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

CODE TABLES USED IN SECTION 1

Code table 1.0 - *GRIB master tables version number*

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

Code table 1.1 - *GRIB local tables version number*

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

Code table 1.2 - *Significance of reference time*

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

Code table 1.3 - *Production status of data*

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

Code table 1.4 - *Type of data*

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

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

Code table 3.1 - *Grid definition template number*

Code figure	Meaning	Comments	Status
0	Latitude/longitude	Also called equidistant cylindrical, or Plate Carrée	Operational
1	Rotated latitude/longitude		Operational
2	Stretched latitude/longitude		Operational
3	Stretched and rotated latitude/longitude		Operational
4-9	Reserved		Operational
10	Mercator		Operational
11-19	Reserved		Operational
20	Polar stereographic projection	Can be south or north	Operational
21-29	Reserved		Operational
30	Lambert conformal	Can be secant or tangent, conical or bipolar	Operational
31	Albers equal area		Operational
32-39	Reserved		Operational
40	Gaussian latitude/longitude		Operational
41	Rotated Gaussian latitude/longitude		Operational
42	Stretched Gaussian latitude/longitude		Operational
43	Stretched and rotated Gaussian latitude/longitude		Operational
44-49	Reserved		Operational
50	Spherical harmonic coefficients		Operational
51	Rotated spherical harmonic coefficients		Operational
52	Stretched spherical harmonic coefficients		Operational
53	Stretched and rotated spherical harmonic coefficients		Operational
54-89	Reserved		Operational
90	Space view perspective or orthographic		Operational
91-99	Reserved		Operational
100	Triangular grid based on an icosahedron		Operational
101	*General unstructured grid*		*Validation*
102-109	*Reserved*		*Validation*
110	Equatorial azimuthal equidistant projection		Operational
111-119	Reserved		Operational
120	Azimuth-range projection		Operational
121-129	*Reserved*		*Validation*
130	*Irregular latitude/longitude grid*		*Validation*
131-999	Reserved		Validation
1000	Cross-section grid with points equally spaced on the horizontal		Operational
1001-1099	Reserved		Operational

(continued)

(Code table 3.1 - continued)

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

Code table 3.2 - *Shape of the Earth*

Code figure	Meaning	Status
0	Earth assumed spherical with radius = 6 367 470.0 m	Operational
1	Earth assumed spherical with radius specified (in m) by data producer	Operational
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)	Operational
3	Earth assumed oblate spheroid with major and minor axes specified (in km) by data producer	Operational
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)	Operational
5	Earth assumed represented by WGS84 (as used by ICAO since 1998)	Operational
6	Earth assumed spherical with radius of 6 371 229.0 m	Operational
7	Earth assumed oblate spheroid with major or minor axes specified (in m) by data producer	Operational
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	Operational
9-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

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	Status
1-2		Reserved	Operational
3	0	i direction increments not given	Operational
	1	i direction increments given	Operational
4	0	j direction increments not given	Operational
	1	j direction increments given	Operational
5	0	Resolved u- and v- components of vector quantities relative to easterly and northerly directions	Operational
	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	Operational
6-8		Reserved - set to zero	Operational

Flag table 3.4 - *Scanning mode*

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

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	Status
1	0	North Pole is on the projection plane	Operational
	1	South Pole is on the projection plane	Operational
2	0	Only one projection centre is used	Operational
	1	Projection is bipolar and symmetric	Operational

Code table 3.6 - *Spectral data representation type*

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

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

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

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	Status
0	Reserved	Operational
1	The complex numbers F_n^m (see code figure 1 in Code table 3.6) are stored for m≥0 as pairs of real numbers Re(F_n^m), Im(F_n^m) ordered with n increasing from m to N(m), first for m=0 and then for m=1, 2, ... M (see Note)	Operational
2-254	Reserved	Operational
255	Missing	Operational

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

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

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

Flag table 3.10 - *Scanning mode for one diamond*

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

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

Code figure	Meaning	Status
0	There is no appended list	Operational
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	Operational
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	Operational
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)	Operational
4-254	Reserved	Operational
255	Missing	Operational

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

Notes:

(1) Negative values associated to this coordinate will indicate depth below ground surface. If values are all below surface, use of entry 106 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	Status
0	Rhumb	Operational
1	Great circle	Operational
2-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

Code table 3.21 - *Vertical dimension coordinate values definition*

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

CODE TABLES USED IN SECTION 4

Code table 4.0 - *Product definition template number*

Code figure	Meaning	Status
0	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time	Operational
1	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer at a point in time	Operational
2	Derived forecasts based on all ensemble members at a horizontal level or in a horizontal layer at a point in time	Operational
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	Operational
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	Operational
5	Probability forecasts at a horizontal level or in a horizontal layer at a point in time	Operational
6	Percentile forecasts at a horizontal level or in a horizontal layer at a point in time	Operational
7	Analysis or forecast error at a horizontal level or in a horizontal layer at a point in time	Operational
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	Operational
9	Probability forecasts at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval	Operational
10	Percentile forecasts at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval	Operational
11	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer, in a continuous or non-continuous interval	Operational
12	Derived forecasts based on all ensemble members at a horizontal level or in a horizontal layer, in a continuous or non-continuous interval	Operational
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	Operational
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	Operational
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	Operational
16-19	Reserved	Operational
20	Radar product	Operational
21-29	Reserved	Operational
30	Satellite product (deprecated)	Deprecated
31	Satellite product	Operational
32	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time for simulated (synthetic) satellite data	Operational
33-39	Reserved	Operational
40	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time for atmospheric chemical constituents	Operational
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	Operational
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	Operational
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	Operational
44	Analysis or forecast at a horizontal level or in a horizontal layer at a point in time for aerosol	Operational

