

## GRIB1 Fields Produced by Unipost

GRIB1 fields produced by *unipost* (column 1), abbreviated names used in the *wrf\_cntrl.parm* file (column 2), corresponding grib1 identification number for the field (column 3), corresponding grib identification number for the vertical coordinate (column 4), and corresponding array location UPP uses to store the variable in parallel arrays (column 5).

Field Description	Name in Grib1 Control File	Grib1 ID	Vertical Level	UPP ID
Radar reflectivity on model surface*	RADAR REFL MDL SFCS	211	109	250
Pressure on model surface	PRESS ON MDL SFCS	1	109	1
Height on model surface	HEIGHT ON MDL SFCS	7	109	77
Temperature on model surface	TEMP ON MDL SFCS	11	109	2
Potential temperature on model surface	POT TEMP ON MDL SFCS	13	109	3
Dew point temperature on model surface	DWPT TEMP ON MDL SFC	17	109	4
Specific humidity on model surface	SPEC HUM ON MDL SFCS	51	109	5
Relative humidity on model surface	REL HUM ON MDL SFCS	52	109	6
Moisture convergence on model surface	MST CNVG ON MDL SFCS	135	109	83
U component wind on model surface	U WIND ON MDL SFCS	33	109	7
V component wind on model surface	V WIND ON MDL SFCS	34	109	8
Cloud water on model surface	CLD WTR ON MDL SFCS	153	109	124
Cloud ice on model surface	CLD ICE ON MDL SFCS	58	109	125
Rain on model surface	RAIN ON MDL SFCS	170	109	181
Snow on model surface	SNOW ON MDL SFCS	171	109	182
Cloud fraction on model surface	CLD FRAC ON MDL SFCS	71	109	145
Omega on model surface	OMEGA ON MDL SFCS	39	109	9
Absolute vorticity on model surface	ABS VORT ON MDL SFCS	41	109	10
Geostrophic streamfunction on model surface	STRMFUNC ON MDL SFCS	35	109	84
Turbulent kinetic energy on model surface	TRBLNT KE ON MDL SFC	158	109	11
Richardson number on model surface	RCHDSN NO ON MDL SFC	254	109	111
Master length scale on model surface	MASTER LENGTH SCALE	226	109	146
Asymptotic length scale on model surface	ASYMPT MSTR LEN SCL	227	109	147
Radar reflectivity on pressure surface*	RADAR REFL ON P SFCS	211	100	251
Height on pressure surface	HEIGHT OF PRESS SFCS	7	100	12
Temperature on pressure surface	TEMP ON PRESS SFCS	11	100	13
Potential temperature on pressure surface	POT TEMP ON P SFCS	13	100	14
Dew point temperature on pressure surface	DWPT TEMP ON P SFCS	17	100	15
Specific humidity on pressure surface	SPEC HUM ON P SFCS	51	100	16
Relative humidity on pressure surface	REL HUMID ON P SFCS	52	100	17
Moisture convergence on pressure surface	MST CNVG ON P SFCS	135	100	85
U component wind on pressure surface	U WIND ON PRESS SFCS	33	100	18
V component wind on pressure surface	V WIND ON PRESS SFCS	34	100	19
Omega on pressure surface	OMEGA ON PRESS SFCS	39	100	20
Absolute vorticity on pressure surface	ABS VORT ON P SFCS	41	100	21
Geostrophic streamfunction on pressure surface	STRMFUNC ON P SFCS	35	100	86
Turbulent kinetic energy on pressure surface	TRBLNT KE ON P SFCS	158	100	22
Cloud water on pressure surface	CLOUD WATR ON P SFCS	153	100	153
Cloud ice on pressure surface	CLOUD ICE ON P SFCS	58	100	166
Rain on pressure surface	RAIN ON P SFCS	170	100	183
Snow water on pressure surface	SNOW ON P SFCS	171	100	184
Total condensate on pressure surface	CONDENSATE ON P SFCS	135	100	198
Mesinger (Membrane) sea level pressure	MESINGER MEAN SLP	130	102	23
Shuell sea level pressure	SHUELL MEAN SLP	2	102	105
2 M pressure	SHELTER PRESSURE	1	105	138
2 M temperature	SHELTER TEMPERATURE	11	105	106
2 M specific humidity	SHELTER SPEC HUMID	51	105	112

