Parameters to store from UERRA reanalyses - living document

This document summarizes the agreement as of April 2015 of UERRA reanalysis producers on the output of the different products to be stored.

Below, the sections are divided according to the output levels: model levels, pressure levels, height levels, and the surface level including vertically integrated parameters.

1 Model Levels

Output on model levels are stored up to a height of about 15km, for a specific set of parameters, and for the analyses every six hours only. The main users to address with this product may be regional climate modellers who like to initialize their model with our output.

1.1 Time step for model levels

Store analysis output every six hours at 00UTC, 06UTC, 12UTC, 18UTC for all models.
Don't store any forecast fields.

1.2 Parameters on model levels

Here, the wind components are stored. In order to calculate wind speed and direction from them it is necessary to provide information of the grid on which the output is stored.

Parameter	Harmonie (SMHI)	Param id	Levtype	levels
	Analyses Files			
cloud cover				
cloud liquid water content (specific)				
cloud ice content (specific)				
pressure				
specific humidity	bayyyymmddhh+000grib	51.253	ml	1..65
temperature	bayyyymmddhh+000grib	11.253	ml	1..65
U component of wind	bayyyymmddhh+000grib	33.253	ml	1..65
V component of wind	bayyyymmddhh+000grib	34.253	ml	1..65

1.3 Model levels to output (approximate height and pressure values)

Output on all model levels up to a height of about 15km above ground.

SMHI:

- relative to the model grid elevations / terrain following
- pressure relative to 1013.25 hPa surface pressure
- heights are approximate using a temperature of 273 K

2. Pressure levels

Output on pressure levels seems to be the main archive to be used, so the output is stored on a rather dense vertical grid, for a specific set of parameters, and for forecasts and analyses.

2.1 Time steps for pressure levels

Analysis:

- Store analysis output in six hourly intervals at 00 UTC, 06 UTC, 12 UTC, 18 UTC for Harmonie

Forecasts:

- T+1,2,3,4,5,6,9,12,15,18,21,24,27,30
  started at 00 UTC and 12 UTC
- T+1,2,3,4,5,6
  started at 06 UTC and 18 UTC

2.2 Parameters on pressure levels

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype pl 100
cloud cover		fcyyyymmddhh+lllgrib_fp	71.253
cloud liquid water content (specific)		fcyyyymmddhh+lllgrib_fp	76.253
cloud ice content (specific)		fcyyyymmddhh+lllgrib_fp	58.253
geopotential height	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	6.253
relative humidity	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	52.253
temperature	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	11.253
U component of wind	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	33.253
V component of wind	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	34.253

2.3 Pressure levels to output

Output on pressure levels on a rather dense vertical grid.

Pressure levels [hPa]
1000
975
950
925
900
875
850
825
800
750
700
600
500
400
300
250
200
150
100
70
50
30
20
10

3. Height levels

The agreement is to store lower tropospheric, near-ground, output on height levels in addition to model levels. Height levels are provided on fixed geometric height above model topography. It is a user friendly format, and the main user communities interested in this output may be the wind energy sector and forestry.

3.1 Time steps for height levels

Analysis:

- Store analysis output in six hourly intervals at 00 UTC, 06 UTC, 12 UTC, 18 UTC for Harmonie

Forecasts for all models:

- T+1,2,3,4,5,6,9,12,15,18,21,24,27,30
  started at 00 UTC and 12 UTC
- T+1,2,3,4,5,6
  started at 06 UTC and 18 UTC

3.2 Parameters on height levels

It was decided that wind is provided as wind speed and wind direction on height levels because it is envisaged that the user community interested in height levels is more interested in these parameters instead of the separate components.

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype 105
Cloud cover			
cloud liquid water content (specific)		fcyyyymmddhh+lllgrib_fp	76.253
cloud ice content (specific)		fcyyyymmddhh+lllgrib_fp	58.253
Pressure	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	1.253
Relative humidity	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	51 (52).253
Temperature	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	11.253
wind speed	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	33.253
wind direction	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	34.253

NB relative humidity missing from the so far tun reanalyses; only specific (51). Will be 52 too.

3.3 Height levels to output

Output is stored on the following height levels. It needs to be taken care of that wind speed and wind direction at 10m height is also a 2D parameter. It should not be stored twice.