(continued)

(Code table 4.0 - continued)

Code figure	Meaning	Status
45	Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer at a point in time for aerosol	Operational
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	Operational
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	Operational
48-49	Reserved	Operational
50	*Analysis or forecast of a multi component parameter or matrix element at a point in time*	*Validation*
51	Categorical forecasts at a horizontal level or in a horizontal layer at a point in time	Operational
52-90	Reserved	Operational
91	Categorical forecasts at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval	Operational
92-253	Reserved	Operational
254	CCITT IA5 character string	Operational
255-999	Reserved	Operational
1000	Cross-section of analysis and forecast at a point in time	Operational
1001	Cross-section of averaged or otherwise statistically processed analysis or forecast over a range of time	Operational
1002	Cross-section of analysis and forecast, averaged or otherwise statistically processed over latitude or longitude	Operational
1003-1099	Reserved	Operational
1100	Hovmöller-type grid with no averaging or other statistical processing	Operational
1101	Hovmöller-type grid with averaging or other statistical processing	Operational
1102-32767	Reserved	Operational
32768-65534	Reserved for local use	Operational
65535	Missing	Operational

Code table 4.1 - *Parameter category by product discipline*

Note: When a new parameter entry is to be added in 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	Status
0	Temperature	Operational
1	Moisture	Operational
2	Momentum	Operational
3	Mass	Operational
4	Short-wave radiation	Operational
5	Long-wave radiation	Operational
6	Cloud	Operational
7	Thermodynamic stability indices	Operational
8	Kinematic stability indices	Operational
9	Temperature probabilities	Deprecated
10	Moisture probabilities	Deprecated
11	Momentum probabilities	Deprecated
12	Mass probabilities	Deprecated

(continued)

(Code table 4.1 - continued)

Category	Description	Status
13	Aerosols	Operational
14	Trace gases (e.g. ozone, CO_2)	Operational
15	Radar	Operational
16	Forecast radar imagery	Operational
17	Electrodynamics	Operational
18	Nuclear/radiology	Operational
19	Physical atmospheric properties	Operational
20	Atmospheric chemical constituents	Operational
21-189	Reserved	Operational
190	CCITT IA5 string	Operational
191	Miscellaneous	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

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

Product discipline 1 - Hydrological products

Category	Description	Status
0	Hydrology basic products	Operational
1	Hydrology probabilities	Operational
2-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

Product discipline 2 - Land surface products

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

Product discipline 3 - Space products

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

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.

(continued)

(Code table 4.1 - continued)

(2) Data are in specified physical units.

Product discipline 10 - Oceanographic products

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

Code table 4.2 - *Parameter number by product discipline and parameter category*

Note: By convention, the flux sign is positive if downwards.

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

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

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

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

Number	Parameter	Units	Status
0	Specific humidity	kg kg^{-1}	Operational
1	Relative humidity	%	Operational
2	Humidity mixing ratio	kg kg^{-1}	Operational
3	Precipitable water	kg m^{-2}	Operational
4	Vapour pressure	Pa	Operational
5	Saturation deficit	Pa	Operational
6	Evaporation	kg m^{-2}	Operational
7	*Precipitation rate * *	*kg m^{-2} s^{-1}*	*Deprecated*
8	*Total precipitation * *	*kg m^{-2}*	*Deprecated*
9	*Large-scale precipitation (non-convective) * *	*kg m^{-2}*	*Deprecated*
10	*Convective precipitation * *	*kg m^{-2}*	*Deprecated*
11	Snow depth	m	Operational
12	*Snowfall rate water equivalent * *	*kg m^{-2} s^{-1}*	*Deprecated*
13	*Water equivalent of accumulated snow depth * *	*kg m^{-2}*	*Deprecated*

(continued)

(Code table 4.2 - continued)

