

CODE TABLE USED IN SECTION 0

Code table 0.0 - *Discipline of processed data in the GRIB message, number of GRIB Master table*

Code figure	Meaning
0	Meteorological products
1	Hydrological products
2	Land surface products
3	Space products
4-9	Reserved
10	Oceanographic products
11-191	Reserved
192-254	Reserved for local use
255	Missing

CODE TABLES USED IN SECTION 1**Code table 1.0 - GRIB master tables version number**

Code figure	Meaning
0	Experimental
1	Version implemented on 7 November 2001
2	Version implemented on 4 November 2003
3	Version implemented on 2 November 2005
4	Version implemented on 7 November 2007
5	Version implemented on 4 November 2009
6	Version implemented on 15 September 2010
7	Version implemented on 4 May 2011
8	Version implemented on 2 November 2011
9	Pre-operational to be implemented by next amendment
10-254	Future versions
255	Missing

Code table 1.1 - GRIB local tables version number

Code figure	Meaning
0	Local tables not used. Only table entries and templates from the current master table are valid
1-254	Number of local tables version used
255	Missing

Code table 1.2 - Significance of reference time

Code figure	Meaning
0	Analysis
1	Start of forecast
2	Verifying time of forecast
3	Observation time
4-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 1.3 - Production status of data

Code figure	Meaning
0	Operational products
1	Operational test products
2	Research products
3	Re-analysis products
4	THORPEX Interactive Grand Global Ensemble (TIGGE)
5	THORPEX Interactive Grand Global Ensemble (TIGGE) test
6-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 1.4 - *Type of data*

Code figure	Meaning
0	Analysis products
1	Forecast products
2	Analysis and forecast products
3	Control forecast products
4	Perturbed forecast products
5	Control and perturbed forecast products
6	Processed satellite observations
7	Processed radar observations
8	Event probability
9-191	Reserved
192-254	Reserved for local use
255	Missing

Note: An initialized analysis is considered a zero-hour forecast.

CODE AND FLAG TABLES USED IN SECTION 3**Code table 3.0 - Source of grid definition**

Code figure	Meaning	Comments
0	Specified in Code table 3.1	
1	Predetermined grid definition	Defined by originating centre
2-191	Reserved	
192-254	Reserved for local use	
255	A grid definition does not apply to this product	

Code table 3.1 - Grid definition template number

Code figure	Meaning	Comments
0	Latitude/longitude	Also called equidistant cylindrical, or Plate Carrée
1	Rotated latitude/longitude	
2	Stretched latitude/longitude	
3	Stretched and rotated latitude/longitude	
4-9	Reserved	
10	Mercator	
11-19	Reserved	
20	Polar stereographic projection	Can be south or north
21-29	Reserved	
30	Lambert conformal	Can be secant or tangent, conical or bipolar
31	Albers equal area	
32-39	Reserved	
40	Gaussian latitude/longitude	
41	Rotated Gaussian latitude/longitude	
42	Stretched Gaussian latitude/longitude	
43	Stretched and rotated Gaussian latitude/longitude	
44-49	Reserved	
50	Spherical harmonic coefficients	
51	Rotated spherical harmonic coefficients	
52	Stretched spherical harmonic coefficients	
53	Stretched and rotated spherical harmonic coefficients	
54-89	Reserved	
90	Space view perspective or orthographic	
91-99	Reserved	
100	Triangular grid based on an icosahedron	
101-109	Reserved	
110	Equatorial azimuthal equidistant projection	
111-119	Reserved	
120	Azimuth-range projection	
121-999	Reserved	
1000	Cross-section grid with points equally spaced on the horizontal	
1001-1099	Reserved	

(continued)

(Code table 3.1 - continued)

Code figure	Meaning
1100	Hovmöller diagram grid with points equally spaced on the horizontal
1101-1199	Reserved
1200	Time section grid
1201-32767	Reserved
32768-65534	Reserved for local use
65535	Missing

Code table 3.2 - Shape of the Earth

Code figure	Meaning
0	Earth assumed spherical with radius = 6 367 470.0 m
1	Earth assumed spherical with radius specified (in m) by data producer
2	Earth assumed oblate spheroid with size as determined by IAU in 1965 (major axis = 6 378 160.0 m, minor axis = 6 356 775.0 m, $f = 1/297.0$)
3	Earth assumed oblate spheroid with major and minor axes specified (in km) by data producer
4	Earth assumed oblate spheroid as defined in IAG-GRS80 model (major axis = 6 378 137.0 m, minor axis = 6 356 752.314 m, $f = 1/298.257\ 222\ 101$)
5	Earth assumed represented by WGS84 (as used by ICAO since 1998)
6	Earth assumed spherical with radius of 6 371 229.0 m
7	Earth assumed oblate spheroid with major or minor axes specified (in m) by data producer
8	Earth model assumed spherical with radius of 6 371 200 m, but the horizontal datum of the resulting latitude/longitude field is the WGS84 reference frame
9-191	Reserved
192-254	Reserved for local use
255	Missing

Note: WGS84 is a geodetic system that uses IAG-GRS80 as a basis.

Flag table 3.3 - Resolution and component flags

Bit No.	Value	Meaning
1-2		Reserved
3	0	i direction increments not given
	1	i direction increments given
4	0	j direction increments not given
	1	j direction increments given
5	0	Resolved u- and v- components of vector quantities relative to easterly and northerly directions
	1	Resolved u- and v- components of vector quantities relative to the defined grid in the direction of increasing x and y (or i and j) coordinates, respectively
6-8		Reserved - set to zero

Flag table 3.4 - Scanning mode

Bit No.	Value	Meaning
1	0	Points of first row or column scan in the +i (+x) direction
	1	Points of first row or column scan in the -i (-x) direction
2	0	Points of first row or column scan in the -j (-y) direction
	1	Points of first row or column scan in the +j (+y) direction
3	0	Adjacent points in i (x) direction are consecutive
	1	Adjacent points in j (y) direction is consecutive
4	0	All rows scan in the same direction
	1	Adjacent rows scans in the opposite direction
5-8		Reserved

Notes:

- (1) i direction: west to east along a parallel or left to right along an x-axis.
- (2) j direction: south to north along a meridian, or bottom to top along a y-axis.
- (3) If bit number 4 is set, the first row scan is as defined by previous flags.

Flag table 3.5 - Projection centre

Bit No.	Value	Meaning
1	0	North Pole is on the projection plane
	1	South Pole is on the projection plane
2	0	Only one projection centre is used
	1	Projection is bipolar and symmetric

Code table 3.6 - Spectral data representation type

Code figure	Meaning
1	The associated Legendre functions of the first kind are defined by:

$$P_n^m(\mu) = \sqrt{(2n+1) \frac{(n-m)!}{(n+m)!}} \frac{1}{2^n n!} (1-\mu^2)^{m/2} \frac{d^{n+m}}{d\mu^{n+m}} (\mu^2 - 1)^n, m \geq 0$$

$$P_n^{-m}(\mu) = P_n^m(\mu)$$

A field $F(\lambda, \mu)$ is represented by:

$$F(\lambda, \mu) = \sum_{m=-M}^M \sum_{n=|m|}^{N(m)} F_n^m P_n^m(\mu) e^{im\lambda}$$

where λ is the longitude,
 μ the sine of latitude,

and F_n^{-m} the complex conjugate of F_n^m

Code table 3.7 - Spectral data representation mode

Code figure	Meaning
0	Reserved
1	The complex numbers F_n^m (see code figure 1 in Code table 3.6) are stored for $m \geq 0$ as pairs of real numbers $\text{Re}(F_n^m)$, $\text{Im}(F_n^m)$ ordered with n increasing from m to $N(m)$, first for $m = 0$ and then for $m = 1, 2, \dots M$ (see Note)
2-254	Reserved
255	Missing

Note: Values of $N(m)$ for common truncation cases:

Triangular:	$M = J = K,$	$N(m) = J$
Rhomboidal:	$K = J + M,$	$N(m) = J + m$
Trapezoidal:	$K = J, K > M,$	$N(m) = J$

