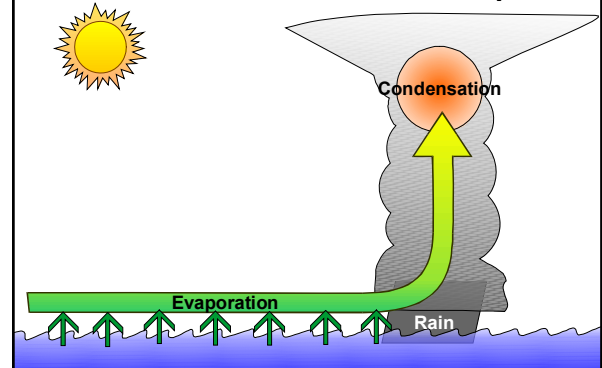


The Trade Winds



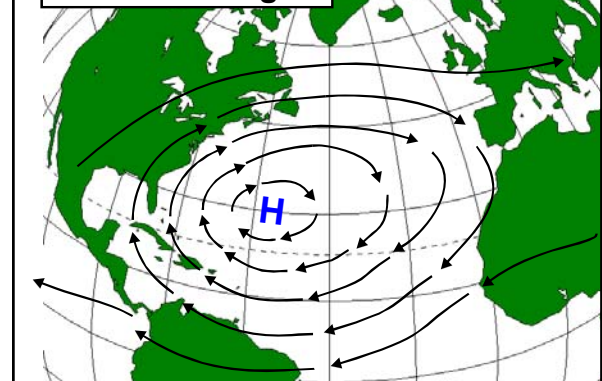
Convective Vertical Heat Transport



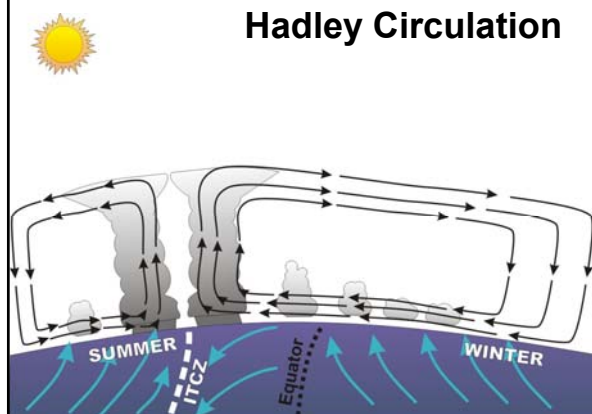
Trade-Wind History

- Known to mariners since Europeans ventured out of the Mediterranean
- Steady winds from the east equatorward of 30° Lat
- Calms, bad for sailing ships, near equator
- “Doldrums”
- Also near 30° N and S “Horse Latitudes”
- Ships could sail west in the Trades
- And return eastward in the (Stormy!) Westerlies
- Columbus had been to Iceland and to the Azores and Canary Is. and had seen evidence, borne by the westerlies, of land to the west