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

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
56	Large scale snowfall rate water equivalent	kg m^{-2} s^{-1}	Operational
57	Total snowfall rate	m s^{-1}	Operational
58	Convective snowfall rate	m s^{-1}	Operational
59	Large scale snowfall rate	m s^{-1}	Operational
60	Snow depth water equivalent	kg m^{-2}	Operational
61	Snow density	kg m^{-3}	Operational
62	Snow evaporation	kg m^{-2}	Operational
63	Reserved		Operational
64	Total column integrated water vapour	kg m^{-2}	Operational
65	Rain precipitation rate	kg m^{-2} s^{-1}	Operational
66	Snow precipitation rate	kg m^{-2} s^{-1}	Operational
67	Freezing rain precipitation rate	kg m^{-2} s^{-1}	Operational
68	Ice pellets precipitation rate	kg m^{-2} s^{-1}	Operational
69	Total column integrated cloud water	kg m^{-2}	Operational
70	Total column integrated cloud ice	kg m^{-2}	Operational
71	*Hail mixing ratio*	*kg kg^{-1}*	*Validation*
72	Total column integrated hail	kg m^{-2}	Operational
73	*Hail precipitation rate*	*kg m^{-2} s^{-1}*	*Validation*
74	Total column integrated graupel	kg m^{-2}	Operational
75	*Graupel (snow pellets) precipitation rate*	*kg m^{-2} s^{-1}*	*Validation*
76	*Convective rain rate*	*kg m^{-2} s^{-1}*	*Validation*
77	*Large scale rain rate*	*kg m^{-2} s^{-1}*	*Validation*
78	Total column integrated water (all components including precipitation)	kg m^{-2}	Operational
79	*Evaporation rate*	*kg m^{-2} s^{-1}*	*Validation*
80	*Total Condensate*	*kg kg^{-1}*	*Validation*
81	*Total Column-Integrated Condensate*	*kg m^{-2}*	*Validation*
82	*Cloud Ice Mixing-Ratio*	*kg kg^{-1}*	*Validation*
83	Specific cloud liquid water content	kg kg^{-1}	Operational
84	Specific cloud ice water content	kg kg^{-1}	Operational
85	Specific rain water content	kg kg^{-1}	Operational
86	Specific snow water content	kg kg^{-1}	Operational
87-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

* 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.

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

Number	Parameter	Units	Status
0	Wind direction (from which blowing)	°	Operational
1	Wind speed	m s^{-1}	Operational
2	u-component of wind	m s^{-1}	Operational
3	v-component of wind	m s^{-1}	Operational
4	Stream function	m^2 s^{-1}	Operational

(continued)

(Code table 4.2 - continued)

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

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

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

Number	Parameter	Units	Status
0	Pressure	Pa	Operational
1	Pressure reduced to MSL	Pa	Operational
2	Pressure tendency	$Pa\ s^{-1}$	Operational
3	ICAO Standard Atmosphere Reference Height	m	Operational
4	Geopotential	$m^2\ s^{-2}$	Operational
5	Geopotential height	gpm	Operational
6	Geometric height	m	Operational
7	Standard deviation of height	m	Operational
8	Pressure anomaly	Pa	Operational
9	Geopotential height anomaly	gpm	Operational

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
10	Density	kg m^{-3}	Operational
11	Altimeter setting	Pa	Operational
12	Thickness	m	Operational
13	Pressure altitude	m	Operational
14	Density altitude	m	Operational
15	5-wave geopotential height	gpm	Operational
16	Zonal flux of gravity wave stress	N m^{-2}	Operational
17	Meridional flux of gravity wave stress	N m^{-2}	Operational
18	Planetary boundary layer height	m	Operational
19	5-wave geopotential height anomaly	gpm	Operational
20	Standard deviation of sub-grid scale orography	m	Operational
21	Angle of sub-gridscale orography	rad	Operational
22	Slope of sub-gridscale orography	Numeric	Operational
23	Gravity wave dissipation	W m^{-2}	Operational
24	Anisotropy of sub-gridscale orography	Numeric	Operational
25	Natural logarithm of pressure in Pa	Numeric	Operational
26-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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

Number	Parameter	Units	Status
0	*Net short-wave radiation flux (surface) **	*W m^{-2}*	*Deprecated*
1	*Net short-wave radiation flux (top of atmosphere) **	*W m^{-2}*	*Deprecated*
2	*Short-wave radiation flux **	*W m^{-2}*	*Deprecated*
3	Global radiation flux	W m^{-2}	Operational
4	Brightness temperature	K	Operational
5	Radiance (with respect to wave number)	W m^{-1} sr^{-1}	Operational
6	Radiance (with respect to wave length)	W m^{-3} sr^{-1}	Operational
7	Downward short-wave radiation flux	W m^{-2}	Operational
8	Upward short-wave radiation flux	W m^{-2}	Operational
9	Net short wave radiation flux	W m^{-2}	Operational
10	Photosynthetically active radiation	W m^{-2}	Operational
11	Net short-wave radiation flux, clear sky	W m^{-2}	Operational
12	Downward UV radiation	W m^{-2}	Operational
13-49	Reserved		Operational
50	UV index (under clear sky) **	Numeric	Operational
51	UV index **	Numeric	Operational
52-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

* 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).

(continued)

(Code table 4.2 - continued)

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:

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

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

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

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

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

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

Number	Parameter	Units	Status
0	Cloud ice	kg m^{-2}	Operational
1	Total cloud cover	%	Operational
2	Convective cloud cover	%	Operational
3	*Low cloud cover **	*%*	*Deprecated*
4	*Medium cloud cover **	*%*	*Deprecated*
5	*High cloud cover **	*%*	*Deprecated*
6	Cloud water	kg m^{-2}	Operational
7	Cloud amount	%	Operational
8	Cloud type	(Code table 4.203)	Operational
9	Thunderstorm maximum tops	m	Operational
10	Thunderstorm coverage	(Code table 4.204)	Operational
11	Cloud base	m	Operational
12	Cloud top	m	Operational
13	Ceiling	m	Operational
14	Non-convective cloud cover	%	Operational
15	Cloud work function	J kg^{-1}	Operational
16	Convective cloud efficiency	Proportion	Operational
17	Total condensate	kg kg^{-1}	Validation (to deprecate)
18	Total column-integrated cloud water	kg m^{-2}	Validation (to deprecate)
19	Total column-integrated cloud ice	kg m^{-2}	Validation (to deprecate)

