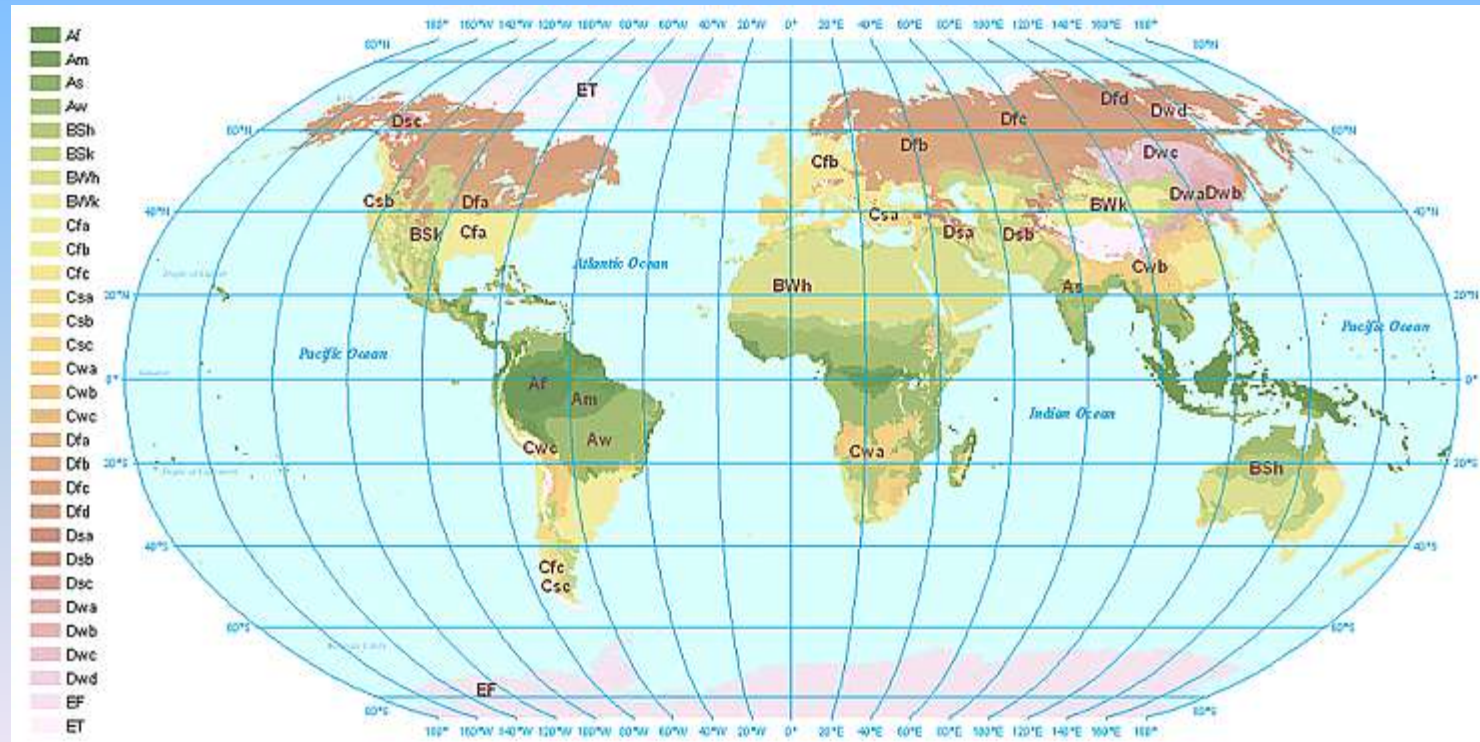


# Chapter

# 2.2

# Climate



# Weather or Climate?

## Definitions weather and climate

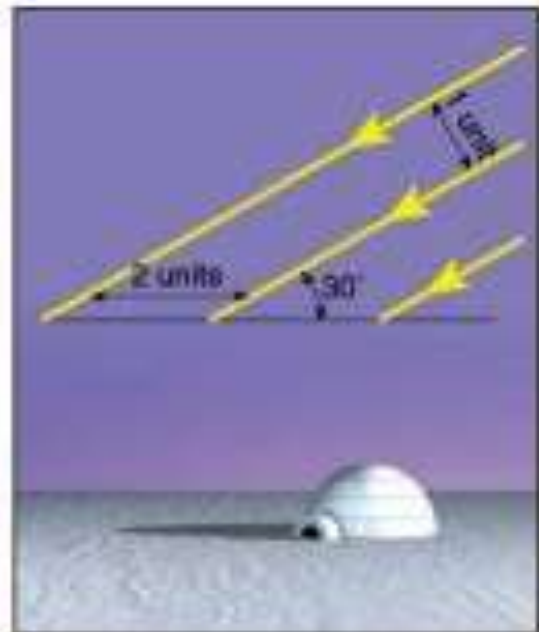
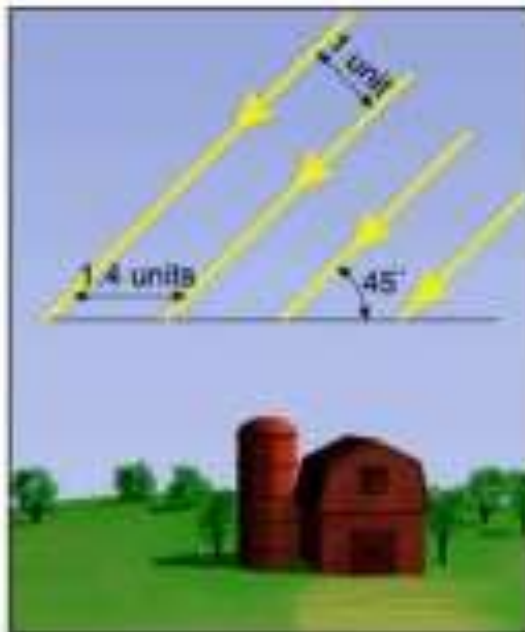
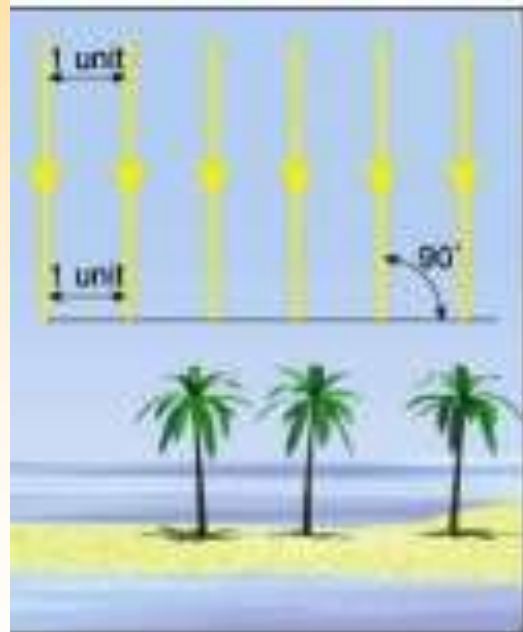
- ◆ **Weather:** temperature, precipitation and wind in a specific place at specific time
- ◆ **Climate:** average weather (temperature, precipitation and wind) during a longer period of time (30 – 40 years)

