March 2022 Thunderstorm demonstration
ATM 419/563 Spring 2024 - Fovell

--------------------------------------------

• SETUP
  • Create a directory called TSTORM and move into it
  • Copy $LAB/SCRIPTS/WRF_REAL_SETUP_SNOW.TAR into it and unpack as per usual
  • Copy $LAB/TSTORM/plot_WRF_TSTORM.ipynb to your TSTORM directory
  • Execute make_all_links_SNOW.sh

• GEOGRID
  • Edit namelist.wps to configure our domain
    - max_dom = 2  [so for multicolumn entries, the 2nd column matters]
    - D1: e_we = 115, e_sn = 100
    - D2: e_we = 166, e_sn = 100
    - dx = dy = 12000
    - Lambert, ref_lat = 42.6, ref_lon = -76, both true_lats = 42.6, stand_lon = -76
    - MAKE SURE you do not write these numbers with more than one decimal point
  • Position D2 within D1
    - i_parent_start = 1, 22
    - j_parent_start = 1, 32
  • Visualize domain using ‘ncl plotgrids.ncl’ and/or plot_WRF_domain.ipynb and compare to image in PPT [don’t skip this step!]
  • Run geogrid: srun -p snow -n 8 geogrid.exe
  • Visualize terrain with plot_WRF_terrain.ipynb

• UNGRIB
  • Vtable.GFS as Vtable
  • Edit namelist.wps for our start and end times, and interval_seconds
    start_date = '2022-03-31_12:00:00', '2022-03-31_12:00:00'
    end_date = '2022-04-01_00:00:00', '2022-04-01_00:00:00'
    interval_seconds = 3600,
  • Link to the GFS data:
    link_grib.csh $LAB/DATA/GFS_2022033112/gfs*.
  • Submit ungrib script. You may have to wait for resources. Ungrib takes time:
    sbatch -p snow submit_ungrib
  • Looking for at end of ungrib.log:
    "*** Successful completion of program ungrib.exe ***"

• METGRID  [after both ungrib and geogrid are complete]
  • No further editing of namelist.wps should be needed at this point
  • Submit metgrid script
    sbatch -p snow submit_metgrid
  • tail -f metgrid.log.0000: "*** Successful completion of program metgrid.exe ***"
• What are num_metgrid_levels, num_st_layers, num_sm_layers???
  → select one of the met_em outputs, dump header, pipe to more
  → edit num_metgrid_levels, num_metgrid_soil_levels in namelist.input

• REAL
• Edit namelist.input to configure time information
  • We will run for 12 hours, so: run_days = 0, run_hours = 12
  • Set same start and end times as namelist.wps
  • Same interval_seconds as in namelist.wps

• Edit namelist.input for domain information
  • time_step = 30 [this is specified for D1 ONLY. See PPT.]
  • max_dom = 1 [we are running the single domain version at this point]
  • Same e_sn, e_we for D1 and D2 as in namelist.wps
  • Leave e_vert at 57 for each domain [they need to be set equal]
  • dx = 12000, 4000, and dy = 12000, 4000
  • Nest positioning to match namelist.wps
  • Make sure num_metgrid_levels, num_metgrid_soil_levels are correct

• Edit namelist.input for physics information!! Some of these need to be changed
  • Thompson microphysics mp_physics = 8 for both domains
  • Noah land surface model sf_surface_physics = 2 for both domains
  • MYNN surface layer sf_sfclay_physics = 5 for both domains
  • MYNN PBL bl_pbl_physics = 5 for both domains
  • Cumulus cu_physics = 1, 0 [Kain-Fritsch scheme, ON for 12 km, OFF for 4 km domain]

• Submit real script: sbatch -p snow submit_real
• tail -f rsl.out.0000: “real_em: SUCCESS COMPLETE REAL_EM INIT”

• WRF for control run
• Submit wrf script: sbatch -p snow submit_wrf
• tail -f rsl.out.0000: “wrf_em: SUCCESS COMPLETE WRF”

• Visualization of control run
• Launch ARCC Jupyterlab. Either Batch or Snow is OK; minimal resources will suffice.
• Launch and execute plot_WRF_TSTORM.ipynb

• Cumulus ensemble
• See slides 37+