



Oct 15: Overview and Midterm Exam

This midterm exam includes

- Four short questions, selected from a total of five (20 points each),
- An extra credit from short question (i.e., optional) (5 points),
- Five true/false or multiple-choice questions (20 points)

Covers materials since week one, including

- Global climate change
- Spatial and temporal variations
- Theoretical foundations for global warming
- Koppen climate classification
- Ecosystem phenology
- Paleoclimate and Technosphere
- Climate and lakes

Extra sheets: your name and page number on each sheet



Oct 15: Overview and Midterm Exam

Physical Foundations for Global Climatic Changes

- Physical Laws
- Radiative processes & Albedo
- Energy balance of the Earth
- What is greenhouse effect?
- Major Greenhouse Gases (GHG)
- Albedo of terrestrial ecosystems, land use, measurements, and GWP



Oct 15: Overview and Midterm Exam

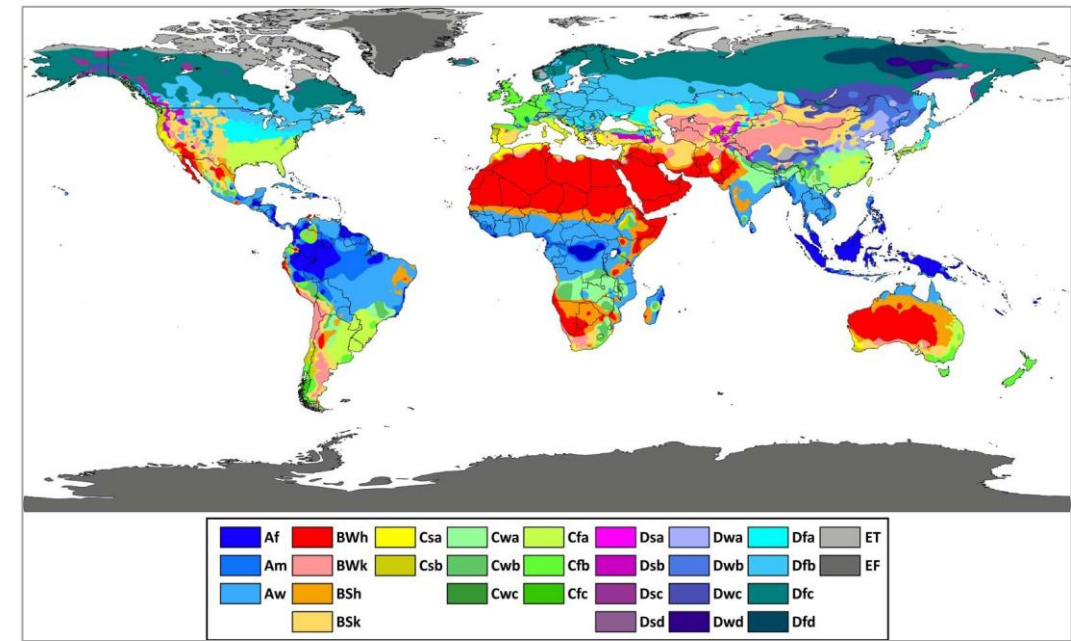
Climate Zones and Characteristics

- Köppen climate classification: 5 (6) major zones and their characteristics
- How are they delineated

Group	Description	Temperature	Precipitation	Extent
A	Tropical Moist Climates	Mean Temperature: above 64°F	Annual Rainfall: over 59"	From Equator to between 15° and 25°
B	Dry Climates		Deficient most years, evaporation exceeds precipitation	Extend from 20° to 30° latitude in large continental regions, often surrounded by mountains
C	Moist Subtropical Mid-Latitude Climates	Humid, mild winters with mean temperatures below 64°F but above 27°F		On the eastern and western regions of most continents from about 25° to 40°
D	Moist Continental Climates	Mean winter temperatures are below 27°F, mean summer temperatures above 50°F		North of moist subtropical mid-latitude climates
E	Polar Climates	Year round temperatures are below 50°F		Northern coastal areas of North America and Eurasia, Greenland and Antarctica

Source: Fluxnet | NASA

Köppen climate classification map





Oct 15: Overview and Midterm Exam

Three Guest Lectures

Land surface phenology

- What and Why?

Paleoclimate reconstructions

- Methods and facts
- Physical, chemical, and biological proxies

Technosphere and climate change

- Major issues
- Major properties



Oct 15: Overview and Midterm Exam

Major Consequences of Climate Change

- Climate changes occur across both time and space (direct/indirect impacts)
- Evidences from the Asian Dryland Belt (ADB)
- Large regional variations and high uncertainty in projections (emerging global water challenges, evapotranspiration (ET), and water use efficiency (WUE),
- **Aral Sea** (water level, land use, physical and socioeconomic consequences, etc.)
- **Great Lakes and climate change** (algal blooms, frozen surface, snow fall, ET, etc.)
- **Shift of Water Level in Global Lakes**

Oct 22: Field Excursion to Gustafson Farm

- **Oct. 22 at 3:00 PM** sharp
- Return to Geography by 4:20 pm
- Check your email for update (e.g., extreme weather)

