

## **Mesoscale Analysis and Forecasting**

### **Review sheet for 2nd Midterm Exam: 26 February 2009**

This exam will count for 12.5% of your final grade.

Unit 2 includes the topics that we covered beginning with convection and convective initiation and extending through multicells. Supercells will be on the Unit 3 exam (not this exam). The relevant parts of the text are: chapter 6, chapter 7 (except not section 7.5), sections 8.1–8.3, and section 9.3. The exam will be conceptual, and will not require you to do derivations. However, we spent some time using and working out some important equations. You should have enough familiarity to recognize these equations, and to apply them. Examples include:

- Definitions for buoyancy including the hydrometeor loading terms; CAPE and DCAPE
- Diagnostic pressure equation (do **not** memorize, but be able to apply it to simple situations)

#### **Other things to have down:**

- Know your way around skew- $T$  ln- $p$  diagrams and hodographs
- Know how to decode basic METAR observations, how to read surface and upper air charts, etc.
- All basic conversions... °F to °C and K, kts to m/s, temperature to potential temperature, etc.
- Be able to draw phenomena: cumulus clouds, ordinary cells, and multicells... plan views and cross-sections... reflectivity, flow fields, cloud outlines, etc.

#### **Unit 2 questions/topics for thought and review:**

- What is convection? Deep moist convection? Forced/active/passive convection? What does mixing do to convective clouds? What is needed for a convective cloud to produce precipitation? How are convective storms initiated?
- What is the life span for an ordinary cell? What governs this time scale? What are the basic elements of a forecast for deep moist convection? For severe storms? How does dry air aloft impact moist convection?
- How do downdrafts come about? What are their possible impacts on the convection? On society? What are the key properties of environments for dry and wet microbursts? For heat bursts?
- What happens when a pool of cold outflow develops at the surface? What impacts the speed of the outflow boundary?
- What are multicells like? What do they require in order to be long-lived? Why?
- What are the basic elements of a forecast for deep moist convection? For severe convective storms? Make sure you know the keys on the “basic, ingredients-based approach to the convective forecasting process” handout, and the accompanying Powerpoint slides.