2 M mixing ratio	SHELTER MIX RATIO	53	105	414
2 M dew point temperature	SHELTER DEWPOINT	17	105	113
2 M RH	SHELTER REL HUMID	52	105	114
10 M u component wind	U WIND AT ANEMOM HT	33	105	64
10 M v component wind	V WIND AT ANEMOM HT	34	105	65
10 M potential temperature	POT TEMP AT 10 M	13	105	158
10 M specific humidity	SPEC HUM AT 10 M	51	105	159
Surface pressure	SURFACE PRESSURE	1	1	24
Terrain height	SURFACE HEIGHT	7	1	25
Skin potential temperature	SURFACE POT TEMP	13	1	27
Skin specific humidity	SURFACE SPEC HUMID	51	1	28
Skin dew point temperature	SURFACE DEWPOINT	17	1	29
Skin Relative humidity	SURFACE REL HUMID	52	1	76
Skin temperature	SFC (SKIN) TEMPRATUR	11	1	26
Soil temperature at the bottom of soil layers	BOTTOM SOIL TEMP	85	111	115/571
Soil temperature in between each of soil layers	SOIL TEMPERATURE	85	112	116
Soil moisture in between each of soil layers	SOIL MOISTURE	144	112	117
Snow water equivalent	SNOW WATER EQUIVALNT	65	1	119
Snow cover in percentage	PERCENT SNOW COVER	238	1	120
Heat exchange coeff at surface	SFC EXCHANGE COEF	208	1	169
Vegetation cover	GREEN VEG COVER	87	1	170
Soil moisture availability	SOIL MOISTURE AVAIL	207	112	171
Ground heat flux - instantaneous	INST GROUND HEAT FLX	155	1	152
Lifted index—surface based	LIFTED INDEX-SURFCE	131	101	30
Lifted index—best	LIFTED INDEX-BEST	132	116	31
Lifted index—from boundary layer	LIFTED INDEX-BNDLYR	24	116	75
CAPE (4 types) ***	CNVCT AVBL POT ENRGY (Levels 1-4)	157	1	32
CIN (4 types) ***	CNVCT INHIBITION (Levels 1-4)	156	1	107
Column integrated precipitable water	PRECIPITABLE WATER	54	200	80
Column integrated cloud water	TOTAL COLUMN CLD WTR	136	200	200
Column integrated cloud ice	TOTAL COLUMN CLD ICE	137	200	201
Column integrated rain	TOTAL COLUMN RAIN	138	200	202
Column integrated snow	TOTAL COLUMN SNOW	139	200	203
Column integrated total condensate	TOTAL COL CONDENSATE	140	200	204
Column integrated cloud water	TOTAL COLUMN CLD WTR	136	200	575
Helicity	STORM REL HELICITY	190	106	162
U component storm motion	U COMP STORM MOTION	196	106	163
V component storm motion	V COMP STORM MOTION	197	106	164
Accumulated total precipitation	ACM TOTAL PRECIP	61	1	87
Accumulated convective precipitation	ACM CONVCTIVE PRECIP	63	1	33
Accumulated grid-scale precipitation	ACM GRD SCALE PRECIP	62	1	34
Accumulated snowfall	ACM SNOWFALL	65	1	35
Accumulated large scale snow	ACM GRD SCALE SW ICE	79	1	244
Accumulated total snow melt	ACM SNOW TOTAL MELT	99	1	121
Precipitation type (4 types) - instantaneous	INSTANT PRECIP TYPE	140	1	160
Precipitation rate - instantaneous	INSTANT PRECIP RATE	59	1	167
Composite radar reflectivity*	COMPOSITE RADAR REFL	212	200	252
Low level cloud fraction	LOW CLOUD FRACTION	73	214	37
Mid level cloud fraction	MID CLOUD FRACTION	74	224	38
High level cloud fraction	HIGH CLOUD FRACTION	75	234	39
Total cloud fraction	TOTAL CLD FRACTION	71	200	161
Time-averaged total cloud fraction	AVG TOTAL CLD FRAC	71	200	144
Time-averaged stratospheric cloud fraction	AVG STRAT CLD FRAC	213	200	139
Time-averaged convective cloud fraction	AVG CNVCT CLD FRAC	72	200	143
Cloud bottom pressure	CLOUD BOT PRESSURE	1	2	148

