

Meteorology 3110 - Fall 2024 - Final Exam Review

Air Masses, Fronts, Jet Streaks

Air Masses

- Air mass classification and general identification of air masses on a map

Fronts

- Front type identification and front location.
- Front type id: Movement of the cold air.
- Front location: temperature discontinuity, pressure discontinuity, wind shift, dew point discontinuity, etc.

Jet Streaks

- Quadrant identification construction and identification.
- Areas of upward and downward motion.
- Physical justification of upward and downward motion regions.
 - “Skier” explanation, PVA/NVA explanation
- Direct and Indirect circulations.

Remote Sensing (Satellite and Radar)

Satellite remote sensing

- Characteristics of Visible, IR, and Water Vapor imagery.
- Strengths and weaknesses of each.

Radar

- Definitions and general characteristics of Doppler and dual polarization radars

Numerical Weather Prediction and NBM tables

Numerical weather prediction

- Finite differencing techniques (centered, upwind)
- Primarily “Model Types” and “Important Features” slides in PowerPoint presentation.

NBM Model Tables

- What is the NBM (National Blend of Models)?
- Characteristics of NBM systems (ensemble modeling).
- Reading an NBM table report.

Divergence, Vorticity, and Upward Motion

Natural coordinates

Divergence

- Mathematical form (Cartesian coordinates)
- If I want you to use natural coordinate form, I will provide it.
 - However, you should be able to explain this form.
- Where does it come from?
 - Acceleration/Deceleration of air parcels.
 - Confluence/Diffluence
 - Very difficult to see if there is a net convergence or divergence from looking at maps alone. Need to do the calculation.
- Why is convergence/divergence important at low levels? What is the result of each?

Vorticity

- Mathematical form (Cartesian coordinates)
- If I want you to use natural coordinate form, I will provide it.
 - However, you should be able to explain this form.
- PVA/NVA
- Why is PVA/NVA important? What is the result of each?

Upward Motion

- Equation is on equation sheet.
- Vertical motions vs. vertical velocity.

Balanced Wind Approximations

Geostrophic Wind

- Equation is on the equation sheet.
- What is it and where does it come from?
- Where does it work best and why?

Gradient Wind

- Equation is on the equation sheet.
- What is it and where does it come from?
- Where does it work best and why?
- How does it differ from the geostrophic wind?
- How does it differ from the real wind?

- Remember sign conventions for radius of curvature.
- Derivations and conclusions based on gradient wind.

Thermal Wind

- What is it? Difference in geostrophic wind with height.
- If geostrophic wind backs with height: CAA
- If geostrophic wind veers with height: WAA
- What does WAA and CAA advection imply for vertical motions and thickness changes?
- Review thickness equation.

Good Luck!