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
20	Total column-integrated condensate	kg m^{-2}	Validation (to deprecate)
21	Ice fraction of total condensate	Proportion	Operational
22	Cloud cover	%	Operational
23	Cloud ice mixing ratio	kg kg^{-1}	Validation (to deprecate)
24	Sunshine	Numeric	Operational
25	Horizontal extent of cumulonimbus (CB)	%	Operational
26	*Height of convective cloud base*	*m*	*Validation*
27	*Height of convective cloud top*	*m*	*Validation*
28	*Number concentration of cloud droplets*	*kg^{-1}*	*Validation*
29	*Number concentration of cloud ice*	*kg^{-1}*	*Validation*
30	*Number density of cloud droplets*	*m^{-3}*	*Validation*
31	*Number density of cloud ice*	*m^{-3}*	*Validation*
32	Fraction of cloud cover	Numeric	Operational
33	Sunshine duration	s	Operational
34-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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

(continued)

(Code table 4.2 - continued)

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

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

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

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

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

Number	Parameter	Units	Status
0	Base spectrum width	m s^{-1}	Operational
1	Base reflectivity	dB	Operational
2	Base radial velocity	m s^{-1}	Operational
3	Vertically-integrated liquid	kg m^{-1}	Operational
4	Layer-maximum base reflectivity	dB	Operational
5	Precipitation	kg m^{-2}	Operational
6	Radar spectra (1)	-	Operational
7	Radar spectra (2)	-	Operational
8	Radar spectra (3)	-	Operational
9	*Reflectivity of cloud droplets*	*dB*	*Validation*
10	*Reflectivity of cloud ice*	*dB*	*Validation*
11	*Reflectivity of snow*	*dB*	*Validation*
12	*Reflectivity of rain*	*dB*	*Validation*
13	*Reflectivity of graupel*	*dB*	*Validation*
14	*Reflectivity of hail*	*dB*	*Validation*
15-191	*Reserved*		*Validation*
192-254	Reserved for local use		Operational
255	Missing		Operational

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

Number	Parameter	Units	Status
0	Equivalent radar reflectivity factor for rain	mm^6 m^{-3}	Operational
1	Equivalent radar reflectivity factor for snow	mm^6 m^{-3}	Operational
2	Equivalent radar reflectivity factor for parameterizedconvection	mm^6 m^{-3}	Operational
3	Echo top	m	Operational
4	Reflectivity	dB	Operational
5	Composite reflectivity	dB	Operational

(continued)

(Code table 4.2 - continued)

Note:

(1) 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*).

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

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

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	Status
0	Visibility	m	Operational
1	Albedo	%	Operational
2	Thunderstorm probability	%	Operational
3	Mixed layer depth	m	Operational
4	Volcanic ash	(Code table 4.206)	Operational
5	Icing top	m	Operational
6	Icing base	m	Operational
7	Icing	(Code table 4.207)	Operational
8	Turbulence top	m	Operational
9	Turbulence base	m	Operational
10	Turbulence	(Code table 4.208)	Operational
11	Turbulent kinetic energy	J kg^{-1}	Operational

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
12	Planetary boundary-layer regime	(Code table 4.209)	Operational
13	Contrail intensity	(Code table 4.210)	Operational
14	Contrail engine type	(Code table 4.211)	Operational
15	Contrail top	m	Operational
16	Contrail base	m	Operational
17	*Maximum snow albedo (see Note 1)*	*%*	*Deprecated*
18	Snow free albedo	%	Operational
19	Snow albedo	%	Operational
20	Icing	%	Operational
21	In-cloud turbulence	%	Operational
22	Clear air turbulence (CAT)	%	Operational
23	Supercooled large droplet probability (see Note 2)	%	Operational
24	*Convective turbulent kinetic energy*	*J kg^{-1}*	*Validation*
25	*Weather Interpretation ww (WMO)*	*-*	*Validation*
26	Convective outlook	Code table 4.224	Operational
27-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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	Status
0	Mass density (concentration)	kg m^{-3}	Operational
1	Column-integrated mass density (see Note)	kg m^{-2}	Operational
2	Mass mixing ratio (mass fraction in air)	kg kg^{-1}	Operational
3	Atmosphere emission mass flux	kg m^{-2} s^{-1}	Operational
4	Atmosphere net production mass flux	kg m^{-2} s^{-1}	Operational
5	Atmosphere net production and emission mass flux	kg m^{-2} s^{-1}	Operational
6	Surface dry deposition mass flux	kg m^{-2} s^{-1}	Operational
7	Surface wet deposition mass flux	kg m^{-2} s^{-1}	Operational
8	Atmosphere re-emission mass flux	kg m^{-2} s^{-1}	Operational
9-49	Reserved		Operational
50	Amount in atmosphere	mol	Operational
51	Concentration in air	mol m^{-3}	Operational
52	Volume mixing ratio (fraction in air)	mol mol^{-1}	Operational
53	Chemical gross production rate of concentration	mol m^{-3} s^{-1}	Operational
54	Chemical gross destruction rate of concentration	mol m^{-3} s^{-1}	Operational
55	Surface flux	mol m^{-2} s^{-1}	Operational
56	Changes of amount in atmosphere (see Note)	mol s^{-1}	Operational
57	Total yearly average burden of the atmosphere	mol	Operational
58	Total yearly averaged atmospheric loss (see Note)	mol s^{-1}	Operational
59-99	Reserved		Operational
100	Surface area density (aerosol)	m^{-1}	Operational