Cloud top pressure	CLOUD TOP PRESSURE	1	3	149
Cloud bottom height (above MSL)	CLOUD BOTTOM HEIGHT	7	2	178
Cloud top height (above MSL)	CLOUD TOP HEIGHT	7	3	179
Convective cloud bottom pressure	CONV CLOUD BOT PRESS	1	242	188
Convective cloud top pressure	CONV CLOUD TOP PRESS	1	243	189
Shallow convective cloud bottom pressure	SHAL CU CLD BOT PRES	1	248	190
Shallow convective cloud top pressure	SHAL CU CLD TOP PRES	1	249	191
Deep convective cloud bottom pressure	DEEP CU CLD BOT PRES	1	251	192
Deep convective cloud top pressure	DEEP CU CLD TOP PRES	1	252	193
Grid scale cloud bottom pressure	GRID CLOUD BOT PRESS	1	206	194
Grid scale cloud top pressure	GRID CLOUD TOP PRESS	1	207	195
Convective cloud fraction	CONV CLOUD FRACTION	72	200	196
Convective cloud efficiency	CU CLOUD EFFICIENCY	134	200	197
Above-ground height of LCL	LCL AGL HEIGHT	7	5	109
Pressure of LCL	LCL PRESSURE	1	5	110
Cloud top temperature	CLOUD TOP TEMPS	11	3	168
Temperature tendency from radiative fluxes	RADFLX CNVG TMP TNDY	216	109	140
Temperature tendency from shortwave radiative flux	SW RAD TEMP TNDY	250	109	40
Temperature tendency from longwave radiative flux	LW RAD TEMP TNDY	251	109	41
Outgoing surface shortwave radiation - instantaneous	INSTN OUT SFC SW RAD	211	1	141
Outgoing surface longwave radiation - instantaneous	INSTN OUT SFC LW RAD	212	1	142
Incoming surface shortwave radiation - time-averaged	AVE INCMG SFC SW RAD	204	1	126
Incoming surface longwave radiation - time-averaged	AVE INCMG SFC LW RAD	205	1	127
Outgoing surface shortwave radiation - time-averaged	AVE OUTGO SFC SW RAD	211	1	128
Outgoing surface longwave radiation - time-averaged	AVE OUTGO SFC LW RAD	212	1	129
Outgoing model top shortwave radiation - time-averaged	AVE OUTGO TOA SW RAD	211	8	130
Outgoing model top longwave radiation - time-averaged	AVE OUTGO TOA LW RAD	212	8	131
Incoming surface shortwave radiation - instantaneous	INSTN INC SFC SW RAD	204	1	156
Incoming surface longwave radiation - instantaneous	INSTN INC SFC LW RAD	205	1	157
Roughness length	ROUGHNESS LENGTH	83	1	44
Friction velocity	FRICION VELOCITY	253	1	45
Surface drag coefficient	SFC DRAG COEFFICIENT	252	1	132
Surface u wind stress	SFC U WIND STRESS	124	1	133
Surface v wind stress	SFC V WIND STRESS	125	1	134
Surface sensible heat flux - time-averaged	AVE SFC SENHEAT FX	122	1	43
Ground heat flux - time-averaged	AVE GROUND HEAT FX	155	1	135
Surface latent heat flux - time-averaged	AVE SFC LATHEAT FX	121	1	42
Surface momentum flux - time-averaged	AVE SFC MOMENTUM FX	172	1	46
Accumulated surface evaporation	ACC SFC EVAPORATION	57	1	47
Surface sensible heat flux - instantaneous	INST SFC SENHEAT FX	122	1	154
Surface latent heat flux - instantaneous	INST SFC LATHEAT FX	121	1	155
Latitude	LATITUDE	176	1	48
Longitude	LONGITUDE	177	1	49
Land sea mask (land=1 sea=0)	LAND-SEA MASK	81	1	50
Sea ice mask	SEA ICE MASK	91	1	51

Surface midday albedo	SFC MIDDAY ALBEDO	84	1	150
Sea surface temperature	SEA SFC TEMPERATURE	80	1	151
Press at tropopause	PRESS AT TROPOPAUSE	1	7	54
Temperature at tropopause	TEMP AT TROPOPAUSE	11	7	55
Potential temperature at tropopause	POTENTL TEMP AT TROP	13	7	108
U wind at tropopause	U WIND AT TROPOPAUSE	33	7	56
V wind at tropopause	V WIND AT TROPOPAUSE	34	7	57
Wind shear at tropopause	SHEAR AT TROPOPAUSE	136	7	58
Height at tropopause	HEIGHT AT TROPOPAUSE	7	7	177
Temperature at flight levels	TEMP AT FD HEIGHTS	11	103	59
U wind at flight levels	U WIND AT FD HEIGHTS	33	103	60
V wind at flight levels	V WIND AT FD HEIGHTS	34	103	61
Freezing level height (above mean sea level)	HEIGHT OF FRZ LVL	7	4	62
Freezing level RH	REL HUMID AT FRZ LVL	52	4	63
Highest freezing level height	HIGHEST FREEZE LVL	7	204	165
Pressure in boundary layer (30 mb mean)	PRESS IN BNDRY LYR	1	116	67
Temperature in boundary layer (30 mb mean)	TEMP IN BNDRY LYR	11	116	68
Potential temperature in boundary layers (30 mb mean)	POT TMP IN BNDRY LYR	13	116	69
Dew point temperature in boundary layer (30 mb mean)	DWPT IN BNDRY LYR	17	116	70
Specific humidity in boundary layer (30 mb mean)	SPC HUM IN BNDRY LYR	51	116	71
RH in boundary layer (30 mb mean)	REL HUM IN BNDRY LYR	52	116	72
Moisture convergence in boundary layer (30 mb mean)	MST CNV IN BNDRY LYR	135	116	88
Precipitable water in boundary layer (30 mb mean)	P WATER IN BNDRY LYR	54	116	89
U wind in boundary layer (30 mb mean)	U WIND IN BNDRY LYR	33	116	73
V wind in boundary layer (30 mb mean)	V WIND IN BNDRY LYR	34	116	74
Omega in boundary layer (30 mb mean)	OMEGA IN BNDRY LYR	39	116	90
Visibility	VISIBILITY	20	1	180
Vegetation type	VEGETATION TYPE	225	1	218
Soil type	SOIL TYPE	224	1	219
Canopy conductance	CANOPY CONDUCTANCE	181	1	220
PBL height	PBL HEIGHT	221	1	221
Slope type	SLOPE TYPE	222	1	223
Snow depth	SNOW DEPTH	66	1	224
Liquid soil moisture	LIQUID SOIL MOISTURE	160	112	225
Snow free albedo	SNOW FREE ALBEDO	170	1	226
Maximum snow albedo	MAXIMUM SNOW ALBEDO	159	1	227
Canopy water evaporation	CANOPY WATER EVAP	200	1	228
Direct soil evaporation	DIRECT SOIL EVAP	199	1	229
Plant transpiration	PLANT TRANSPIRATION	210	1	230
Snow sublimation	SNOW SUBLIMATION	198	1	231
Air dry soil moisture	AIR DRY SOIL MOIST	231	1	232
Soil moist porosity	SOIL MOIST POROSITY	240	1	233
Minimum stomatal resistance	MIN STOMATAL RESIST	203	1	234
Number of root layers	NO OF ROOT LAYERS	171	1	235
Soil moist wilting point	SOIL MOIST WILT PT	219	1	236
Soil moist reference	SOIL MOIST REFERENCE	230	1	237
Canopy conductance - solar component	CANOPY COND SOLAR	246	1	238
Canopy conductance - temperature component	CANOPY COND TEMP	247	1	239
Canopy conductance - humidity component	CANOPY COND HUMID	248	1	240
Canopy conductance - soil component	CANOPY COND SOILM	249	1	241

