
L	Aviation information in XML	B7	C1	C1	(1)	1/2/3
M	–					
N	Notices	B1	C1	C1	**	4
O	Oceanographic information (GRIB)	B4	C3	C4	D1	3
P	Pictorial information (Binary coded)	B2	C3	C4	D2	3
Q	Pictorial information regional (Binary coded)	B2	C3	C5	D2	3
R	–					
S	Surface data	B1	C1/C2	C1/C2	**	2/4*
T	Satellite data	B1	C3	C4	**	2
U	Upper-air data	B1	C1/C2	C1/C2	**	2
V	National data	(1)	C1	C1	**	(2)
W	Warnings	B1	C1	C1	**	1
X	Common Alert Protocol (CAP) messages					
Y	GRIB regional use	B2	C3	C5	D2	3
Z	–					

- * Priority level: 1 is allocated to service messages.
2 is allocated to data and request messages.
3 is allocated to seismic waveform data ($T_1T_2 = SY$).
4 is allocated to administrative messages.
- ** See paragraph 2.3.2.2 for definition and use.
- *** See paragraph 2.4.2 for definition and use.
- (1) Table B2 or national table.
- (2) To be determined.

Note: CLIMAT TEMP is not recommended for operations. See the *Abridged Final Report with Resolutions and Recommendations of the 2010 Extraordinary Session of the Commission for Basic Systems* (WMO-No. 1070).

Table B1. Data type designator T_2 (when $T_1 = A, C, F, N, S, T, U$ or W)

Instructions for the proper application of the data type designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the type of data contained within the body of the bulletin.
2. When the tables does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.
3. This table includes only the FM number and code name for an individual code form. The Roman numeral identifying the latest version has been omitted to reduce clutter. In all cases the latest version of a code is implied. Refer to the *Manual on Codes* (WMO-No. 306) for the complete code name (including the version) of any numbered code. In those few instances where a numbered code does not exist, a reference and the common name is given: e.g. [ICAO] (AIREP). An explanatory note may be appended to an individual table if necessary.
4. In the event that no standard format has been established for a particular data type, and where there is a recommended format, that format is given in square brackets under the column labelled Code form (e.g. [TEXT]). This is a character code in free form – International Alphabet No. 2 (Attachment II-1) or International Alphabet No. 5 (Attachment II-2) will be used.

$T_1 = A$ Analyses

T_2 Designator	Data type	Code form (name)
C	Cyclone	[TEXT]
G	Hydrological/marine	[TEXT]
H	Thickness	[TEXT]
I	Ice	FM 44 (ICEAN)
O	Ozone layer	[TEXT]
R	Radar	[TEXT]
S	Surface	FM 45 (IAC)/FM 46 (IAC FLEET)
U	Upper air	FM 45 (IAC)
W	Weather summary	[TEXT]
X	Miscellaneous	[TEXT]

T₁ = C Climatic data

<i>T₂</i> <i>Designator</i>	<i>Data type</i>	<i>Code form (name)</i>
A	Climatic anomalies	[TEXT]
E	Monthly means (upper air)	FM 76 (SHIP)
H	Monthly means (surface)	FM 72 (CLIMAT SHIP)
O	Monthly means (ocean areas)	FM 73 (NACLI, CLINP, SPCLI, CLISA, INCLI)
S	Monthly means (surface)	FM 71 (CLIMAT)

T₁ = F Forecasts

<i>T₂</i> <i>Designator</i>	<i>Data type</i>	<i>Code form (name)</i>
A	Aviation area/GAMET/advisories	FM 53 (ARFOR)/[TEXT]
B	Upper winds and temperatures	FM 50 (WITEM)
C	Aerodrome (VT < 12 hours)	FM 51 (TAF)
D	Radiological trajectory dose	FM 57 (RADOF)
E	Extended	[TEXT]
F	Shipping	FM 46 (IAC FLEET)
G	Hydrological	FM 68 (HYFOR)
H	Upper-air thickness	[TEXT]
I	Iceberg	[TEXT]
J	Radio warning service (including IUWDS data)	[TEXT]
K	Tropical cyclone advisories	[TEXT]
L	Local/area	[TEXT]
M	Temperature extremes	[TEXT]
O	Guidance	[TEXT]
P	Public	[TEXT]
Q	Other shipping	[TEXT]
R	Aviation route	FM 54 (ROFOR)
S	Surface	FM 45 (IAC)/FM 46 (IAC FLEET)
T	Aerodrome (VT ≥ 12 hours)	FM 51 (TAF)
U	Upper air	FM 45 (IAC)
V	Volcanic ash advisories	[TEXT]
W	Winter sports	[TEXT]
X	Miscellaneous	[TEXT]
Z	Shipping area	FM 61 (MAFOR)

T₁ = N Notices

<i>T₂</i> <i>Designator</i>	<i>Data type</i>	<i>Code form (name)</i>
G	Hydrological	[TEXT]
H	Marine	[TEXT]
N	Nuclear emergency response	[TEXT]
O	METNO/WIFMA	[TEXT]
P	Product generation delay	[TEXT]
T	TEST MSG [System related]	[TEXT]
W	Warning related and/or cancellation	[TEXT]

$T_1 = S$ Surface data		
T_2 Designator	Data type	Code form (name)
A	Aviation routine reports	FM 15 (METAR)
B	Radar reports (Part A)	FM 20 (RADOB)
C	Radar reports (Part B)	FM 20 (RADOB)
D	Radar reports (Parts A & B)	FM 20 (RADOB)
E	Seismic data	* (SEISMIC)
F	Atmospherics reports	FM 81 (SFAZI)/FM 82 (SFLOC)/FM 83 (SFAZU)
G	Radiological data report	FM 22 (RADREP)
H	Reports from DCP stations	(any format)
I	Intermediate synoptic hour	FM 12 (SYNOP)/FM 13 (SHIP)
L	–	–
M	Main synoptic hour	FM 12 (SYNOP)/FM 13 (SHIP)
N	Non-standard synoptic hour	FM 12 (SYNOP)/FM 13 (SHIP)
O	Oceanographic data	FM 63 (BATHY)/FM 64 (TESAC)/ FM 62 (TRACKOB)
P	Special aviation weather reports	FM 16 (SPECI)
R	Hydrological (river) reports	FM 67 (HYDRA)
S	Drifting buoy reports	FM 18 (DRIFTER)
T	Sea ice	[TEXT]
U	Snow depth	[TEXT]
V	Lake ice	[TEXT]
W	Wave information	FM 65 (WAVEOB)
X	Miscellaneous	[TEXT]
Y	Seismic waveform data	(any format)
Z	Sea-level data and deep-ocean tsunami data	(any alphanumeric format)

* The international seismic code is documented in the *Manual on Codes* (WMO-No. 306), Volume I.1, Attachment III.