# Factors That Affect Climate

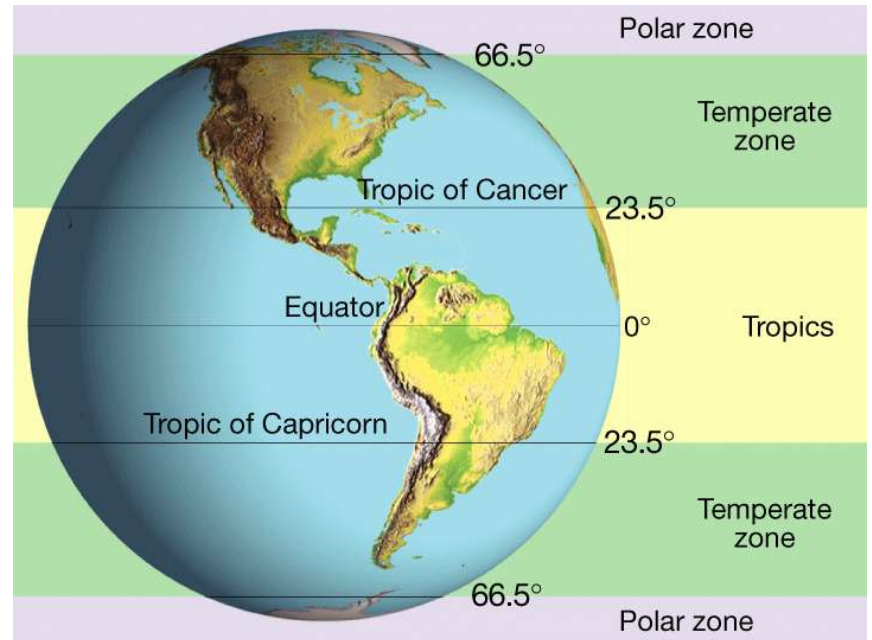
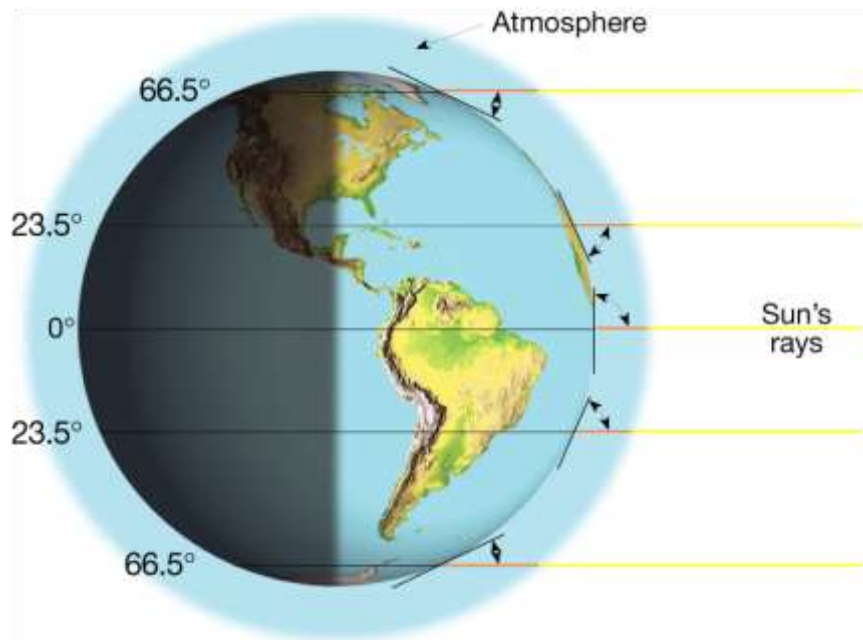
## Factors That Affect Climate

### ◆ Latitude

- As latitude increases, the intensity of solar energy decreases.
- The **tropical zone** is between  $23.5^{\circ}$  north (the tropic of Cancer) and  $23.5^{\circ}$  south (the tropic of Capricorn) of the equator. The sun's rays are most intense and the temperatures are always warm.
- The **temperate zones** are between  $23.5^{\circ}$  and  $66.5^{\circ}$  north and between  $23.5^{\circ}$  and  $66.5^{\circ}$  south of the equator. The sun's rays strike Earth at a smaller angle than near the equator.



# Earth's Major Climate Zones



# Factors That Affect Climate

## Factors That Affect Climate

### ◆ Latitude

- **Polar zones** are between  $66.5^{\circ}$  north and south latitudes and the poles. The sun's rays strike Earth at a very small angle in the polar zones.

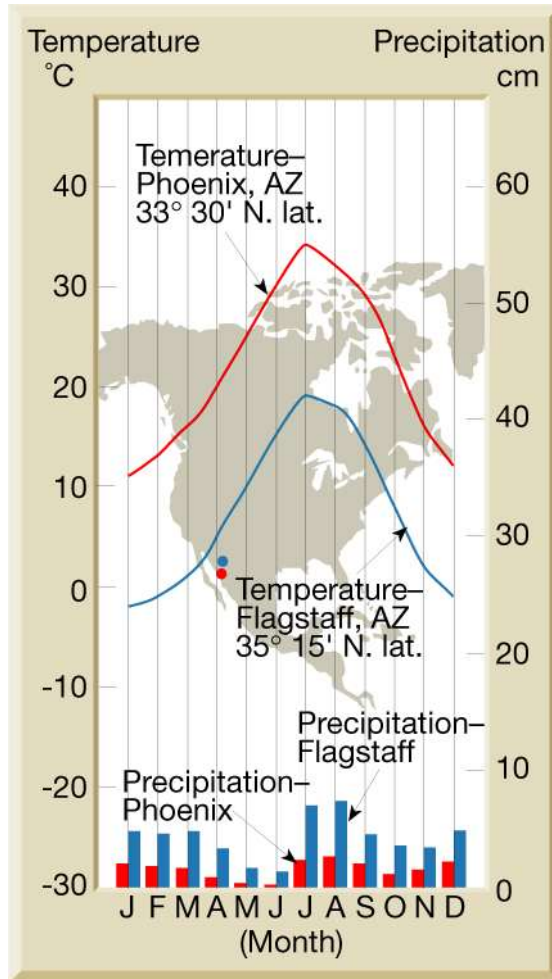
### ◆ Altitude

- The higher the altitude, the colder the climate: when air rises, it cools down.