Code table 3.8 - Grid point position

Code figure	Meaning
0	Grid points at triangle vertices
1	Grid points at centres of triangles
2	Grid points at midpoints of triangle sides
3-191	Reserved
192-254	Reserved for local use
255	Missing

Flag table 3.9 - Numbering order of diamonds as seen from the corresponding pole

Bit No.	Value	Meaning
1	0	Clockwise orientation
	1	Anti-clockwise (i.e. counter-clockwise) orientation
2-8		Reserved

Flag table 3.10 - Scanning mode for one diamond

Bit No.	Value	Meaning
1	0	Points scan in +i direction, i.e. from pole to Equator
	1	Points scan in -i direction, i.e. from Equator to pole
2	0	Points scan in +j direction, i.e. from west to east
	1	Points scan in -j direction, i.e. from east to west
3	0	Adjacent points in i direction are consecutive
	1	Adjacent points in j direction are consecutive
4-8		Reserved

Code table 3.11 - Interpretation of list of numbers at end of section 3

Code figure	Meaning
0	There is no appended list
1	Numbers define number of points corresponding to full coordinate circles (i.e. parallels), coordinate values on each circle are multiple of the circle mesh, and extreme coordinate values given in grid definition (i.e. extreme longitudes) may not be reached in all rows
2	Numbers define number of points corresponding to coordinate lines delimited by extreme coordinate values given in grid definition (i.e. extreme longitudes) which are present in each row
3	Numbers define the actual latitudes for each row in the grid. The list of numbers are integer values of the valid latitudes in microdegrees (scaled by 10^{-6}) or in unit equal to the ratio of the basic angle and the subdivisions number for each row, in the same order as specified in the "scanning mode flag" (bit no. 2). (see Note 2)
4-254	Reserved
255	Missing

Notes:

- (1) For entry 1, it should be noted that depending on values of extreme (first/last) coordinates, and regardless of bit-map, effective number of points per row may be less than the number of points on the current circle.
- (2) The value for the constant direction increment D_i (or D_x) in the accompanying Grid definition template should be set to all ones (missing).

Code table 3.15 - Physical meaning of vertical coordinate

Code figure	Meaning	Unit
0-19	Reserved	
20	Temperature	K
21-99	Reserved	
100	Pressure	Pa
101	Pressure deviation from mean sea level	Pa
102	Altitude above mean sea level	m
103	Height above ground (see Note 1)	m
104	Sigma coordinate	
105	Hybrid coordinate	
106	Depth below land surface	m
107	Potential temperature (theta)	K
108	Pressure deviation from ground to level	Pa
109	Potential vorticity	$K m^{-2} kg^{-1} s^{-1}$
110	Geometrical height	m
111	Eta coordinate (see Note 2)	
112	Geopotential height	gpm
113-159	Reserved	
160	Depth below sea level	m
161-191	Reserved	
192-254	Reserved for local use	
255	Missing	

(continued)

(Code table 3.15 - continued)

Notes:

- (1) Negative values associated to this coordinate will indicate depth below ground surface. If values are all below surface, use of entry 10^6 is recommended, with positive coordinate values instead.
- (2) The Eta vertical coordinate system involves normalizing the pressure at some point on a specific level by the mean sea level pressure at that point.

Code table 3.20 - Type of horizontal line

Code figure	Meaning
0	Rhumb
1	Great circle
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 3.21 - Vertical dimension coordinate values definition

Code figure	Meaning
0	Explicit coordinate values set
1	Linear coordinates $f(1) = C1$ $f(n) = f(n-1) + C2$
2-10	Reserved
11	Geometric coordinates $f(1) = C1$ $f(n) = C2 \times f(n-1)$
12-191	Reserved
192-254	Reserved for local use
255	Missing

CODE TABLES USED IN SECTION 4**Code table 4.0** - *Product definition template number*

Code figure	Meaning
0	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time
1	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer at a point in time
2	Derived forecasts based on all ensemble members at a horizontal level or in a horizontal layer at a point in time
3	Derived forecasts based on a cluster of ensemble members over a rectangular area at a horizontal level or in a horizontal layer at a point in time
4	Derived forecasts based on a cluster of ensemble members over a circular area at a horizontal level or in a horizontal layer at a point in time
5	Probability forecasts at a horizontal level or in a horizontal layer at a point in time
6	Percentile forecasts at a horizontal level or in a horizontal layer at a point in time
7	Analysis or forecast error at a horizontal level or in a horizontal layer at a point in time
8	Average, accumulation, extreme values or other statistically processed values at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval
9	Probability forecasts at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval
10	Percentile forecasts at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval
11	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer, in a continuous or non-continuous interval
12	Derived forecasts based on all ensemble members at a horizontal level or in a horizontal layer, in a continuous or non-continuous interval
13	Derived forecasts based on a cluster of ensemble members over a rectangular area, at a horizontal level or in a horizontal layer, in a continuous or non-continuous interval
14	Derived forecasts based on a cluster of ensemble members over a circular area, at a horizontal level or in a horizontal layer, in a continuous or non-continuous interval
15	Average, accumulation, extreme values, or other statistically processed values over a spatial area at a horizontal level or in a horizontal layer at a point in time
16-19	Reserved
20	Radar product
21-29	Reserved
30	Satellite product (deprecated)
31	Satellite product
32	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time for simulated (synthetic) satellite data
33-39	Reserved
40	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time for atmospheric chemical constituents
41	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer at a point in time for atmospheric chemical constituents
42	Average, accumulation and/or extreme values or other statistically processed values at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for atmospheric chemical constituents
43	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for atmospheric chemical constituents
44	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time for aerosol

(continued)

(Code table 4.0 - continued)

Code figure	Meaning
45	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer at a point in time for aerosol
46	Average, accumulation, and/or extreme values or other statistically processed values at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for aerosol
47	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer in a continuous or non continuous time interval for aerosol
48-50	Reserved
51	Categorical forecasts at a horizontal level or in a horizontal layer at a point in time
52-90	Reserved
91	Categorical forecasts at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval
92-253	Reserved
254	CCITT IA5 character string
255-999	Reserved
1000	Cross-section of analysis and forecast at a point in time
1001	Cross-section of averaged or otherwise statistically processed analysis or forecast over a range of time
1002	Cross-section of analysis and forecast, averaged or otherwise statistically processed over latitude or longitude
1003-1099	Reserved
1100	Hovmöller-type grid with no averaging or other statistical processing
1101	Hovmöller-type grid with averaging or other statistical processing
1102-32767	Reserved
32768-65534	Reserved for local use
65535	Missing

Code table 4.1 - Parameter category by product discipline

Note: When a new category is to be added to Code table 4.1 and more than one discipline applies, the choice of discipline should be made based on the intended use of the product.

Product discipline 0 - Meteorological products

Category	Description
0	Temperature
1	Moisture
2	Momentum
3	Mass
4	Short-wave radiation
5	Long-wave radiation
6	Cloud
7	Thermodynamic stability indices
8	Kinematic stability indices
9	Temperature probabilities
10	Moisture probabilities
11	Momentum probabilities
12	Mass probabilities
13	Aerosols
14	Trace gases (e.g. ozone, CO ₂)

(continued)

(Code table 4.1 - continued)

Category	Description
15	Radar
16	Forecast radar imagery
17	Electrodynamics
18	Nuclear/radiology
19	Physical atmospheric properties
20	Atmospheric chemical constituents
21-189	Reserved
190	CCITT IA5 string
191	Miscellaneous
192-254	Reserved for local use
255	Missing

Note: Entries 9, 10, 11 and 12 are deprecated.