Potential evaporation	POTENTIAL EVAP	145	1	242
Heat diffusivity on sigma surface	DIFFUSION H RATE S S	182	107	243
Surface wind gust	SFC WIND GUST	180	1	245
Convective precipitation rate	CONV PRECIP RATE	214	1	249
Radar reflectivity at certain above ground heights*	RADAR REFL AGL	211	105	253
MAPS Sea Level Pressure	MAPS SLP	129	102	445
Total soil moisture	TOTAL SOIL MOISTURE	86	112	36
Plant canopy surface water	PLANT CANOPY SFC WTR	223	1	118
Accumulated storm surface runoff	ACM STORM SFC RNOFF	235	1	122
Accumulated baseflow runoff	ACM BSFL-GDWR RNOFF	234	1	123
Fraction of frozen precipitation	FROZEN FRAC CLD SCHM	194	1	172
GSD Cloud Base pressure	GSD CLD BOT PRESSURE	1	2	787
GSD Cloud Top pressure	GSD CLD TOP PRESSURE	1	3	406
Averaged temperature tendency from grid scale latent heat release	AVE GRDSCL RN TMPTDY	241	109	78
Averaged temperature tendency from convective latent heat release	AVE CNVCT RN TMPTDY	242	109	79
Average snow phase change heat flux	AVE SNO PHSCNG HT FX	229	1	136
Accumulated potential evaporation	ACC POT EVAPORATION	228	1	137
Highest freezing level relative humidity	HIGHEST FRZ LVL RH	52	204	350
Maximum wind pressure level	MAX WIND PRESS LEVEL	1	6	173
Maximum wind height	MAX WIND HGHT LEVEL	7	6	174
U-component of maximum wind	U COMP MAX WIND	33	6	175
V-component of maximum wind	V COMP MAX WIND	34	6	176
GSD cloud base height	GSD CLD BOT HEIGHT	7	2	408
GSD cloud top height	GSD CLD TOP HEIGHT	7	3	409
GSD visibility	GSD VISIBILITY	20	3	410
Wind energy potential	INSTN WIND POWER AGL	126	105	411
U wind at 80 m above ground	U WIND AT 80M AGL	49	105	412
V wind at 80 m above ground	V WIND AT 80M AGL	50	105	413
Graupel on model surface	GRAUPEL ON MDL SFCS	179	109	415
Graupel on pressure surface	GRAUPEL ON P SFCS	179	100	416
Maximum updraft helicity	MAX UPDRAFT HELICITY	236	106	420
Maximum 1km reflectivity	MAX 1km REFLECTIVITY	235	105	421
Maximum wind speed at 10m	MAX 10m WIND SPEED	229	105	422
Maximum updraft vertical velocity	MAX UPDRAFT VERT VEL	237	106	423
Maximum downdraft vertical velocity	MAX DNDRAFT VERT VEL	238	106	424
Mean vertical velocity	MEAN VERT VEL	40	108	425
Radar echo top in KDT	ECHO TOPS IN KFT	7	105	426
Updraft helicity	UPDRAFT HELICITY PRM	227	106	427
Column integrated graupel	VERT INTEG GRAUP	179	200	428
Column integrated maximum graupel	MAX VERT INTEG GRAUP	239	200	429
U-component of 0-1km level wind shear	U COMP 0-1 KM SHEAR	230	106	430
V-component of 0-1km level wind shear	V COMP 0-1 KM SHEAR	238	106	431
U-component of 0-6km level wind shear	U COMP 0-6 KM SHEAR	239	106	432
V-component of 0-6km level wind shear	V COMP 0-6 KM SHEAR	241	106	433
Total precipitation accumulated over user-specified bucket	BUCKET TOTAL PRECIP	61	1	434
Convective precipitation accumulated over user-specified bucket	BUCKET CONV PRECIP	63	1	435
Grid-scale precipitation accumulated over user-specified bucket	BUCKET GRDSCALE PRCP	62	1	436
Snow accumulated over user-specified bucket	BUCKET SNOW PRECIP	65	1	437
Model level fraction of rain for Ferrier scheme	F_rain ON MDL SFCS	131	109	185
Model level fraction of ice for Ferrier scheme	F_ice ON MDL SFCS	132	109	186