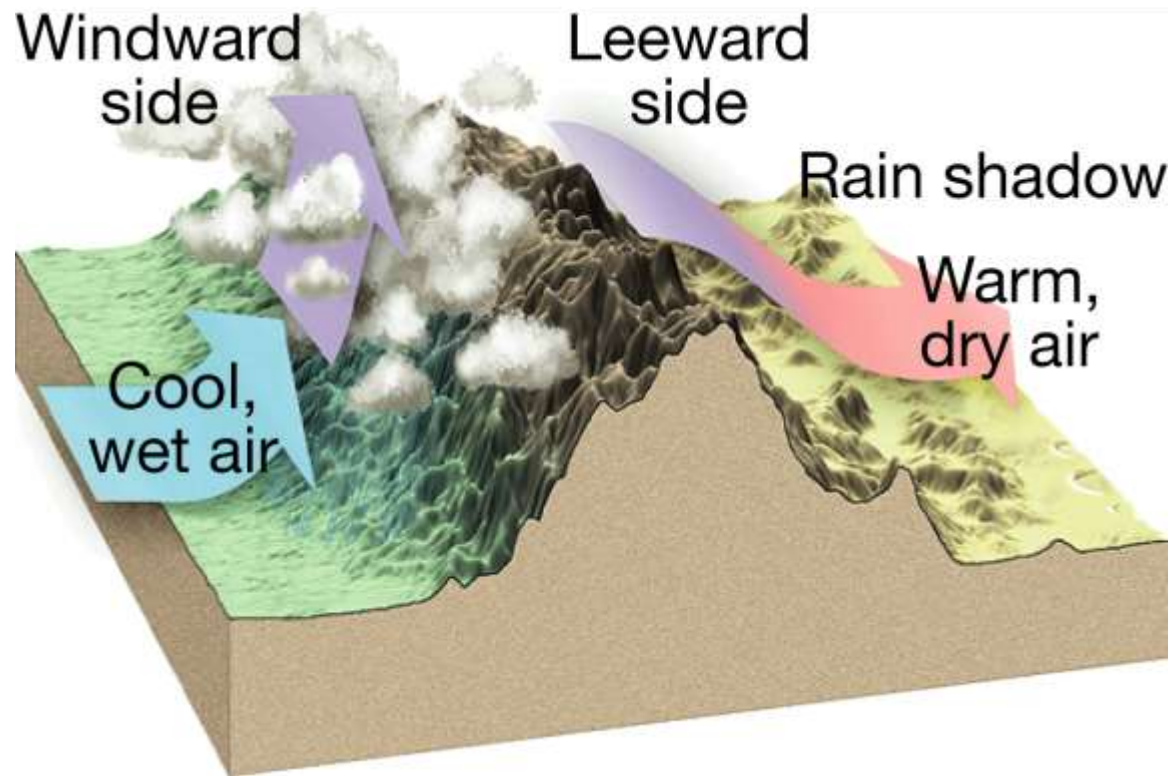
### ◆ Topography

- Topographic features such as mountains play an important role in the amount of precipitation that falls over an area.

# Climate Data for Two Cities



# The Rain Shadow Effect



# Factors That Affect Climate

## ◆ Water bodies

- Large bodies of water such as lakes and oceans have an important effect on the temperature of an area because the temperature of the water body influences the temperature of the air above it.

## ◆ Temperature above land and sea

- Land gets warmer than water but it gets colder than water too.
- Land heats up and cools down faster than water.