WP3 suggestion [m]
15
30
50
75
100
150
200
250
300

400
500

4 Surface level

4.1 Time steps for 2D parameters

Analysis:

- Store analysis output in six hourly intervals at 00 UTC, 06 UTC, 12 UTC, 18 UTC for Harmonie.

Forecast:

- Store forecast output at T+1,2,3,4,5,6,9,12,15,18,21,24,27,30 started at 00 UTC and 12 UTC for Harmonie
- Store forecast output at T+1,2,3,4,5,6 started at 06 UTC and 18 UTC for Harmonie

4.2 Parameters for the surface level

4.2.1 Precipitation and humidity

Parameter	Harmonie (SMHI)			
	Analysis Files	Forecast Files	Levtype 105	level
Accumulated total precipitation	bayyyymmddhh+000grib	fcyyyymmddhh+lllgrib_fp	61.253	0
2m relative humidity	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	52.253	2
Total column water vapour	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	54.253	0
runoff				
drainage				

4.2.2 Accumulated Radiation Fluxes

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype 105 level 0
Albedo	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	84.253
Clear-sky short-wave downward flux at the surface		fcyyyymmddhh+lllgrib_fp	
Clear-sky short-wave upward flux at the surface			
Clear-sky long-wave downward flux at the surface		fcyyyymmddhh+lllgrib_fp	?
Direct short-wave radiation flux at the surface		fcyyyymmddhh+lllgrib_fp	116.253
Evaporation		fcyyyymmddhh+lllgrib_fp	132.253
Long-wave downward flux at the surface		fcyyyymmddhh+lllgrib_fp	115.253
Net long-wave radiation flux at the surface		fcyyyymmddhh+lllgrib_fp	112.253
Net short-wave radiation flux at the surface		fcyyyymmddhh+lllgrib_fp	111.253

Surface latent heat flux	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	121.1
Surface sensible heat flux	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	122.1
1Total short-wave radiation flux at the surface	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	117.253

4.2.3 Temperature and wind speed

Parameter	Harmonie (SMHI)			
	Analysis Files	Forecast Files	Levtype 105	
10m wind speed	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	32.253	10
10 m wind direct	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	31.253	10
10 m wind gust [in the last 24 hrs | since previous post-processing] speed	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	228.253	10
Maximum [1.5 m | 2 m] temperature since previous post-processing	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	15.253	2
Minimum [1.5 m | 2 m] temperature since previous post-processing	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	16.253	2
[1.5 | 2] m temperature	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	11.253	2
Surface temperature	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	11.253	0

Wind gust speed missing, not sure about wind speed and dir, exist for height levels but also at 10, can't see the levels with grib_api, u and v are there and need to be converted to speed e.g. with MARS compute

4.2.4 Pressure/Height

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype 105 0
Mean sea level pressure	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	6.253
Surface pressure	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	1.253

Again check level 0 as opposed to the other height levels

4.2.5 Cloud properties

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype 105 0
High cloud cover	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	75.253
Medium cloud cover	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	74.253
Low cloud cover	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	73.253
Total cloud cover	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	71.253

4.2.6 Snow

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype 105 0
Water equivalent of accumulated snow depth	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	65.253
Accumulated total		fcyyyymmddhh+lllgrib_fp	184.253

snowfall			
Snow density	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	191.253
Snow depth	fcyyyymmddhh+000grib_fp	fcyyyymmddhh+lllgrib_fp	(66.253)

Snow depth 66 missing

4.2.7 Soil

Parameter	Harmonie (SMHI)			
	Analysis Files	Forecast Files	Levtype 105	lev
Soil temperature level 1	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	11.1	?
Soil temperature level 2	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	11.1	?
Soil temperature level 3	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	11.1	?
Soil temperature level 4				
Volumetric soil water layer 1	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	86.1	?
Volumetric soil water layer 2	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	86.1	?
Volumetric soil water layer 3	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	86.1	?
Volumetric soil water layer 4				
Soil water index in the root zone (total and liquid)				
Soil water index for the first cm (total and liquid)				
Soil water index for 5cm (total and liquid)				
Soil heat flux				

4.2.8 Static fields

Parameter	Harmonie (SMHI)		
	Analysis Files	Forecast Files	Levtype 105
Land cover (1=land, 0=sea)	bayyyymmddhh+000grib		81.253
Orography (surface geopot height)	bayyyymmddhh+000grib		1.253
(Forecast) surface roughness	fcyyyymmddhh+000grib_sfx	fcyyyymmddhh+lllgrib_sfx	83.253