Product discipline 1 - Hydrological products

Category	Description
0	Hydrology basic products
1	Hydrology probabilities
2	Inland water and sediment properties
3-191	Reserved
192-254	Reserved for local use
255	Missing

Product discipline 2 - Land surface products

Category	Description
0	Vegetation/biomass
1	Agri-/aquacultural special products
2	Transportation-related products
3	Soil products
4	Fire weather products
5-191	Reserved
192-254	Reserved for local use
255	Missing

Product discipline 3 - Space products

Category	Description
0	Image format products (see Note 1)
1	Quantitative products (see Note 2)
2-191	Reserved
192-254	Reserved for local use
255	Missing

Notes:

- (1) Data are numeric without units, although they might be given quantitative meaning through a code table defined external to this document. The emphasis is on a displayable “picture” of some phenomenon, perhaps with certain enhanced features. Generally, each datum is an unsigned, one octet integer, but some image format products might have another datum size. The size of a datum is indicated in section 5.
- (2) Data are in specified physical units.

(continued)

*(Code table 4.1 - continued)***Product discipline 10 - Oceanographic products**

Category	Description
0	Waves
1	Currents
2	Ice
3	Surface properties
4	Sub-surface properties
5-190	Reserved
191	Miscellaneous
192-254	Reserved for local use
255	Missing

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 (sub-surface 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	Dew-point temperature	K
7	Dew-point 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 dew-point depression*	K
15	Virtual potential temperature	K
16	Snow phase change heat flux	W m ⁻²
17	Skin temperature	K
18-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

Product discipline 0 - Meteorological products, parameter category 1: moisture

Number	Parameter	Units
0	Specific humidity	kg kg ⁻¹
1	Relative humidity	%
2	Humidity mixing ratio	kg kg ⁻¹
3	Precipitable water	kg m ⁻²
4	Vapour pressure	Pa
5	Saturation deficit	Pa
6	Evaporation	kg m ⁻²
7	Precipitation rate*	kg m ⁻² s ⁻¹
8	Total precipitation*	kg m ⁻²

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
9	Large-scale precipitation (non-convective)*	kg m^{-2}
10	Convective precipitation*	kg m^{-2}
11	Snow depth	m
12	Snowfall rate water equivalent*	$\text{kg m}^{-2} \text{ s}^{-1}$
13	Water equivalent of accumulated snow depth*	kg m^{-2}
14	Convective snow*	kg m^{-2}
15	Large-scale snow*	kg m^{-2}
16	Snow melt	kg m^{-2}
17	Snow age	d
18	Absolute humidity	kg m^{-3}
19	Precipitation type	(Code table 4.201)
20	Integrated liquid water	kg m^{-2}
21	Condensate	kg kg^{-1}
22	Cloud mixing ratio	kg kg^{-1}
23	Ice water mixing ratio	kg kg^{-1}
24	Rain mixing ratio	kg kg^{-1}
25	Snow mixing ratio	kg kg^{-1}
26	Horizontal moisture convergence	$\text{kg kg}^{-1} \text{ s}^{-1}$
27	Maximum relative humidity*	%
28	Maximum absolute humidity*	kg m^{-3}
29	Total snowfall*	m
30	Precipitable water category	(Code table 4.202)
31	Hail	m
32	Graupel (snow pellets)	kg kg^{-1}
33	Categorical rain	(Code table 4.222)
34	Categorical freezing rain	(Code table 4.222)
35	Categorical ice pellets	(Code table 4.222)
36	Categorical snow	(Code table 4.222)
37	Convective precipitation rate	$\text{kg m}^{-2} \text{ s}^{-1}$
38	Horizontal moisture divergence	$\text{kg kg}^{-1} \text{ s}^{-1}$
39	Per cent frozen precipitation	%
40	Potential evaporation	kg m^{-2}
41	Potential evaporation rate	W m^{-2}
42	Snow cover	%
43	Rain fraction of total cloud water	Proportion
44	Rime factor	Numeric
45	Total column integrated rain	kg m^{-2}
46	Total column integrated snow	kg m^{-2}
47	Large scale water precipitation (non-convective)	kg m^{-2}
48	Convective water precipitation	kg m^{-2}
49	Total water precipitation	kg m^{-2}
50	Total snow precipitation	kg m^{-2}
51	Total column water (Vertically integrated total water (vapour + cloud water/ice))	kg m^{-2}
52	Total precipitation rate**	$\text{kg m}^{-2} \text{ s}^{-1}$

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
53	Total snowfall rate water equivalent**	$\text{kg m}^{-2} \text{s}^{-1}$
54	Large scale precipitation rate	$\text{kg m}^{-2} \text{s}^{-1}$
55	Convective snowfall rate water equivalent	$\text{kg m}^{-2} \text{s}^{-1}$
56	Large scale snowfall rate water equivalent	$\text{kg m}^{-2} \text{s}^{-1}$
57	Total snowfall rate	m s^{-1}
58	Convective snowfall rate	m s^{-1}
59	Large scale snowfall rate	m s^{-1}
60	Snow depth water equivalent	kg m^{-2}
61	Snow density	kg m^{-3}
62	Snow evaporation	kg m^{-2}
63	Reserved	
64	Total column integrated water vapour	kg m^{-2}
65	Rain precipitation rate	$\text{kg m}^{-2} \text{s}^{-1}$
66	Snow precipitation rate	$\text{kg m}^{-2} \text{s}^{-1}$
67	Freezing rain precipitation rate	$\text{kg m}^{-2} \text{s}^{-1}$
68	Ice pellets precipitation rate	$\text{kg m}^{-2} \text{s}^{-1}$
69	Total column integrated cloud water	kg m^{-2}
70	Total column integrated cloud ice	kg m^{-2}
71	Reserved	
72	Total column integrated hail	kg m^{-2}
73	Reserved	
74	Total column integrated graupel	kg m^{-2}
75-77	Reserved	
78	Total column integrated water (all components including precipitation)	kg m^{-2}
79-82	Reserved	
83	Specific cloud liquid water content	kg kg^{-1}
84	Specific cloud ice water content	kg kg^{-1}
85	Specific rainwater content	kg kg^{-1}
86	Specific snow water content	kg kg^{-1}
87-89	Reserved	
90	Total kinematic moisture flux	$\text{kg kg}^{-1} \text{m s}^{-1}$
91	u-component (zonal) kinematic moisture flux	$\text{kg kg}^{-1} \text{m s}^{-1}$
92	v-component (meridional) kinematic moisture flux	$\text{kg kg}^{-1} \text{m s}^{-1}$
93-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

** Total precipitation/snowfall rate stands for the sum of convective and large-scale precipitation/snowfall rate.

(continued)

(Code table 4.2 - continued)

Product discipline 0 - Meteorological products, parameter category 2: momentum

Number	Parameter	Units
0	Wind direction (from which blowing)	degree true
1	Wind speed	m s^{-1}
2	u-component of wind	m s^{-1}
3	v-component of wind	m s^{-1}
4	Stream function	$\text{m}^2 \text{s}^{-1}$
5	Velocity potential	$\text{m}^2 \text{s}^{-1}$
6	Montgomery stream function	$\text{m}^2 \text{s}^{-2}$
7	Sigma coordinate vertical velocity	s^{-1}
8	Vertical velocity (pressure)	Pa s^{-1}
9	Vertical velocity (geometric)	m s^{-1}
10	Absolute vorticity	s^{-1}
11	Absolute divergence	s^{-1}
12	Relative vorticity	s^{-1}
13	Relative divergence	s^{-1}
14	Potential vorticity	$\text{K m}^2 \text{kg}^{-1} \text{s}^{-1}$
15	Vertical u-component shear	s^{-1}
16	Vertical v-component shear	s^{-1}
17	Momentum flux, u-component	N m^{-2}
18	Momentum flux, v-component	N m^{-2}
19	Wind mixing energy	J
20	Boundary layer dissipation	W m^{-2}
21	Maximum wind speed*	m s^{-1}
22	Wind speed (gust)	m s^{-1}
23	u-component of wind (gust)	m s^{-1}
24	v-component of wind (gust)	m s^{-1}
25	Vertical speed shear	s^{-1}
26	Horizontal momentum flux	N m^{-2}
27	u-component storm motion	m s^{-1}
28	v-component storm motion	m s^{-1}
29	Drag coefficient	Numeric
30	Frictional velocity	m s^{-1}
31	Reserved	
32	Eta coordinate vertical velocity	s^{-1}
33	Wind fetch	m
34-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

(continued)

