

Weather Analysis and Forecasting
ATMO 574
Homework #1: Synoptic Analysis of a Significant Weather Event

Part 1: Surface Analysis

Given the METAR observations for central U.S. region, transcribe these data as the station models at each respective geographic location. The geographic positional referencing for all METAR station locations can be found at <http://weather.rap.ucar.edu/surface/stations.txt>

Do the following on your map:

- Draw isobars in intervals of 4 mb with a solid black line. Note that you will need to convert from the altimeter reading for the approximate surface pressure in mb.
- Draw isotherms in intervals of 5° F with a red dashed line.
- Indicate local areas of high and low pressure and sketch any surface front(s) with appropriate coloring and symbols.
- Shaded areas where there is precipitation being observed (preferably in light green)
- Label any locations where relatively strong warm or cold advection is occurring, respectively by CAA and WAA

Part 2: Weather discussion

Write a brief synopsis of the weather for this day. Your synopsis should include:

- Discussion of the presence of any mid-latitude cyclone(s) and at what stage of development they are, according to the Norwegian Cyclone model, and why.
- Justification for positioning of the fronts and types of fronts
- Description of the observed surface weather in relation to mid-latitude cyclone structure and presence of surface fronts.
- Notation of geographic areas where weather watch or warning criteria are likely warranted, and what these should be.

Part 3: Inference of upper level patterns

Based on your knowledge of mid-latitude cyclone structure (per your answer in Part 2) and the locations of strong surface warm and cold advection, sketch what a plausible upper-air map of 500-mb geopotential heights and 1000-500 mb geopotential height thickness would look like for this weather event. You should include plausible values for the contour intervals. Indicate areas of strong rising or sinking motion per your analysis of thickness advection.

Due September 26