



Weather Forecasting – Numerical Weather Prediction

WHAT YOU SHOULD LEARN IN THIS EXERCISE:

- How to read and interpret numerical weather prediction model output and to recognize the each model gives slightly different forecasts.

WHAT YOU NEED TO DO IN THE COMPUTER LAB:

Part A: Getting Started

A1. Launch Internet Explorer and open the “Weather Information Page” – the link can be found from the “external links” section of the Blackboard web page. Choose “Forecast Maps.”

Part B: Background Information

- B1. Your TA will provide you with some information of how numerical weather prediction models work.
- B2. Our most sophisticated forecasting approach will be the use of numerical weather prediction (NWP) models. NWP uses mathematical equations describing the atmosphere to estimate the weather conditions at some time in the future. Different computer models may give slightly different forecasts. Two models we will examine are the “ETA” and the “Aviation” (AVN). These models are often more accurate in predicting upper-air maps rather than surface maps because the models do not include details of the surface.

We will examine Sea Level Pressure/Precipitation forecast maps and 300mb forecast charts.

SLP/Precipitation maps

- The cyan lines are sea level pressure, contoured every 4 mb.
- The colored shading is accumulated precipitation in inches. A scale is provided at the bottom of the chart.
- The yellow lines are contours of the 1000 mb – 500 mb thickness. You can think of them as temperature contours. The “540” line is the approximate location of 32 °F.

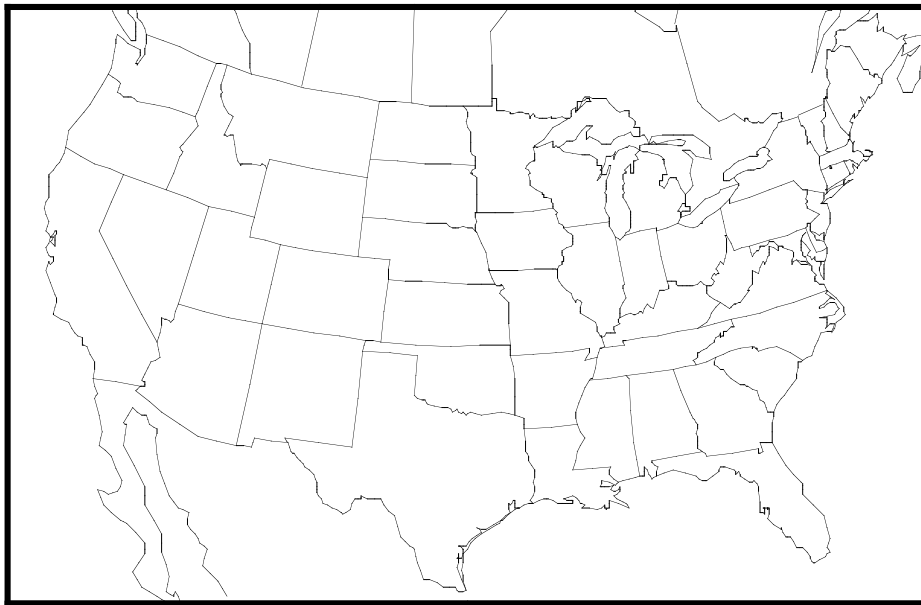
300 mb charts

- The white lines are height contours, they give the same information as pressure contours
- The white arrows are wind vectors indicating the direction and magnitude of the wind.
- The colored shading is wind speed. A scale is provided at the bottom of the chart.

Part C: Making a forecast – Comparing model output

ETA Model

- C1. On the Forecast page, scroll down to “Short Term Forecasts” and click on the ETA from UW-Madison.
- C2. Click the “24 hr fcst” forecast for 300 mb. On the map of the U.S. below sketch in the location of the jet stream.
 Write the date and time the map is valid: _____
- C3. Now go back to the and choose the “24 hr fcst, 12 hr pcpr.” Using the location of the jetstream and the information on this map:
- Write the date and time the map is valid: _____
 - Identify where low pressure systems might be found by placing an “L” on the map.
 - Sketch in where precipitation may fall.
 - Sketch in the locations of fronts.