(Code table 4.2 - continued)

Product discipline 0 - Meteorological products, parameter category 3: mass

Number	Parameter	Units
0	Pressure	Pa
1	Pressure reduced to MSL	Pa
2	Pressure tendency	Pa s ⁻¹
3	ICAO Standard Atmosphere Reference Height	m
4	Geopotential	m ² s ⁻²
5	Geopotential height	gpm
6	Geometric height	m
7	Standard deviation of height	m
8	Pressure anomaly	Pa
9	Geopotential height anomaly	gpm
10	Density	kg m ⁻³
11	Altimeter setting	Pa
12	Thickness	m
13	Pressure altitude	m
14	Density altitude	m
15	5-wave geopotential height	gpm
16	Zonal flux of gravity wave stress	N m ⁻²
17	Meridional flux of gravity wave stress	N m ⁻²
18	Planetary boundary layer height	m
19	5-wave geopotential height anomaly	gpm
20	Standard deviation of sub-grid scale orography	m
21	Angle of sub-gridscale orography	rad
22	Slope of sub-gridscale orography	Numeric
23	Gravity wave dissipation	W m ⁻²
24	Anisotropy of sub-gridscale orography	Numeric
25	Natural logarithm of pressure in Pa	Numeric
26-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 0 - Meteorological products, parameter category 4: short-wave radiation

Number	Parameter	Units
0	Net short-wave radiation flux (surface)*	W m ⁻²
1	Net short-wave radiation flux (top of atmosphere)*	W m ⁻²
2	Short-wave radiation flux*	W m ⁻²
3	Global radiation flux	W m ⁻²
4	Brightness temperature	K
5	Radiance (with respect to wave number)	W m ⁻¹ sr ⁻¹
6	Radiance (with respect to wave length)	W m ⁻³ sr ⁻¹
7	Downward short-wave radiation flux	W m ⁻²
8	Upward short-wave radiation flux	W m ⁻²
9	Net short wave radiation flux	W m ⁻²
10	Photosynthetically active radiation	W m ⁻²
11	Net short-wave radiation flux, clear sky	W m ⁻²
12	Downward UV radiation	W m ⁻²

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
13-49	Reserved	
50	UV index (under clear sky)**	Numeric
51	UV index**	Numeric
52-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

** The Global Solar UVI is formulated using the International Commission on Illumination (CIE) reference action spectrum for UV-induced erythema on the human skin (ISO 17166:1999/CIE S 007/E-1998).

It is a measure of the UV radiation that is relevant to and defined for a horizontal surface. The UVI is a unitless quantity defined by the formula:

$$I_{UV} = k_{er} \cdot \int_{250 \text{ nm}}^{400 \text{ nm}} E_{\lambda} \cdot s_{er}(\lambda) d\lambda$$

where E_{λ} is the solar spectral irradiance expressed in $W / (m^2 \cdot \text{nanometre})$ at wavelength λ and $d\lambda$ is the wavelength interval used in the summation. $s_{er} \lambda$ is the erythema reference action spectrum, and k_{er} is a constant equal to $40 \text{ m}^2 / W$.

Product discipline 0 - Meteorological products, parameter category 5: long-wave radiation

Number	Parameter	Units
0	Net long-wave radiation flux (surface)*	$W \text{ m}^{-2}$
1	Net long-wave radiation flux (top of atmosphere)*	$W \text{ m}^{-2}$
2	Long-wave radiation flux*	$W \text{ m}^{-2}$
3	Downward long-wave radiation flux	$W \text{ m}^{-2}$
4	Upward long-wave radiation flux	$W \text{ m}^{-2}$
5	Net long wave radiation flux	$W \text{ m}^{-2}$
6	Net long-wave radiation flux, clear sky	$W \text{ m}^{-2}$
7-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

Product discipline 0 - Meteorological products, parameter category 6: cloud

Number	Parameter	Units
0	Cloud ice	$kg \text{ m}^{-2}$
1	Total cloud cover	%
2	Convective cloud cover	%
3	Low cloud cover*	%
4	Medium cloud cover*	%
5	High cloud cover*	%
6	Cloud water	$kg \text{ m}^{-2}$
7	Cloud amount	%
8	Cloud type	(Code table 4.203)
9	Thunderstorm maximum tops	m
10	Thunderstorm coverage	(Code table 4.204)

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
11	Cloud base	m
12	Cloud top	m
13	Ceiling	m
14	Non-convective cloud cover	%
15	Cloud work function	J kg ⁻¹
16	Convective cloud efficiency	Proportion
17	Total condensate	kg kg ⁻¹
18	Total column-integrated cloud water	kg m ⁻²
19	Total column-integrated cloud ice	kg m ⁻²
20	Total column-integrated condensate	kg m ⁻²
21	Ice fraction of total condensate	Proportion
22	Cloud cover	%
23	Cloud ice mixing ratio	kg kg ⁻¹
24	Sunshine	Numeric
25	Horizontal extent of cumulonimbus (CB)	%
26-31	Reserved	
32	Fraction of cloud cover	Numeric
33	Sunshine duration	s
34-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

Product discipline 0 - Meteorological products, parameter category 7: thermodynamic stability indices

Number	Parameter	Units
0	Parcel lifted index (to 500 hPa)	K
1	Best lifted index (to 500 hPa)	K
2	K index	K
3	KO index	K
4	Total totals index	K
5	Sweat index	Numeric
6	Convective available potential energy	J kg ⁻¹
7	Convective inhibition	J kg ⁻¹
8	Storm relative helicity	J kg ⁻¹
9	Energy helicity index	Numeric
10	Surface lifted index	K
11	Best (4-layer) lifted index	K
12	Richardson number	Numeric
13-14	Reserved	
15	Updraft helicity	m ² s ⁻²
16-191	Reserved	
192-254	Reserved for local use	
255	Missing	

(continued)

(Code table 4.2 - continued)

Product discipline 0 - Meteorological products, parameter category 13: aerosols

Number	Parameter	Units
0	Aerosol type	(Code table 4.205)
1-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 0 - Meteorological products, parameter category 14: trace gases

Number	Parameter	Units
0	Total ozone	DU
1	Ozone mixing ratio	kg kg ⁻¹
2	Total column integrated ozone	DU
3-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 0 - Meteorological products, parameter category 15: radar

Number	Parameter	Units
0	Base spectrum width	m s ⁻¹
1	Base reflectivity	dB
2	Base radial velocity	m s ⁻¹
3	Vertically integrated liquid	kg m ⁻¹
4	Layer-maximum base reflectivity	dB
5	Precipitation	kg m ⁻²
6	Radar spectra (1)	-
7	Radar spectra (2)	-
8	Radar spectra (3)	-
9-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product Discipline 0 - Meteorological products, parameter category 16: forecast radar imagery

Number	Parameter	Units
0	Equivalent radar reflectivity factor for rain	mm ⁶ m ⁻³
1	Equivalent radar reflectivity factor for snow	mm ⁶ m ⁻³
2	Equivalent radar reflectivity factor for parameterized convection	mm ⁶ m ⁻³
3	Echo top	m
4	Reflectivity	dB
5	Composite reflectivity	dB
6-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Note: Decibel (dB) is a logarithmic measure of the relative power, or of the relative values of two flux densities, especially of sound intensities and radio and radar power densities. In radar meteorology, the logarithmic scale (dBZ) is used for measuring radar reflectivity factor (obtained from the American Meteorological Society *Glossary of Meteorology*).

