Short Range (24 h) Forecast without NWP

In this course the "take" on weather forecasting is for students to learn how to make the most of available NWP guidance. However the point of this exercise to promote at least some experience in forecasting without NWP, i.e. based only on available recent *analyses*.

It is a challenge to forecast without NWP guidance on ranges beyond about 48 hours, so we'll go with 24 h. The principle of weather "persistence" is likely to play an important role in your forecast (i.e. an assumption that the large scale pattern is stable, or liable to change in the same sense and at the same rate as it has done for the past 24 hours). The forecast should appropriately be qualitative, and should target: dominating pressure system and upper flow; categorical surface temperature, surface wind strength and direction; likely sky condition, and possibility of precipitation.

Principles

As notation, let t_0 designate your initial time (time at which the available analyses apply), so that for a 24h forecast the valid time is $t_0 + 24$.

- Identify surface pressure systems that could affect the forecast region within the forecast interval, and identify their location and strength at $t_0 - 24$
- Identify the pattern of the waves aloft, say at 500 hPa. The orientation of the winds aloft is considered indicative of the direction of motion of surface storms... but this guidance should be considered in concert with the storm's history, and the most recent surface pressure trend.
- Is thickness likely to increase, or decrease?
- Referring to the 850 hPa analysis (and/or the 1000-500 hPa thickness pattern), is there a possibility of radical temperature advection?
- Is there a likelihood of cyclogenesis that might affect the forecast location? – look for strong baroclinic zones, and shortwaves
- If your forecast location seems liable to be affected by a storm, will the storm pass north, south, or over your location?
- Is a mechanism for ascent liable to operate? Is there a moisture supply?

Procedure

1. start with a hard copy of the 500 hPa analysis for your initial time t_0. Identify the point of interest **P** on the map.
2. mark the present locations of the centres of at most two relevant surface pressure systems (and perhaps their central pressures)
3. mark the centre locations and central pressures 24 hours ago
4. highlight a 500 hPa contour running through **P**, based on the 500 hPa analysis, and also (roughly) its history (i.e. position at $t_0 - 24$)
5. on this single contour, mark the present (t_0) and past ($t_0 - 24$) positions of the nearest upwind shortwave (if any) – based on the 500 and/or 700 hPa analysis
6. mark up relevant thermal ridges and troughs... and their position (roughly) at ($t_0 - 24$)
7. draw a line locating any strong baroclinic zone (or front) near **P**, based on the 850 hPa analysis
8. extrapolate the positions of the surface centres forward 24 h, based on: past motion, orientation of your upper contour, surface pressure trend
9. readjust position of fronts
10. if your system(s) have upper support, deepen or fill accordingly