

WFIP2 Model Data in the DAP

Data Archived in Real Time: Initial Conditions, Lateral-Boundary Conditions, WRF Namelists, and Graphics

Description:

Initial conditions, lateral-boundary conditions, WRF namelists, and output graphics were archived from three real-time modeling frameworks:

- 1) RAP-ESRL: the experimental RAP (run hourly)
- 2) HRRR-ESRL: the experimental HRRR (run hourly)
- 3) HRRR-WFIP2: the experimental, WFIP2-provisional version of the HRRR, run twice daily at 0600 and 1800 UTC. The real-time HRRR-WFIP2 also ran with a concurrent 750-m nest (i.e., the HRRR-WFIP2 nest) that was initialized at 1 h into the HRRR forecast (i.e., 0700 and 1900 UTC).

Each of these frameworks should be considered experimental, subject to intermittent production outages (sometimes persistent), data-assimilation outages, and changes to data-assimilation procedures and physical parameterizations.

The archive of real-time data from these modeling frameworks consists of the following two zip-file aggregations:

- 1) files containing initial conditions, lateral boundary conditions, and WRF namelists:

For RAP-ESRL and HRRR-ESRL runs, three files are compressed into a single zip file:

- i) wrfinput_d01: initial conditions (netCDF)
- ii) wrfbdy_d01: lateral-boundary conditions (netCDF)

iii) namelist.input: the WRF-ARW namelist (plain text)

The HRRR-WFIP2 archive also includes these files, but with the addition of "wrfinput_d02", the nested-domain initial conditions (netCDF). Note that while the archived HRRR-WFIP2 namelist specifies a 15-h forecast, **lateral-boundary conditions for most runs are available for a 24-h forecast.**

2) files containing output graphics (.png files). Given the large number of graphics files that are produced, a detailed description of the zip-file contents is not given here.

Where to find the data:

The file naming convention for this dataset is as follows:

```
RAP-ESRL: realtime.rap_esrl.{type}.01.fcst.{idate}.{ihour}0000.f0000.zip
```

```
HRRR-ESRL: realtime.hrrr_esrl.{type}.01.fcst.{idate}.{ihour}0000.f0000.zip
```

```
HRRR-WFIP2: realtime.hrrr_wfip2.{type}.02.fcst.{idate}.{ihour}0000.f0000.zip
```

where:

{type} is "icbc" for the aggregated initial conditions, boundary conditions, and namelist, or "graphics" for the aggregated graphical output

{idate} is the eight-digit initialization date (yyyymmdd)

{ihour} is the two-digit initialization hour

The 2-digit descriptor before "fcst" ("01" or "02") simply indicates the number of domains that are included in the file (the HRRR-WFIP2 includes a second nested domain). The "f0000" descriptor is universal. As examples, the following are valid filenames for this dataset:

```
realtime.rap_esrl.icbc.01.20170227.190000.f0000.zip
```

```
realtime.hrrr_esrl.graphics.01.20170227.130000.f0000.zip
```

```
realtime.hrrr_wfip2.icbc.02.20170227.060000.f0000.zip
```

Model Output from Case Studies

Description:

Individual case studies have been designated by the Event Log Team and Model Development Team as encapsulating weather events of particularly great interest for WFIP2 model development. Typically, these events were characterized by poor performance of real-time forecasts. These events are documented in the WFIP2 Event Log. Each case will have a control and experimental simulation(s). The archive itself consists of zip-compressed files of GRIB2-formatted output.

Where to find the data:

[\(a naming convention for case studies will be finalized on a later date\)](#)

Model Output from 10-Day Retrospective Runs

Description:

Model output from two 10-day retrospective periods, encompassing meteorology that is deemed relevant to WFIP2 objectives, is available. These periods consist of 10-20 February 2016 and 14-23 August 2016. For each period, model forecasts are supplied from a "control" WRF-ARW configuration (i.e., pre-WFIP2 development), and an experimental WRF-ARW configuration (i.e., incorporating model physics developed during WFIP2). Other (non-WRF) aspects of the modelling system (e.g., data assimilation) are the same between these retrospective configurations. A complete description of these configurations is provided in a separate document.

For a given retrospective period and a given WRF-ARW configuration, output is supplied from the RAP, HRRR, and HRRR 750-m nest modeling frameworks. RAP forecasts are run hourly and supply lateral-boundary and cold-start backgrounds to the HRRR (of the same configuration). The HRRR and HRRR-nest are run concurrently at three-hourly times (i.e., 00, 03, 06, 09, 12, 15, 18, and 21 UTC). Forecast output from the RAP is available at 60-min intervals, and output from the HRRR and nest is available at 15-min intervals. The archive itself consists of zip-compressed files of GRIB2-formatted output.

