

**AOSC 470/600**  
**Homework #1 -- "OCTOBOMB" Python Graphics**  
**DUE: Tuesday 12 September 2017 (5 p.m.)**

For this assignment, we will be creating some graphics from reanalysis data of the Octobomb event for one of the following times:

**26 October 2010, 00 UTC**  
**26 October 2010, 06 UTC**  
**26 October 2010, 12 UTC**  
**26 October 2010, 18 UTC**  
**27 October 2010, 00 UTC**

First, select one of the above five times to perform your analysis.

For the above times, you can find reanalysis data here:

/data/op/dkleist/aosc600/data/oct2010/cfsr/pgbhn1.gdas.yyyymmddhh.nc

or

/data/op/dkleist/aosc600/data/oct2010/narr/narr-a\_221\_yyyymmdd\_hh00\_000.nc

Here, yyyy = four digit year, mm = two digit month, dd = two digit day, and hh = two digit hour. These are two different reanalysis data sets (cfsr is global half degree data, narr is North American on the "221" grid). The files have different contents, so be sure to use ncview or ncdump before getting too far. Feel free to use either the narr or cfsr data.

**Assignment:** Please submit your graphics and code electronically to dkleist@umd (or upload via ELMS)

AOSC470 students, please complete two of the three graphics. For AOSC600 students, please complete all three of the following:

1. Plot 500 mb Height (color filled with associated color bar, 30m interval) and mean sea level pressure (contoured, 4 mb interval) on the same plot. The plot should be something along the lines of the Unisys ECMWF graphics:  
[http://weather.unisys.com/ecmwf/ecmwf\\_500p\\_4panel.gif](http://weather.unisys.com/ecmwf/ecmwf_500p_4panel.gif)

**Hint:** The pressure tendency graphic in the tutorial had color filling and contouring on the same graphic.

2. Plot the 500 mb absolute vorticity (color-filled with associated color bar) and 500 mb heights (contoured, 30m interval). For this, compute the relative vorticity from the wind field using the gradient routine in numpy (which will give you  $du/dx$ ,  $du/dy$ ,  $dv/dx$ , and  $dv/dy$ ). Be sure to combine your computed relative vorticity with coriolis (note you have an array containing the latitude already). Please do this using the NARR data. Feel free to compare your result with the contents of the CFSR data (ABSV\_500hgt).
3. Plot one variable of your choosing to help identify where there may be a lower tropospheric frontal zone. Feel free to use temperature, potential temperature, water vapor, or gradients of one or more of the relevant quantities.