Obtaining NOAA Data for BalloonDrift Simulation

NOAA provides hourly, high-altitude, global wind forecast data up to 1 mb (atmospheric pressure) on a 0.25-degree lat-lon grid.

The data for the current day is available at:
*http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/gfs/para/gfs.**YYYYMMDD**/00/*

where **YYYYMMDD** is the current date. For example, if data is being pulled on November 5, 2018, the link would be:

http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/gfs/para/gfs.20181105/00/

The files that contain wind forecast data are named in the format:

*gfs.txxz.pgrb2.0p25.f**xxx***

where **xxx** is the forecast time in hours for when the data was collected (given on the same page). For example, 48-hour forecast data would end in the form:

f048

The files download in a .bin format. In order to use the data, an in-house NOAA tool named *wgrib2* must be used on a Linux machine. To compile *wgrib2*, navigate to this link on a Linux machine:

ftp://ftp.cpc.ncep.noaa.gov/wd51we/wgrib2/wgrib2.tgz

Following the completion of the download, open the Linux terminal (right click on desktop and select *Open in Terminal*) and complete the following set of commands (if *wgrib2* had previously been compiled, it must be removed before continuing. This can be done by navigating to the directory *wgrib2* is located in and using the command: *rm -r grib2):*

1. Navigate to the directory in which the *wgrib.tgz* file was just downloaded. This can be done using:
    - *cd **FILENAME*** – to enter a deeper file
    - *cd ..* – to back out of a file to the subsequent file
2. Untar *wgrib2.tgz* using: *tar -xzvf wgrib2.tgz*
3. Cd to main directory: *cd grib2*

4. Define the C and fortran compilers and make:
   If using Bash enter these commands, hitting "*enter"* between each:
   i. *export CC=gcc*
   ii. *export FC=gfortran*
   iii. *make*
   iv. *make lib*
   If using Csh enter these commands, hitting "*enter"* between each:
   v. *setenv CC gcc*
   vi. *setenv FC gfortran*
   vii. *make*
   viii. *make lib*
5. See if *wgrib2* was compiled (a list should be shown with installed options):
   wgrib2/wgrib2 -config

After successfully compiling *wgrib2*, navigate to the "wgrib2" subfolder. This is located inside the "grib2" folder and can easily be done directly after compiling using the command: *cd wgrib2*

Using the basic file explorer, move the downloaded .bin NOAA data file to the "wgrib2" folder mentioned above.

The specifications for the launch are as follows:

Lat range: 40 to 42.5

Lon range: -120.75 to -116.5

Minimum Pressure: 20mb

Export the .bin file into a .csv file using the following commands:

./wgrib2 ***GFS FILE NAME*** *-small_grib -120.75:-116.5 40:42.5 small.grb*

./wgrib2 small.grb -wind_dir wind.grb -wind_speed wind.grb -match "(UGRD|VGRD)" -not "(0.4|1|2|3|5|7) mb"

./wgrib2 wind.grb -spread wind.csv

Within the "wgrib2" subfolder, a .csv file named "wind.csv" should have been created that will contain data on wind speed and direction for altitudes up to 10 mb.

A description of each function can be found at:

http://www.cpc.ncep.noaa.gov/products/wesley/wgrib2/short_cmd_list.html