ATMS 350 WEATHER FORECASTING

Course Objectives: to familiarize students with the tools meteorologists use to make weather forecasts; to familiarize students with the process of making a weather forecast; to give students the chance to develop and sharpen their own forecast skills

Grading: homework (30%)- assignments are due the following class period unless otherwise noted, points will be taken off for late assignments; four tests (60%); final exam (10%). Normal ten point scale will be used. Depending on the grade distribution, I may scale grades slightly and use + and - grades.

Forecasts: each class day, you will do a forecast for the Asheville Airport; you will forecast the high and low temperature and precipitation by category for midnight to midnight the following day. Each forecast will get a score- 1 point for each degree you=re off on the high and low and 5 points for each precip. category you=re off by. You can either submit the forecast in writing or by e-mail. The latest time a forecast can be submitted or amended is 5PM. Missed forecasts can not be made up. You will be given the highest score of your classmates. You won=t be graded for this, so have fun and try to improve your forecasting ability. We=ll add these up at the end of the semester and see who wins.

Your Instructor

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I'll use the Campus Pipeline to e-mail you. Make sure you can get your e-mail from your Bulldog account.

Course Outline

Text: Weather Forecasting by E.A. Brotak

- Introduction
- Winter Precipitation Forecasting
  - Precip. Type Forecasting
  - Snow Forecasting
- Forecast Problem
- Persistence, Continuity, and Analog Forecasting
- Numerical Weather Prediction
  - Early Numerical Models
  - Short Range Forecast Models
    - Nested Grid Model (NGM) and Products
    - ETA Model and Products
    - Spectral Models and Products
  - Medium Range Forecast Models
  - Mesoscale Models
    - Rapid Update Cycle (RUC) and Products
    - MM5 and Products
- Model Output Statistics (MOS)
  - Development of MOS Products
  - Probability of Precipitation (POP)
  - MOS Guidance Packages
  - Other MOS Products
- National Weather Service Operations
- NCEP Products
  - Short Term Forecast Products
    - Prognostic Discussions
    - Surface Prog Charts
  - Medium Range Forecast Products
    - Medium Range Forecast Discussions
    - Medium Range Forecast Charts
  - Extended Outlook Products
    - Extended Outlook Discussions
    - Extended Outlook Charts
- Local NWS Office Products
  - Area Forecast Discussion
  - Short Term Forecast (NOWCAST)
  - Zone Forecasts and Derivative Products
  - Revised Digital Forecast
  - Short Fused and Long Fused Weather Warnings, Watches, & Advisories
- Thunderstorm and Severe Weather Forecasting
  - Synoptic Charts
  - Soundings
  - Stability Indices
  - Thunderstorm and Severe Weather Charts
  - Severe Weather Watches and Warnings
- Tropical Cyclone Forecasting
- Aviation Forecasting

MAKING A FORECAST

First, you must know something about the location.

1. Geographic setting: elevation, mountain ranges, bodies of water
2. Site of station: urban vs. rural
3. Climatology: averages, extremes (gives framework for forecast)

Check conditions over the recent past (at least the last few days).

1. Temperature: highs & lows, above or below normal
2. Precipitation: wet or dry
3. Relationship to the overall pattern

Check current conditions- this is your starting point

1. Latest surface observation
2. Latest surface map
3. Latest radar and satellite information
4. Latest upper-level charts (especially 500 mb)

Forecast- will future conditions be the same as the current conditions or will they change; use forecasting models and guidance (things we will discuss in this course)

Temperature forecast: start with today's readings and adjust for situation

a. Frontal passage
b. Temperature advection (warm, cold, or neutral)- check where air is coming from
c. Amount of cloudiness- clouds will produce higher minimums and lower maximums
d. Wind- will produce higher minimums
e. Amount of moisture in the air
   1) Moist air will not allow as much heating during the day- lower maximums especially in summer
   2) Moist air will not allow as much cooling at night- higher minimums (dewpoint can give you an idea of how cold it may get)
f. Precipitation- evaporative cooling lowers temps.

Remember you are forecasting for midnight to midnight. Normally, the min occurs near sunrise and the max in the afternoon. Especially in winter, frontal passages can change the usual pattern. In such cases, check for midnight highs and/or lows.

Precipitation forecast

Look for systems that could bring precip.- surface lows and fronts, upper level troughs, jet streaks
Look for moisture advection
Look for lifting mechanisms- warm advection (frontal lifting, overrunning, isentropic lifting), divergence aloft, topography, convection (steep lapse rates)

Precip., which is inherently more difficult to forecast than temperature, lends itself to a range approach. Determine which categories you think can't happen and work from there.

This is a learning experience. Don't just copy the MOS forecast. You'll learn nothing by doing this. Make your own forecast first and then compare it to MOS. If there are major differences, go back and check your reasoning and adjust if you feel necessary. Remember, MOS isn't always right.

Use common sense. Learn from your mistakes. It is impossible to be right all the time.