

### Atmospheric Circulation in a nutshell

- Hot air rises (rains a lot) in the **tropics**
- Air cools and sinks in the **subtropics** (deserts)
- Poleward-flow is deflected by the Coriolis force into westerly jet streams in the **temperate** zone
- Jet streams are unstable to small perturbations, leading to huge eddies (**storms and fronts**) that finish the job

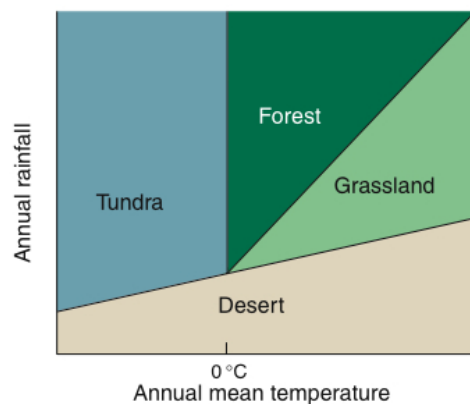
### Climates of the World

- **Deep Tropics:** hot and wet, with little seasonal variation
- **Seasonal tropics:** hot, with "summer" rain and "winter" dry (monsoon)
- **Subtropics:** dry and sunny, deserts and savannas, often with a well-defined rainy season (summer *or* winter)
- **Midlatitude temperate zone:** warm summers, cold winters, moisture varies by location but often comes in episodes throughout the year
- **Polar regions:** very cold, generally very dry, dark in the winter

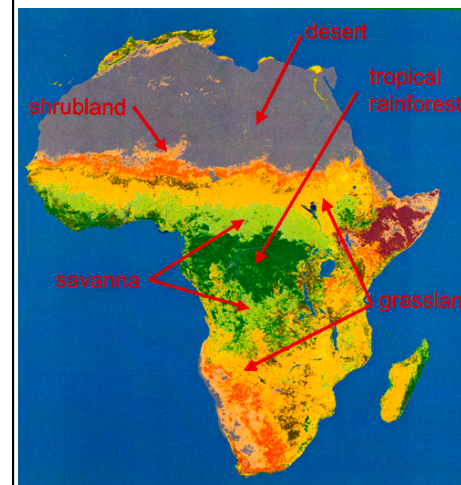
#### Other Influences:

Ocean currents, "continentality," vegetation, mountain ranges (altitude and orographic precipitation)

### Patterns of Climate and Vegetation



### Tropical and Subtropical Vegetation



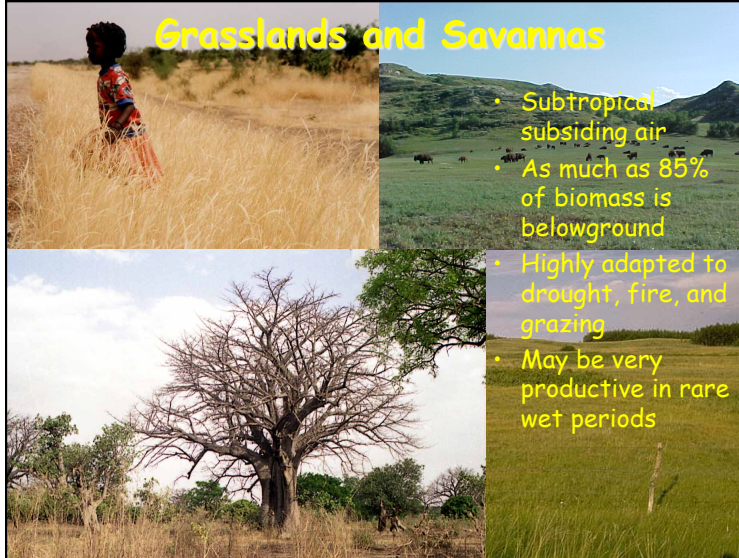
- Rainfall and its seasonal distribution determine the distribution of plant types
- Savannas and grasslands are adapted to seasonal and longer dry periods
- Landscape patterns strongly influence radiation budgets and climate

### Tropical Forest



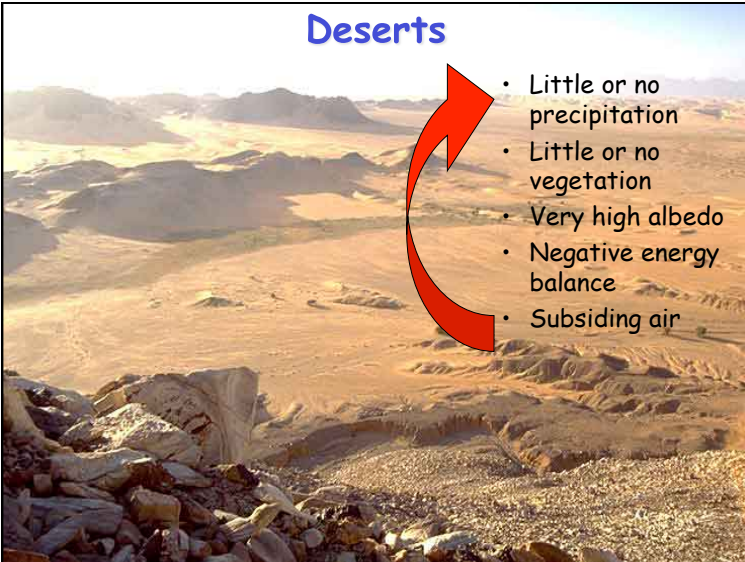
Located in equatorial zone of mean rising motion and heavy precipitation during much of the year  
 Low albedo, very strong energy absorption  
 Broadleaf evergreen trees with extensive understory, as many as 300 tree species per km<sup>2</sup>  
 The most productive ecosystems on Earth  
 Some are very deeply rooted (> 10 m) and can withstand periods of severe drought

### Grasslands and Savannas



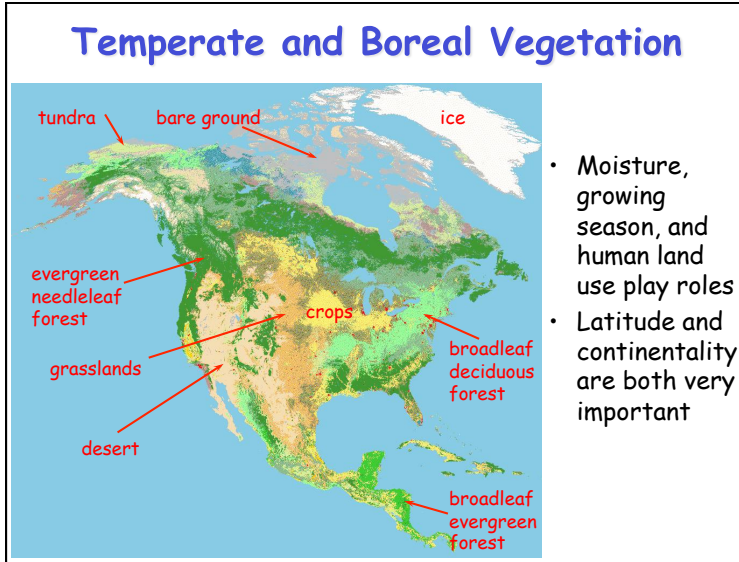
- Subtropical subsiding air
- As much as 85% of biomass is belowground
- Highly adapted to drought, fire, and grazing
- May be very productive in rare wet periods

### Deserts



- Little or no precipitation
- Little or no vegetation
- Very high albedo
- Negative energy balance
- Subsiding air

### Temperate and Boreal Vegetation



- Moisture, growing season, and human land use play roles
- Latitude and continentality are both very important