(continued)

(Code table 4.2 - continued)

Product discipline 0 - Meteorological products, parameter category 18: nuclear/radiology

Number	Parameter	Units
0	Air concentration of caesium 137	Bq m ⁻³
1	Air concentration of iodine 131	Bq m ⁻³
2	Air concentration of radioactive pollutant	Bq m ⁻³
3	Ground deposition of caesium 137	Bq m ⁻²
4	Ground deposition of iodine 131	Bq m ⁻²
5	Ground deposition of radioactive pollutant	Bq m ⁻²
6	Time-integrated air concentration of caesium pollutant (see Note 1)	Bq s m ⁻³
7	Time-integrated air concentration of iodine pollutant (see Note 1)	Bq s m ⁻³
8	Time-integrated air concentration of radioactive pollutant (see Note 1)	Bq s m ⁻³
9	Reserved	
10	Air concentration	Bq m ⁻³
11	Wet deposition	Bq m ⁻²
12	Dry deposition	Bq m ⁻²
13	Total deposition (wet + dry)	Bq m ⁻²
14-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Notes:

- (1) Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.
- (2) Parameters from 10 onward may be used in combination with Product definition templates 4.40 – 4.43 and Common Code table C-14 (Code table 4.230) to represent any type of radioisotope.

Product discipline 0 - Meteorological products, parameter category 19: physical atmospheric properties

Number	Parameter	Units
0	Visibility	m
1	Albedo	%
2	Thunderstorm probability	%
3	Mixed layer depth	m
4	Volcanic ash	(Code table 4.206)
5	Icing top	m
6	Icing base	m
7	Icing	(Code table 4.207)
8	Turbulence top	m
9	Turbulence base	m
10	Turbulence	(Code table 4.208)
11	Turbulent kinetic energy	J kg ⁻¹
12	Planetary boundary-layer regime	(Code table 4.209)
13	Contrail intensity	(Code table 4.210)
14	Contrail engine type	(Code table 4.211)
15	Contrail top	m
16	Contrail base	m
17	Maximum snow albedo (see Note 1)	%
18	Snow free albedo	%

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
19	Snow albedo	%
20	Icing	%
21	In-cloud turbulence	%
22	Clear air turbulence (CAT)	%
23	Supercooled large droplet probability (see Note 2)	%
24-25	Reserved	
26	Convective outlook	(Code table 4.224)
27-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Notes:

- (1) Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.
- (2) Supercooled large droplets (SLD) are defined as those with a diameter greater than 50 microns.

Product discipline 0 - Meteorological products, parameter category 20: atmospheric chemical constituents

Number	Parameter	Units
0	Mass density (concentration)	kg m^{-3}
1	Column-integrated mass density (see Note)	kg m^{-2}
2	Mass mixing ratio (mass fraction in air)	kg kg^{-1}
3	Atmosphere emission mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
4	Atmosphere net production mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
5	Atmosphere net production and emission mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
6	Surface dry deposition mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
7	Surface wet deposition mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
8	Atmosphere re-emission mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
9	Wet deposition by large-scale precipitation mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
10	Wet deposition by convective precipitation mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
11	Sedimentation mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
12	Dry deposition mass flux	$\text{kg m}^{-2} \text{ s}^{-1}$
13	Transfer from hydrophobic to hydrophilic	$\text{kg kg}^{-1} \text{ s}^{-1}$
14	Transfer from SO ₂ (Sulphur dioxide) to SO ₄ (sulphate)	$\text{kg kg}^{-1} \text{ s}^{-1}$
15-49	Reserved	
50	Amount in atmosphere	mol
51	Concentration in air	mol m^{-3}
52	Volume mixing ratio (fraction in air)	mol mol^{-1}
53	Chemical gross production rate of concentration	$\text{mol m}^{-3} \text{ s}^{-1}$
54	Chemical gross destruction rate of concentration	$\text{mol m}^{-3} \text{ s}^{-1}$
55	Surface flux	$\text{mol m}^{-2} \text{ s}^{-1}$
56	Changes of amount in atmosphere (see Note)	mol s^{-1}
57	Total yearly average burden of the atmosphere	mol

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
58	Total yearly averaged atmospheric loss (see Note)	mol s ⁻¹
59	Aerosol number concentration	m ⁻³
60-99	Reserved	
100	Surface area density (aerosol)	m ⁻¹
101	Atmosphere optical thickness	m
102	Aerosol optical thickness	Numeric
103	Single scattering albedo	Numeric
104	Asymmetry factor	Numeric
105	Aerosol extinction coefficient	m ⁻¹
106	Aerosol absorption coefficient	m ⁻¹
107	Aerosol lidar backscatter from satellite	m ⁻¹ sr ⁻¹
108	Aerosol lidar backscatter from the ground	m ⁻¹ sr ⁻¹
109	Aerosol lidar extinction from satellite	m ⁻¹
110	Aerosol lidar extinction from the ground	m ⁻¹
111-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Note: FirstFixedSurface and SecondFixedSurface of Code table 4.5 (Fixed surface types and units) to define the vertical extent, i.e. FirstFixedSurface can be set to 1 (Ground or water surface) and SecondFixedSurface set to 7 (Tropopause) for a restriction to the troposphere.

Product discipline 0 - Meteorological products, parameter category 190: CCITT IA5 string

Number	Parameter	Units
0	Arbitrary text string	CCITT IA5
1-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 0 - Meteorological products, parameter category 191: miscellaneous

Number	Parameter	Units
0	Seconds prior to initial reference time (defined in Section 1)	s
1-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 1 - Hydrological products, parameter category 0: hydrology basic products

Number	Parameter	Units
0	Flash flood guidance (Encoded as an accumulation over a floating subinterval of time between the reference time and valid time)	kg m ⁻²
1	Flash flood runoff (Encoded as an accumulation over a floating subinterval of time)	kg m ⁻²
2	Remotely sensed snow cover	(Code table 4.215)

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
3	Elevation of snow-covered terrain	(Code table 4.216)
4	Snow water equivalent per cent of normal	%
5	Baseflow-groundwater runoff	kg m ⁻²
6	Storm surface runoff	kg m ⁻²
7-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Notes:

- (1) Remotely sensed snow cover is expressed as a field of dimensionless, thematic values. The currently accepted values are for no-snow/no-cloud, 50, for clouds, 100, and for snow, 250 (see Code table 4.215).
- (2) A data field representing snow coverage by elevation portrays at which elevations there is a snow pack. The elevation values typically range from 0 to 90 in 100-metre increments. A value of 253 is used to represent a no-snow/no-cloud data point. A value of 254 is used to represent a data point at which snow elevation could not be estimated because of clouds obscuring the remote sensor (when using aircraft or satellite measurements).
- (3) Snow water equivalent per cent of normal is stored in per cent of normal units. For example, a value of 110 indicates 110 per cent of the normal snow water equivalent for a given depth of snow.

Product discipline 1 - Hydrological products, parameter category 1: hydrology probabilities

Number	Parameter	Units
0	Conditional per cent precipitation amount fractile for an overall period (Encoded as an accumulation)	kg m ⁻²
1	Per cent precipitation in a sub-period of an overall period (Encoded as per cent accumulation over the sub-period)	%
2	Probability of 0.01 inch of precipitation (POP)	%
3-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 1 - Hydrological products, parameter category 2: inland water and sediment properties

Number	Parameter	Units
0	Water depth	m
1	Water temperature	K
2	Water fraction	Proportion
3	Sediment thickness	m
4	Sediment temperature	K
5	Ice thickness	m
6	Ice temperature	K
7	Ice cover	Proportion
8	Land cover (0 = water, 1 = land)	Proportion
9	Shape factor with respect to salinity profile	-
10	Shape factor with respect to temperature profile in thermocline	-
11	Attenuation coefficient of water with respect to solar radiation	m ⁻¹
12	Salinity	kg kg ⁻¹

(continued)

(Code table 4.2 - continued)

Product discipline 2 - Land surface products, parameter category 0: vegetation/biomass

