Geographical Determinants of Climate

Latitude

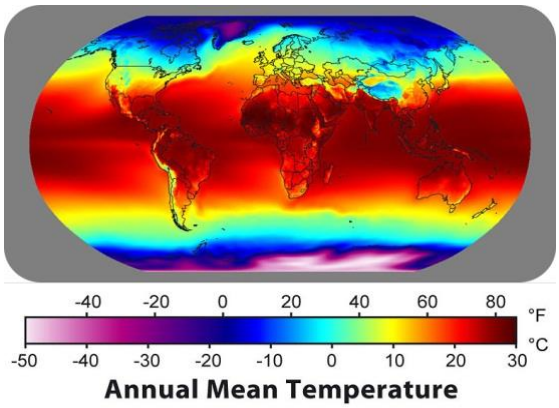
- Latitude is the most important factor in determining climates.
- The equator receives the most solar radiation; the sun rises high during the day.
- The Polar Regions receive the least solar radiation; the sun is low, radiation filters through a thick wedge of atmosphere, and light is often reflected by ice and snow.

Study Tip

If you shine a flashlight on a basketball, you'll notice that some parts of the basketball aren't as bright as other parts. Similarly, the light from the sun hits the earth with greater intensity at some parts more than others.

Atmospheric Circulation

- **Intertropical Convergence Zone (ITCZ)** is the low-pressure area near the equator, between the Hadley cells. The air rises and condenses into clouds, creating weather that is warm and wet. The ITCZ migrates slightly upward during the summer, because the land often heats faster than water.



Upper latitudes receive less solar radiation in comparison to latitudes near the equator, resulting in lower mean temperatures

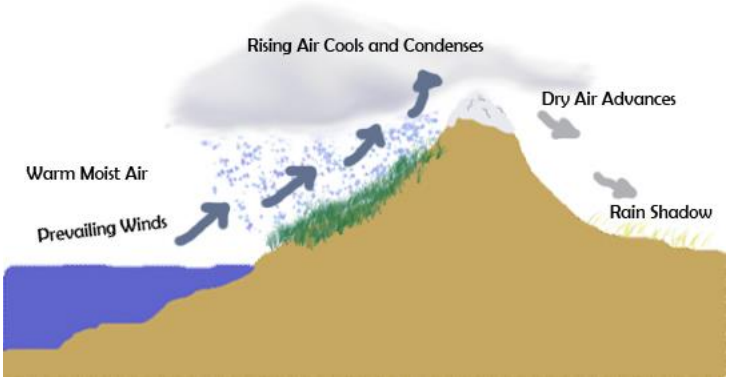
- Horse latitudes are boundaries between the Hadley cells and the Ferrel cells. The air descends and clouds evaporate, creating weather that is warm and dry.
- Polar fronts are the boundaries between Ferrel cells and Polar cells. Cold polar air and warm tropical air meet, creating weather that is stormy. The polar front migrates slightly as the Earth orbits the Sun.
- Prevailing winds are the bases of the three cells. They bring the weather from the locations they come from.

Continental Position

- A **maritime climate** is strongly influenced by the winds from nearby sea. Temperatures vary a relatively small amount, because sea currents moderate the climate with their own temperatures.
- A **continental climate** is influenced by nearby land. Temperatures are more extreme between day and night, and between summer and winter.

Altitude and Mountains

- Air temperature decreases with altitude. At higher altitudes, pressure is lower and there are fewer collisions to create heat.
- The rain shadow effect brings a warm, dry climate to the leeward side of a mountain.
- Mountains may separate the coastal region from the inland region, creating a maritime climate on one side and a continental climate on the other.



Rain shadow effect

Concept Check

- How is latitude a factor in determining climate?
- Describe the climate in the Intertropical Convergence Zone.
- What differences are there between maritime climates and continental climates?
- How does altitude affect air temperature?
- How are rain shadows created?