$T_1 = T$ Satellite data		
T_2 Designator	Data type	Code form (name)
B	Satellite orbit parameters	[TEXT]
C	Satellite cloud interpretations	FM 85 (SAREP)
H	Satellite remote upper-air soundings	FM 86 (SATEM)
R	Clear radiance observations	FM 87 (SARAD)
T	Sea surface temperatures	FM 88 (SATO B)
W	Winds and cloud temperatures	FM 88 (SATO B)
X	Miscellaneous	[TEXT]

$T_1 = U$ Upper-air data		
T_2 Designator	Data type	Code form (name)
A	Aircraft reports	FM 41 (CODAR), ICAO (AIREP)
D	Aircraft reports	FM 42 (AMDAR)
E	Upper-level pressure, temperature, humidity and wind (Part D)	FM 35 (TEMP)/FM 36 (TEMP SHIP)/ FM 38 (TEMP MOBIL)
F	Upper-level pressure, temperature, humidity and wind (Parts C and D) [National and bilateral option]	FM 35 (TEMP)/FM 36 (TEMP SHIP)/ FM 38 (TEMP MOBIL)
G	Upper wind (Part B)	FM 32 (PILOT)/FM 33 (PILOT SHIP)/ FM 34 (TEMP MOBIL)
H	Upper wind (Part C)	FM 32 (PILOT)/FM 33 (PILOT SHIP)/ FM 34 (TEMP MOBIL)
I	Upper wind (Parts A and B) [National and bilateral option]	FM 32 (PILOT)/FM 33 (PILOT SHIP)/ FM 34 (TEMP MOBIL)
K	Upper-level pressure, temperature, humidity and wind (Part B)	FM 35 (TEMP)/FM 36 (TEMP SHIP)/ FM 38 (TEMP MOBIL)
L	Upper-level pressure, temperature, humidity and wind (Part C)	FM 35 (TEMP)/FM 36 (TEMP SHIP)/ FM 38 (TEMP MOBIL)
M	Upper-level pressure, temperature, humidity and wind (Parts A and B) [National and bilateral option]	FM 35 (TEMP)/FM 36 (TEMP SHIP)/ FM 38 (TEMP MOBIL)
N	Rocketsonde reports	FM 39 (ROCOB)/FM 40 (ROCOB SHIP)
P	Upper wind (Part A)	FM 32 (PILOT)/FM 33 (PILOT SHIP)/ FM 34 (PILOT MOBIL)
Q	Upper wind (Part D)	FM 32 (PILOT)/FM 33 (PILOT SHIP)/ FM 34 (PILOT MOBIL)
R	Aircraft report	[NATIONAL*] (RECCO)
S	Upper-level pressure, temperature, humidity and wind (Part A)	FM 35 (TEMP)/FM 36 (PILOT SHIP)/ FM 38 (TEMP MOBIL)
T	Aircraft report	FM 41 (CODAR)
X	Miscellaneous	[TEXT]
Y	Upper wind (Parts C and D) [National and bilateral option]	FM 32 (PILOT)/FM 33 (PILOT SHIP)/ FM 34 (PILOT MOBIL)
Z	Upper-level pressure, temperature, humidity and wind from a sonde released by carrier balloon or aircraft (Parts A, B, C, D)	FM 37 (TEMP DROP)

* For example, United States national code form for reports from a meteorological reconnaissance flight (RECCO), is documented in the *Manual on Codes* (WMO-No. 306), Volume II, Chapter IV, Part E.

$T_1 = W$ Warnings		
T_2 Designator	Data type	Code form (name)
A	AIRMET	[TEXT]
C	Tropical cyclone (SIGMET)	[TEXT]
E	Tsunami	[TEXT]
F	Tornado	[TEXT]
G	Hydrological/river flood	[TEXT]
H	Marine/coastal flood	[TEXT]
O	Other	[TEXT]
R	Humanitarian activities	(any format)
S	SIGMET	[TEXT]
T	Tropical cyclone (Typhoon/hurricane)	[TEXT]
U	Severe thunderstorm	[TEXT]
V	Volcanic ash clouds (SIGMET)	[TEXT]
W	Warnings and weather summary	[TEXT]

Table B2. Data type designator T_2 (when $T_1 = D, G, H$ or Y)

Instructions for the proper application of the data type designators

1. The designator specified in this table should be used to the greatest extent possible to indicate the type of data contained within the text of the bulletin.
2. Where more than one type is contained in the text, the designator for one of the data types should be used.
3. When the table does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.

Designator	Data type	Designator	Data type
A	Radar data	N	Radiation
B	Cloud	O	Vertical velocity
C	Vorticity	P	Pressure
D	Thickness (relative topography)	Q	Wet bulb potential temperature
E	Precipitation	R	Relative humidity
G	Divergence	T	Temperature
H	Height	U	Eastward wind component
J	Wave height + combinations	V	Northward wind component
K	Swell height + combinations	W	Wind
M	For national use	Z	Not assigned

Table B3. Data type designator T_2 (when $T_1 = I$ or J)

Instructions for the proper application of the data type designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the type of data contained within the body of the BUFR bulletin.
2. Where more than one data type is contained in the bulletin, the designators for only one of the data types should be used.
3. When the table does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be introduced and the WMO secretariat notified.

<i>Designator</i>	<i>Data type</i>
N	Satellite data
O	Oceanographic/limnographic (water property)
P	Pictorial
S	Surface/sea level
T	Text (plain language information)
U	Upper-air data
X	Other data types

Table B4. Data type designator T_2 (when $T_1 = O$)

Instructions for the proper application of the data type designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the type of data contained within the body of the GRIB bulletin for oceanographic products.
2. Where more than one data type is contained in the bulletin, the designators for only one of the data types should be used.
3. When the table does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be introduced and the WMO secretariat notified.

<i>Designator</i>	<i>Data type</i>
D	Depth
E	Ice concentration
F	Ice thickness
G	Ice drift
H	Ice growth
I	Ice convergence/divergence
Q	Temperature anomaly
R	Depth anomaly
S	Salinity
T	Temperature
U	Current component
V	Current component
W	Temperature warming
X	Mixed data

Table B5. Data type designator T₂ (when T₁ = E)

<i>Designator</i>	<i>Data type</i>	<i>Designator</i>	<i>Data type</i>
C	Cloud top temperature	V	Visible
F	Fog	W	Water vapour
I	Infrared	Y	User specified
S	Surface temperature	Z	Unspecified

Table B6. Data type designator T₂ (when T₁ = P, Q)

Instructions for the proper application of the data type designators

1. The designator specified in this table should be used to the greatest extent possible to indicate the type of data contained within the text of the bulletin.
2. Where more than one type is contained in the text, the designator for one of the data types should be used.
3. When the table does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.

<i>Designator</i>	<i>Data type</i>	<i>Designator</i>	<i>Data type</i>
A	Radar data	N	Radiation
B	Cloud	O	Vertical velocity
C	Clear air turbulence	P	Pressure
D	Thickness (relative topography)	Q	Wet bulb potential temperature
E	Precipitation	R	Relative humidity
F	Aerological diagrams (Ash cloud)	S	Snow cover
G	Significant weather	T	Temperature
H	Height	U	Eastward wind component
I	Ice flow	V	Northward wind component
J	Wave height + combinations	W	Wind
K	Swell height + combinations	X	Lifted index
L	Plain language	Y	Observational plotted chart
M	For national use	Z	Not assigned

Table B7. Data type designator T₂ (when T₁ = L)

<i>Designator</i>	<i>Data type</i>	<i>GTS priority</i>	<i>Code form name</i>
A	Aviation routine reports ("METAR")	2	
C	Aerodrome Forecast ("TAF") (VT < 12 hours)	3	
P	Special aviation weather reports ("SPECI")	2	
S	Aviation general warning ("SIGMET")	1	
T	Aerodrome forecast ("TAF") (VT ≥ 12 hours)	3	
V	Aviation volcanic ash warning ("SIGMET")	1	
Y	Aviation tropical cyclone warning ("SIGMET")	1	

Note: Data that are expressed in extensible markup language (XML) and use data designators of T₁ = L and T₂ = A, C, P, S, T, V and Y are using IWXXM (FM-205).

Table C1. Geographical designators A₁A₂ for use in abbreviated headings T₁T₂A₁A₂ii CCCC YYGGgg for bulletins containing meteorological information, excluding ships' weather reports and oceanographic data

Instructions for the proper application of the geographical designators

1. This table is subdivided into two parts: Part I contains geographical designators related to countries or territories in each RTH zone of responsibility for the collection of observational reports (surface and upper-air); Part II contains those for vast areas such as continents, hemispheres, etc.
2. In the case of bulletins containing observational reports (surface and upper-air) from land stations, geographical designators contained in Part II of the table should be used only when no suitable designators are available in Part I of the table.
3. In the case of bulletins containing meteorological information related to aircraft reports, analyses, prognoses, warnings, climatological data, satellite data and also analogue facsimile information, all the geographical designators contained in this table can be used. However, as far as possible, the geographical designator XX should not be used.
4. For the geographical designator in the abbreviated heading of the METNO and WIFMA messages, XX should be used.
5. Geographical designators contained in this table should not be used in the abbreviated heading of bulletins containing ships' weather reports and oceanographic data.

