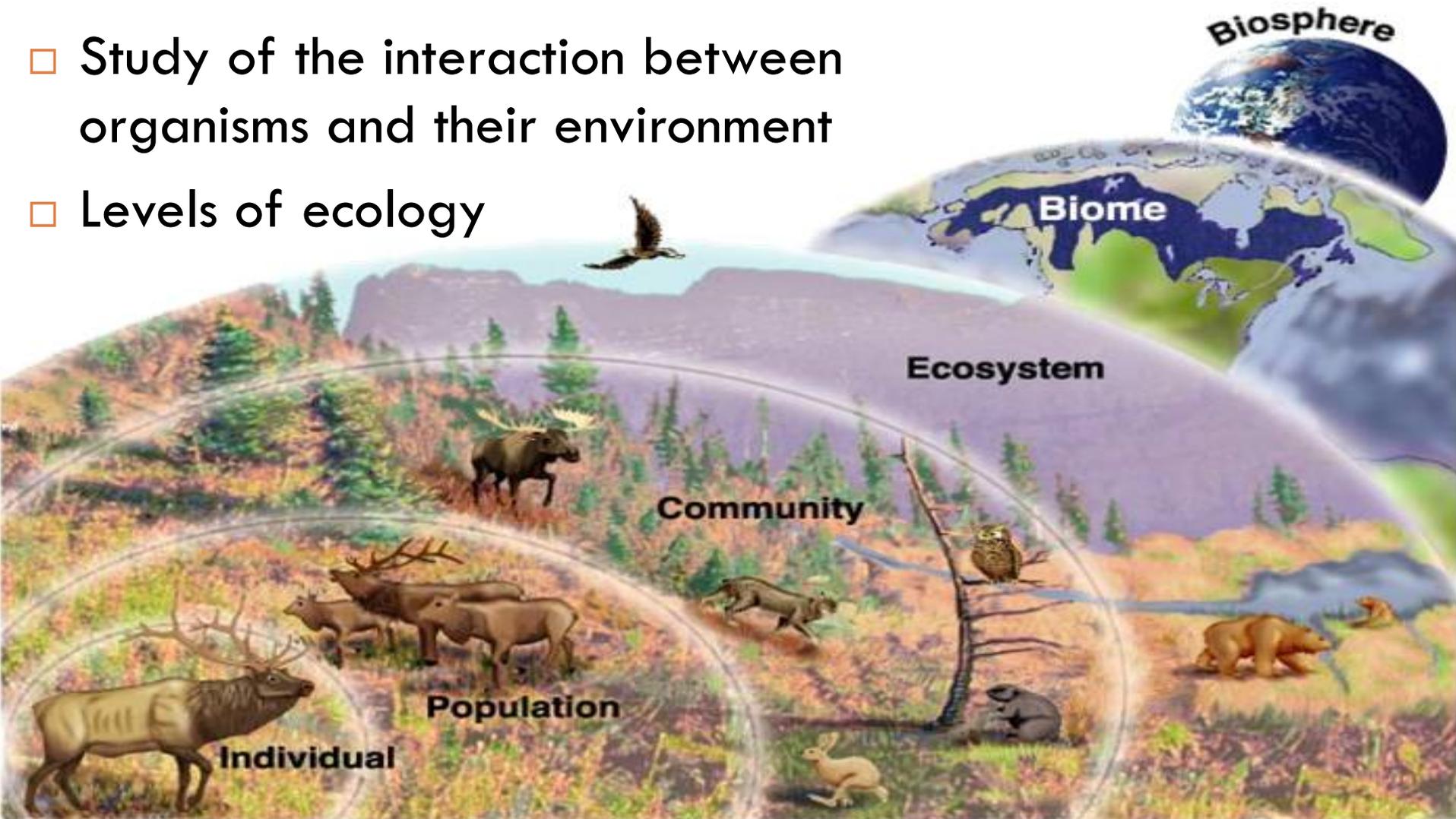


INTRODUCTION TO ECOLOGY

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Ecology overview

- Study of the interaction between organisms and their environment
- Levels of ecology



Fields of ecology

- Organismal ecology

- ▣ Study of morphological, physiological, and behavioral adaptations of individuals



How do individuals interact with each other and their physical environment?

Salmon migrate from saltwater to freshwater environments to breed

Fields of ecology

- Population ecology
 - ▣ Study of how numbers of individuals in a population change over time



How and why does population size change over time?

Each female salmon produces thousands of eggs. Only a few will survive to adulthood. On average, only two will return to the stream of their birth to breed

Fields of ecology

- Community ecology

- ▣ Study interaction among species within an area



How do species interact, and what are the consequences?