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
101	Atmosphere optical thickness	m	Operational
102-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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	Status
0	Arbitrary text string	CCITT IA5	Operational
1-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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

Number	Parameter	Units	Status
0	Seconds prior to initial reference time (defined in Section 1)	s	Operational
1	*Geographical latitude*	*° N*	*Validation*
2	*Geographical longitude*	*° E*	*Validation*
3-191	*Reserved*		*Validation*
192-254	Reserved for local use		Operational
255	Missing value		Operational

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

Number	Parameter	Units	Status
0	Flash flood guidance (Encoded as an accumulation over a floating subinterval of time between the reference time and valid time)	kg m^{-2}	Operational
1	Flash flood runoff (Encoded as an accumulation over a floating subinterval of time)	kg m^{-2}	Operational
2	Remotely-sensed snow cover	(Code table 4.215)	Operational
3	Elevation of snow-covered terrain	(Code table 4.216)	Operational
4	Snow water equivalent per cent of normal	%	Operational
5	Baseflow-groundwater runoff	kg m^{-2}	Operational
6	Storm surface runoff	kg m^{-2}	Operational
7-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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).

(continued)

(Code table 4.2 - continued)

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

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

Number	Parameter	Units	Status
0	Land cover (0 = sea, 1 = land)	Proportion	Operational
1	Surface roughness	m	Operational
2	Soil temperature	K	Validation (to deprecate)
3	*Soil moisture content **	*kg m^{-2}*	*Deprecated*
4	Vegetation	%	Operational
5	Water runoff	kg m^{-2}	Operational
6	Evapotranspiration	kg^{-2} s^{-1}	Operational
7	Model terrain height	m	Operational
8	Land use	(Code table 4.212)	Operational
9	*Volumetric soil moisture content ***	*Proportion*	*Not to use*
10	*Ground heat flux **	*W m^{-2}*	*Deprecated*
11	Moisture availability	%	Operational
12	Exchange coefficient	kg m^{-2} s^{-1}	Operational
13	Plant canopy surface water	kg m^{-2}	Operational
14	Blackadar's mixing length scale	m	Operational
15	Canopy conductance	m s^{-1}	Operational
16	Minimal stomatal resistance	s m^{-1}	Operational
17	*Wilting point **	*Proportion*	*No to use*
18	Solar parameter in canopy conductance	Proportion	Operational
19	Temperature parameter in canopy	Proportion	Operational
20	Humidity parameter in canopy conductance	Proportion	Operational
21	Soil moisture parameter in canopy conductance	Proportion	Operational
22	Soil moisture	kg m^{-3}	Validation (to deprecate)

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
23	Column-integrated soil water	kg m^{-2}	Validation (to deprecate)
24	Heat flux	W m^{-2}	Operational
25	Volumetric soil moisture	m^3 m^{-3}	Operational
26	Wilting point	kg m^{-3}	Operational
27	Volumetric wilting point	m^3 m^{-3}	Operational
28	*Leaf area index*	*Numeric*	*Validation*
29	*Evergreen forest*	*Numeric*	*Validation*
30	*Deciduous forest*	*Numeric*	*Validation*
31	*Normalized differential vegetation index (NDVI)*	*Numeric*	*Validation*
32	*Root depth of vegetation*	*m*	*Validation*
33-191	*Reserved*		*Validation*
192-254	Reserved for local use		Operational
255	Missing		Operational

* 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	Status
0	Soil type	(Code table 4.213)	Operational
1	*Upper layer soil temperature **	*K*	*Deprecated*
2	*Upper layer soil moisture **	*kg m^{-3}*	*Deprecated*
3	*Lower layer soil moisture **	*kg m^{-3}*	*Deprecated*
4	*Bottom layer soil temperature **	*K*	*Deprecated*
5	*Liquid volumetric soil moisture (non-frozen) ***	*Proportion*	*Not to use*
6	Number of soil layers in root zone	Numeric	Operational
7	*Transpiration stress-onset (soil moisture) ***	*Proportion*	*Not to use*
8	*Direct evaporation cease (soil moisture) ***	*Proportion*	*Not to use*
9	*Soil porosity ***	*Proportion*	*Not to use*
10	Liquid volumetric soil moisture (non-frozen)	m^3 m^{-3}	Operational
11	Volumetric transpiration stress-onset (soil moisture)	m^3 m^{-3}	Operational
12	Transpiration stress-onset (soil moisture)	kg m^{-3}	Operational
13	Volumetric direct evaporation cease (soil moisture)	m^3 m^{-3}	Operational
14	Direct evaporation cease (soil moisture)	kg m^{-3}	Operational
15	Soil porosity	m^3 m^{-3}	Operational
16	Volumetric saturation of soil moisture	m^3 m^{-3}	Operational
17	Saturation of soil moisture	kg m^{-3}	Operational
18	*Soil Temperature*	*K*	*Validation*
19	*Soil moisture*	*kg m^{-3}*	*Validation*
20	*Column-integrated soil moisture*	*kg m^{-2}*	*Validation*
21	*Soil ice*	*kg m^{-3}*	*Validation*
22	*Column-integrated soil ice*	*kg m^{-2}*	*Validation*
23-191	*Reserved*		*Validation*
192-254	Reserved for local use		Operational
255	Missing		Operational