Notes:

1. The designations employed and the presentation of the material in this table do not imply the expression of any opinion whatsoever on the part of the World Meteorological Organization concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.
2. For T₁T₂ = SZ, A₁A₂ area designator from Table C1 should be used.

Part I – Country or territory designators

A ₁ A ₂	Country	A ₁ A ₂	Country
AB	Albania	BD	Brunei Darussalam
AG	Argentina	BE	Bermuda
AH	Afghanistan	BH	Belize
AI	Ascension Island	BI	Burundi
AJ	Azerbaijan	BJ	Benin
AK	Alaska	BK	Banks Islands
AL	Algeria	BM	Myanmar
AN	Angola	BN	Bahrain
AT	Antigua and Barbuda, Saint Kitts and Nevis, and other British islands in the vicinity	BO	Bolivia (Plurinational State of)
AU	Australia	BR	Barbados
AY	Armenia	BT	Bhutan
AZ	Azores	BU	Bulgaria
		BV	Bouvet Island
		BW	Bangladesh
BA	Bahamas	BX	Belgium, Luxembourg
BC	Botswana	BY	Belarus

A_1A_2	<i>Country</i>	A_1A_2	<i>Country</i>
BZ	Brazil	GI	Gibraltar
CD	Chad	GL	Greenland
CE	Central African Republic	GM	Guam
CG	Congo	GN	Guinea
CH	Chile	GO	Gabon
CI	China	GQ	Equatorial Guinea
CM	Cameroon	GR	Greece
CN	Canada	GU	Guatemala
CO	Colombia	GW	Guinea-Bissau
CR	Canary Islands (Spain)	GY	Guyana
CS	Costa Rica		
CT	Canton Island	HA	Haiti
CU	Cuba	HE	Saint Helena
CV	Cabo Verde	HK	Hong Kong, China
CY	Cyprus	HO	Honduras
CZ	Czech Republic	HU	Hungary
		HV	Burkina Faso
DJ	Djibouti	HW	Hawaiian Islands
DL	Germany		
DN	Denmark	IC	Comoros
DO	Dominica	ID	Indonesia
DR	Dominican Republic	IE	Ireland
		IL	Iceland
EG	Egypt	IN	India
EI	Eritrea	IQ	Iraq
EO	Estonia	IR	Islamic Republic of Iran
EQ	Ecuador	IS	Israel
ER	United Arab Emirates	IV	Côte d'Ivoire
ES	El Salvador	IY	Italy
ET	Ethiopia		
		JD	Jordan
FA	Faroe Islands	JM	Jamaica
FG	French Guiana	JP	Japan
FI	Finland		
FJ	Fiji	KA	Caroline Islands
FK	Falkland Islands (Malvinas)	KB	Kiribati
FM	Federated States of Micronesia	KI	Christmas Island
FP	Saint Pierre and Miquelon	KK	Cocos Islands
FR	France	KN	Kenya
FW	Wallis and Futuna	KO	Republic of Korea
		KP	Cambodia
GB	Gambia	KR	Democratic People's Republic of Korea
GC	Cayman Islands	KU	Cook Islands
GD	Grenada	KW	Kuwait
GE	Gough Island	KY	Kyrgyzstan
GG	Georgia	KZ	Kazakhstan
GH	Ghana		

A_1A_2	<i>Country</i>	A_1A_2	<i>Country</i>
LA	Lao People's Democratic Republic	NV	Vanuatu
LB	Lebanon	NW	Nauru
LC	Saint Lucia	NZ	New Zealand
LI	Liberia		
LJ	Slovenia	OM	Oman
LN	Southern Line Islands	OR	South Orkney Islands
LS	Lesotho	OO	Monaco
LT	Lithuania	OS	Austria
LV	Latvia		
LY	Libya	PF	French Polynesia
		PH	Philippines
MA	Mauritius	PI	Phoenix Islands
MB	Marion Island	PK	Pakistan
MC	Morocco	PL	Poland
MD	Madeira	PM	Panama
MF	Saint-Martin, Saint-Barthélemy, Guadeloupe and other French islands in the vicinity	PO	Portugal
MG	Madagascar	PR	Peru
MH	Marshall Islands	PT	Pitcairn
MI	Mali	PU	Puerto Rico
MJ	The former Yugoslav Republic of Macedonia	PY	Paraguay
MK	Montenegro		
ML	Malta	QB	Bosnia and Herzegovina
MN	St Maarten, St Eustatius and Saba	QT	Qatar
MO	Mongolia		
MR	Martinique	RA	Russian Federation (East)
MS	Malaysia	RE	Réunion and associated islands
MT	Mauritania	RH	Croatia
MU	Macao, China	RM	Republic of Moldova
MV	Maldives	RO	Romania
MW	Malawi	RS	Russian Federation (West)
MX	Mexico	RW	Rwanda
MY	Mariana Islands		
MZ	Mozambique	SB	Sri Lanka
		SC	Seychelles
NC	New Caledonia	SD	Saudi Arabia
NE	Niue	SG	Senegal
NG	Papua New Guinea	SI	Somalia
NI	Nigeria	SK	Sarawak
NK	Nicaragua	SL	Sierra Leone
NL	Netherlands	SM	Suriname
NM	Namibia	SN	Sweden
NO	Norway	SO	Solomon Islands
NP	Nepal	SP	Spain
NR	Niger	SQ	Slovakia
NU	Bonaire, Curaçao and Aruba	SR	Singapore
		SS	South Sudan

A_1A_2	<i>Country</i>	A_1A_2	<i>Country</i>
SU	Sudan	TS	Tunisia
SV	Swaziland	TU	Turkey
SW	Switzerland	TV	Tuvalu
SX	Santa Cruz Islands		
SY	Syrian Arab Republic	UG	Uganda
SZ	Spitzbergen Islands	UK	United Kingdom of Great Britain and Northern Ireland
TA	Tajikistan		
TC	Tristan da Cunha	UR	Ukraine
TD	Trinidad and Tobago	US	United States of America
TG	Togo	UY	Uruguay
TH	Thailand	UZ	Uzbekistan
TI	Turks and Caicos Islands		
TK	Tokelau	VG	Saint Vincent and the Grenadines
TM	Timor-Leste	VI	Virgin Islands
TN	United Republic of Tanzania	VN	Venezuela (Bolivarian Republic of)
TO	Tonga	VS	Viet Nam
TP	Sao Tome and Principe		
TR	Turkmenistan	YE	Yemen
		YG	Serbia

A_1A_2	<i>Geographical area</i>	A_1A_2	<i>Geographical area</i>
AA	Antarctic	GA	Gulf of Alaska area
AC	Arctic	GX	Gulf of Mexico area
AE	South-East Asia		
AF	Africa	IO	Indian Ocean area
AM	Central Africa		
AO	West Africa	ME	Eastern Mediterranean area
AP	Southern Africa	MM	Mediterranean area
AS	Asia	MP	Central Mediterranean area
AW	Near East	MQ	Western Mediterranean area
AX	Arabian Sea area		
		NA	North America
BQ	Baltic Sea area	NT	North Atlantic area
CA	Caribbean and Central America	OC	Oceania
		OH	Sea of Okhotsk
EA	East Africa		
EC	East China Sea area	PA	Pacific area
EE	Eastern Europe	PE	Persian Gulf area
EM	Middle Europe	PN	North Pacific area
EN	Northern Europe	PQ	Western North Pacific
EU	Europe	PS	South Pacific area
EW	Western Europe	PW	Western Pacific area
		PZ	Eastern Pacific area

A_1A_2	Geographical area	A_1A_2	Geographical area
SA	South America	XN	Northern hemisphere
SE	Southern Ocean area	XS	Southern hemisphere
SJ	Sea of Japan area	XT	Tropical belt
SS	South China Sea area	XW	Western hemisphere
ST	South Atlantic area	XX	For use when other designators are not appropriate
XE	Eastern hemisphere		

Table C2. Geographical designators A_1A_2 for use in abbreviated headings $T_1T_2A_1A_2$ ii CCCC YYGGgg for bulletins containing ships' weather reports and oceanographic data including reports from automatic marine stations

Instructions for the proper application of the geographical designators

- The first letter A_1 will denote the nature of the ship or automatic marine station:

For ocean weather stations:	W
For mobile ships and other marine stations:	V
For floats ($T_1T_2 = SO$):	F
- The second letter A_2 will denote the area from which the reports contained in the bulletins originate.
- Whenever practicable, separate bulletins should be prepared to avoid the use of the letter X.