Salmon are prey as well as predators

Fields of ecology

- Ecosystem ecology

- ▣ Study how nutrients and energy move b/n organisms and the abiotic environment



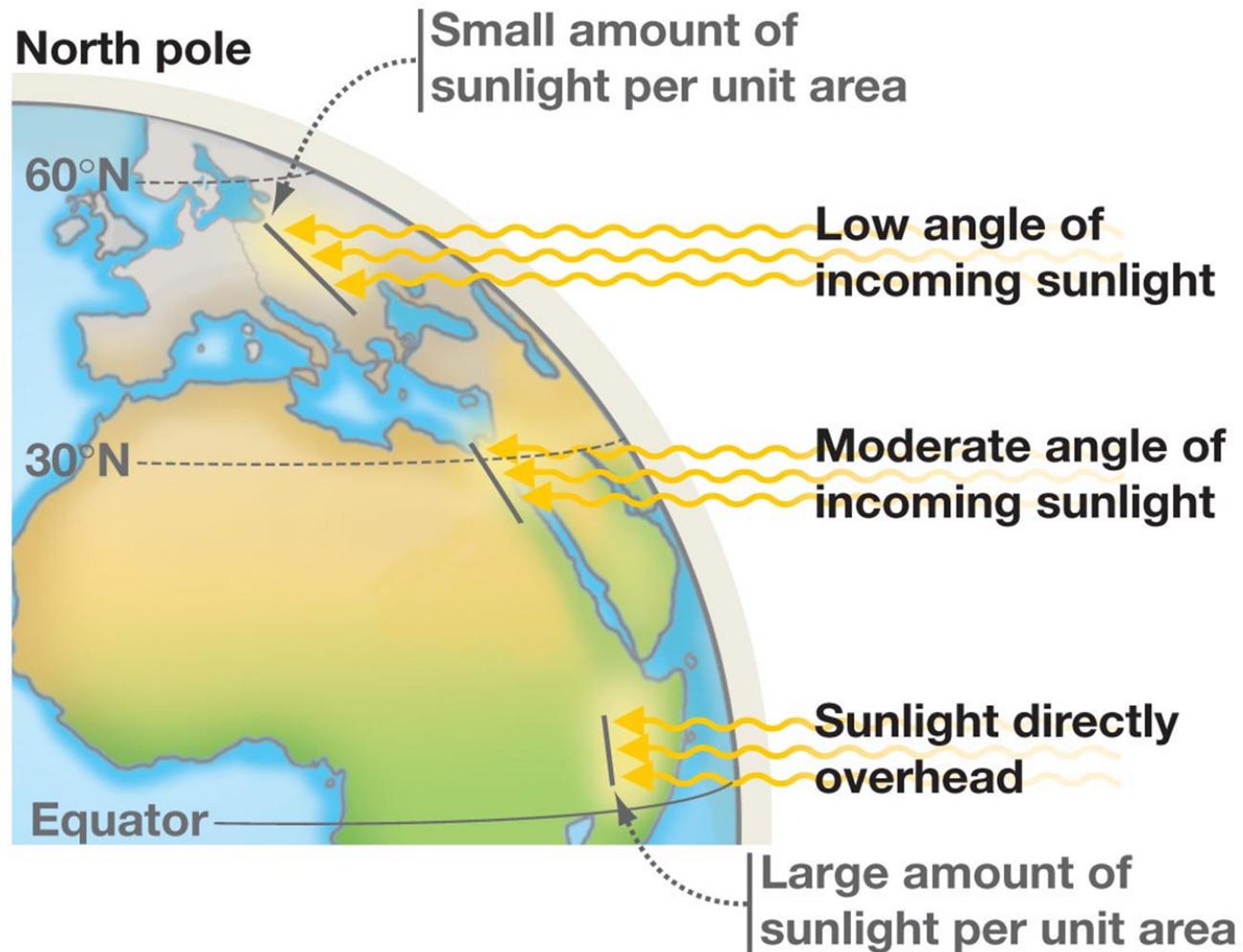
How do energy and nutrients cycle through the environment?

Salmon die and then decompose, releasing nutrients that are used by bacteria, archaea, plants, protists, young salmon, and other organisms