(continued)

(Code table 4.2 - continued)

* 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*	*Status*
0	Fire outlook	Code table 4.224	Operational
1	Fire outlook due to dry thunderstorm	Code table 4.224	Operational

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

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

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

Number	Parameter	Units	Status
0	Estimated precipitation	kg m^{-2}	Operational
1	Instantaneous rain rate	kg m^{-2} s^{-1}	Operational
2	Cloud top height	m	Operational
3	Cloud top height quality indicator	Code table 4.219	Operational
4	Estimated u component of wind	m s^{-1}	Operational
5	Estimated v component of wind	m s^{-1}	Operational
6	Number of pixel used	Numeric	Operational
7	Solar zenith angle	°	Operational
8	Relative azimuth angle	°	Operational
9	Reflectance in 0.6 micron channel	%	Operational
10	Reflectance in 0.8 micron channel	%	Operational
11	Reflectance in 1.6 micron channel	%	Operational
12	Reflectance in 3.9 micron channel	%	Operational
13	Atmospheric divergence	s^{-1}	Operational
14	Cloudy brightness temperature	K	Operational
15	Clear-sky brightness temperature	K	Operational
16	Cloudy radiance (with respect to wave number)	W m^{-1} sr^{-1}	Operational
17	Clear-sky radiance (with respect to wave number)	W m^{-1} sr^{-1}	Operational
18	Reserved		Operational

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
19	Wind speed	m s^{-1}	Operational
20	Aerosol optical thickness at 0.635 um		Operational
21	Aerosol optical thickness at 0.810 um		Operational
22	Aerosol optical thickness at 1.640 um		Operational
23	Angstrom coefficient		Operational
24-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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

Number	Parameter	Units	Status
0	Wave spectra (1)	-	Operational
1	Wave spectra (2)	-	Operational
2	Wave spectra (3)	-	Operational
3	Significant height of combined wind waves and swell	m	Operational
4	Direction of wind waves	°	Operational
5	Significant height of wind waves	m	Operational
6	Mean period of wind waves	s	Operational
7	Direction of swell waves	°	Operational
8	Significant height of swell waves	m	Operational
9	Mean period of swell waves	s	Operational
10	Primary wave direction	°	Operational
11	Primary wave mean period	s	Operational
12	Secondary wave direction	°	Operational
13	Secondary wave mean period	s	Operational
14	Direction of combined wind waves and swell	°	Operational
15	Mean period of combined wind waves and swell	s	Operational
16	*Coefficient of drag with waves*	-	*Validation*
17	*Friction velocity*	*m s^{-1}*	*Validation*
18	*Wave stress*	*N m^{-2}*	*Validation*
19	*Normalised wave stress*	-	*Validation*
20	*Mean square slope of waves*	-	*Validation*
21	*u-component surface Stokes drift*	*m s^{-1}*	*Validation*
22	*v-component surface Stokes drift*	*m s^{-1}*	*Validation*
23	*Period of maximum individual wave height*	*s*	*Validation*
24	*Maximum individual wave height*	*m*	*Validation*
25	*Inverse mean wave frequency*	*s*	*Validation*
26	*Inverse mean frequency of the wind waves*	*s*	*Validation*
27	*Inverse mean frequency of the total swell*	*s*	*Validation*
28	*Mean zero-crossing wave period*	*s*	*Validation*
29	*Mean zero-crossing period of the wind waves*	*s*	*Validation*
30	*Mean zero-crossing period of the total swell*	*s*	*Validation*
31	*Wave directional width*	-	*Validation*
32	*Directional width of the wind waves*	-	*Validation*
33	*Directional width of the total swell*	-	*Validation*

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
34	*Peak wave period*	*s*	*Validation*
35	*Peak period of the wind waves*	*s*	*Validation*
36	*Peak period of the total swell*	*s*	*Validation*
37	*Altimeter wave height*	*m*	*Validation*
38	*Altimeter corrected wave height*	*m*	*Validation*
39	*Altimeter range relative correction*	*-*	*Validation*
40	*10 metre neutral wind speed over waves*	*$m\ s^{-1}$*	*Validation*
41	*10 metre wind direction over waves*	*°*	*Validation*
42	*Wave energy spectrum*	*$m^2\ s\ rad^{-1}$*	*Validation*
43	*Kurtosis of the sea surface elevation due to waves*	*-*	*Validation*
44	*Benjamin-Feir index*	*-*	*Validation*
45	*Spectral peakedness factor*	*s^{-1}*	*Validation*
46	*2-dim spectral energy density E (f, θ)*	*$m^2\ s$*	*Validation*
47	*Frequency spectral energy density $E(f) = \int E(f,\theta)\, d\theta$*	*$m^2\ s$*	*Validation*
48	*Directional spectral energy density $E(\theta) = \int E(f,\theta)\, df / m_0$*	*-*	*Validation*
49-191	*Reserved*		*Validation*
192-254	Reserved for local use		Operational
255	Missing		Operational

* Further information concerning the wave parameters can be found in WMO Publication No 702, “Guide to Wave Analysis and Forecasting (http://www.wmo.int/pages/prog/amp/mmop/documents/WMO%20No%20702/WMO702.pdf)