Model level riming factor for Ferrier scheme	F_RimeF ON MDL SFCS	133	109	187
Model level total condensate for Ferrier scheme	CONDENSATE MDL SFCS	135	109	199
Height of sigma surface	HEIGHT OF SIGMA SFCS	7	107	205
Temperature on sigma surface	TEMP ON SIGMA SFCS	11	107	206
Specific humidity on sigma surface	SPEC HUM ON S SFCS	51	107	207
U-wind on sigma surface	U WIND ON SIGMA SFCS	33	107	208
V-wind on sigma surface	V WIND ON SIGMA SFCS	34	107	209
Omega on sigma surface	OMEGA ON SIGMA SFCS	39	107	210
Cloud water on sigma surface	CLOUD WATR ON S SFCS	153	107	211
Cloud ice on sigma surface	CLOUD ICE ON S SFCS	58	107	212
Rain on sigma surface	RAIN ON S SFCS	170	107	213
Snow on sigma surface	SNOW ON S SFCS	171	107	214
Condensate on sigma surface	CONDENSATE ON S SFCS	135	107	215
Pressure on sigma surface	PRESS ON SIG SFCS	1	107	216
Turbulent kinetic energy on sigma surface	TRBLNT KE ON S SFCS	158	107	217
Cloud fraction on sigma surface	CLD FRAC ON SIG SFCS	71	107	222
Graupel on sigma surface	GRAUPEL ON S SFCS	179	107	255
LCL level pressure	LIFT PCL LVL PRESS	141	116	246
LOWEST WET BULB ZERO HEIGHT	LOW WET BULB ZERO HT	7	245	247
Leaf area index	LEAF AREA INDEX	182	1	254
Accumulated land surface model precipitation	ACM LSM PRECIP	154	1	256
In-flight icing	IN-FLIGHT ICING	186	100	257
Clear air turbulence	CLEAR AIR TURBULENCE	185	100	258
Wind shear between shelter level and 2000 FT	0-2000FT LLWS	136	106	259
Ceiling	CEILING	7	215	260
Flight restriction	FLIGHT RESTRICTION	20	2	261
Instantaneous clear sky incoming surface shortwave	INSTN CLR INC SFC SW	161	1	262
Pressure level riming factor for Ferrier scheme	F_RimeF ON P SFCS	133	100	263
Model level vertical velocity	W WIND ON MDL SFCS	40	109	264
Brightness temperature	BRIGHTNESS TEMP	213	8	265
Average albedo	AVE ALBEDO	84	1	266
Ozone on model surface	OZONE ON MDL SFCS	154	109	267
Ozone on pressure surface	OZONE ON P SFCS	154	100	268
Surface zonal momentum flux	SFC ZONAL MOMEN FX	124	1	269
Surface meridional momentum flux	SFC MERID MOMEN FX	125	1	270
Average precipitation rate	AVE PRECIP RATE	59	1	271
Average convective precipitation rate	AVE CONV PRECIP RATE	214	1	272
Instantaneous outgoing longwave at top of atmosphere	INSTN OUT TOA LW RAD	212	8	274
Total spectrum brightness temperature	BRIGHTNESS TEMP NCAR	118	8	275
Model top pressure	MODEL TOP PRESSURE	1	8	282
Composite rain radar reflectivity	COMPOSITE RAIN REFL	165	200	276
Composite ice radar reflectivity	COMPOSITE ICE REFL	166	200	277
Composite radar reflectivity from convection	COMPOSITE CONV REFL	167	200	278
Rain radar reflecting angle	RAIN RADAR REFL AGL	165	105	279
Ice radar reflecting angle	ICE RADAR REFL AGL	166	105	280
Convection radar reflecting angle	CONV RADAR REFL AGL	167	105	281
Model level vertical velocity	W WIND ON P SFCS	40	100	284
Column integrated super cool liquid water	TOTAL COLD LIQUID	168	200	285
Column integrated melting ice	TOTAL MELTING ICE	169	200	286
Height of lowest level super cool liquid water	COLD LIQ BOT HEIGHT	7	253	287