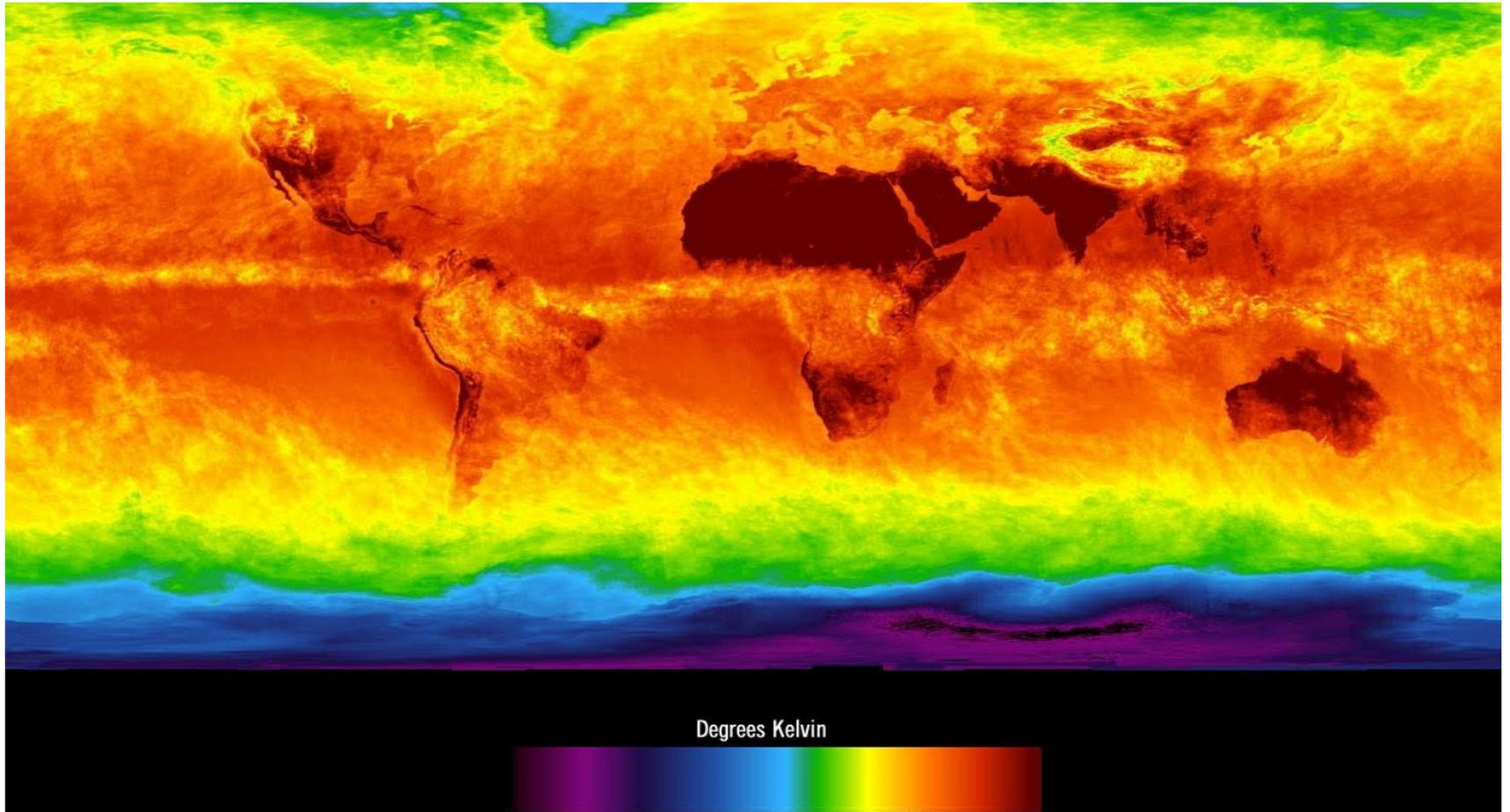
Abiotic and biotic factors

- *Ranges* (species distributions) of most species
 - ▣ Primarily determined by physical (*abiotic*) factors
 - ▣ Because of fitness tradeoffs, organisms are adapted to limited set of abiotic factors
- Biotic factors also play a role
 - ▣ Competition
 - ▣ Parasitism/disease

Temperature variations

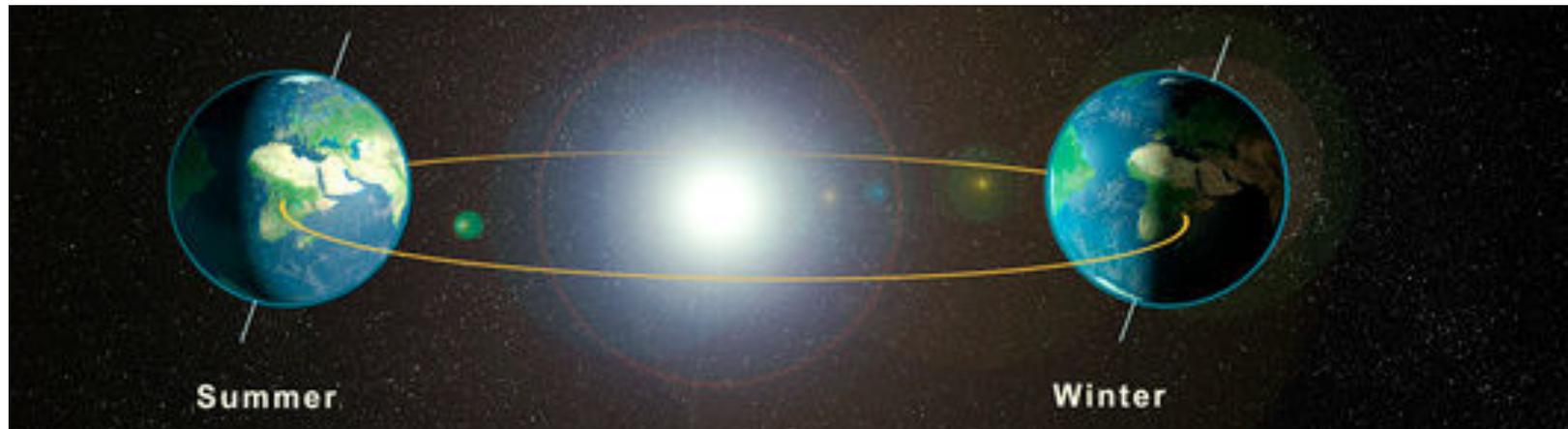
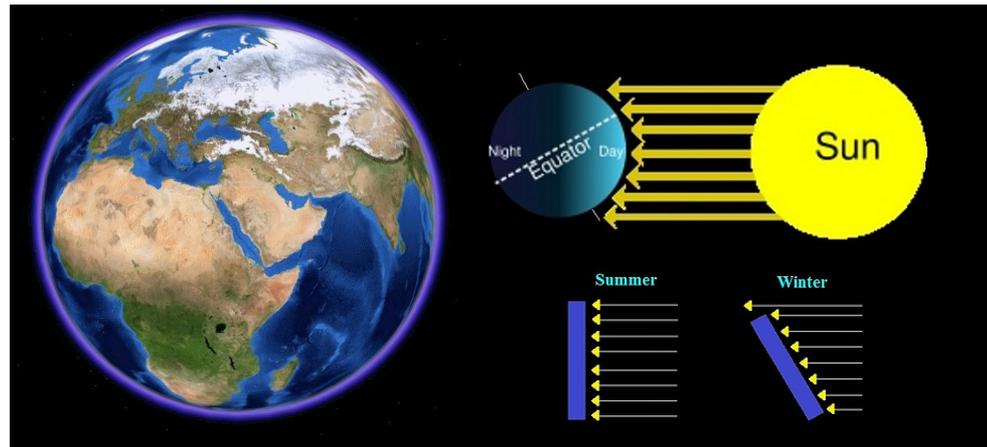