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

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

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

Number	Parameter	Units	Status
0	Ice cover	Proportion	Operational
1	Ice thickness	m	Operational
2	Direction of ice drift	°	Operational
3	Speed of ice drift	$m\ s^{-1}$	Operational
4	u-component of ice drift	$m\ s^{-1}$	Operational
5	v-component of ice drift	$m\ s^{-1}$	Operational
6	Ice growth rate	$m\ s^{-1}$	Operational
7	Ice divergence	s^{-1}	Operational
8	Ice temperature	K	Operational
9	Ice internal pressure	Pa m	Operational

(continued)

(Code table 4.2 - continued)

Number	Parameter	Units	Status
10-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

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

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

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

Number	Parameter	Units	Status
0	Main thermocline depth	m	Operational
1	Main thermocline anomaly	m	Operational
2	Transient thermocline depth	m	Operational
3	Salinity	kg kg^{-1}	Operational
4	Ocean vertical heat diffusivity	m2 s^{-1}	Operational
5	Ocean vertical salt diffusivity	m2 s^{-1}	Operational
6	Ocean vertical momentum diffusivity	m2 s^{-1}	Operational
7	*Bathymetry*	*m*	*Validation*
8-191	*Reserved*		*Validation*
192-254	Reserved for local use		Operational
255	Missing		Operational

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

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

Code table 4.3 - *Type of generating process*

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

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

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

Code table 4.5 - *Fixed surface types and units*

Code figure	Meaning	Unit	Status
0	Reserved		Operational
1	Ground or water surface	-	Operational
2	Cloud base level	-	Operational
3	Level of cloud tops	-	Operational
4	Level of 0°C isotherm	-	Operational
5	Level of adiabatic condensation lifted from the surface	-	Operational
6	Maximum wind level	-	Operational
7	Tropopause	-	Operational
8	Nominal top of the atmosphere	-	Operational
9	Sea bottom	-	Operational
10	Entire atmosphere	-	Operational
11	Cumulonimbus (CB) base	m	Operational
12	Cumulonimbus (CB) top	m	Operational
13-19	Reserved		Operational
20	Isothermal level	K	Operational
21-99	Reserved		Operational
100	Isobaric surface	Pa	Operational
101	Mean sea level		Operational
102	Specific altitude above mean sea level	m	Operational
103	Specified height level above ground	m	Operational
104	Sigma level	“sigma” value	Operational
105	Hybrid level	-	Operational
106	Depth below land surface	m	Operational
107	Isentropic (theta) level	K	Operational
108	Level at specified pressure difference from ground to level	Pa	Operational
109	Potential vorticity surface	K m^2 kg^{-1} s^{-1}	Operational
110	Reserved		Operational
111	Eta level *	-	Operational
112	*Reserved*		*Validation*
113	*Logarithmic hybrid coordinate*	-	*Validation*
114-116	*Reserved*		*Validation*
117	Mixed layer depth	m	Operational
118	Hybrid height level	-	Operational
119	Hybrid pressure level	-	Operational
120	*Pressure thickness*	*Pa*	*Validation*
121-149	*Reserved*		*Validation*
150	*Generalized vertical height coordinate (4)*		*Validation*
151-159	*Reserved*		*Validation*
160	Depth below sea level	m	Operational
161-191	Reserved		Operational
192-254	Reserved for local use		Operational
255	Missing		Operational

* 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.

(continued)

(Code table 4.5 - continued)

Notes:

(1) Hybrid height level (Code figure 118) can be defined as:
z(k) = A(k) + B(k) x orog
(k=1,...,NLevels; orog=orography; z(k)=height in metres at level k)

(2) Hybrid pressure level, for which Code figure 119 shall be used instead of 105, can be defined as:
p(k) = A(k) + B(k) x sp
(k=1,...,NLevels; sp=surface pressure; p(k)=pressure at level k)

(4) Hybrid log-pressure level (Code figure 113) can be defined as:
log (pi) = ai * log (Psfc) + bi
(i=1, …, Nlevels); Psfc = surface pressure ; log (pi) = natural logarithm of pressure at level i)

(5) The definition of a generalized vertical height coordinate implies the absence of coordinate values in Section 4 but the presence of an external 3D-GRIB message that specifies the height of every model grid point in meters (see Notes for Section 4), i.e. this GRIB message will contain the field with discipline=0, category=3, parameter=6 (Geometric height).

(6) 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	Status
0	Unperturbed high-resolution control forecast	Operational
1	Unperturbed low-resolution control forecast	Operational
2	Negatively perturbed forecast	Operational
3	Positively perturbed forecast	Operational
4	Multi-model forecast	Operational
5-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

Code table 4.7 - *Derived forecast*

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

Note:

(1) * Large anomaly index is defined as {(number of members whose anomaly is higher than 0.5 x SD) - (number of members whose anomaly is lower than -0.5 x SD)} / (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 max. and min. described by PDT 4.8.