Height of highest level super cool liquid water	COLD LIQ TOP HEIGHT	7	254	288
Richardson number planetary boundary layer height	RICH NO PBL HEIGHT	7	220	289
Total column shortwave temperature tendency	TOT COL SW T TNDY	250	200	290
Total column longwave temperature tendency	TOT COL LW T TNDY	251	200	291
Total column gridded temperature tendency	TOT COL GRD T TNDY	241	200	292
Total column convective temperature tendency	TOT COL CNVCT T TNDY	242	200	293
Radiative flux temperature tendency on pressure level	RADFLX TMP TNDY ON P	216	100	294
Column integrated moisture convergence	TOT COL MST CNVG	135	200	295
Time averaged clear sky incoming UV-B shortwave	AVE CLR INC UV-B SW	201	1	297
Time averaged incoming UV-B shortwave	AVE INC UV-B SW	200	1	298
Total column ozone	TOT COL OZONE	10	200	299
Average low cloud fraction	AVE LOW CLOUD FRAC	71	214	300
Average mid cloud fraction	AVE MID CLOUD FRAC	71	224	301
Average high cloud fraction	AVE HIGH CLOUD FRAC	71	234	302
Average low cloud bottom pressure	AVE LOW CLOUD BOT P	1	212	303
Average low cloud top pressure	AVE LOW CLOUD TOP P	1	213	304
Average low cloud top temperature	AVE LOW CLOUD TOP T	11	213	305
Average mid cloud bottom pressure	AVE MID CLOUD BOT P	1	222	306
Average mid cloud top pressure	AVE MID CLOUD TOP P	1	223	307
Average mid cloud top temperature	AVE MID CLOUD TOP T	11	223	308
Average high cloud bottom pressure	AVE HIGH CLOUD BOT P	1	232	309
Average high cloud top pressure	AVE HIGH CLOUD TOP P	1	233	310
Average high cloud top temperature	AVE HIGH CLOUD TOP T	11	233	311
Total column relative humidity	TOT COL REL HUM	52	200	312
Cloud work function	CLOUD WORK FUNCTION	146	200	313
Temperature at maximum wind level	MAX WIND TEMPERATURE	11	6	314
Time averaged zonal gravity wave stress	AVE Z GRAVITY STRESS	147	1	315
Time averaged meridional gravity wave stress	AVE M GRAVITY STRESS	148	1	316
Average precipitation type	AVE PRECIP TYPE	140	1	317
Simulated GOES 12 channel 2 brightness temperature	GOES TB - CH 2	213	8	327
Simulated GOES 12 channel 3 brightness temperature	GOES TB - CH 3	214	8	328
Simulated GOES 12 channel 4 brightness temperature	GOES TB - CH4	215	8	329
Simulated GOES 12 channel 5 brightness temperature	GOES TB - CH5	216	8	330
Cloud fraction on pressure surface	CLD FRAC ON P SFCS	71	100	331
U-wind on theta surface	U WIND ON THETA SFCS	33	113	332
V-wind on theta surface	V WIND ON THETA SFCS	34	113	333
Temperature on theta surface	TEMP ON THETA SFCS	11	113	334
Potential vorticity on theta surface	PV ON THETA SFCS	4	113	335
Montgomery streamfunction on theta surface	M STRMFUNC ON THETA	37	113	353
Relative humidity on theta surface	RH ON THETA SFCS	52	113	352
U wind on constant PV surface	U WIND ON PV SFCS	33	117	336
V wind on constant PV surface	V WIND ON PV SFCS	34	117	337
Temperature on constant PV surface	TEMP ON PV SFCS	11	117	338
Height on constant PV surface	HEIGHT ON PV SFCS	7	117	339