Global Light Intensity



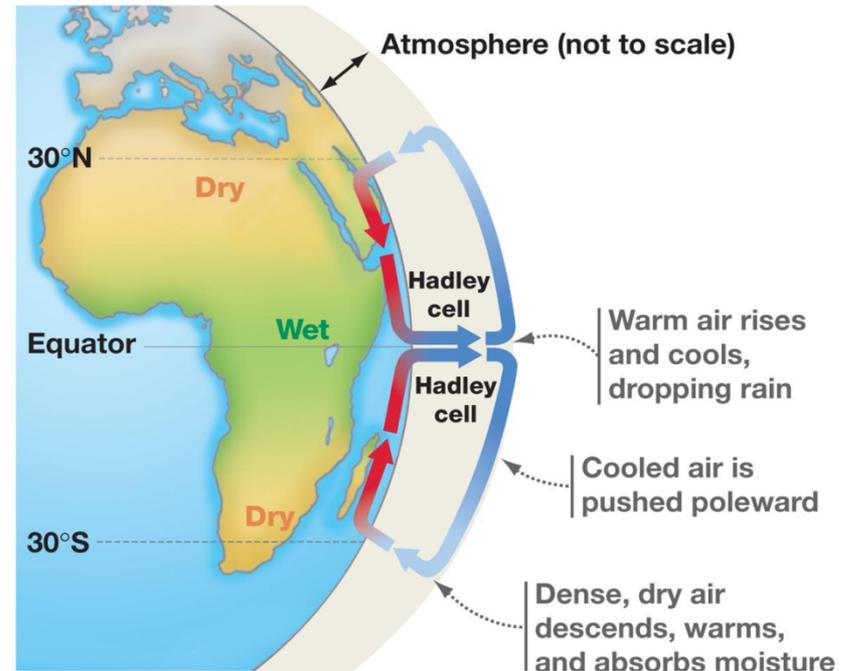
Temperature variations

- Seasons caused by
 - Earth's 23.5° on its axis
 - Angle of incidence
- Winter vs. summer solstice
- Equinoxes