Code table 4.8 - *Clustering method*

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

Code table 4.9 - *Probability type*

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

Code table 4.10 - *Type of statistical processing*

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

Code table 4.11 - *Type of time intervals*

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

* 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	Status
0	Maintenance mode	Operational
1	Clear air	Operational
2	Precipitation	Operational
3-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

Code table 4.13 - *Quality control indicator*

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

Code table 4.14 - *Clutter filter indicator*

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

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

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

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

Code table 4.201 - *Precipitation type*

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

Code table 4.202 - *Precipitable water category*

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

Code table 4.203 - *Cloud type*

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

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

Code table 4.205 - *Presence of aerosol*

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

Code table 4.206 - *Volcanic ash*

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

Code table 4.207 - *Icing*

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

Code table 4.208 - *Turbulence*

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

Code table 4.209 - *Planetary boundary-layer regime*

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

Code table 4.210 - *Contrail intensity*

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

Code table 4.211 - *Contrail engine type*

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

Code table 4.212 - *Land use*

Code figure	Meaning	Status
0	Reserved	Operational
1	Urban land	Operational
2	Agriculture	Operational
3	Range land	Operational

(continued)

(Code table 4.212 - continued)

Code figure	Meaning	Status
4	Deciduous forest	Operational
5	Coniferous forest	Operational
6	Forest/wetland	Operational
7	Water	Operational
8	Wetlands	Operational
9	Desert	Operational
10	Tundra	Operational
11	Ice	Operational
12	Tropical forest	Operational
13	Savannah	Operational
14-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

Code table 4.213 - *Soil type*

Code figure	Meaning	Status
0	Reserved	Operational
1	Sand	Operational
2	Loamy sand	Operational
3	Sandy loam	Operational
4	Silt loam	Operational
5	Organic (redefined)	Operational
6	Sandy clay loam	Operational
7	Silt clay loam	Operational
8	Clay loam	Operational
9	Sandy clay	Operational
10	Silty clay	Operational
11	Clay	Operational
12	*Loam*	*Validation*
13	*Peat*	*Validation*
14	*Rock*	*Validation*
15	*Ice*	*Validation*
16	*Water*	*Validation*
17-191	*Reserved*	*Validation*
192-254	Reserved for local use	Operational
255	Missing	Operational

Code table 4.215 - *Remotely-sensed snow coverage*

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

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

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

Code table 4.217 - *Cloud mask type*

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

Code table 4.218 - *Pixel scene type*

Code figure	Meaning	Status
0	No scene identified	Operational
1	Green needle-leafed forest	Operational
2	Green broad-leafed forest	Operational
3	Deciduous needle-leafed forest	Operational
4	Deciduous broad-leafed forest	Operational
5	Deciduous mixed forest	Operational
6	Closed shrub-land	Operational
7	Open shrub-land	Operational
8	Woody savannah	Operational
9	Savannah	Operational
10	Grassland	Operational
11	Permanent wetland	Operational
12	Cropland	Operational
13	Urban	Operational
14	Vegetation / crops	Operational
15	Permanent snow / ice	Operational
16	Barren desert	Operational
17	Water bodies	Operational
18	Tundra	Operational
19-96	Reserved	Operational
97	Snow / ice on land	Operational
98	Snow / ice on water	Operational
99	Sun-glint	Operational
100	General cloud	Operational
101	Low cloud / fog / Stratus	Operational
102	Low cloud / Stratocumulus	Operational
103	Low cloud / unknown type	Operational

(continued)

(Code table 4.218 - continued)

Code figure	Meaning	Status
104	Medium cloud / Nimbostratus	Operational
105	Medium cloud / Altostratus	Operational
106	Medium cloud / unknown type	Operational
107	High cloud / Cumulus	Operational
108	High cloud / Cirrus	Operational
109	High cloud / unknown	Operational
110	Unknown cloud type	Operational
111-191	Reserved	Operational
192-254	Reserved for local use	Operational
255	Missing	Operational

Code table 4.219 - *Cloud top height quality indicator*

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

Code table 4.220 - *Horizontal dimension processed*

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

Code table 4.221 - *Treatment of missing data*

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

Code table 4.222 - *Categorical result*

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

Code table 4.223 - *Fire detection indicator*

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

Code table 4.224 - *Categorical outlook*

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

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	Status
0	Grid point data - simple packing	Operational
1	Matrix value at grid point - simple packing	Operational
2	Grid point data - complex packing	Operational
3	Grid point data - complex packing and spatial differencing	Operational
4	Grid point data - IEEE floating point data	Operational
5-39	Reserved	Operational
40	Grid point data - JPEG 2000 code stream format	Operational
41	Grid point data - Portable Network Graphics (PNG)	Operational
42	*Grid point and spectral data - CCSDS szip*	*Validation*
43-49	*Reserved*	*Validation*
50	Spectral data - simple packing	Operational
51	Spherical harmonics data - complex packing	Operational
52-60	Reserved	Operational
61	Grid point data - simple packing with logarithm pre-processing	Operational
62-199	Reserved	Operational
200	Run length packing with level values	Operational
201-49151	Reserved	Operational
49152-65534	Reserved for local use	Operational
65535	Missing	Operational

Code table 5.1 - *Type of original field values*

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

Code table 5.2 - *Matrix coordinate value function definition*

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

Code table 5.3 - *Matrix coordinate parameter*

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

Code table 5.4 - *Group splitting method*

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

Code table 5.5 - *Missing value management for complex packing*

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

Code table 5.6 - *Order of spatial differencing*

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

Code table 5.7 - *Precision of floating-point numbers*

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

Code table 5.40 - *Type of compression*

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

CODE TABLES USED IN SECTION 6

Code table 6.0 - *Bit map indicator*

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