Atm 401/501 – Spring 2019 **30 April 2019**

Real-Time Severe Weather/Quantitative Precipitation Forecasting Exercise

The purpose of this exercise is to prepare heavy precipitation forecasts and issue severe weather outlooks (and watches as needed) for three consecutive 12-h periods beginning at 0000 UTC. For this exercise, the class will be split into Atm 401 team and Atm 501 teams. The Th 25 April class will be devoted to a general discussion of severe weather. Forecasts will be made on Tu 1 May, Th 3 May, and Tu 7 May. Each team will be responsible for presenting present their forecasts each day. Each team will be allocated 20 min to present and discuss their forecasts starting at 4:55 pm (see presentation details below).

1. Forecasts to be issued:

a. National 12-h quantitative precipitation forecasts (QPFs) for 0000–1200 UTC (overnight), 1200–0000 UTC (tomorrow), and 0000–1200 UTC (tomorrow night) for precipitation amount thresholds of 0.25", 0.50", 1.00", 2.00", etc.
b. National severe weather outlooks for the same periods as the QPF forecasts and modeled after the Storm Prediction Center (SPC) outlooks that are routinely disseminated. Watch boxes may be issued as appropriate.

2. Methods:

a. Work as a team.
b. Use any available maproom and internet products.
c. Use SPC real-time mesoanalyses (https://www.spc.noaa.gov/exper/mesoanalysis/)
d. Use SPC HRRR Model Browser (https://www.spc.noaa.gov/exper/hrrr/)
e. Pay special attention to surface boundaries of all kinds.
f. Use satellite, radar imagery and precipitable water charts to locate moisture axes.
g. Monitor/calculate surface and upper-air moisture convergence
h. Monitor/calculate stability changes from model gridded datasets
i. Construct simple 850–700-hPa and 700–500-hPa temperature difference maps
j. Use ingredients-based forecasting (i.e., lift, instability, moisture, and boundaries)
k. Produce electronic forecast maps using your preferred graphics package
l. **Prepare a composite chart to show key features (moisture axes, jet corridors, boundaries, thermal ridges, ascent zones, etc.) as in Maddox and Crisp (1999) (See page 3).**

3. Verification:

a. Prior to the map discussion and forecast presentations beginning on day 2, the lead team from the previous day will be responsible for providing an overview of the QPF and severe weather forecast verification from the previous day.
b. Each team will perform verification twice (the lead team on the last day of the forecast exercise should provide the group with a short electronic verification).

c. Verification data can be found at:
    i. SPC: http://www.spc.noaa.gov/climo/
    ii. NOAA/NWS: http://water.weather.gov/precip/

4. Presentation Mechanics:

a. Each team overviews and presents their forecast (**~20 min each**).
b. C**hallenge/question** each other's forecasts and reasoning as required
c. Beg to differ (but decline to bicker) as required
d. Highlight points of disagreement with evidence-based arguments

5. Potentially Useful Severe Weather-Related Links:

a. ATM401/501 Severe Weather Presentation: http://www.atmos.albany.edu/daes/atmclasses/atm401/PPTs-PDFs_files/SevereWx_Overview.pptx
b. SPC Forecast Tools: http://www.spc.noaa.gov/exper/
c. College of DuPage Weather Lab (https://weather.cod.edu/)
d. Victor Gensini weather page at Northern Illinois University (http://atlas.niu.edu/)
e. COMET MetEd Modules: http://www.meted.ucar.edu/index.htm
    i. A Convective Storm Matrix: Buoyancy/Shear Dependencies
    ii. An MCS Matrix
    iii. Mesoscale Convective systems: Squall Lines and Bow Echoes
    iv. Severe Convection II: Mesoscale Convective systems
f. University of Illinois Severe and Hazardous Weather Page - An excellent resource for learning about storm structure and climatology: https://www.atmos.illinois.edu/~snodgrss/Ag_Wx.html
g. HPC Development and Training – QPF and winter weather: http://www.wpc.ncep.noaa.gov/research/res2.shtml
h. HPC Model Diagnostics – Model verification and d(prog)/dt: http://www.wpc.ncep.noaa.gov/html/model2.shtml
i. Mike Bodner's real-time standardized anomaly page at NCEP/HPC: http://www.wpc.ncep.noaa.gov/training/SDs/
j. Kyle Griffin's archived/forecast GFS analyses: http://www.atmos.albany.edu/student/kgriffin/maps/
k. TwisterData model analyses and forecasts: http://www.twisterdata.com/
l. Tom Galarneau's real-time QG diagnostics: https://tgalarneau.faculty.arizona.edu/content/real-time-qg-diagnostics
m. Pivotal Weather (https://www.pivotalweather.com/)

Composite chart after Maddox and Crisp (1999):

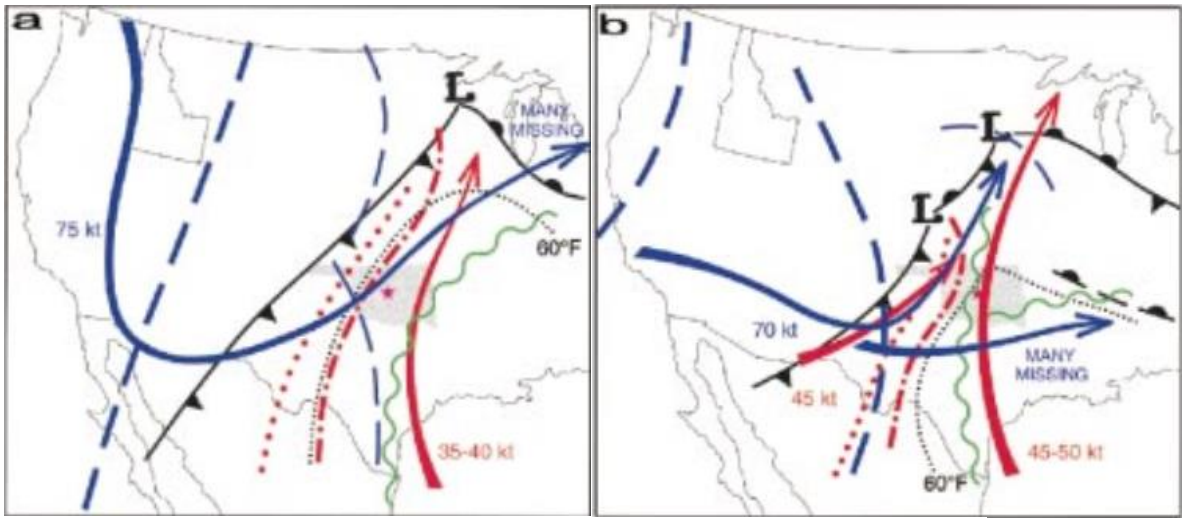

FIG. 7. Composite charts constructed for (a) 0600 UTC 21 Mar 1948 and (b) 0000 UTC 26 Mar 1948. Features are as on preceding charts with 500-mb features in blue, 850-mb features in red and green, and surface frontal analyses and 60°F dewpoint in black. The wavy green lines indicate moisture axes at 850 mb and the red dotted lines the axes of highest temperatures at 850 mb. Maximum observed wind speeds are indicated; many winds were missing at 500 mb.