Where to find the data:

The file naming convention for this dataset is as follows:

RAP: retro.rap.{config}.fcst.01.{idate}.{ihour}0000.f{fhour}00.zip

HRRR: retro.hrrr.{config}.fcst.01.{idate}.{ihour}0000.f{fhour}{fmin}.zip

HRRR nest: retro.hrrr.{config}.fcst.02.{idate}.{ihour}0000.f{fhour}{fmin}.zip

where:

{config} is the two-digit configuration identifier: "01" for control, and "02" for experimental

{idate} is the eight-digit initialization date (yyyymmdd)

{ihour} is the two-digit initialization hour

{fhour} is the two-digit forecast length (whole hours)

{fmin} is the two-digit forecast length (minutes after fhour)

Some examples of files:

retro.rap.02.fcst.01.20160210.080000.f1500.zip

retro.hrrr.01.fcst.01.20160210.150000.f0945.zip

retro.hrrr.01.fcst.02.20160210.150000.f0945.zip

Initial Conditions, Lateral-Boundary Conditions, WRF Namelists, and Model Output from Year-Long Reforecasts

Description:

Two year-long reforecasts, with control and experimental WRF-ARW configurations, were performed for the months of April 2016, July 2016, October 2016, and January 2017. This included twice-daily (initialized at 00 and 12 UTC) forecasts out to 24 h. These model runs used a cold-start initialization from the RAP without data assimilation, "spin up", or antecedent cycling. The reforecasts included a 3-km parent domain covering the western U.S. and an embedded 750-m nest centered over the study region. The nest is initialized 3-h into the parent-domain

forecast.

Initial conditions, lateral-boundary conditions, WRF namelists (control configuration), and 15-minute forecast output is archived. The following two zip-file aggregations are available:

1) files containing model cold-start initial conditions, lateral boundary conditions, and WRF namelists:

Seven files are compressed into a single file:

- i) sigma.wrfinput_d01: parent-domain initial conditions on the WRF-ARW terrain-following vertical coordinate (netCDF)
- ii) sigma.wrfinput_d02: nested-domain initial conditions on the WRF terrain-following vertical coordinate (netCDF)
- iii) sigma.wrfbdy_d01: lateral-boundary conditions on the WRF-ARW terrain-following vertical coordinate (netCDF)
- iv) hyb.wrfinput_d01: parent-domain initial conditions on the WRF-ARW hybrid vertical coordinate (netCDF)
- v) hyb.wrfinput_d02: nested-domain initial conditions on the WRF-ARW hybrid vertical coordinate (netCDF)
- vi) hyb.wrfbdy_d01: lateral-boundary conditions on the WRF-ARW hybrid vertical coordinate (netCDF)
- vii) sigma.namelist.input: the WRF-ARW namelist used for the control configuration (plain text)

Control runs for the reforecast utilized the terrain following vertical coordinate (i.e., files prefixed with "sigma"), while experimental runs utilized the hybrid vertical coordinate (i.e., files prefixed with "hyb").

2) files containing model forecasts (zip-compressed files of GRIB2-formatted output)

Where to find the data:

1) For files containing model cold-start initial conditions, lateral boundary conditions, and WRF namelists, the file naming convention is as follows:

```
refcst.coldstart.icbc.02.{idate}.{ihour}0000.zip
```

where:

{idate} is the eight-digit initialization date (yyyymmdd)

{ihour} is the two-digit initialization hour

Note that the "02" is redundant and purely descriptive, indicating that input files for two domains are included. As an example, the following is a valid filename for this dataset:

```
refcst.coldstart.icbc.02.20161031.120000.zip
```

2) For files containing forecast output, the file naming convention is as follows:

```
3-km parent: refcst.{config}.fcst.01.{idate}.{ihour}0000.f{fhour}{fmin}.zip
```

```
750-m nest: refcst.{config}.fcst.02.{idate}.{ihour}0000.f{fhour}{fmin}.zip
```

where:

{config} is the two-digit configuration identifier: "01" for control, and "02" for experimental

{idate} is the eight-digit initialization date (yyyymmdd)

{ihour} is the two-digit initialization hour

{fhour} is the two-digit forecast length (whole hours)

{fmin} is the two-digit forecast length (minutes after fhour)

As examples, the following are valid filenames for this dataset:

```
refcst.02.fcst.01.20160701.000000.f2345.zip
```

```
refcst.02.fcst.02.20161031.120000.f0300.zip
```