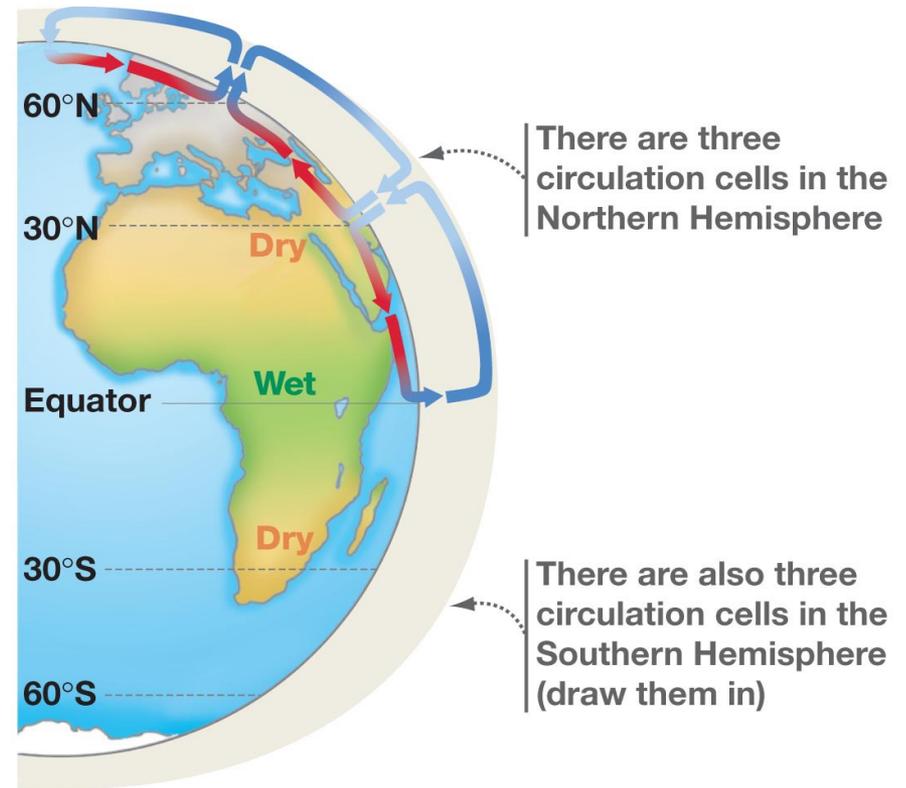
Hadley cells

- Major cycle of tropical air circulation
- Air hotter at equator
 - ▣ Expands and rises
 - ▣ Warm air holds more moisture (as gas)
- As it rises
 - ▣ Water cools and condenses into liquid
- As it sinks
 - ▣ Absorbs more solar E
 - ▣ Gaining water-holding capacity
 - ▣ Creating 30° deserts