Note: For $T_1T_2 = SZ$, A_1A_2 area designators from Table C1 should be used.

Designator	Geographical area
A	Area between 30°N–60°S, 35°W–70°E
B	Area between 90°N–05°N, 70°E–180°E
C	Area between 05°N–60°S, 120°W–35°W
D	Area between 90°N–05°N, 180°W–35°W
E	Area between 05°N–60°S, 70°E–120°W
F	Area between 90°N–30°N, 35°W–70°E
J	Area south of 60°S
X	More than one area

Table C3. Geographical area designator A_1 (when $T_1 = D, G, H, O, P, Q, T, X$ or Y) and geographical area designator A_2 (when $T_1 = I$ or J)

Instructions for the proper application of the geographical area designator

- The designator specified in this table should be used to the greatest extent possible to indicate the geographical area of the data contained within the text of the bulletin.
- Where the geographical area of the data does not correspond exactly with the designator, the designator for the area most approximating that of the data may be used.
- When the table does not contain a suitable designator for the geographical area, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.

<i>Designator</i>	<i>Geographical area</i>		<i>Designator</i>	<i>Geographical area</i>	
A	0° – 90°W	northern hemisphere	I	0° – 90°W	southern hemisphere
B	90°W – 180°	northern hemisphere	J	90°W – 180°	southern hemisphere
C	180° – 90°E	northern hemisphere	K	180° – 90°E	southern hemisphere
D	90°E – 0°	northern hemisphere	L	90°E – 0°	southern hemisphere
E	0° – 90°W	tropical belt	N	Northern hemisphere	
F	90°W – 180°	tropical belt	S	Southern hemisphere	
G	180° – 90°E	tropical belt	T	45°W – 180°	northern hemisphere
H	90°E – 0°	tropical belt	X	Global area (area not definable)	

Table C4. Reference time designator A_2 (when $T_1 = D, G, H, J, O, P,$ or T)

Instructions for the proper application of the reference time designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the reference time of data contained within the text of the bulletin.
2. Where the table does not contain a suitable designator for the reference time, an alphabetic designator which is not assigned in the table should be used.

<i>Designator</i>	<i>Reference time</i>	<i>Designator</i>	<i>Reference time</i>
A	Analysis (00 hour)	L	84 hours forecast
B	6 hours forecast	M	96 hours forecast
C	12 hours forecast	N	108 hours forecast
D	18 hours forecast	O	120 hours forecast (5 days)
E	24 hours forecast	P	132 hours forecast
F	30 hours forecast	Q	144 hours forecast
G	36 hours forecast	R	156 hours forecast (7 days)
H	42 hours forecast	S	168 hours forecast
I	48 hours forecast	T	10 days forecast
J	60 hours forecast	U	15 days forecast
K	72 hours forecast	V	30 days forecast
		W...Z	Not assigned

Table C5. Reference time designator A_2 (when $T_1 = Q, X$ or Y)

<i>Designator</i>	<i>Reference time</i>	<i>Designator</i>	<i>Reference time</i>
A	Analysis (00 hour)	J	27 hours forecast
B	3 hours forecast	K	30 hours forecast
C	6 hours forecast	L	33 hours forecast
D	9 hours forecast	M	36 hours forecast
E	12 hours forecast	N	39 hours forecast
F	15 hours forecast	O	42 hours forecast
G	18 hours forecast	P	45 hours forecast
H	21 hours forecast	Q	48 hours forecast
I	24 hours forecast		

Table C6. Data type designator A_1 (when $T_1 = I$ or J)

Instructions for the proper application of the data type designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the type of data contained within the body of the BUFR bulletin.
2. Where more than one data type is contained in the bulletin, the designators for only one of the data types should be used.
3. When the table does not contain a suitable designator for the data types, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.

$T_1 T_2$	A_1	ii	Data type	TAC correspondence	Data category subcategory (Common Table C13)
IN	A		Satellite data (AMSUA)		003/003
IN	B		Satellite data (AMSUB)		003/004
IN	C		CrIS (selected channels)		003/030
IN	H		Satellite data (HIRS)		003/005
IN	I		IRAS		003/020
IN	J		HIRAS		003/030
IN	K		MWHS/MWHS-2		003/040
IN	M		Satellite data (MHS)		003/006
IN	Q		IASI (Principle component scores)		003/007
IN	S		ATMS		003/040
IN	T		MWTS/MWTS-2		003/040
IO	B		Buoy observations	BUOY	001/025
IO	I		Sea ice		
IO	P		Sub-surface profiling floats	TESAC	031/004
IO	R		Sea surface observations	TRACKOB	031/001
IO	S		Sea surface and below soundings	BATHY, TESAC	031/005
IO	T		Sea surface temperature		
IO	W		Sea surface waves	WAVEOB	031/002
IO	X		Other sea environmental		
IO	Z		Deep ocean tsunameter		031/007
IP	C		Radar composite imagery data		
IP	I		Satellite imagery data		
IP	R		Radar imagery data		
IP	X		Not defined		
IS	A	01–29	Routinely scheduled observations for distribution from automatic (fixed or mobile) land stations (e.g. 0000, 0100, ... or 0220, 0240, 0300, ..., or 0715, 0745, ... UTC)	n/a	000/006
IS	A	30–59	N-minute observations from automatic (fixed or mobile) land stations	n/a	000/007
IS	B		Radar reports (parts A and B)	RADOB	006/003

T_1T_2	A_1	ii	Data type	TAC correspondence	Data category subcategory (Common Table C13)
IS	C	01–45	Climatic observations from land stations	CLIMAT	000/020
IS	C	46–59	Climatic observations from marine stations	CLIMAT SHIP	001/020
IS	D		Radiological observation	RADREP	010/001
IS	E		Measurement of surface ozone	n/a	008/000
IS	F		Source of atmospheric	SFAZI, SFLOC, SFAZU	000/030
IS	I	01–45	Intermediate synoptic observations from fixed land stations	SYNOP (SIxx)	000/001 000/051
IS	I	46–59	Intermediate synoptic observations from mobile land stations	SYNOP MOBIL	000/004
IS	M	01–45	Main synoptic observations from fixed land stations	SYNOP (SMxx)	000/002 000/052
IS	M	46–59	Main synoptic observations from mobile land stations	SYNOP MOBIL	000/005
IS	N	01–45	Synoptic observations from fixed land stations at non-standard time (i.e. 0100, 0200, 0400, 0500, ... UTC)	SYNOP (SNxx)	000/000 000/050
IS	N	46–59	Synoptic observations from mobile land stations at non-standard time (i.e. 0100, 0200, 0400, 0500, ... UTC)	SYNOP MOBIL	000/003
IS	R		Hydrologic reports	HYDRA	000/040
IS	S	01–19	Synoptic observations from marine stations	SHIP	001/000
IS	S	20–39	One-hour observations from automatic marine stations	n/a	001/006
IS	S	40–59	N-minute observations from automatic marine stations	n/a	001/007
IS	T	01–19	Tide gauge observations	n/a	001/030
IS	T	20–39	Observed water level time series	n/a	001/031
IS	V		Special aeronautical observations (SPECI)	SPECI	000/011
IS	W		Aviation routine weather observations (METAR)	METAR	000/010
IS	X		Other surface data	IAC, IAC FLEET	
IT	A		Administrative message		
IT	B		Service message		
IT	R		Request for data (inclusive of type)		
IT	X		Other text messages or information		
IU	A		Single level aircraft reports (automatic)	AMDAR	004/000
IU	A		Single level aircraft reports (manual)	AIREP/PIREP	004/001
IU	B		Single level balloon reports	n/a	
IU	C		(used for single level satellite-derived reports – see Note 3)	SAREP/SATOB	005/000
IU	D		Dropsonde/Dropwindsondes	TEMP DROP	002/007
IU	E		Ozone vertical sounding	n/a	008/001
IU	I		Dispersal and transport analysis	n/a	009/000
IU	J	01–19	Upper wind from fixed land stations (entire sounding)	PILOT (parts A, B, C, D)	002/001