Pressure on constant PV surface	PRESSURE ON PV SFCS	1	117	340
Wind shear on constant PV surface	SHEAR ON PV SFCS	136	117	341
Planetary boundary layer cloud fraction	PBL CLD FRACTION	71	211	342
Average water runoff	AVE WATER RUNOFF	90	1	343
Planetary boundary layer regime	PBL REGIME	220	1	344
Maximum 2m temperature	MAX SHELTER TEMP	15	105	345
Minimum 2m temperature	MIN SHELTER TEMP	16	105	346
Maximum 2m RH	MAX SHELTER RH	218	105	347
Minimum 2m RH	MIN SHELTER RH	217	105	348
Ice thickness	ICE THICKNESS	92	1	349
Shortwave tendency on pressure surface	SW TNDY ON P SFCS	250	100	354
Longwave tendency on pressure surface	LW TNDY ON P SFCS	251	100	355
Deep convective tendency on pressure surface	D CNVCT TNDY ON P SF	242	100	357
Shallow convective tendency on pressure surface	S CNVCT TNDY ON P SF	244	100	358
Grid scale tendency on pressure surface	GRDSCL TNDY ON P SFC	241	100	359
Deep convective moisture on pressure surface	D CNVCT MOIS ON P SF	243	100	361
Shallow convective moisture on pressure surface	S CNVCT MOIS ON P SF	245	100	362
Ozone tendency on pressure surface	OZONE TNDY ON P SFCS	188	100	366
Mass weighted potential vorticity	MASS WEIGHTED PV	139	100	367
Simulated GOES 12 channel 3 brightness count	GOES BRIGHTNESS-CH 3	221	8	376
Simulated GOES 12 channel 4 brightness count	GOES BRIGHTNESS-CH 4	222	8	377
Omega on theta surface	OMEGA ON THETA SFCS	39	113	378
Mixing height	MIXHT HEIGHT	67	1	381
Average clear-sky incoming longwave at surface	AVE CLR INC SFC LW	163	1	382
Average clear-sky incoming shortwave at surface	AVE CLR INC SFC SW	161	1	383
Average clear-sky outgoing longwave at surface	AVE CLR OUT SFC LW	162	1	384
Average clear-sky outgoing longwave at top of atmosphere	AVE CLR OUT TOA LW	162	8	385
Average clear-sky outgoing shortwave at surface	AVE CLR OUT SFC SW	160	1	386
Average clear-sky outgoing shortwave at top of atmosphere	AVE CLR OUT TOA SW	160	8	387
Average incoming shortwave at top of atmosphere	AVE INC TOA SW	204	8	388
Transport wind u component	TRANSPORT U WIND	33	220	389
Transport wind v component	TRANSPORT V WIND	34	220	390
Sunshine duration	SUNSHINE DURATION	191	1	396
Field capacity	FIELD CAPACITY	220	1	397
ICAO height at maximum wind level	ICAO HGHT MAX WIND	5	6	398
ICAO height at tropopause	ICAO HGHT AT TROP	5	7	399
Radar echo top	RADAR ECHO TOP	240	200	400
Time averaged surface Visible beam downward solar flux	AVE IN SFC VIS SW BE	166	1	401
Time averaged surface Visible diffuse downward solar flux	AVE IN SFC VIS SW DF	167	1	402
Time averaged surface Near IR beam downward solar flux	AVE IN SFC IR SW BE	168	1	403



Time averaged surface Near IR diffuse downward solar flux	AVE IN SFC IR SW DF	169	1	404
Average snowfall rate	AVE SNOWFALL RATE	64	1	405
Dust 1 on pressure surface	DUST 1 ON P SFCS	240	100	438
Dust 2 on pressure surface	DUST 2 ON P SFCS	241	100	439
Dust 3 on pressure surface	DUST 3 ON P SFCS	242	100	440
Dust 4 on pressure surface	DUST 4 ON P SFCS	243	100	441
Dust 5 on pressure surface	DUST 5 ON P SFCS	244	100	442
Equilibrium level height	EQUIL LEVEL HEIGHT	7	247	443
Lightning	LIGHTNING	187	1	444
Goes west channel 2 brightness temperature	GOES W TB - CH 2	241	8	446
Goes west channel 3 brightness temperature	GOES W TB - CH 3	242	8	447
Goes west channel 4 brightness temperature	GOES W TB - CH 4	243	8	448
Goes west channel 5 brightness temperature	GOES W TB - CH 5	244	8	449
In flight icing from NCAR algorithm	NCAR IN-FLIGHT ICING	168	100	450
Specific humidity at flight levels	SPE HUM AT FD HEIGHT	51	103	451
Virtual temperature based convective available potential energy	TV CNVCT AVBL POT EN	202	1	452
Virtual temperature based convective inhibition	TV CNVCT INHIBITION	201	1	453
Virtual temperature on model surfaces	VTEMP ON MDL SFCS	12	109	909
Virtual temperature on pressure surfaces	VTEMP ON PRESS SFCS	12	100	910
Virtual temperature on flight levels	VTEMP AT FD HEIGHTS	12	103	911
Ventilation rate	VENTILATION RATE	241	220	454
Haines index	HAINES INDEX	250	1	455
Pressure at flight levels	PRESS AT FD HEIGHTS	1	103	482
Time-averaged percentage snow cover	TIME AVG PCT SNW CVR	238	1	500
Time-averaged surface pressure	TIME AVG SFC PRESS	1	1	501
Time-averaged 10m temperature	TIME AVG TMP AT 10M	11	105	502
Time-averaged mass exchange coefficient	TAVG MASS EXCH COEF	185	1	503
Time-averaged wind exchange coefficient	TAVG WIND EXCH COEF	186	1	504
Temperature at 10m	TEMP AT 10 M	11	105	505
Maximum U-component wind at 10m	U COMP MAX 10 M WIND	253	105	506
Maximum V-component wind at 10m	V COMP MAX 10 M WIND	254	105	507
Simulated GOES 12 channel 2 brightness temperature with satellite angle correction	GOESE TB-2 NON NADIR	213	8	456
Simulated GOES 12 channel 3 brightness temperature with satellite angle correction	GOESE TB-3 NON NADIR	214	8	457
Simulated GOES 12 channel 4 brightness temperature with satellite angle correction	GOESE TB-4 NON NADIR	215	8	458
Simulated GOES 12 channel 5 brightness temperature with satellite angle correction	GOESE TB-5 NON NADIR	216	8	459
Simulated GOES 11 channel 2 brightness temperature with satellite angle correction	GOESW TB-2 NON NADIR	241	8	460
Simulated GOES 11 channel 3 brightness temperature with satellite angle correction	GOESW TB-3 NON NADIR	242	8	461
Simulated GOES 11 channel 4 brightness temperature with satellite angle correction	GOESW TB-4 NON NADIR	243	8	462
Simulated GOES 11 channel 5 brightness temperature with satellite angle correction	GOESW TB-5 NON NADIR	244	8	463
Simulated GOES 15 channel 5 brightness temperature with satellite angle correction	GOES-15 NON-NADIR (Levels 1-4 = Channels 2-5)	118 (241-244)	109	872
Simulated GOES 13 channel 2 brightness temperature with satellite angle correction	GOES-13 NON-NADIR (Levels 1-4 = Channels 2-5)	118 (237-240)	109	868
Simulated AMSR-E channel 9 brightness temperature	AMSRE TB - CH 9	176	8	483

