ATSC 5160
WRF Project

Objectives:

- to become acquainted with NWP processes by running your own WRF model and varying physics packages, boundary conditions, resolution, domain, etc
- to better understand synoptic processes, as your model output will serve as basis for the plotting of some new diagnostics in the labs

Method:

- read the relevant chapter in the textbook: Chapter 10 (NWP)
- read the guidelines at http://www.mmm.ucar.edu/wrf/users/.
- follow the procedure you followed for ATSC 5004 Dynamic Meteorology last semester to edit the namelist files that drive WRF-ARW v3. Guidelines from Dr. Parish are available on the ATSC5160 site.

Case:

A deep cyclone affected the Eastern US on 2012/12/20. Model initial time: 12 Z on 19 Dec 2012. Forecast period: 48 hrs. As initial and boundary field, you can use the 12 km NAM (218 grid) data, which can be downloaded from the NOMADS server (http://nomads.ncdc.noaa.gov/data.php#hires_weather_datasets). You can also use the 32 km, 3-hourly North American Regional Reanalysis (NARR) .grb files (221 grid), available from the NOMADS server as well (http://nomads.ncdc.noaa.gov/data.php#narr_datasets).

I suggest you run a single nest at a fine vertical resolution (use maybe twice the standard number of levels, e.g. 64) and a coarse horizontal resolution, e.g. 60 km. You can go finer if you like, but mesoscale features will start to emerge and dominate in the QG diagnostics; sometimes, esp. when the initial field is the 12 km NAM, you may find the simulation to crash at a resolution of 60 km. In that case, try a slightly smaller grid spacing. The domain is roughly from 20N;-130 W to 65N;-55 W (SW to NE corners). Use the default number of levels in the vertical, and don't set the top level higher than 100 hPa. You can use a rather coarse geog_data_res dataset, 10 minutes (1/6 degree) or coarser. (In general, the geographical info needs to be just finer than your grid resolution). In the WRF namelist, you need to define a center point and range, which you can derive from the corners given. Your time step needs to satisfy the CFL stability criterion (p 249 in the textbook).

Other parameters & physics options are yours to choose and justify, based on your reading of Chapter 10. Your first task will be to specify your model configuration. Everyone will run the same case, but everyone should have a different model configuration.

Assignment:

1. **due Thu 5 Feb**: have your initial/boundary data downloaded and ready to use as grids for your WRF run (WPS), and your WRF configuration ready. Email me your namelist.wps, namelist.input. Also provide a brief description and justification (max 2 pages) of your planned model run, including a table detailing your WRF configuration choices.
2. **due Thu 12 Feb**: have your model output ready. The first lab assignment to use your model output will be on Wed 5 Feb. Instructions will be given to convert this output to pressure coordinates, further analysis using gempak.