T_1T_2	A_1	ii	Data type	TAC correspondence	Data category subcategory (Common Table C13)
IU	J	20-39	Upper wind from mobile land stations (entire sounding)	PILOT MOBIL (parts A, B, C, D)	002/003
IU	J	40-59	Upper wind from marine stations (entire sounding)	PILOT SHIP (parts A, B, C, D)	002/002
IU	K	01-19	Radio soundings from fixed land stations (up to 100 hPa)	TEMP (parts A, B)	002/004
IU	K	20-39	Radio soundings from mobile land stations (up to 100 hPa)	TEMP MOBIL (parts A, B)	002/006
IU	K	40-59	Radio soundings from marine stations (up to 100 hPa)	TEMP SHIP (parts A, B)	002/005
IU	L		Total ozone		008/002
IU	M		Model derived sondes		
IU	N		Rocketsondes		
IU	O		Profiles of aircraft observations in ascending/descending	AMDAR	002/020
IU	P		Profilers	PILOT	002/010
IU	Q		RASS temperature profilers	TEMP	002/011
IU	R		(used for radiance data – see Note 3)		
IU	S	01-19	Radiosondes/pibal reports from fixed land stations (entire sounding)	TEMP (parts A, B, C, D)	002/004
IU	S	20-39	Radio soundings from mobile land stations (entire sounding)	TEMP MOBIL (parts A, B, C, D)	002/006
IU	S	40-59	Radio soundings from marine stations (entire sounding)	TEMP SHIP (parts A, B, C, D)	002/005
IU	T		(used for satellite-derived sondes – see Note 3)	SATEM, SARAD, SATOB	
IU	U	46-59	Monthly statistics of data from marine stations	SHIP	002/026
IU	W	01-19	Upper wind from fixed land stations (up to 100 hPa)	PILOT (parts A, B)	002/001
IU	W	20-39	Upper wind from mobile land stations (up to 100 hPa)	PILOT MOBIL (parts A, B)	002/003
IU	W	40-59	Upper wind from marine stations (up to 100 hPa)	PILOT SHIP (parts A, B)	002/002
IU	X		Other upper-air reports		
JO	I		Sea ice		
JO	S		Sea surface and below soundings		
JO	T		Sea surface temperature		
JO	W		Sea surface waves		
JO	X		Other sea environmental data		
JS	A		Surface area forecast (e.g. airways)		
JS	D		Radiological forecast	RADOF	
JS	M		Surface forecasts (e.g. MOS)		
JS	O		Maritime forecast	MAFOR	
JS	P		Forecast amendments (airways)		
JS	R		Hydrologic forecast	HYFOR	

T_1T_2	A_1	<i>ii</i>	<i>Data type</i>	<i>TAC correspondence</i>	<i>Data category subcategory (Common Table C13)</i>
JS	S		Forecast amendments (TAF)		
JS	T		Aerodrome forecast (TAF)		
JS	X		Other surface forecasts		
JT	E		Tsunami		
JT	H		Hurricane, typhoon, tropical storm warning		
JT	S		Severe weather, SIGMET		
JT	T		Tornado warning		
JT	X		Other warnings		
JU	A		Forecast at single levels		
JU	B		Binary coded SIGWX, Embedded Cumulonimbus		
JU	C		Binary coded SIGWX, Clear-air turbulence		
JU	F		Binary coded SIGWX, Fronts		
JU	N		Binary coded SIGWX, Other SIGWX parameters		
JU	O		Binary coded SIGWX, Turbulence		
JU	S		Forecast soundings		
JU	T		Binary coded SIGWX, Icing/Tropopause		
JU	V		Binary coded SIGWX, Tropical storms, sandstorms, volcanoes		
JU	W		Binary coded SIGWX, High-level winds		
JU	X		Other upper-air forecasts		

Notes:

1. Content of ISMx, ISIx, ISNx messages corresponds to the content of traditional SYNOP messages SMxx, Slix, SNxx.
2. Category/Subcategory = 000/000 identifies SYNOP data from 0100, 0200, 0300, 0400, 0500, 0700, 0800, 1000, 1100, 1300, ... UTC). Thus SNxx in traditional SYNOP corresponds to ISNx in BUFR.
3. Designators A_1 for T_1T_2 already used for satellite data (e.g. IUC, IUR, IUT) are not allocated and reserved for future allocations, pending the allocation of A_1 for $T_1T_2 = IN$ (satellite data).

Table C7. Data type designator T_2 and A_1 (when $T_1 = K$)

T_1T_2	A_1	<i>ii</i>	<i>Data type</i>	<i>TAC correspondence</i>	<i>Data category subcategory (Common Table C13)</i>
KF	A		Surface area forecast (e.g. airways)		
KF	D		Radiological forecast	RADOF	
KF	M		Surface forecasts (e.g. MOS)		
KF	O		Maritime forecast	MAFOR	
KF	P		Forecast amendments (airways)		
KF	R		Hydrologic forecast	HYFOR	
KF	S		Forecast amendments (TAF)		
KF	T		Aerodrome forecast (TAF)		
KF	X		Other surface forecasts		

T_1T_2	A_1	ii	Data type	TAC correspondence	Data category subcategory (Common Table C13)
KO	B		Buoy observations	BUOY	001/025
KO	I		Sea ice		
KO	P		Sub-surface profiling floats	TESAC	031/004
KO	R		Sea surface observations	TRACKOB	031/001
KO	S		Sea surface and below soundings	BATHY, TESAC	031/005
KO	T		Sea surface temperature		
KO	W		Sea surface waves	WAVEOB	031/002
KO	X		Other sea environmental	WAVEOB	031/002
KP	I		Sea ice		
KP	S		Sea surface and below soundings		
KP	T		Sea surface temperature		
KP	W		Sea surface waves		
KP	X		Other sea environmental		
KS	A	01–29	Routinely scheduled observations for distribution from automatic (fixed or mobile) land stations (e.g. 0000, 0100, ... or 0220, 0240, 0300, ..., or 0715, 0745, ... UTC)	n/a	000/006
KS	A	30–59	N-minute observations from automatic (fixed or mobile) land stations	n/a	000/007
KS	B		Radar reports (parts A and B)	RADOB	006/003
KS	C	01–45	Climatic observations from land stations	CLIMAT	000/020
KS	C	46–59	Climatic observations from marine stations	CLIMAT SHIP	001/020
KS	D		Radiological observation	RADREP	010/001
KS	E		Measurement of surface ozone	n/a	008/000
KS	F		Source of atmospheric	SFAZI, SFLOC, SFAZU	000/030
KS	I	01–45	Intermediate synoptic observations from fixed land stations	SYNOP (SIxx)	000/001 000/051
KS	I	46–59	Intermediate synoptic observations from mobile fixed land stations	SYNOP MOBIL	000/004
KS	M	01–45	Main synoptic observations from fixed land stations	SYNOP (SMxx)	000/002 000/052
KS	M	46–59	Main synoptic observations from mobile land stations	SYNOP MOBIL	000/005
KS	N	01–45	Synoptic observations from fixed land stations at non-standard time (i.e. 0100, 0200, 0400, 0500, ..., UTC)	SYNOP (SNxx)	000/000 000/050
KS	N	46–59	Synoptic observations from mobile land stations at non-standard time (i.e. 0100, 0200, 0400, 0500, 0700, 0800, 1000, 1100, 1300, ... UTC)	SYNOP MOBIL	000/003
KS	R		Hydrologic reports	HYDRA	000/040
KS	S	01–19	Synoptic observations from marine stations	SHIP	001/000
KS	S	20–39	One-hour observations from automatic marine stations	n/a	001/006
KS	S	40–59	N-minute observations from automatic marine stations	n/a	001/007
KS	V		Special aeronautical observations (SPECI)	SPECI	000/011