- C4. Using the map you created and the information on-line, make a forecast for the weather at each city listed below.

| | Temperature (warm, cold) | Sky Cover (clear, cloudy) | Precipitation (no, yes – type) | Winds (strength, direction) |
|----------------------|-------------------------------------|--------------------------------------|---|--|
| Denver, CO | | | | |
| Duluth, MN | | | | |
| Champaign, IL | | | | |
| New York City, NY | | | | |

AVN Model

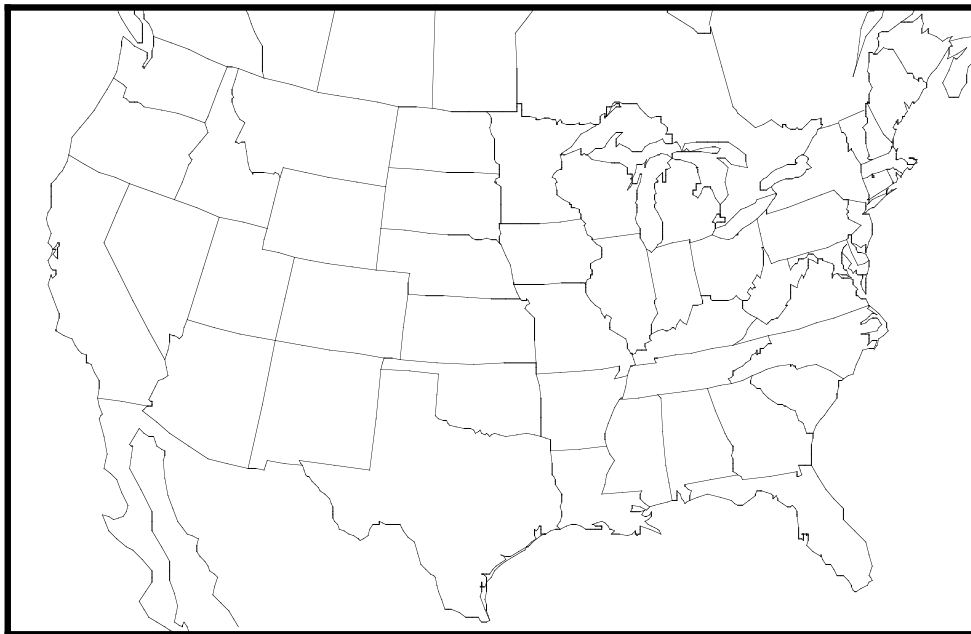
C5. Now you are going to make the same forecast as above using another model. From the Forecast page, click on the link for UW-Madison “AVN”

Open the 300 mb forecast chart for the same time as the one in C2. On the map of the U.S. below sketch in the location of the jet stream.

Write the date and time the map is valid: _____

C6. Now open the Surface forecast for the same time. Using the location of the jetstream and the information on this map:

- Write the date and time the map is valid: _____
- Identify where low pressure systems might be found by placing an “L” on the map.
- Sketch in where precipitation may fall.
- Sketch in the locations of fronts.



C7. Using the map you created and the information on-line, make a forecast for the weather at each city listed below.

| | Temperature (warm, cold) | Sky Cover (clear, cloudy) | Precipitation (no, yes – type) | Winds (strength, direction) |
|-------------------|-------------------------------------|--------------------------------------|---|--|
| Denver, CO | | | | |
| Duluth, MN | | | | |
| Champaign, IL | | | | |
| New York City, NY | | | | |



Part D: Forecast Comparison

- D1. Compare your forecast of the jetstream location in parts C2 and C5. How are they similar? How are they different?
- D2. Compare your forecasts for the location of low pressure centers and precipitation in parts C3 and C6. How are they similar and different?
- D3. Are there any differences between your forecast for each of the cities? If so, what?
- D4. List at least two that reasons can you think of that might explain why the two computer models, with the same initial information, might produce different forecasts.

(Turn in all completed sheets to your TA.)