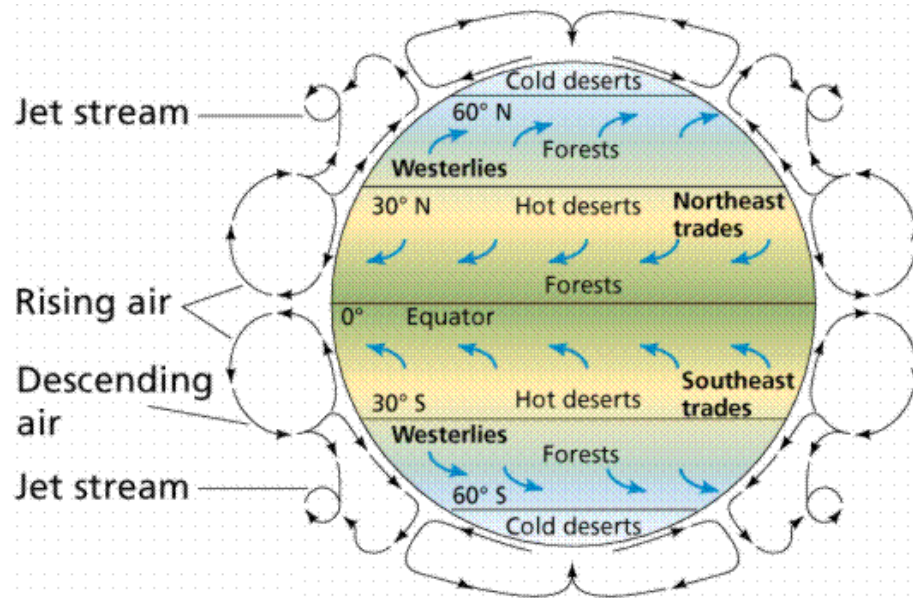
### **Therefore:**

- This difference influences the air temperature
- Air temperature above sea is never very high or low
- Air above land can be very warm or cold (sudden change is possible)

# Factors That Affect Climate

## ◆ Atmospheric Circulation

- Global winds are another factor that influences climate because they distribute heat and moisture around Earth.



# World Climates

## The Köppen Climate Classification System

- ◆ The **Köppen climate classification system** uses mean monthly and annual values of temperature and precipitation to **classify climates**.
- ◆ A tropical rainforest (Af, Aw)
- ◆ B dry (BS, BW)
- ◆ C sea or temperate maritime (Cf, Cs, Cw)
- ◆ D continental (Df, Dw)
- ◆ E polar (ET, EF, EH)

# World Climates

## Meaning of the additions f, s, w

- ◆ f = fehlt no dry period; precipitation all year
- ◆ s = sommer dry in the summer
- ◆ w = winter dry in the winter

### ***Examples:***

***Cs climate is a temperate maritime climate with a dry summer also called Mediterranean climate.***

***Aw climate is a tropical climate with a dry winter, also called Savanna climate.***

# World Climates

## Humid Tropical Climates

- ◆ Humid tropical climates are without winters. Every month in such a climate has a mean temperature above 18°C. The amount of precipitation can exceed 200 cm per year.
- ◆ Wet Tropical
  - **Wet tropical climates** have high temperatures and much annual precipitation.

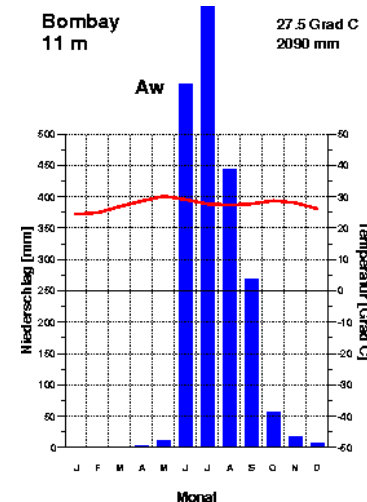
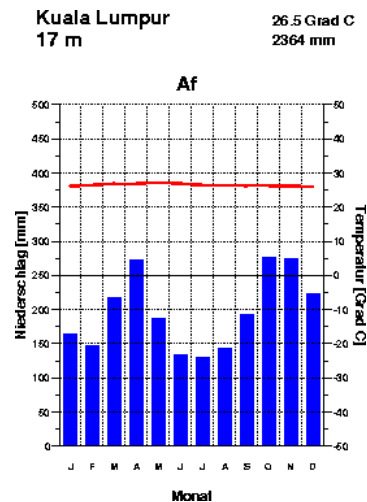
# Rain Forest in Malaysia



# World Climates

## Humid Tropical Climates

- ◆ Tropical Wet and Dry (Af & Aw)
  - **Tropical wet and dry climates** are climates that transition between the wet tropics and the subtropical savanna.



