Script for Boulder Windstorm case WIND01 (Part 1)

ATM419/563 Spring 2023

*** ---------- preliminaries ---------- ***

* make a directory in your lab space called **WINDSTORM**, and move into it

* copy **$LAB/SCRIPTS/WRF_REAL_SETUP.TAR** and unpack it

(tar -xvf WRF_REAL_SETUP.TAR)

* execute **sh make_all_links.sh**

*** ---------- geogrid ----------***

• Edit namelist.wps

- **200 x 200 gridpoints**
- **max_dom = 1**
- **6 km horizontal grid spacing**
- **Lambert**
- **Reference lat 40.0, reference lon -105.0**
- **True latitudes both 40.0**

ncl plotgrids.ncl — *Click on NCL window to dismiss. Compare to slide 7*

srun -p snow -n 4 geogrid.exe — Look for: "*Successful completion of geogrid*." Ignore "OpenFabrics" warnings

csh max.csh MAPFAC_M geo_em.d01.nc — *[stuff in grey == optional]*

ncview geo_em.d01.nc

[select 2D variable MAPFAC_M from drop down menu]

Optional: visualize via python script `plot_terrain_wrfpython.ipynb`

- get a copy from $LAB/SCRIPTS/, edit for location of your geo_em file
- See intro_linux_snow.ppt for info on running Jupyter on Snow

*** ---------- ungrib ----------***

• Edit namelist.wps

- **start_date = '2021-12-30-12:00:00'** **[only first column matters]**
- **end_date = '2021-12-31-00:00:00'**
- **interval_seconds = 10800** **[3 h]**

link_grib.csh $LAB/DATA/NAM_2021123012/nam.*

ls -al GRIBFILE* [make sure everything is OK]

cp Vtable.NAM Vtable [select correct Vtable!]

OPTIONS {because ungrib step will take > 20 min}:

(A) sbatch -p snow submit_ungrib [tail -f ug.srun.out *to follow along*]

(B) ln -s $LAB/DATA/ NAM_2021123012/FILE* . [to skip ungrib]

*** ---------- metgrid ----------***

srun -p snow -n 4 metgrid.exe

tail -f metgrid.log.0000 [look for *Successful completion of program metgrid.exe*]

ls met_em*

• Check number of metgrid atmospheric and soil levels

ncdump -h met_em.d01.2021-12-30_12:00:00.nc | more [TAB COMPLETION!]

[Note values for `num_metgrid_levels` and `num_st_levels` in the header information. The second is used for `num_metgrid_soil_levels` in `namelist.input`]

*** ---------- real.exe ----------***

• Edit namelist.input (Part 1)

- run_hours = 12 and run_days = 0 [12 hours]
- start and end times as in namelist.wps [1st column matters]
- interval_seconds to match namelist.wps
- time_step = 20 [20 sec]
- e_we, e_sn to match namelist.wps
- num_metgrid_levels needs to be set correctly
- num_metgrid_soil_levels needs to be set correctly
- leave e_vert [vertical levels] set at 57
- leave p_top_requested at 5000 [50 mb, in Pascals]
- set dx, dy to match namelist.wps

In namelist.input, make/check these entries:

- bl_pbl_physics = 5 and sf_sfclay_physics = 5 (MYNN2, used by HRRR)
- sf_surface_physics = 2 (Noah land surface model, used by NAM)
- num_soil_layers = 4
  (required by Noah LSM; <u>not</u> same as num_metgrid_soil_levels)
- leave bldt = 0
- leave mp_physics = 4, ra_lw_physics = 4, ra_sw_physics = 4
- set cu_physics = 0 [unwanted at 6km Δx]
- *Other settings do not need to be changed*

sbatch -p snow submit_real

[NOTE JOB NUMBER ASSIGNED. Example: Submitted batch job 774952]

squeue -u *yournetid*

[when job is finished, check 'tail' of rsl.out.0000 file with 'trsl' command.
Make sure it says "SUCCESS COMPLETE REAL_EM INIT"
Break out of tail command with ctrl-c]

*** ---------- wrf.exe ----------***

sbatch -p snow submit_wrf

[check job status as directed. WRF runs should take > 48 minutes.]
squeue -u [yournetid]

* monitor WRF run – check for 'successful completion'
trsl *(ctrl-c to break out)*

[check for successful completion with 'trsl']

ls -1 wrfout_d01*

*** ---------- GrADS analysis ----------***

• Copy control_file.3Dz from $LAB/SCRIPTS/. Edit name of wrfout file [slide 10]
• Copy vert_xz.gs from $LAB/SCRIPTS/

w2g **control_file.3Dz** wind01 [script interpolates output to specified heights]

• Slide 12:
set lat 40
set lon -108 -104
set lev 0 9
set t 7
vert_xz.gs

*** ---------- Python analysis ----------***

• You can copy and use plot_vertical_cross_section_wrfpython.ipynb from $LAB/SCRIPTS/. Modifications needed. See slide 10.

See slide 13 for Part 1 task.