Global Circulation patterns

- Three cells
 - in each hemisphere
 - Semi-wet at 60°



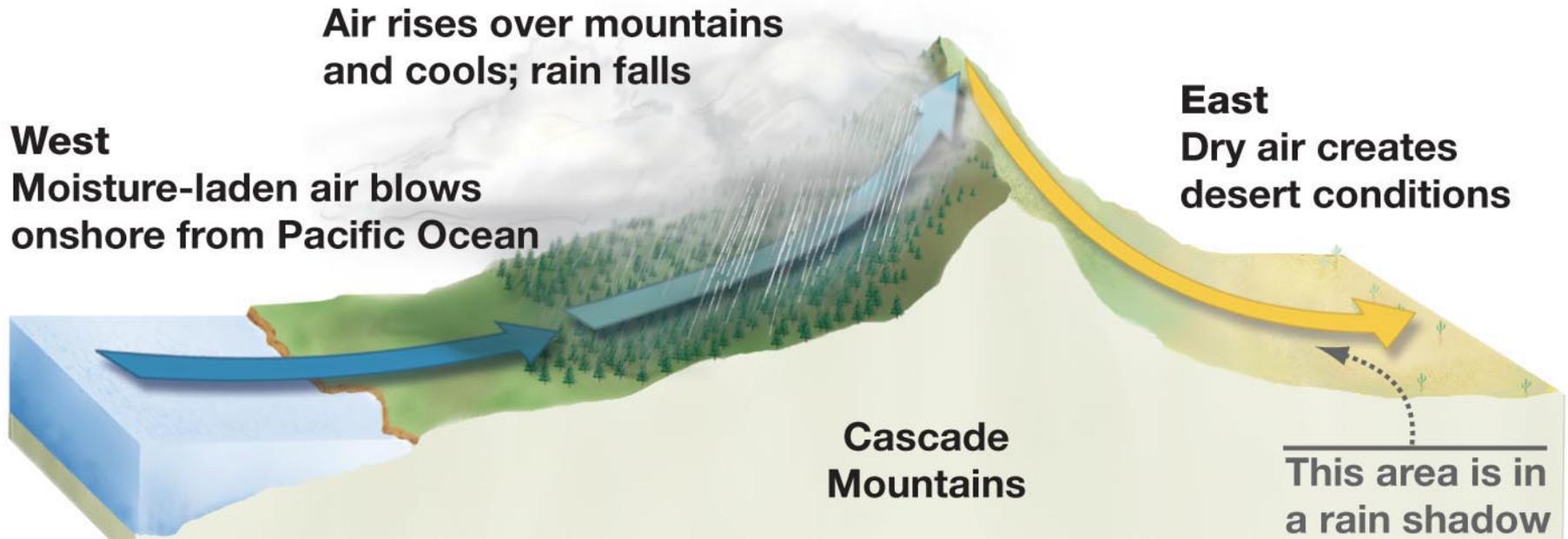
Regional effects

□ Rain shadow effect

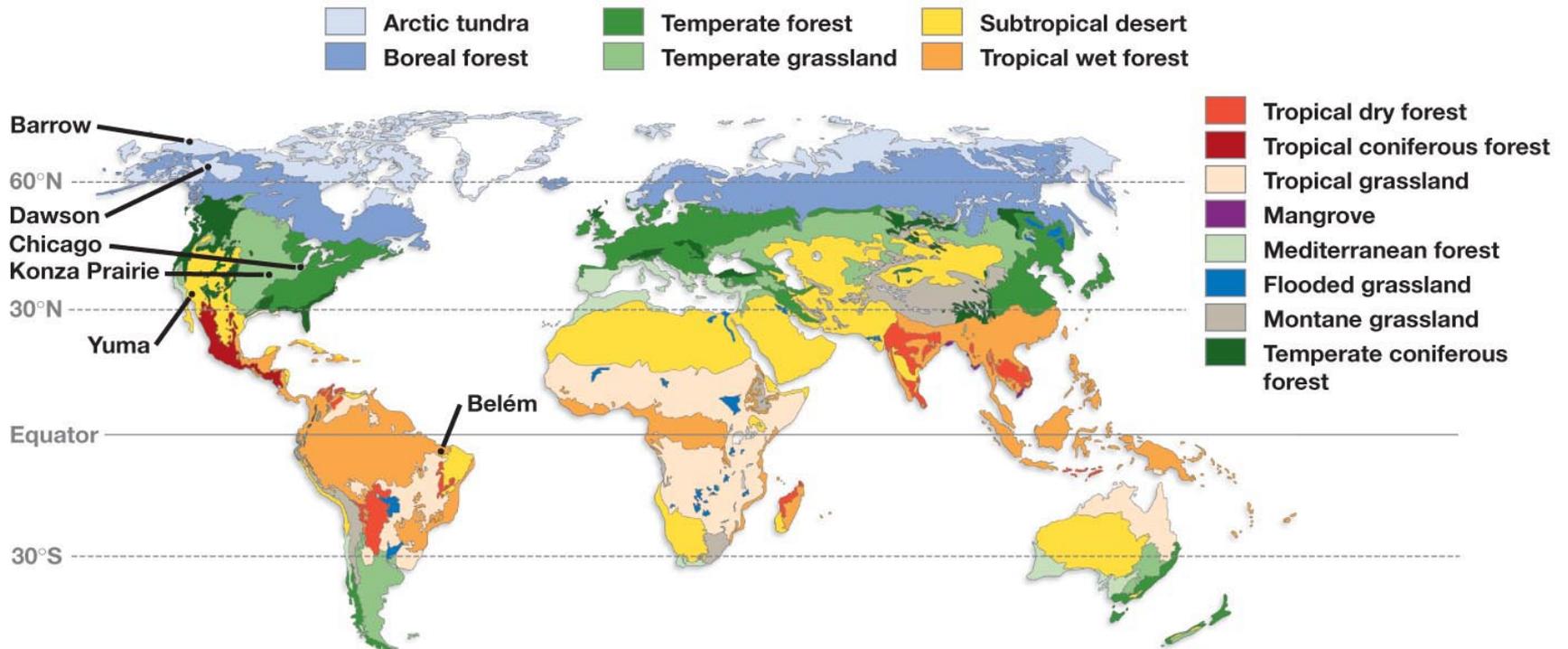
- Precipitates on one side, but not other
- Creates high deserts

□ Ocean moderation effect

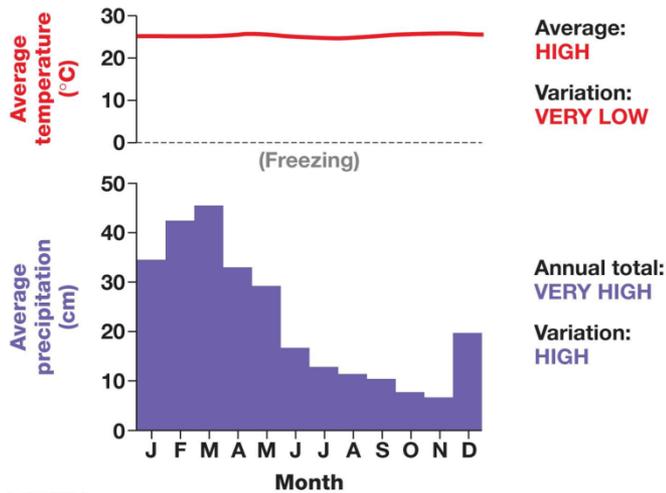
- High capacity for storing E
- Moderates temperature