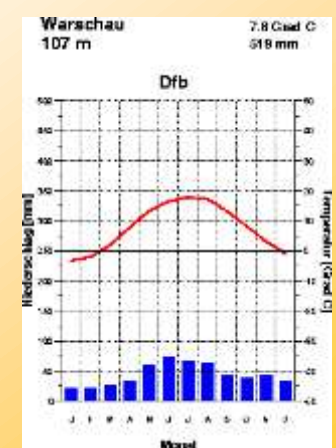
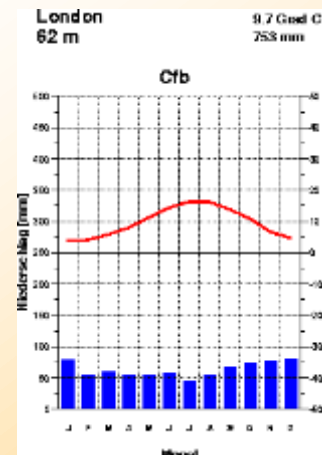
# African Savanna



# World Climates

## Humid Mid-Latitude Climates

- ◆ Climates (Cf) with mild winters have an average temperature in the coldest month that is below  $18^{\circ}\text{C}$  but above  $-3^{\circ}\text{C}$ .
- ◆ Climates (Df) with severe winters have an average temperature in the coldest month that is below  $-3^{\circ}\text{C}$ .

