Script for Kansas test case KANSAS01 (Part 1)
ATM419/563 Spring 2022

*** ---------- preliminaries ---------- ***
* make a directory in your lab space called **KANSAS**, and move into it
* copy **$LAB/KANSAS/SETUP.TAR** and unpack it (tar -xvf SETUP.TAR)
* execute **sh make_all_links.sh**

*** ---------- geogrid ---------- ***
srun -p snow -n 4 geogrid.exe Look for: "*Successful completion of geogrid*."
Ignore "OpenFabrics" warnings
ncl plotgrids.ncl *Click on NCL window to dismiss*

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]

*** ---------- ungrib ---------- ***
link_grib.csh $LAB/DATA/GFS_2016031300/gfs.*
ls -al GRIBFILE* [make sure everything is OK]

wgrib2 GRIBFILE.AAA | more [looking at contents]

cp Vtable.GFS Vtable [select correct Vtable!]

UNGRIB CAN BE TIME-CONSUMING AND CAUSE RESOURCE CONTENTION
Listen for which option we will use for this demonstration
Ungrib is done when you see: *"Successful completion of ungrib."*

Option (A): Run ungrib using srun
srun -p snow ungrib.exe ***(output goes to screen)***

Option (B): Submit ungrib as a batch job
sbatch -p snow submit_ungrib
tail -f ug.srun.out *Break out of tail with ctrl-C*

Option (C): Link to prepared ungrib outputs
ln -s $LAB/KANSAS/UNGRIB/FILE* .

Ungrib makes 11 gigabytes worth of outputs…
ls FILE*

ncl plotfmt.ncl 'filename="FILE:2016-03-13_00"' **[EXACTLY AS SHOWN]**
[That ends with a double quote followed by a single quote]
[Click to advance to next field. Ctrl-C to break out when you're done]

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

srun -p snow -n 4 metgrid.exe

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

ls met_em*

ncdump –h met_em.d01.2016-03-13_00:00:00.nc | more [TAB COMPLETION!]

[Notice is says `num_metgrid_levels = 27` in the header information]

[Note in `namelist.input`, we specify `num_metgrid_levels = 27`]

* ---------- **TOUR of batch scripts** ----------*

(see PPT)

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

sbatch -p snow submit_real

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

[check job status as directed]

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"]

trsl *Break out of tail with ctrl-c*

ls -al wrfbdy* wrfin*

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

sbatch -p snow submit_wrf

[check job status as directed. WRF runs should take about 3 minutes.]

squeue -u [yournetid]

* ---------- *while WRF is running* ----------*

* ---------- **look at wrfinput_d01** ---------- *

• visualize our model domain terrain using GrADS

w2g control_file.real real_grads [creates `real_grads.ctl`, `real_grads.dat`]

[GrADS: slide 33 figure was created from `real_grads.ctl` using `terrain.gs`]

• visualize our model domain using Python [see slide 34]

`ssh reed.atmos.albany.edu` [or `ash.atmos.albany.edu`]

`cd /spare11/NWP/yournetid`

`cp ../plot_terrain_wrfpython.ipynb .`

`cp ../plot_vertical_cross_section_wrfpython.ipynb .`

From Jupyter notebook, click NWP link, launch `plot_terrain_wrfpython.ipynb`

Edit cell 2 for the location of your geogrid output file

• examine model vertical grid (see slides 45, 46)
dopython
python read_wrfinput.py wrfinput_d01

* monitor WRF run
trsl *(ctrl-c to break out)*

*** ---------- TOUR of namelist.input settings ---------- ***
(see PPT)
*** ---------- when WRF job finishes ---------- ***
[check for successful completion with 'trsl']

ls -1 wrfout_d01*

[control_file already configured to read in that wrfout file]
[control_file.3Ds processes WRF model output on *model* (s=sigma) levels]
w2g **control_file.3Ds** kansas01

*** ---------- look at kansas01.ctl ---------- ***
open kansas01.ctl in GrADS *[GrADS commands follow]*
white
set mpdset hires *(specifies nicer looking coastlines, etc.)*
step.gs slvl 1 49 4

c
set t 13
wind.gs *(see slide 49)*

* looking at a single point, near Wichita, KS. Daytime will be ~ 12Z to 00Z
c
set t 1 49
set z 1
set lat 38
set lon -97
d swdown

c
set z 1 10 *(lowest 10 **model levels**, NOT linear with height)*
d mag(u,v) (what time of day is near-surface wind fastest?)
c
d theta *(look at 296 K contour @18Z day 1, 300 K day 2)*
(what time of day is vertical stability smallest?)

set z 10 (at what time of day is vertical shear largest?)
d mag(u,v) *(wind speed at ~1500m above ground level = AGL)*
d mag(u10,v10) *(wind speed at 10m AGL)*

```
c
set z 1 10
set lon -105                    (near Pueblo, CO)
d theta
c
d mag(u,v)*2.24                 (wind speed in mph – arithmetic is possible)

* ---------- make or copy kansas01_z.ctl  ---------- *
* ------ OR cp  $LAB/KANSAS/kansas01_z* .
* this file has model fields interpolated to height coordinates

w2g control_file.3Dz kansas01_z
open kansas01_z in GrADS
set t 13
vert_xz.gs                      (W-E vertical x-section along 38N; see slide 50)

* ------------------------------------------------------------------- *
Python script for plotting vertical cross section (see slide 51):
/spare11/NWP/plot_vertical_cross_section_wrfpython.ipynb
```