Atmospheric circulation and its consequences

ATM 210 -- Fall 2023 -- Fovell
Keep in mind

- Coriolis acts to right following motion in NH, to left in SH
- In geostrophic flow, PGF and Coriolis oppose
- Sea-breeze model showed us
  - Air tends to rise and establish surface L pressure when/where warm
  - Air tends to sink and establish surface H pressure when/where cold
- Rising air can lead to storms
- On the large scale, air circulates CCW around surface L pressure (cyclones) and CW around surface H pressure (anticyclones) in NH; opposite in SH
- Coriolis weaker in tropics, zero at equator
Expected surface winds from 3-cell model

- Polar easterlies
- Midlatitude westerlies
- NE trades
- SE trades
- Midlatitude westerlies
- Polar easterlies
Zoom in on equator

inter-tropical convergence zone (ITCZ)
ITCZ seen from space
“In theory, there’s no difference between theory and practice, but in practice there is.”
Annual average sea-level pressure (SLP)

60°S low is prominent owing to more ocean, less land.
NH winter average SLP

L at 60°N is prominent, especially over oceans
H at 30°N is weak

Highest pressures are where? Why?
High pressure at 30°N is prominent
Low at 60°N is absent
Where are the lowest SLPs? Why?
North Atlantic hurricane tracks 1947-2007

NH hurricanes tend to move westward south of 30°N, and move eastward north of 30°N.
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