Terrestrial Biomes



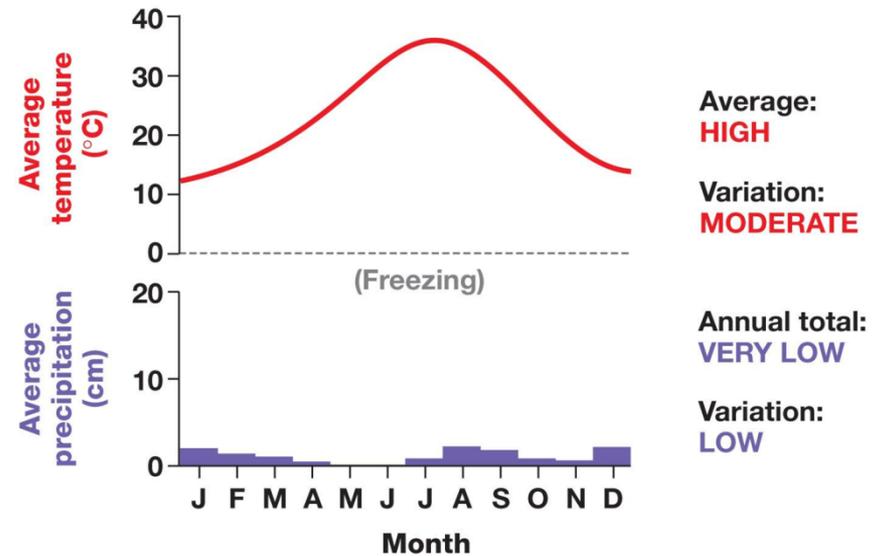
Tropical rain forests



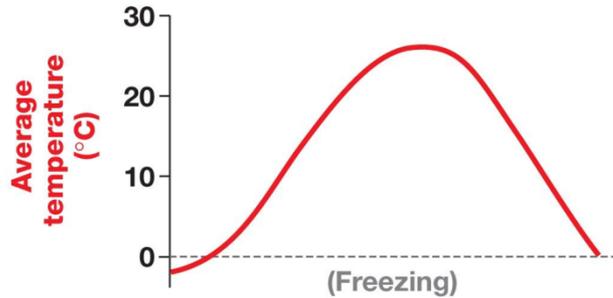
- Equatorial
- Rainfall very high
 - Seasonal: wet & dry
- Temperature invariable
- Very high biomass
- Very high biodiversity
- Multilayered canopy

Subtropical deserts

- Found at 30°N & 30°S
- High ave. temperature
- Moderate variation in temperature
- Very low precipitation
- Very low biomass
 - ▣ Plants widely spaced

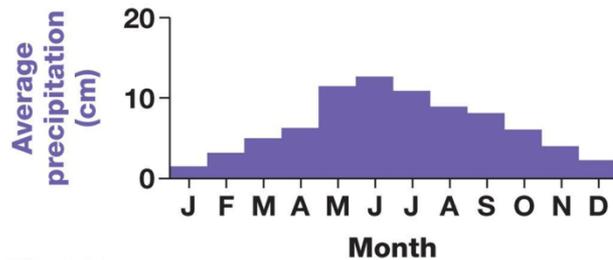


Temperate grasslands



Average:
MODERATE

Variation:
MODERATE



Annual total:
LOW

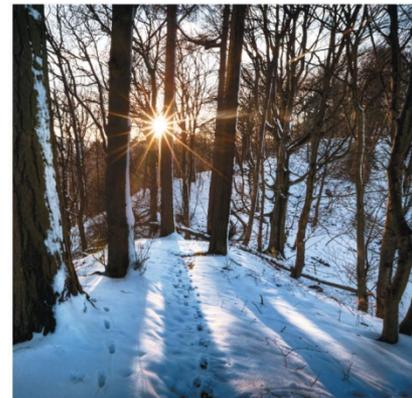
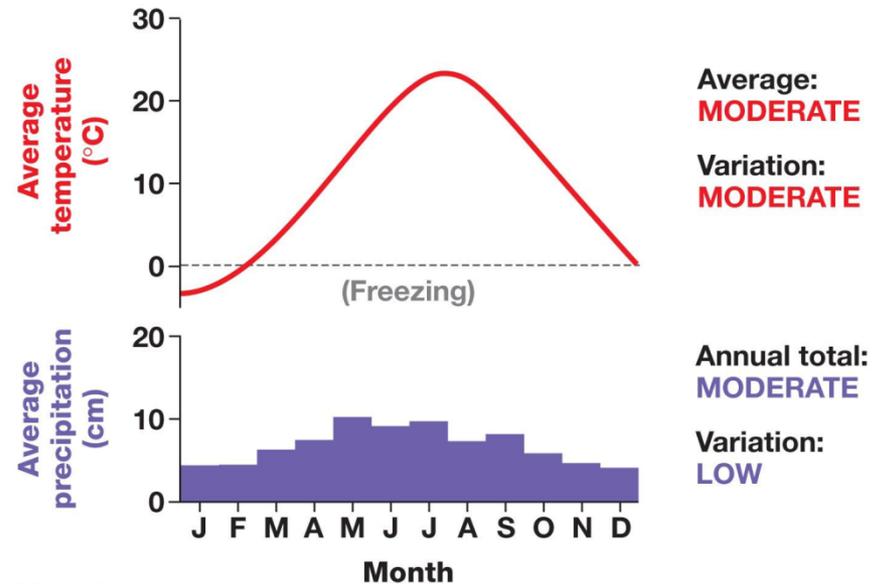
Variation:
MODERATE



- Long, warm summers
- Short, cold winters
- Low precipitation
- Moderate temp. variation
- High productivity
- Low biomass
- Moderate productivity
- Few to no trees
 - Too dry
 - Fire is common