T_1T_2	A_1	ii	Data type	TAC correspondence	Data category subcategory (Common Table C13)
KS	W		Aviation routine weather observations (METAR)	METAR	000/010
KS	X		Other surface data	IAC, IAC FLEET	
KT	E		Tsunami		
KT	H		Hurricane, typhoon, tropical storm warning		
KT	S		Severe weather, SIGMET		
KT	T		Tornado warning		
KT	X		Other warnings		
KU	A		Single level aircraft reports (automatic)	AMDAR	004/000
KU	A		Single level aircraft reports (manual)	AIREP/PIREP	004/001
KU	B		Single level balloon reports	n/a	
KU	C		Single level satellite-derived reports	SAREP	005/000
KU	D		Dropsonde/dropwindsondes	TEMP DROP	002/007
KU	E		Ozone vertical sounding		008/001
KU	I		Dispersal and transport analysis	n/a	009/000
KU	J	01–19	Upper wind from fixed land stations	PILOT (parts A, B, C and D)	002/001
KU	J	20–39	Upper wind from mobile land stations	PILOT MOBIL (parts A, B, C and D)	002/003
KU	J	40–59	Upper wind from marine stations	PILOT SHIP (parts A, B, C and D)	002/002
KU	K	01–19	Radio soundings from fixed land stations	TEMP (parts A and B)	002/004
KU	K	20–39	Radio soundings from mobile land stations	TEMP MOBIL (parts A and B)	002/006
KU	K	40–59	Radio soundings from marine stations	TEMP SHIP (parts A and B)	002/005
KU	L		Total ozone	n/a	008/002
KU	M		Model derived sondes		
KU	N		Rocketsondes		
KU	O		Profiles of aircraft observations in ascending/descending	AMDAR	002/020
KU	P		Profilers	PILOT	002/010
KU	Q		RASS temperature profilers	TEMP	002/011
KU	S	01–19	Radiosondes/pibal reports from fixed land stations	TEMP (parts A, B, C and D)	002/004
KU	S	20–39	Radio soundings from mobile land stations	TEMP MOBIL (parts A, B, C and D)	002/006
KU	S	40–59	Radio soundings from marine stations	TEMP SHIP (parts A, B, C and D)	002/005
KU	T		Satellite derived sondes		
KU	U	46–59	Monthly statistics of data from marine stations	SHIP	002/026
KU	W	01–19	Upper wind from fixed land stations	PILOT (parts A and B)	002/001

T_1T_2	A_1	ii	<i>Data type</i>	<i>TAC correspondence</i>	<i>Data category subcategory (Common Table C13)</i>
KU	W	20–39	Upper wind from mobile land stations	PILOT MOBIL (parts A and B)	002/003
KU	W	40–59	Upper wind from marine stations	PILOT SHIP	002/002
KU	X		Other upper-air reports	(parts A and B)	
KV	A		Forecast at single levels		
KV	B		Coded SIGWX, Embedded Cumulonimbus		
KV	C		CREX coded SIGWX, Clear air turbulence		
KV	F		CREX coded SIGWX, Fronts		
KV	N		CREX coded SIGWX, Other SIGWX parameters		
KV	O		CREX coded SIGWX, Turbulence		
KV	S		Forecast soundings		
KV	T		CREX coded SIGWX, Icing/Tropopause		
KV	V		CREX coded SIGWX, Tropical storms, sandstorms, volcanoes		
KV	W		CREX coded SIGWX, High-level winds		
KV	X		Other upper-air forecasts		

Note: $T_1T_2 = SZ$ is allocated to sea-level data and deep-ocean tsunami data in any alphanumerical form including CREX.

Table D1. Level designator ii (when $T_1 = O$)

Instructions for the proper application of level designators for ocean depths

The designators specified in this table should be used to the greatest extent possible to indicate the levels below the ocean surface in the body of the GRIB bulletin for oceanographic products.

<i>Designator</i>	<i>Depth (in metres)</i>	<i>Designator</i>	<i>Depth (in metres)</i>
98	Surface	62	500
96	2.5	60	600
94	5.0	58	700
92	7.5	56	800
90	12.5	54	900
88	17.5	52	1 000
86	25.0	50	1 100
84	32.5	48	1 200
82	40.0	46	1 300
80	50.0	44	1 400
78	62.5	42	1 500
76	75.0	40	1 750
74	100	38	2 000
72	125	36	2 500
70	150	34	3 000
68	200	32	4 000
66	300	30	5 000
64	400	01	Primary layer depth

Table D2. Level designator ii (when $T_1 = D, G, H, J, P, Q, X$ or Y)

Instructions for the proper application of level designators

1. The designator specified in this table should be used to the greatest extent possible to indicate the level of the data contained within the text of the bulletin.
2. When data at more than one level are contained in the text, the designator for only one of the levels should be used.
3. When the table does not contain a suitable designator for the level, a designator which is not assigned in the table should be used.

<i>Designator</i>	<i>Level</i>	<i>Designator</i>	<i>Level</i>
99	1000 hPa	66	660 hPa
98	Air properties for the Earth's surface	65	650 hPa
97	Level of the tropopause	64	640 hPa
96	Level of maximum wind	63	630 hPa
95	950 hPa	62	625 hPa
94	Level of 0°C isotherm	61	610 hPa
93	975 hPa	60	600 hPa
92	925 hPa	59	590 hPa
91	875 hPa	58	580 hPa
90	900 hPa	57	570 hPa
89	Any parameter reduced to sea level (e.g. MSLP)	56	560 hPa
88	Ground or water properties for the Earth's surface (i.e. snow cover, wave and swell)	55	550 hPa
87	1000–500 hPa thickness	54	540 hPa
86	Boundary level	53	530 hPa
85	850 hPa	52	520 hPa
84	840 hPa	51	510 hPa
83	830 hPa	50	500 hPa
82	825 hPa	49	490 hPa
81	810 hPa	48	480 hPa
80	800 hPa	47	470 hPa
79	790 hPa	46	460 hPa
78	780 hPa	45	450 hPa
77	775 hPa	44	440 hPa
76	760 hPa	43	430 hPa
75	750 hPa	42	420 hPa
74	740 hPa	41	410 hPa
73	730 hPa	40	400 hPa
72	725 hPa	39	390 hPa
71	710 hPa	38	380 hPa
70	700 hPa	37	370 hPa
69	690 hPa	36	360 hPa
68	680 hPa	35	350 hPa
67	675 hPa	34	340 hPa
		33	330 hPa
		32	320 hPa

<i>Designator</i>	<i>Level</i>	<i>Designator</i>	<i>Level</i>
31	310 hPa	12	120 hPa
30	300 hPa	11	110 hPa
24	240 hPa	10	100 hPa
23	230 hPa	09	090 hPa
22	220 hPa	08	080 hPa
21	210 hPa	07	070 hPa
20	200 hPa	06	060 hPa
19	190 hPa	05	050 hPa
18	180 hPa	04	040 hPa
17	170 hPa	03	030 hPa
16	160 hPa	02	020 hPa
15	150 hPa	01	010 hPa
14	140 hPa	00	Entire atmosphere (e.g. precipitable water)
13	130 hPa		

Table D3. Level designator ii (when $T_1T_2 = FA$ or UA)

T_1T_2	<i>Designator ii</i>	<i>Data type</i>	<i>Code form (name)</i>
FA	01–49	Aviation area/advisories	FM 53 (ARFOR) [text]
FA	50–59	GAMET	[TEXT]
FA	60–99	Not assigned	Not assigned
UA	01–59	Routine aircraft reports	ICAO AIREP
UA	60–69	Special aircraft reports, except for volcanic ash	ICAO AIREP
UA	70–79	Special aircraft reports, related to volcanic ash	ICAO AIREP
UA	80–99	Routine aircraft reports	ICAO AIREP

Note: Noting that there is no known use of the series 80–99, these series were allocated to routine aircraft reports up to 1 September 2008. After 1 September 2008, the series are reserved for future use.

