

MPO531 Spring 2009 Class Project:

We will become more familiar with available satellite remote sensing tools, and with the strengths and limitations of the Weather Research and Forecasting (WRF) model and its parameterization choices. The focus will be on the Atlantic basin (35N-equator, 95W-0W). The two time periods are: a) Sept. 12-20, 2006, when hurricane Helene interacted with a Saharan dust outbreak, with ~30 dropsondes deployed as part of SALEX (the mission is described further in 20060916N1sum.pdf), and b) a typical week-long Atlantic summer climatology: I picked June 16-24, 2007 based on a superficial perusal of MODIS imagery.

The model is run using boundary conditions derived from NCEP, updated every 6 hours.

Si Won will compile satellite observations, using the "Giovanni" NASA website: <http://disc.sci.gsfc.nasa.gov/giovanni/>. This is a website that allows one to visualize satellite datasets without committing to downloading data and plotting it up oneself. One focus is on variables that can be compared to the model output.

Marcella will run WRF simulations for the 2 cases for the specified Atlantic domain, trying out 3 of the microphysics packages and 2 of the cumulus parameterization packages in turn. The microphysics packages are the Kessler scheme (which doesn't include ice); the WSM 3-class scheme (allows ice, but no supercooled water nor snow evaporation); and the Morrison 2-moment scheme (which tries to be fairly complete). The 2 cumulus parameterizations are the Kain-Frisch scheme, and the Betts-Miller-Janjic scheme. Output variables are: cloud fraction, preferably at 3 levels (low,middle,high); cloud liquid water path; cloud ice water path; and precipitation;

For the default parameterization (cu_physics=2,mp_physics=3), two vertically-resolved variables, temperature and relative humidity, are also output.

Or, 7 total number of runs:

- for June 16-24, 2007: cumulus parameterization = 2 + microphysics option = 1,3, and 10; cumulus option = 1 + microphysics option = 3 (4 runs)
- for Sept 12-20, 2006: Marcela's defaults, Betts-Miller+ Kessler scheme, and Kain-Frisch +mp_physics=3 (3 runs).

Model output is daily, let's say at 18 UTC (which will reflect afternoon conditions over the domain).