

Earth System Science 5: The Atmosphere (2007S)

Final Exam study guide

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Final Exam: 06/12/2007 Tuesday 4:00pm

!!!!!!All Homework & Quizzes!!!!!!

Chapter 6: Cloud Development and Forms

- ◆ Four air lifting ways: frontal, orographic, convergence and convective lifting
- ◆ Adiabatic VS. diabatic processes?
- ◆ Lapse rates: Environmental lapse rate, dry adiabatic lapse rate and moist (wet) adiabatic lapse rate.
- ◆ How to determine if the atmosphere is absolute or conditional stable or unstable?
- ◆ Cloud type based on height: Low / Middle / High
- ◆ Properties of every cloud type.

Chapter 7 Precipitation Processes

- ◆ What is terminal velocity?
- ◆ Growth in warm cloud VS. cool and cold clouds
- ◆ What are collision and coalescence and where do they happen?
- ◆ What is Bergeron process about? What are rimming and aggregation?
- ◆ Forms of precipitation (snow, rain, graupel, hail, sleet, freezing rain)
- ◆ Cloud seeding

Chapter 8 Atmospheric Circulation and Pressure Distributions

- ◆ What is the three-cell model? What are the three cells? What is ITCZ, subtropical high?
- ◆ Upper troposphere westerlies; Semi-permanent pressure cells
- ◆ The polar front and the two jet streams
- ◆ How do we define the scales of the atmosphere? What is the order from largest to smallest?
- ◆ Major wind systems: Monsoons, Sea/Land breezes, Mountain/Valley breezes; what is their common mechanism?
- ◆ Santa Ana winds
- ◆ Surface wind-driven ocean current
- ◆ El Nino and Walker Circulation (Southern Oscillation)

Chapter 9 Air Masses and Fronts

- ◆ What are the classifications of air masses? How many air masses? Where are the source regions (map)? What are the two characteristics of certain air mass?
- ◆ Four kinds of front systems: cold front, warm front, stationary front and occluded front. And cloud types above the warm front VS. the cold front.
- ◆ Arctic front vs. polar front

Chapter 10 Mid-latitude Cyclones

- ◆ The characteristics of mid-latitude cyclones
- ◆ The life cycle (3 stages) of a mid-latitude cyclone
- ◆ Earth (planetary) vorticity, relative vorticity and absolute vorticity
- ◆ Anticyclones

Chapter 11 Lightning, Thunder, and Tornadoes

- ◆ Processes of lightning formation
- ◆ cloud-to-cloud (sheet lightning) and cloud-to-ground lightning
- ◆ What is a thunderstorm? Two types of thunderstorms
- ◆ Air mass thunderstorm three stages
- ◆ Mesoscale Convective Systems (MCS) ; Mesoscale Convective Complexes (MCC)?
- ◆ Downbursts and Microbursts
- ◆ Tornadoes; The location and timing of tornadoes in U.S.
- ◆ The Fujita scale

Chapter 12 Tropical Storms and Hurricanes

- ◆ Naming of Hurricane / Typhoon / Cyclone, Annual hurricane frequency
- ◆ Hurricane characteristics, formations, energy and hurricane season
- ◆ Basic structures of hurricane

Chapter 16 Climate Change: Past and Future

- ◆ Lecture notes
- ◆ Temperature changes in the past 20th century
- ◆ Ocean VS. land temperature changes; vertical distribution of temperature changes
- ◆ Projected precipitation/hurricane activity changes in the future