Simulated AMSR-E channel 10 brightness temperature	AMSRE TB - CH 10	177	8	484
Simulated AMSR-E channel 11 brightness temperature	AMSRE TB - CH 11	178	8	485
Simulated AMSR-E channel 12 brightness temperature	AMSRE TB - CH 12	179	8	486
SSMI F13 (19H 19V 37H 37V 85H 85V)	F13 SSMI NON-NADIR (Levels 1-6 = Channels 1,2,4,5,6,7) (UPPV4.0.1; Levels 1-7 = Channels 1-7)	118 (176-181)	109	800
SSMI F14 (19H 19V 37H 37V 85H 85V)	F14 SSMI NON-NADIR (Levels 1-6 = Channels 1,2,4,5,6,7) (UPPV4.0.1; Levels 1-7 = Channels 1-7)	118 (182-187)	109	806
SSMI F15 (19H 19V 37H 37V 85H 85V)	F15 SSMI NON-NADIR (Levels 1-6 = Channels 1,2,4,5,6,7) (UPPV4.0.1; Levels 1-7 = Channels 1-7)	118 (188-193)	109	812
SSMIS F16 (183H 19H 19V 37H 37V 85H 85V)	F16 SSMIS NON-NADIR (Levels 1-7 = Channels 9,12,13,15,16,17,18) (UPPV4.0.1; Levels 1-24 = Channels 1-24)	118 (194-200)	109	818
SSMIS F17 (183H 19H 19V 37H 37V 85H 85V)	F17 SSMIS NON-NADIR (Levels 1-7 = Channels 9,12,13,15,16,17,18) (UPPV4.0.1; Levels 1-24 = Channels 1-24)	118 (201-207)	109	825
SSMIS F18 (183H 19H 19V 37H 37V 85H 85V)	F18 SSMIS NON-NADIR (Levels 1-7 = Channels 9,12,13,15,16,17,18) (UPPV4.0.1; Levels 1-24 = Channels 1-24)	118 (208-214)	109	832
SSMIS F19 (183H 19H 19V 37H 37V 85H 85V)	F19 SSMIS NON-NADIR (Levels 1-7 = Channels 9,12,13,15,16,17,18) (UPPV4.0.1; Levels 1-24 = Channels 1-24)	118 (215-221)	109	839
SSMIS F20 (183H 19H 19V 37H 37V 85H 85V)	F20 SSMIS NON-NADIR (Levels 1-7 = Channels 9,12,13,15,16,17,18) (UPPV4.0.1; Levels 1-24 = Channels 1-24)	118 (222-228)	109	846
MTSAT-1r imager channels 1-4 (backup for mtsat2)	MTSAT1R NON-NADIR (Levels 1-4 = Channels 1-4)	118	109	864
MTSAT2 imager channels 1-4	MTSAT2 NON-NADIR (Levels 1-4 = Channels 1-4)	118	109	860
Seviri brightness temperature channels 5-11 (UPPV4.0.1; channels 4-11)	SEVIRI NON-NADIR (Levels 1-7 = Channels 5-11) (UPPV4.0.1; Levels 1-8 = Channels 4-11)	118 (230-236)	109	876
Insat 3d brightness temperature IR channels 1-4	INSAT 3D NON-NADIR (Levels 1-4 = Channels 1-4)	118	109	865

\* See Appendix A of the UPP Users Guid

\*\*\*4 types of CAPE and CIN can be output with use of the Levels control line in the wrf\_cntrl.parm (nmb\_cntrl.parm file).

Surface based CAPE/CIN is output at one grib record, while the remaining three types are output within one grib record in 3 levels.

- Level 1: Surface Based CAPE/CIN
- Level 2: Best Boundary Layer CAPE/CIN
- Level 3: Mixed Layer CAPE/CIN
- Level 4: Most Unstable CAPE/CIN