Management and allocation of addresses and AS numbers

IP addresses

IP addresses should be acquired or agreed on as per the instructions in Appendix 7 below.

GTS-nominated host/network addresses

Host and subnet IP addresses for use with GTS-nominated Centres should be notified to WMO as described above.

AS numbers

AS numbers for use on the GTS will be coordinated and issued by the WMO Secretariat as required. Centres should direct their requests for AS numbers to WMO as described above.

Publication of addresses and AS numbers

WMO will publish updated lists of addresses and AS numbers in the monthly WWW Newsletter and will also make these lists available in ASCII text form for access by FTP on the WMO Web server and in World Wide Web format at http://www.wmo.int/pages/prog/www/ois/Operational_Information/RtngCat_en.html.

GTS DATA EXCHANGE METHODS

Introduction

There are three data exchange methods defined for use on the GTS. The first two are for the exchange of traditional GTS messages. The third is for the exchange of other data.

For traditional GTS messages (those with TTAAii CCCC) the two standards are based on:

- (a) TCP/IP sockets;
- (b) FTP.

Centres are able to choose between these standards by bilateral agreement.

Other data may also be exchanged on the GTS using a separate standard based on FTP.

TCP sockets-based data exchange

The TCP socket standard involves establishing a connection from the sender to the receiver and for GTS messages to be sent preceded by two control fields. The first field contains the message length and the second is a 2-character field indicating message type (binary, alphanumeric or fax). The third field is the actual GTS message contained within a standard GTS SOH/ETX envelope. The receiving centre uses the message length to determine where each incoming message begins and ends.

The GTS TCP socket protocol does not guarantee end-to-end delivery and data may be lost if the link or one of the message switching systems fails.

The complete data structure is illustrated in Figure 6. Note that the message length does not include the length of the first two fields (message length and type). The message length must always be eight characters long and include leading zeroes as required. The message type field should be encoded using ASCII characters BI for binary, AN for alphanumeric and FX for facsimile.

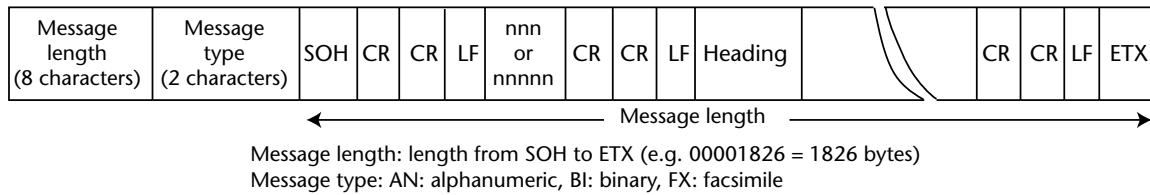


Figure 6. Message structure for socket exchange applications

The rules for use of TCP/IP socket exchange can be summarized as follows:

1. All new connections must start from a new message.
2. Each message is preceded by a message length field of eight ASCII characters and a message type field of two ASCII characters.
3. Message length is counted from SOH to ETX inclusive and must contain leading zeroes as necessary.
4. Message type must be encoded as BI for binary, AN for alphanumeric or FX for facsimile.
5. Receiving centres will check synchronization as follows:
 - Check that the first 8 characters are ASCII numeric;
 - Check that the 9th and 10th characters are BI, AN or FX;
 - Check that the 11th character is SOH;
 - Check that the last character is ETX.
6. If synchronization is lost the receiver shall break the connection using the following sequence of TCP user primitives:
 - shutdown (to make sure that all data in the TCP send buffer has been transferred);
 - close.
7. It is recommended to use separate sockets for ASCII and binary messages, and separate connections for sending and receiving. The sender should always be responsible for establishing the connection.
8. Once a connection is established, it should be maintained.
9. If there should be a need to close a socket, the procedure should be as follows:
 - shutdown (to make sure that all data in the TCP send buffer has been transferred);
 - close.
10. This procedure should also be used when an MSS is being shut down.
11. If the receiving side receives a new unexpected connection request on a port for which it has an established socket, the old socket should be closed and the new socket accepted.
12. TCP/IP service/port numbers for these connections will be decided by bilateral agreement. The use of reserved ports (1 to 1023) should be avoided. The use of ports above 10000 is recommended.
13. To reduce the amount of data lost if an established connection fails, the TCP send and receive buffer sizes can be adjusted. The recommended value for the buffer size is 4KByte, however this value may be agreed on a bilateral basis.
14. To enable detection of message loss, the use of the channel sequence number (CSN) is mandatory. When using the CSN to check for missing messages, the WMO request/repeat procedures should be used to recover these. It may be useful to automate this mechanism to avoid delays caused by manual interaction. In order to minimize data loss, it is strongly recommended that Centres implement a 5-character-long CSN in the future.
15. The channel sequence number 000 (or 00000 respectively) should indicate an initialization, and should not cause retransmission requests.

FTP procedures and file naming convention

Introduction

File Transfer Protocol (FTP) is a convenient and reliable method for exchanging files, especially large files. The protocol is defined in RFC 959.

The main issues to be considered are:

1. Procedures for accumulating messages into files so as to minimize FTP overheads with short messages (applies only to existing message types);
2. File naming conventions for existing message types (existing AHL);
3. General file naming conventions;
4. File renaming;
5. Use of directories;
6. Account names and passwords;
7. FTP sessions;
8. Local FTP requirements;
9. File compression.

Accumulating messages into files

One of the problems with using FTP to send traditional GTS messages is the overhead if each message is sent in a separate file. To overcome this problem, multiple messages in the standard GTS message envelope should be placed in the same file according to the rules set out below. This method of accumulating multiple messages applies only to messages for which AHLs have been assigned.

Centres have the option of including or deleting the Starting Line and End of Message strings and indicating which option they are using via the format identifier (points 2 and 4 below).

1. Each message should be preceded by an 8-octet message length field (8 ASCII characters). The length includes the Starting Line (if present), AHL, text and End of Message (if present).
2. Each message should start with the currently defined Starting Line and AHL as shown in Figure 7.
3. Messages should be accumulated in files thus:
 - (a) Length indicator, message 1 (8 characters);
 - (b) Format identifier (2 characters);
 - (c) Message 1;
 - (d) Length indicator, message 2 (8 characters);
 - (e) Format identifier (2 characters);
 - (f) Message 2;
 - (g) And so on, until the last message;
 - (h) If necessary, and subject to bilateral agreement, a "dummy" message of zero length may be inserted after the last real message, to assist with end of file detection in certain MSS systems. This requirement does not exist in most cases and need only be implemented where necessary, and agreed between centres.
4. Format identifier (2 ASCII characters) has the following values:
 - (a) 00 if Starting Line and End of Message strings present;
 - (b) 01 if Starting Line and End of Message strings absent (not preferred, to be discontinued).
5. The sending centre should combine messages in the file for no more than 60 seconds to minimize transmission delays; this limit should be set to a value depending upon the characteristics of the link. However, the file should be sent immediately when a GTS Priority 1 message (as defined in Part II, section 2.11.1 of the present Manual) is added to the file.
6. The sending centre should limit the number of messages in a file to a maximum of 100; this limit should be set to a value depending upon the characteristics of the link.
7. The format applies regardless of the number of messages, i.e., it applies even if there is only one message in the file.