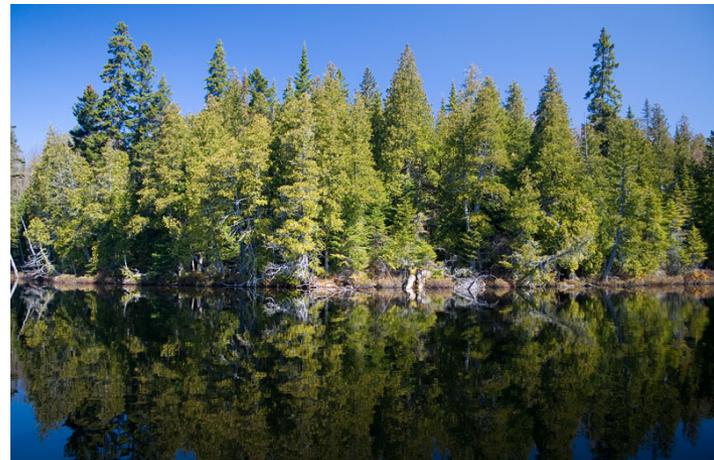
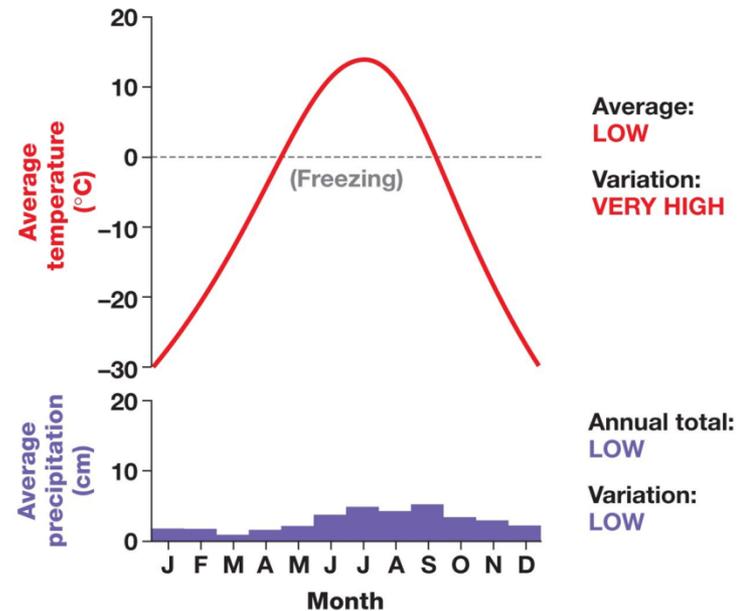
Temperate forests

- Same temp. scheme as temperate grasslands
 - ▣ Higher precipitation
- Defined winter
- Deciduous trees
- Moderate productivity
- High biomass
- Moderate diversity

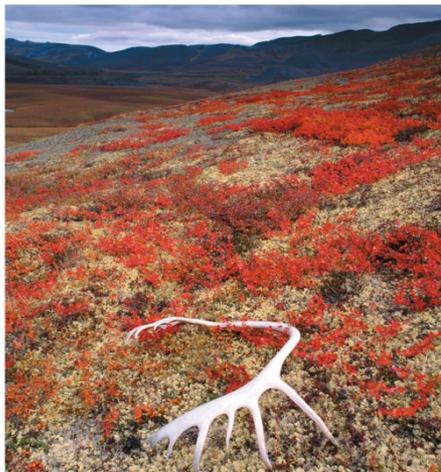
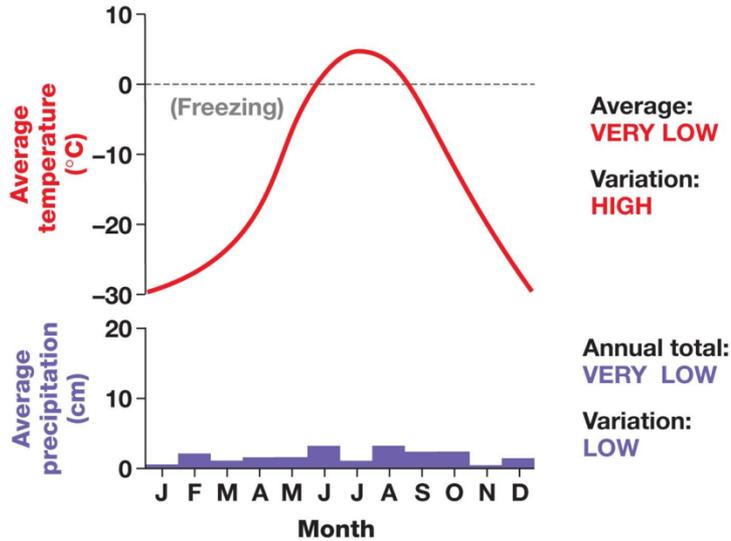


Boreal forests (Taiga)

- Just S of Arctic Circle
 - ▣ Subarctic
- Very cold winter
- Short, cool summers
- Extreme temp. variation
- Low annual precipitation
 - ▣ Evaporation in minimal
- Conifers dominate
- Low productivity
- High biomass
- Extremely low biodiversity



Tundra



- Artic areas
 - not covered by ice
- Very low temperature
- Very low precipitation
- Growing season
 - 6-8 weeks
- Permafrost
- Small woody shrubs, lichens, herbs
- Low diversity
- Low productivity
- Low biomass