Number	Parameter	Units
0	Land cover (0 = sea, 1 = land)	Proportion
1	Surface roughness	m
2	Soil temperature	K
3	Soil moisture content*	kg m^{-2}
4	Vegetation	%
5	Water runoff	kg m^{-2}
6	Evapotranspiration	$\text{kg}^{-2} \text{s}^{-1}$
7	Model terrain height	m
8	Land use	(Code table 4.212)
9	Volumetric soil moisture content**	Proportion
10	Ground heat flux*	W m^{-2}
11	Moisture availability	%
12	Exchange coefficient	$\text{kg m}^{-2} \text{s}^{-1}$
13	Plant canopy surface water	kg m^{-2}
14	Blackadar's mixing length scale	m
15	Canopy conductance	m s^{-1}
16	Minimal stomatal resistance	s m^{-1}
17	Wilting point*	Proportion
18	Solar parameter in canopy conductance	Proportion
19	Temperature parameter in canopy	Proportion
20	Humidity parameter in canopy conductance	Proportion
21	Soil moisture parameter in canopy conductance	Proportion
22	Soil moisture	kg m^{-3}
23	Column-integrated soil water	kg m^{-2}
24	Heat flux	W m^{-2}
25	Volumetric soil moisture	$\text{m}^3 \text{m}^{-3}$
26	Wilting point	kg m^{-3}
27	Volumetric wilting point	$\text{m}^3 \text{m}^{-3}$
28-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

** It is recommended not to use this parameter, but another one with a more descriptive unit.

Product discipline 2 - Land surface products, parameter category 3: soil products

Number	Parameter	Units
0	Soil type	(Code table 4.213)
1	Upper layer soil temperature*	K
2	Upper layer soil moisture*	kg m^{-3}
3	Lower layer soil moisture*	kg m^{-3}
4	Bottom layer soil temperature*	K
5	Liquid volumetric soil moisture (non-frozen)**	Proportion

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
6	Number of soil layers in root zone	Numeric
7	Transpiration stress-onset (soil moisture)**	Proportion
8	Direct evaporation cease (soil moisture)**	Proportion
9	Soil porosity**	Proportion
10	Liquid volumetric soil moisture (non-frozen)	$\text{m}^3 \text{m}^{-3}$
11	Volumetric transpiration stress-onset (soil moisture)	$\text{m}^3 \text{m}^{-3}$
12	Transpiration stress-onset (soil moisture)	kg m^{-3}
13	Volumetric direct evaporation cease (soil moisture)	$\text{m}^3 \text{m}^{-3}$
14	Direct evaporation cease (soil moisture)	kg m^{-3}
15	Soil porosity	$\text{m}^3 \text{m}^{-3}$
16	Volumetric saturation of soil moisture	$\text{m}^3 \text{m}^{-3}$
17	Saturation of soil moisture	kg m^{-3}
18-191	Reserved	
192-254	Reserved for local use	
255	Missing	

* Parameter deprecated. See Regulation 92.6.2 and use another parameter instead.

** It is recommended not to use this parameter, but another one with a more descriptive unit.

Product discipline 2 - Land surface products, parameter category 4: fire weather products

Number	Parameter	Units
0	Fire outlook	Code table 4.224
1	Fire outlook due to dry thunderstorm	Code table 4.224
2	Haines index	Numeric

Product discipline 3 - Space products, parameter category 0: image format products

Number	Parameter	Units
0	Scaled radiance	Numeric
1	Scaled albedo	Numeric
2	Scaled brightness temperature	Numeric
3	Scaled precipitable water	Numeric
4	Scaled lifted index	Numeric
5	Scaled cloud top pressure	Numeric
6	Scaled skin temperature	Numeric
7	Cloud mask	Code table 4.217
8	Pixel scene type	Code table 4.218
9	Fire detection indicator	Code table 4.223
10-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 3 - Space products, parameter category 1: quantitative products

Number	Parameter	Units
0	Estimated precipitation	kg m^{-2}
1	Instantaneous rain rate	$\text{kg m}^{-2} \text{s}^{-1}$
2	Cloud top height	m

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
3	Cloud top height quality indicator	Code table 4.219
4	Estimated u component of wind	m s^{-1}
5	Estimated v component of wind	m s^{-1}
6	Number of pixel used	Numeric
7	Solar zenith angle	°
8	Relative azimuth angle	°
9	Reflectance in 0.6 micron channel	%
10	Reflectance in 0.8 micron channel	%
11	Reflectance in 1.6 micron channel	%
12	Reflectance in 3.9 micron channel	%
13	Atmospheric divergence	s^{-1}
14	Cloudy brightness temperature	K
15	Clear-sky brightness temperature	K
16	Cloudy radiance (with respect to wave number)	$\text{W m}^{-1} \text{sr}^{-1}$
17	Clear-sky radiance (with respect to wave number)	$\text{W m}^{-1} \text{sr}^{-1}$
18	Reserved	
19	Wind speed	m s^{-1}
20	Aerosol optical thickness at 0.635 μm	
21	Aerosol optical thickness at 0.810 μm	
22	Aerosol optical thickness at 1.640 μm	
23	Angstrom coefficient	
24-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 10 - Oceanographic products, parameter category 0: waves

Number	Parameter	Units
0	Wave spectra (1)	-
1	Wave spectra (2)	-
2	Wave spectra (3)	-
3	Significant height of combined wind waves and swell	m
4	Direction of wind waves	degree true
5	Significant height of wind waves	m
6	Mean period of wind waves	s
7	Direction of swell waves	degree true
8	Significant height of swell waves	m
9	Mean period of swell waves	s
10	Primary wave direction	degree true
11	Primary wave mean period	s
12	Secondary wave direction	degree true
13	Secondary wave mean period	s
14	Direction of combined wind waves and swell	degree true
15	Mean period of combined wind waves and swell	s
16-191	Reserved	
192-254	Reserved for local use	
255	Missing	

(continued)

(Code table 4.2 - continued)

Product discipline 10 - Oceanographic products, parameter category 1: currents

Number	Parameter	Units
0	Current direction	degree true
1	Current speed	m s^{-1}
2	u-component of current	m s^{-1}
3	v-component of current	m s^{-1}
4-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 10 - Oceanographic products, parameter category 2: ice

Number	Parameter	Units
0	Ice cover	Proportion
1	Ice thickness	m
2	Direction of ice drift	degree true
3	Speed of ice drift	m s^{-1}
4	u-component of ice drift	m s^{-1}
5	v-component of ice drift	m s^{-1}
6	Ice growth rate	m s^{-1}
7	Ice divergence	s^{-1}
8	Ice temperature	K
9	Ice internal pressure	Pa m
10-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 10 - Oceanographic products, parameter category 3: surface properties

Number	Parameter	Units
0	Water temperature	K
1	Deviation of sea level from mean	m
2-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 10 - Oceanographic products, parameter category 4: sub-surface properties

Number	Parameter	Units
0	Main thermocline depth	m
1	Main thermocline anomaly	m
2	Transient thermocline depth	m
3	Salinity	kg kg^{-1}
4	Ocean vertical heat diffusivity	$\text{m}^2 \text{s}^{-1}$
5	Ocean vertical salt diffusivity	$\text{m}^2 \text{s}^{-1}$
6	Ocean vertical momentum diffusivity	$\text{m}^2 \text{s}^{-1}$
7-10	Reserved	
11	Shape factor with respect to salinity profile	-

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units
12	Shape factor with respect to temperature profile in thermocline	-
13	Attenuation coefficient of water with respect to solar radiation	m^{-1}
14	Water depth	m
15	Water temperature	K
16-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Product discipline 10 - Oceanographic products, parameter category 191: miscellaneous

Number	Parameter	Units
0	Seconds prior to initial reference time (defined in Section 1)	s
1	Meridional overturning stream function	$\text{m}^3 \text{s}^{-1}$
2-191	Reserved	
192-254	Reserved for local use	
255	Missing	

Code table 4.3 - *Type of generating process*

Code figure	Meaning
0	Analysis
1	Initialization
2	Forecast
3	Bias corrected forecast
4	Ensemble forecast
5	Probability forecast
6	Forecast error
7	Analysis error
8	Observation
9	Climatological
10	Probability-weighted forecast
11	Bias-corrected ensemble forecast
12-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.4 - *Indicator of unit of time range*

Code figure	Meaning
0	Minute
1	Hour
2	Day
3	Month
4	Year
5	Decade (10 years)
6	Normal (30 years)
7	Century (100 years)
8-9	Reserved
10	3 hours
11	6 hours
12	12 hours
13	Second
14-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.5 - Fixed surface types and units