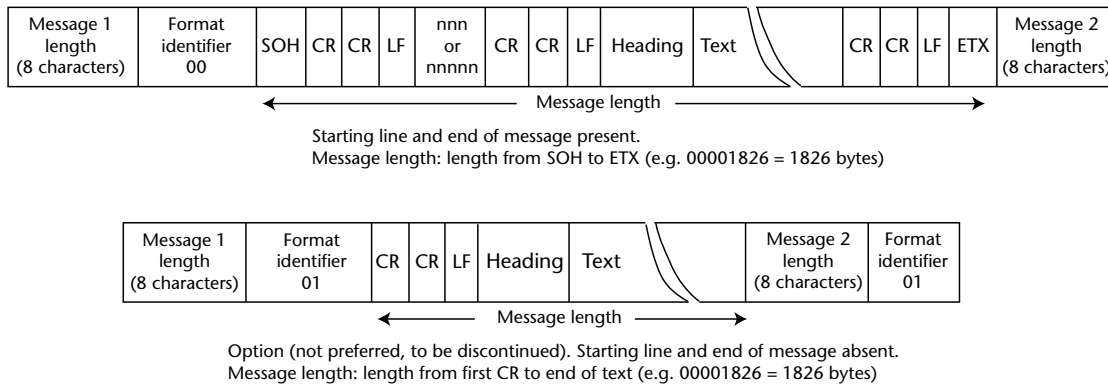


Figure 7. Structure of a typical message in a file

File naming conventions for existing message types (existing AHL)

The file naming convention is:

CCCCNNNNNNNN.ext

where:

CCCC is the international four-letter location identifier of the sending Centre, as defined in *Weather Reporting* (WMO-No. 9), Volume C;

NNNNNNNN is a sequential number from 1 to 99999999 generated by the sending Centre for each data type determined by ext; 0 is used for (re-) initialization; through bilateral agreement, Centres may use NNNN instead of NNNNNNNN in case of limitation on filename length.

ext is

- “ua” for urgent alphanumeric information
- “ub” for urgent binary information
- “a” for normal alphanumeric information
- “b” for normal binary information
- “f” for facsimile information

Note: Where, through bilateral agreement, Centres allow alphanumeric and binary data in the one file, the b or ub extent shall be used.

General file naming conventions

The procedure is based on transmission of file pairs, one file being the information file and the other being the associated metadata file. The concept of file pairs allows the communications function to be implemented independently of data management requirements for structure of metadata, yet provides for the carriage of whatever metadata is required. It is not compulsory to always have a .met file, such as when the information file itself is self-specifying or when a single .met file can describe several information files (for example, as in the case of same data type for different times). There is always, however, a clear relation between the Information File Name and the Metadata File Name, which should only differ from their Extension field and possible wildcards. File names for new message types (no existing AHL) shall follow the following format. It should be noted that file names for existing message types (existing AHL) can also follow the following format.

The File Name format is a predetermined combination of fields, delimited by the _ (underscore) character except for the last two fields, which are delimited by the . (period) character.

Each field can be of variable length, except for the Date/time stamp field which is predetermined.

The order of the fields is mandatory.

The File Name fields are as follows:

pflag_productidentifier_oflag_originator_yyyyMMddhhmmss[_freeformat].type[.compression]

where the mandatory fields are:

pflag is a character or combination of characters indicating how to decode the productidentifier field. At this time, the pflag field has only the following acceptable value:

Table 3. Accepted pflag values

<i>pflag</i>	<i>Meaning</i>
T	The productidentifier field will be decoded as a standard T ₁ T ₂ A ₁ A ₂ ii data designator. (The WMO standard data designators are given in Attachment II-5.)
A	The productidentifier field will be decoded as a standard Abbreviated Heading, including BBB as appropriate, space characters being discarded, e.g. T ₁ T ₂ A ₁ A ₂ iiCCCCYYGGgg[BBB].
W	WMO Product Identifier
Z	Originating centre's local product identifier
TM	The productidentifier field will be decoded as a standard T ₁ T ₂ A ₁ A ₂ ii data designator (the WMO standard data designators are given in Attachment II-5). The file will contain the metadata corresponding to the related "T" file.
AM	The productidentifier field will be decoded as a standard Abbreviated Heading, including BBB as appropriate, space characters being discarded, e.g. T ₁ T ₂ A ₁ A ₂ iiCCCCYYGGgg[BBB]. The file will contain the metadata corresponding to the related "A" file.
WM	WMO Product Identifier. The file will contain the metadata corresponding to the related "W" file.
ZM	Originating centre's local product identifier. The file will contain the metadata corresponding to the related "Z" file.

productidentifier is a variable length field containing information that describes the nature of the data in the file. The productidentifier field should be decoded according to the pflag.

The WMO Product Identifier to be used with **pflag** = W shall be decoded as follows:

<location indicator>,<data designator>,<free description>,<International date-timegroup>,<BBB modification header>

The WMO Product Identifier is composed of two parts:

- (a) The "static part" for description of the product;
- (b) The "optional part" to define the time stamp and status of the product (correction, amendment).

The WMO Product Identifier is not case sensitive. These two parts are defined as follows:

Static part: <location indicator>,<data designator>,<free description>

- <location indicator> defines the producer: Country, organization and the production centre; the country shall be represented by the official ISO 3166 standard 2-letter code. Example: <gb-metoffice-exeter>. Each field shall be separated by the symbol "-" . The ISO 3166 standard 2-letter code xx shall be used for international organizations and shall therefore be the two first characters of the location indicator of international organizations, for example, "xx-eumetsat-darmstadt", "xx-ecmwf-reading".

Note: Although ISO 3166 uses only upper case letters, WMO file names may use either upper or lower case letters for the ISO 2-letter country code and both cases are considered identical when comparing file names.

- <data designator> specifies the type of data with reference to the categories and subcategories defined in Common Table C-13 of the *Manual on Codes* (WMO-No 306), for example, <SYNOP>, <TAF>, <MODEL>, <RADAR>, <SATELLITE>. When the type of data is a composite type, use the sign "+" for concatenation.
- <free description> is determined by the production centre to characterize the product.

Optional part: [,<International date-time group>,<BBB modification header>]

- <International date-time group> is a YYYYMMDDHHMMSS time stamp of the product, full format without substitution characters (only decimal digits). This field is optional because it can be recovered from the file name field: yyyyMMddhhmmss.
- <BBB modification header> is a complementary group with a similar purpose as the current BBB group of AHL.

Note: In order to facilitate the identification of each field of the product identifier, the static part, as well as the optional part if used, shall comprise two symbols "," separating the fields. Each field shall not contain any symbol ",". If a field is empty, no character shall be inserted between the relevant field delimiters "_" or ",".

oflag is a character or combination of characters indicating how to decode the originator field. At this time, the oflag field has only the following acceptable value:

Table 4. Accepted oflag values

<i>oflag</i>	<i>Meaning</i>
C	The originator field will be decoded as a standard CCCC country code

originator is a variable length field containing information that states where the file originated. The originator field should be decoded according to the oflag.

yyyyMMddhhmmss is a fixed length date and time stamp field. The interpretation of this field should be in accordance with the standard rules set for specific data description and types. Therefore it may have various significance, such as date of creation of the file, or date of collection of data. If a particular date and time stamp field is not specified, it should be replaced by a "-" (minus) character. For example: -----311500-- represents a stamp that specifies only the day (31st), hours (15) and minutes (00). If there are no rules for a specific data type, this field should represent the date and time of creation of the file by the originator.

Type is a variable length field that describes the general format type of the file. Although this information could be considered somewhat redundant to the productidentifier field, it is kept as such for industry accepted standard compatibility. It should be noted that the delimiter before the type field is a "." (period). This is to help parse the file name for fields, since the freeformat field could make use of further "_" (underscore) to delimit subfields.

Table 5. Accepted type values

<i>type</i>	<i>Meaning</i>
met	The file is a metadata file pair which describes the content and format of the corresponding information file with the same name
tif	TIFF file
gif	GIF file
png	PNG file
ps	Postscript file
mpg	MPEG file
jpg	JPEG file
txt	text file