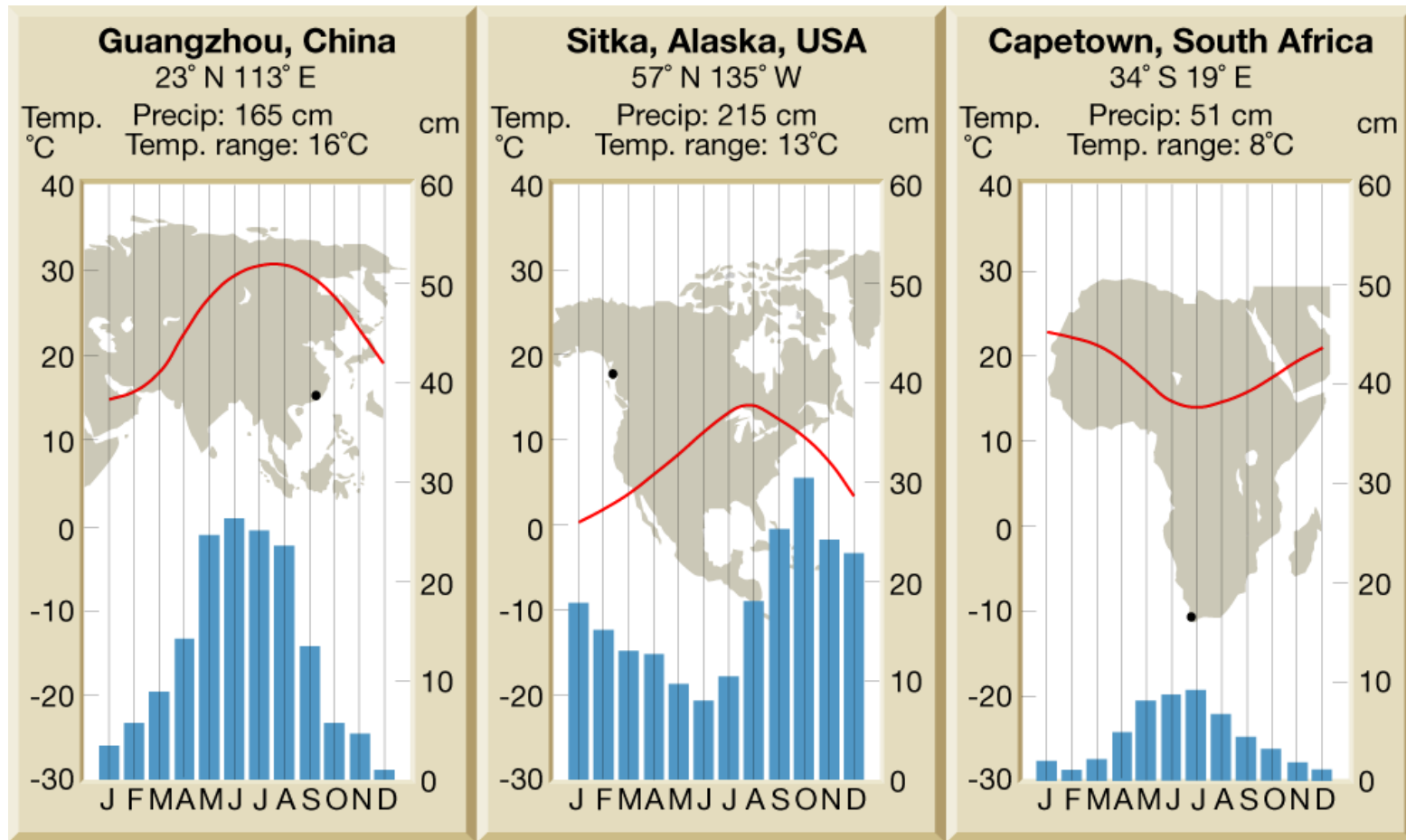


# World Climates

## Humid Mid-Latitude Climates

- ◆ Humid Mid-Latitude with Mild Winters
  - A **humid subtropical climate** is characterized by hot, sultry summers and cool winters (Cw)
- ◆ Humid Mid-Latitude With Mild Winters
  - A **dry-summer subtropical climate** is the only humid climate with a strong winter precipitation maximum. (Cs)

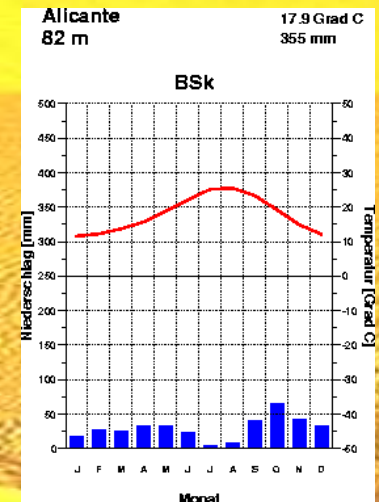
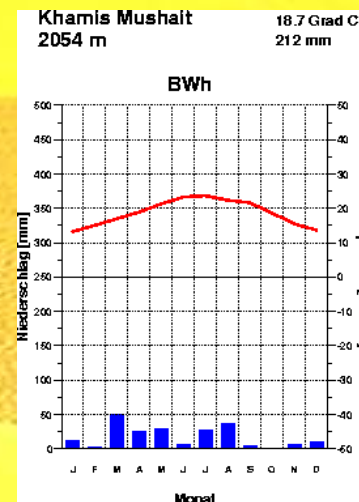
# Mid-Latitude Climates



# World Climates

## Arid Climates

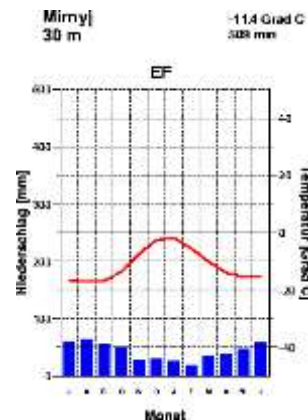
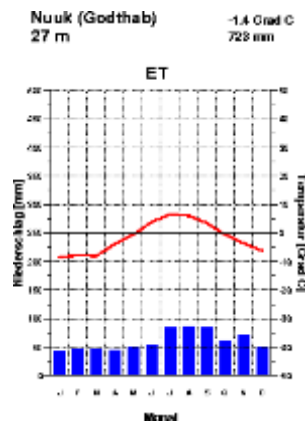
- ◆ A arid (dry) climate is one in which the yearly precipitation is not as great as the potential loss of water by evaporation.
- ◆ BW: very dry desert climate
- ◆ BS: very dry steppe climate



# World Climates

## Polar Climates

- ◆ Polar climates are those in which the mean temperature of the warmest month is below  $10^{\circ}\text{C}$ .
- ◆ ET: tundra summer temp. =  $0^{\circ}$ –  $10^{\circ}\text{C}$
- ◆ EF: perpetual snow, summer  $< 0^{\circ}\text{C}$



## Highland Climates

- ◆ In general, highland climates are cooler and wetter than nearby areas at lower altitudes.
- ◆ EH: perpetual snow on high mountain ranges. Big difference between day and night temperature.



# Exercises and homework

- Exercise 21 and 24 in class
- Everybody: 16 and 25
- 3 students: 17, 18, 19, 20, 21, 24