Code figure	Meaning	Unit
0	Reserved	
1	Ground or water surface	-
2	Cloud base level	-
3	Level of cloud tops	-
4	Level of 0°C isotherm	-
5	Level of adiabatic condensation lifted from the surface	-
6	Maximum wind level	-
7	Tropopause	-
8	Nominal top of the atmosphere	-
9	Sea bottom	-
10	Entire atmosphere	-
11	Cumulonimbus (CB) base	m
12	Cumulonimbus (CB) top	m
13-19	Reserved	
20	Isothermal level	K
21-99	Reserved	
100	Isobaric surface	Pa
101	Mean sea level	
102	Specific altitude above mean sea level	m
103	Specified height level above ground	m
104	Sigma level	"sigma" value
105	Hybrid level	-
106	Depth below land surface	m
107	Isentropic (theta) level	K
108	Level at specified pressure difference from ground to level	Pa
109	Potential vorticity surface	$\text{K m}^2 \text{ kg}^{-1} \text{ s}^{-1}$
110	Reserved	
111	Eta level	-
112-116	Reserved	
117	Mixed layer depth	m
118	Hybrid height level	-
119	Hybrid pressure level	-
120-159	Reserved	
160	Depth below sea level	m
161	Depth below water surface	m
162	Lake or river bottom	-
163	Bottom of sediment layer	-
164	Bottom of thermally active sediment layer	-
165	Bottom of sediment layer penetrated by thermal wave	-
166	Mixing layer	-
167-191	Reserved	
192-254	Reserved for local use	
255	Missing	

(continued)

(Code table 4.5 - continued)

Notes:

- (1) The Eta vertical coordinate system involves normalizing the pressure at some point on a specific level by the mean sea level pressure at that point.
- (2) Hybrid height level (Code figure 118) can be defined as:
 $z(k) = A(k) + B(k) \times \text{orog}$
 $(k = 1, \dots, \text{NLevels}; \text{orog} = \text{orography}; z(k) = \text{height in metres at level } k)$
- (3) Hybrid pressure level, for which Code figure 119 shall be used instead of 105, can be defined as:
 $p(k) = A(k) + B(k) \times \text{sp}$
 $(k = 1, \dots, \text{NLevels}; \text{sp} = \text{surface pressure}; p(k) = \text{pressure at level } k)$
- (4) Ice internal pressure or stress (Pa m) is the integrated pressure across the vertical thickness of a layer of ice. It is produced when concentrated ice reacts to external forces such as wind and ocean currents.

Code table 4.6 - Type of ensemble forecast

Code figure	Meaning
0	Unperturbed high-resolution control forecast
1	Unperturbed low-resolution control forecast
2	Negatively perturbed forecast
3	Positively perturbed forecast
4	Multi-model forecast
5-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.7 - Derived forecast

Code figure	Meaning
0	Unweighted mean of all members
1	Weighted mean of all members
2	Standard deviation with respect to cluster mean
3	Standard deviation with respect to cluster mean, normalized
4	Spread of all members
5	Large anomaly index of all members (see Note 1)
6	Unweighted mean of the cluster members
7	Interquartile range (range between the 25th and 75th quantile)
8	Minimum of all ensemble members
9	Maximum of all ensemble members
10-191	Reserved
192-254	Reserved for local use
255	Missing

Notes:

- (1) Large anomaly index is defined as $\{(\text{number of members whose anomaly is higher than } 0.5 \times \text{SD}) - (\text{number of members whose anomaly is lower than } -0.5 \times \text{SD})\} / (\text{number of members})$ at each grid point, where SD is defined as observed climatological standard deviation.
- (2) It should be noted that the reference for "minimum of all ensemble members" and "maximum of all ensemble members" is the set of ensemble members and not a time interval and should not be confused with the maximum and minimum described by PDT 4.8.

Code table 4.8 - Clustering method

Code figure	Meaning
0	Anomaly correlation
1	Root mean square
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.9 - Probability type

Code figure	Meaning
0	Probability of event below lower limit
1	Probability of event above upper limit
2	Probability of event between lower and upper limits (the range includes the lower limit but not the upper limit)
3	Probability of event above lower limit
4	Probability of event below upper limit
5-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.10 - Type of statistical processing

Code figure	Meaning
0	Average
1	Accumulation
2	Maximum
3	Minimum
4	Difference (value at the end of time range minus value at the beginning)
5	Root mean square
6	Standard deviation
7	Covariance (temporal variance)
8	Difference (value at the start of time range minus value at the end)
9	Ratio
10	Standardized anomaly
11-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.11 - Type of time intervals

Code figure	Meaning
0	Reserved
1	Successive times processed have same forecast time, start time of forecast is incremented
2	Successive times processed have same start time of forecast, forecast time is incremented
3	Successive times processed have start time of forecast incremented and forecast time decremented so that valid time remains constant
4	Successive times processed have start time of forecast decremented and forecast time incremented so that valid time remains constant
5	Floating subinterval of time between forecast time and end of overall time interval*
6-191	Reserved
192-254	Reserved for local use
255	Missing

* Code figure 5 applies to instances where a single time subinterval was used to calculate the statistically processed field. The exact starting and ending times of the subinterval are not given, but it is known that it is contained inclusively between the beginning time and the ending time of the overall interval.

Code table 4.12 - Operating mode

Code figure	Meaning
0	Maintenance mode
1	Clear air
2	Precipitation
3-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.13 - Quality control indicator

Code figure	Meaning
0	No quality control applied
1	Quality control applied
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.14 - Clutter filter indicator

Code figure	Meaning
0	No clutter filter used
1	Clutter filter used
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.15 - Type of spatial processing used to arrive at given data value from the source data

Code figure	Meaning
0	Data is calculated directly from the source grid with no interpolation (see Note 1)
1	Bilinear interpolation using the 4 source grid grid-point values surrounding the nominal grid-point
2	Bicubic interpolation using the 4 source grid grid-point values surrounding the nominal grid-point
3	Using the value from the source grid grid-point which is nearest to the nominal grid-point
4	Budget interpolation using the 4 source grid grid-point values surrounding the nominal grid-point (see Note 2)
5	Spectral interpolation using the 4 source grid grid-point values surrounding the nominal grid-point
6	Neighbor-budget interpolation using the 4 source grid grid-point values surrounding the nominal grid-point (see Note 3)
7-191	Reserved
192-254	Reserved for local use
255	Missing

Notes:

- (1) This method assumes that each field really represents box averages/maxima/minima where each box extends halfway to its neighboring grid point in each direction to represent averages/maxima/minima of values from the source grid with no interpolation.
- (2) Budget interpolation means a low-order interpolation method that quasi-conserves area averages. It would be appropriate for interpolating budget fields such as precipitation. This method assumes that the field really represents box averages/maxima/minima where each box extends halfway to its neighboring grid point in each direction. The method actually averages bilinearly interpolated values in a square array of points distributed within each output grid box.
- (3) Performs a budget interpolation at the grid point nearest to the nominal grid point.

Code table 4.91 - Type of Interval

Code figure	Meaning
0	Smaller than first limit
1	Greater than second limit
2	Between first and second limit. The range includes the first limit but not the second limit
3	Greater than first limit
4	Smaller than second limit
5	Smaller or equal first limit
6	Greater or equal second limit
7	Between first and second. The range includes the first limit and the second limit
8	Greater or equal first limit
9	Smaller or equal second limit
10	Between first and second limit. The range includes the second limit but not the first limit
11	Equal to first limit.
12-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.201 - *Precipitation type*

Code figure	Meaning
0	Reserved
1	Rain
2	Thunderstorm
3	Freezing rain
4	Mixed/ice
5	Snow
6-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.202 - *Precipitable water category*

Code figure	Meaning
0-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.203 - *Cloud type*

Code figure	Meaning
0	Clear
1	Cumulonimbus
2	Stratus
3	Stratocumulus
4	Cumulus
5	Altostratus
6	Nimbostratus
7	Alto cumulus
8	Cirrostratus
9	Cirrocumulus
10	Cirrus
11	Cumulonimbus - ground-based fog beneath the lowest layer
12	Stratus - ground-based fog beneath the lowest layer
13	Stratocumulus - ground-based fog beneath the lowest layer
14	Cumulus - ground-based fog beneath the lowest layer
15	Altostratus - ground-based fog beneath the lowest layer
16	Nimbostratus - ground-based fog beneath the lowest layer
17	Alto cumulus - ground-based fog beneath the lowest layer
18	Cirrostratus - ground-based fog beneath the lowest layer
19	Cirrocumulus - ground-based fog beneath the lowest layer
20	Cirrus - ground-based fog beneath the lowest layer
21-190	Reserved
191	Unknown
192-254	Reserved for local use
255	Missing

Note: Code figures 11-20 indicate all four layers were used and ground-based fog is beneath the lowest layer.

