

CHAPTER 9 – Lecture 23 The Global Scope of Climate

Climate: The average weather of a region, which is based on the measurement of precipitation and temperature. The study of climate is concerned with both average values and their variation through the year. Air temperature cycles are influenced by latitude and coastal continental location. Air temperature also impacts precipitation as warm air can hold more moisture than cold air.

I. Temperature Regimes - These are distinctive types of annual temperature cycles related to latitude and location. There are seven distinct thermal regimes:

1. Subarctic continental
2. Ice sheet
3. Midlatitude continental
4. Tropical continental
5. Midlatitude west coast
6. Equatorial
7. Tropical west coast

II. Global Precipitation - Global precipitation patterns are determined by air masses and their movements, which in turn are produced by global air circulation patterns:

A. Seven global precipitation regions:

1. Wet equatorial belt
2. Trade-wind coasts
3. Tropical deserts
4. Midlatitude deserts and steppes
5. Moist subtropical regions
6. Midlatitude west coasts
7. Arctic and polar deserts

B. Seasonality of Precipitation - Total annual precipitation is a useful quantity in establishing the character of a climate type, but it does not account for the seasonality of precipitation. Monthly precipitation patterns can be described largely by three types:

1. Uniformly distributed precipitation
2. Precipitation maximum during the summer, in which insolation is at its peak
3. Precipitation maximum during the winter or cooler season when insolation is least.

The uniform type of pattern can include a wide range of possibilities from little or no precipitation in any month to abundant precipitation in all months.

III. Climate Classification - Mean monthly values of air temperature and precipitation can describe the climate of a weather station and its nearby region

quite accurately. To study climates from a global viewpoint, climatologists classify these values into distinctive climate types. Climate types are designed to be understood and explained by air mass movements and frontal zones. The rules that define these types are based on an analysis of how the amount of moisture held in the soil varies throughout the year as determined by air temperature and rainfall. The Köppen-Geiger system of climate classification recognizes five general climate types with a combination of subtypes.

IV. Overview of the Climates

1. Group I. Low-latitude Climates

- a) **Wet Equatorial Climate** Warm to hot with abundant rainfall
- b) **Monsoon and Trade-wind Coastal Climate** Warm to hot with a very wet rainy season.
- c) **Wet-dry Tropical Climate** Warm to hot with very distinct wet and dry seasons.
- d) **Dry Tropical Climate** The world's hottest deserts, with little or no rainfall.

2. Group II. Midlatitude Climates

- a) **Dry Subtropical Climate** deserts not quite as hot as the dry tropical climate.
- b) **Moist Subtropical Climate** hot and humid summers, mild winters and ample rainfall year-round.
- c) **Mediterranean Climate** hot, dry summers and rainy winters
- d) **Marine West-coast Climate** warm summers and cool winters with more rainfall in winter
- e) **Dry Midlatitude Climate** warm to hot in summer, cold in winter, and low annual precipitation
- f) **Moist Continental Climate** cold in winter, warm in summer, with ample precipitation through the year.

3. Group III. High-latitude climates

- a) **Boreal-forest Climate** short, cool summers and long, bitterly cold winters
- b) **Tundra Climate** long, severe winter, temperatures are moderated by the proximity to the Arctic Ocean.
- c) **Ice Sheet Climate** bitterly cold temperatures can drop below -50°C during the sunless winter months. Even during the 24-hour days of summer, temperatures remain well below freezing.

V. Dry and Moist Climates - All but two of the 13 climate types are either dry or moist. Dry climates are those where total annual evaporation of moisture from the soil and plant foliage exceeds the annual precipitation by a wide margin. Dry climates do not support permanently-flowing streams. There are two dry climate subtypes: semiarid, and arid. Moist climates are those with sufficient rainfall to maintain the soil in a moist condition through much of the year and to sustain the year round flow of the larger streams. Moist climates support forests or prairies of dense tall grasses. The wet-dry tropical and Mediterranean climates are neither dry, nor moist. They both show a seasonal alteration between a very wet season and a very dry season.