Bermuda High

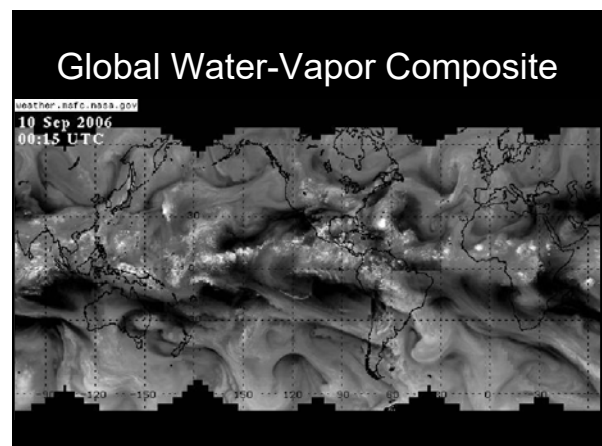
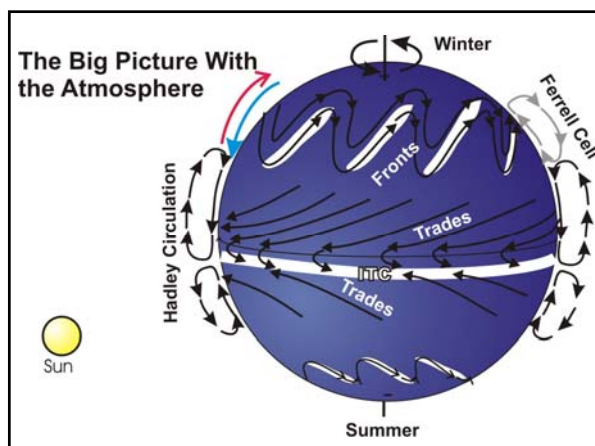
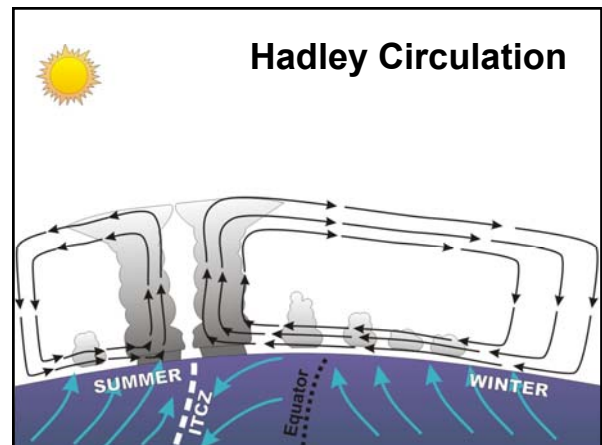
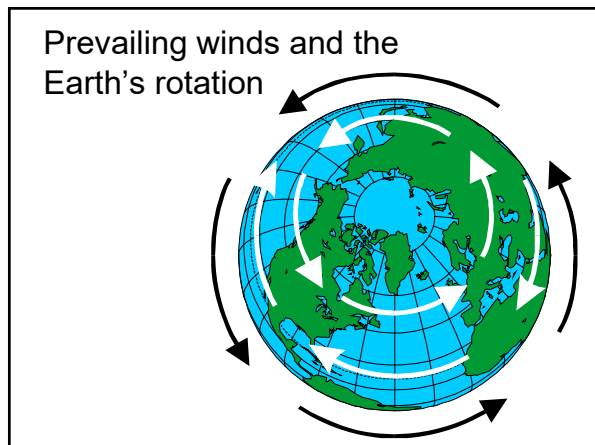
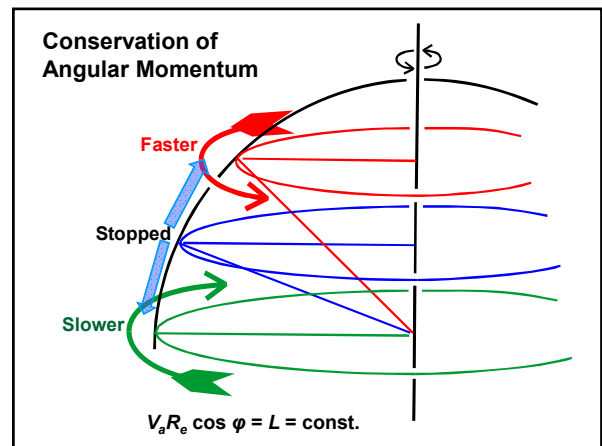
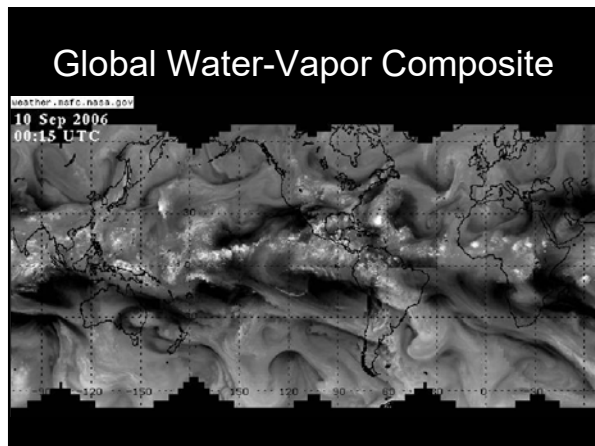


Hadley Circulation

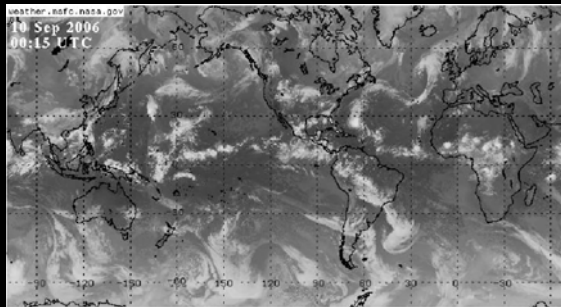


Trade-Wind Cumuli





Global IR Composite



Summary

- Convective moves heat upward
- Hadley Cell
 - Converges moisture toward the equator at low levels
 - Rising warm air in the Intertropical Convergence Zone
 - Pushes warm air northward at 15-18 km altitude
- Trade winds
 - Steady—hence the name
 - Blow from east
 - Rotate more slowly than the surface of the planet equatorward of 30°
 - Friction speed up (makes more westerly)
 - Exported air keeps its angular momentum so the wind becomes westerly
 - Westerlies move faster than surface so friction slows the wind poleward of 30°
- Westerlies are unsteady because shifting north south wind carries heat to the poles

For next time, read
Emanuel 54-61, Heat Engines