Code table 4.204 - Thunderstorm coverage

Code figure	Meaning
0	None
1	Isolated (1-2%)
2	Few (3-5%)
3	Scattered (16-45%)
4	Numerous (> 45%)
5-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.205 - Presence of aerosol

Code figure	Meaning
0	Aerosol not present
1	Aerosol present
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.206 - Volcanic ash

Code figure	Meaning
0	Not present
1	Present
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.207 - Icing

Code figure	Meaning
0	None
1	Light
2	Moderate
3	Severe
4	Trace
5	Heavy
6-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.208 - *Turbulence*

Code figure	Meaning
0	None (smooth)
1	Light
2	Moderate
3	Severe
4	Extreme
5-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.209 - *Planetary boundary-layer regime*

Code figure	Meaning
0	Reserved
1	Stable
2	Mechanically driven turbulence
3	Forced convection
4	Free convection
5-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.210 - *Contrail intensity*

Code figure	Meaning
0	Contrail not present
1	Contrail present
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.211 - *Contrail engine type*

Code figure	Meaning
0	Low bypass
1	High bypass
2	Non-bypass
3-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.212 - *Land use*

Code figure	Meaning
0	Reserved
1	Urban land
2	Agriculture
3	Range land
4	Deciduous forest
5	Coniferous forest
6	Forest/wetland
7	Water
8	Wetlands
9	Desert
10	Tundra
11	Ice
12	Tropical forest
13	Savannah
14-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.213 - *Soil type*

Code figure	Meaning
0	Reserved
1	Sand
2	Loamy sand
3	Sandy loam
4	Silt loam
5	Organic (redefined)
6	Sandy clay loam
7	Silt clay loam
8	Clay loam
9	Sandy clay
10	Silty clay
11	Clay
12-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.215 - *Remotely sensed snow coverage*

Code figure	Meaning
0-49	Reserved
50	No-snow/no-cloud
51-99	Reserved
100	Clouds
101-249	Reserved
250	Snow
251-254	Reserved for local use
255	Missing

Code table 4.216 - *Elevation of snow-covered terrain*

Code figure	Meaning
0-90	Elevation in increments of 100 m
91-253	Reserved
254	Clouds
255	Missing

Code table 4.217 - *Cloud mask type*

Code figure	Meaning
0	Clear over water
1	Clear over land
2	Cloud
3	No data
4-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.218 - *Pixel scene type*

Code figure	Meaning
0	No scene identified
1	Green needle-leaved forest
2	Green broad-leaved forest
3	Deciduous needle-leaved forest
4	Deciduous broad-leaved forest
5	Deciduous mixed forest
6	Closed shrub-land
7	Open shrub-land
8	Woody savannah
9	Savannah
10	Grassland
11	Permanent wetland
12	Cropland
13	Urban

(continued)

(Code table 4.218 - continued)

Code figure	Meaning
14	Vegetation / crops
15	Permanent snow / ice
16	Barren desert
17	Water bodies
18	Tundra
19-96	Reserved
97	Snow / ice on land
98	Snow / ice on water
99	Sun-glint
100	General cloud
101	Low cloud / fog / Stratus
102	Low cloud / Stratocumulus
103	Low cloud / unknown type
104	Medium cloud / Nimbostratus
105	Medium cloud / Altostratus
106	Medium cloud / unknown type
107	High cloud / Cumulus
108	High cloud / Cirrus
109	High cloud / unknown
110	Unknown cloud type
111-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.219 - Cloud top height quality indicator

Code figure	Meaning
0	Nominal cloud top height quality
1	Fog in segment
2	Poor quality height estimation
3	Fog in segment and poor quality height estimation
4-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.220 - Horizontal dimension processed

Code figure	Meaning
0	Latitude
1	Longitude
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.221 - *Treatment of missing data*

Code figure	Meaning
0	Not included
1	Extrapolated
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.222 - *Categorical result*

Code figure	Meaning
0	No
1	Yes
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 4.223 - *Fire detection indicator*

Code figure	Meaning
0	No fire detected
1	Possible fire detected
2	Probable fire detected
3	Missing

Code table 4.224 - *Categorical outlook*

Code figure	Meaning
0	No risk area
1	Reserved
2	General thunderstorm risk area
3	Reserved
4	Slight risk area
5	Reserved
6	Moderate risk area
7	Reserved
8	High risk area
9-10	Reserved
11	Dry thunderstorm (dry lightning) risk area
12-13	Reserved
14	Critical risk area
15-17	Reserved
18	Extremely critical risk area
19-254	Reserved
255	Missing

Code table 4.230 - *Atmospheric chemical constituent type*

(See Common Code table C-14)

Code table 4.233 - *Aerosol type*

(See Common Code table C-14)

CODE TABLES USED IN SECTION 5**Code table 5.0** - *Data representation template number*

Code figure	Meaning
0	Grid point data - simple packing
1	Matrix value at grid point - simple packing
2	Grid point data - complex packing
3	Grid point data - complex packing and spatial differencing
4	Grid point data - IEEE floating point data
5-39	Reserved
40	Grid point data - JPEG 2000 code stream format
41	Grid point data - Portable Network Graphics (PNG)
42-49	Reserved
50	Spectral data - simple packing
51	Spherical harmonics data - complex packing
52-60	Reserved
61	Grid point data - simple packing with logarithm pre-processing
62-199	Reserved
200	Run length packing with level values
201-49151	Reserved
49152-65534	Reserved for local use
65535	Missing

Code table 5.1 - *Type of original field values*

Code figure	Meaning
0	Floating point
1	Integer
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 5.2 - *Matrix coordinate value function definition*

Code figure	Meaning
0	Explicit coordinate values set
1	Linear coordinates $f(1) = C1$ $f(n) = f(n-1) + C2$
2-10	Reserved
11	Geometric coordinates $f(1) = C1$ $f(n) = C2 \times f(n-1)$
12-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 5.3 - Matrix coordinate parameter

Code figure	Meaning
1	Direction degrees true
2	Frequency (s^{-1})
3	Radial number ($2\pi/\lambda$) (m^{-1})
4-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 5.4 - Group splitting method

Code figure	Meaning
0	Row by row splitting
1	General group splitting
2-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 5.5 - Missing value management for complex packing

Code figure	Meaning
0	No explicit missing values included within data values
1	Primary missing values included within data values
2	Primary and secondary missing values included within data values
3-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 5.6 - Order of spatial differencing

Code figure	Meaning
0	Reserved
1	First-order spatial differencing
2	Second-order spatial differencing
3-191	Reserved
192-254	Reserved for local use
255	Missing

Code table 5.7 - Precision of floating-point numbers

Code figure	Meaning
0	Reserved
1	IEEE 32-bit (l=4 in section 7)
2	IEEE 64-bit (l=8 in section 7)
3	IEEE 128-bit (l=16 in section 7)
4-254	Reserved
255	Missing

Code table 5.40 - *Type of compression*

Code figure	Meaning
0	Lossless
1	Lossy
2-254	Reserved
255	Missing

CODE TABLES USED IN SECTION 6**Code table 6.0** - *Bit map indicator*

Code figure	Meaning
0	A bit map applies to this product and is specified in this Section
1-253	A bit map predetermined by the originating/generating centre applies to this product and is not specified in this Section
254	A bit map defined previously in the same "GRIB" message applies to this product
255	A bit map does not apply to this product
