I/O

INPUT AND OUTPUT, PART II

Grib Time: Come and get it

Gribs have these practical defining characteristics

- Store 2d slabs of data for a single parameter/varaible (e.g., 2m air temperature)
- Self describing. The headers are messages in each segment of data.
- Internal packing and compression for each variable.
- Sequential byte range positions for each variable.
- Well supported and used everywhere.

GRIB Defined

GRIB (GRIdded Binary or General Regularly-distributed Information in Binary form[1]) is a concise data format commonly used in meteorology to store historical and forecast weather data. It is standardized by the World Meteorological Organization's Commission for Basic Systems, known under number GRIB FM 92-IX, described in WMO Manual on Codes No.306.

https://en.wikipedia.org/wiki/GRIB

Grib indexes

All grib files can have indexes generated for them. This requires a full inspection of each file to generate it. Files will often have .idx as a suffix.

fh.0003_tl.press_gr.0p50deg
fh.0003_tl.press_gr.0p50deg.idx

such as:

ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/

wgrib2 filename |more

1:0:d=2016102400:UGRD:planetary boundary layer:3 hour fcst:
2:168441:d=2016102400:VGRD:planetary boundary layer:3 hour fcst:
3:337019:d=2016102400:VRATE:planetary boundary layer:3 hour fcst:
4:513215:d=2016102400:GUST:surface:3 hour fcst:
5:687651:d=2016102400:HGT:1 mb:3 hour fcst:
6:837756:d=2016102400:TMP:1 mb:3 hour fcst:
7:906706:d=2016102400:RH:1 mb:3 hour fcst:
8:953992:d=2016102400:UGRD:1 mb:3 hour fcst:
9:1027411:d=2016102400:VGRD:1 mb:3 hour fcst:
10:1099976:d=2016102400:O3MR:1 mb:3 hour fcst:
11:1216352:d=2016102400:HGT:2 mb:3 hour fcst:
12:1366512:d=2016102400:TMP:2 mb:3 hour fcst:
13:1435955:d=2016102400:RH:2 mb:3 hour fcst:
14:1466579:d=2016102400:UGRD:2 mb:3 hour fcst:

Grib record details

280:46296153:d=2016102400:TMP:2 m above ground:3 hour fcst:

where

- 280 is the record number (they start at 1)
- 46296153 is the first byte of this record in the file
- d=2016102400 is the date and runtime of the model. Oct 24, 2016 00z run.
- TMP is the variable
- 2 m above ground is the vertical reference
- 3 hour fcst is the forecast hour from the base model runtime

GRIB files

http://www.ftp.cpc.ncep.noaa.gov/wd51we/wgrib2/tricks.wgrib2

There are some interesting ways to work with these files, such as:

```
wgrib2 fh.0003_tl.press_gr.0p50deg -match "(^280:)" -undefine out-box -110:-109 40:41 -csv out.txt

more out.txt
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-110,40,284.64
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-109.5,40,286.42
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-109,40,286.27
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-110,40.5,281.06
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-109.5,40.5,284.34
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-109,40.5,282.63
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-110,41,281.2
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground",-109.5,41,283.95
"2016-10-24 00:00:00","2016-10-24 03:00:00","TMP","2 m above ground”,-109,41,280.94
```