**ATM350 Homework 4: Due Thursday, April 20**

Preparation: In your **atm350** directory, create a folder named **hw4**, and change its permissions so it is readable, writeable, and executable only by you. Then change into this directory; all of the files you are creating should be in this directory.

For all problems in this assignment, use the initialization time (zero hour forecast, or F00) from the 00 or 12 Z run of the current day’s half degree GFS. You can find this grid file in /data7/nmc2, with the naming convention YYMMDDHH\_gfs255.gem. (Note that this file will automatically be archived to the **/nmc2/gempak** directory after a day or so, so if you begin your assignment on one day and then go back to it later, you may have to switch the value for ***gdfile***). Your plot should be of the entire continental U.S., so you should set your **garea = us**, and leave your **proj** blank. Finally, for smooth contours, set **contur = 3/2**, and for hardware fonts choose **text = 1/22/hw**.

*Note that you get to choose the contour intervals, colors, and in general how the plot looks, and part of the grade for each problem will come from the overall aesthetic and readability of your plot.*

1. Using gdplot2, create a plot of 2-m temperature (in °F, color fill) and 10-m wind (barbs in knots). You should first set your **device** to **xw** and run gdplot2 until you are satisfied with your plot. Then, you should save your settings file and name it “**sfc\_temp\_wnd.nts**”, and then change your device to **gf|sfc\_temp\_wnd.gif**, after which running gdplot2 will create a gif image of your plot, and save it to the directory in which you’ve run gdplot2.

1. As in #1, but now create a plot of color filled 500-mb absolute vorticity (in s-1 x 10-5 so it should be scaled by a factor of 5), 500-mb height (in decameters [m x 10-1], contoured), and wind barbs in knots. Save a settings file called “**500avor.nts**”, and save your plot as a gif image called **500avor.gif**.
2. As in #1 and #2, but now create a plot of color filled 300-mb isotachs (in knots), 300-mb height (in decameters [m x 10-1], contoured), 300-mb divergence (contoured, only plot positive values, or specifically divergence, in s-1 x 10-5 so it should be scaled by a factor of 5) and 300-mb wind (barbs in knots). Save a settings file called “**300div.nts**” and save your plot as a gif image called **300div.gif**.

4. Plot a cross section using the GEMPAK program **gdcross**. In your cross section, you should plot potential temperature contoured every 3 K, relative humidity (color fill), OR vertical motion (omega). Make your cross section at least three large U.S. states in length in any direction (e.g., ALB>RDU). Feel free to draw your cross section through any interesting synoptic feature, like a jet or a front. You can also use any of your previous plots in gdplot2 and run **cursor cxstns** to draw your own cross section line. Set **yaxis = 1000/200** to plot your cross section from 1000 mb to 200 mb.

*Note that you cannot use exclamation points between your variables in gdcross, so you must run gdcross two times to plot two variables on top of each other. If you are using a color fill, you should plot that first, so that contours can be plotted on top of the color fill. In order to plot two variables, you must set* ***clear=yes*** *for the first variable plotted, and* ***clear=no*** *for the second variable. Finally, be sure to keep your device the same for each time gdcross is run, so that the two variables will be plotted on the same gif.* **You should save two settings files**, one for each variable plotted, once you are happy with your plot, so that it is quicker to run gdcross for both of the variables you wish to plot. This is actually easier done using a script, which you may also do. Your graphic should have the naming convention **YYMMDDHH\_xsec.gif**.