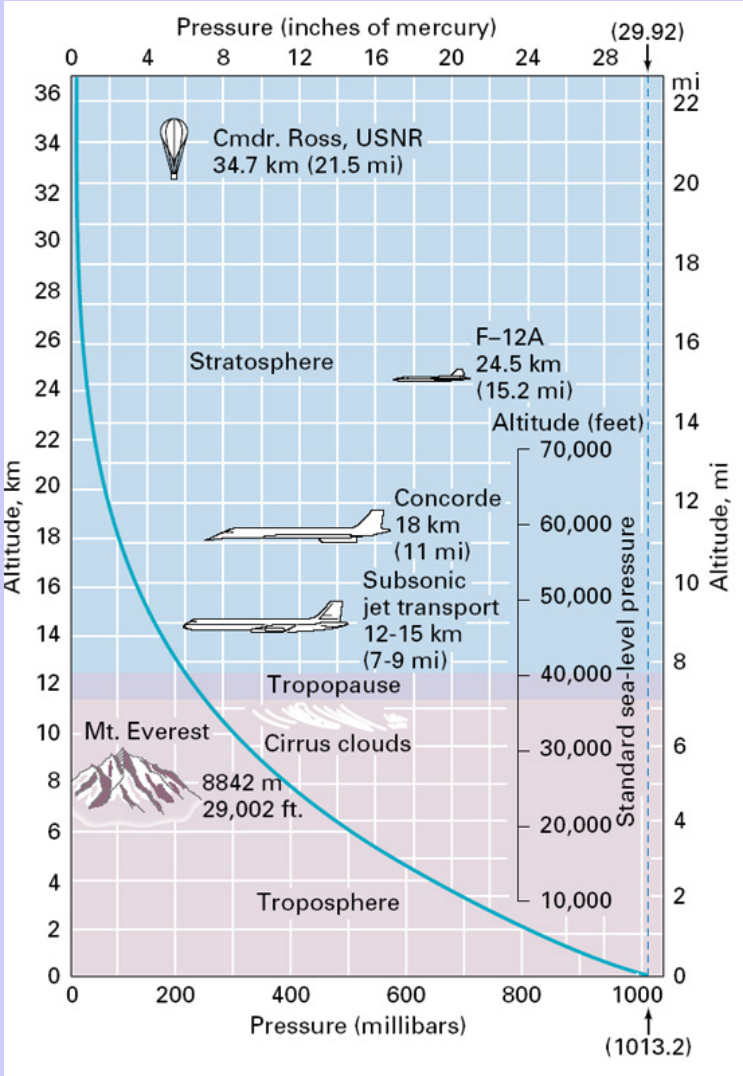
Global Circulation and Winds

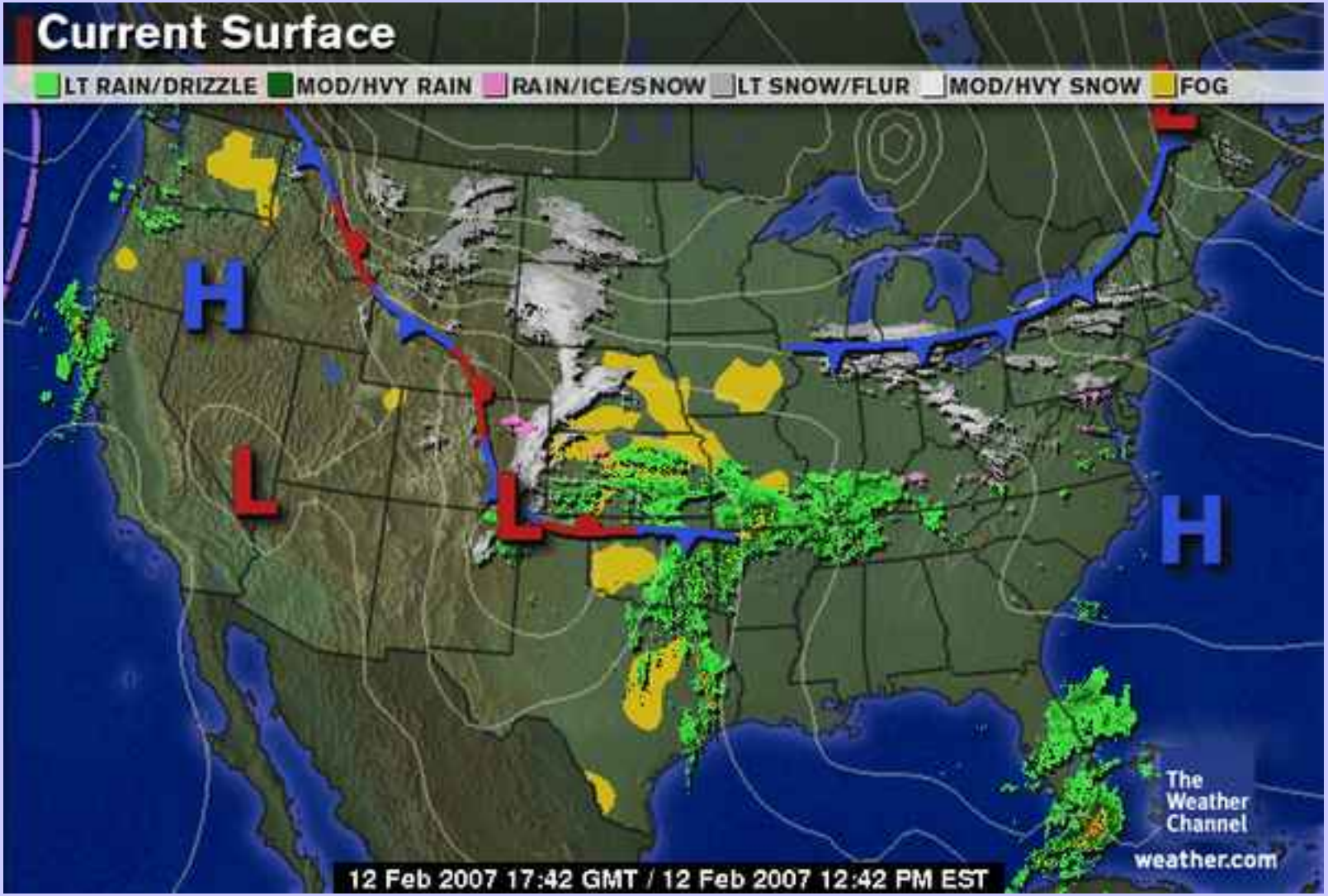
Outline

1. Atmospheric pressure
2. Winds
3. Global circulation patterns
4. Ocean circulation patterns

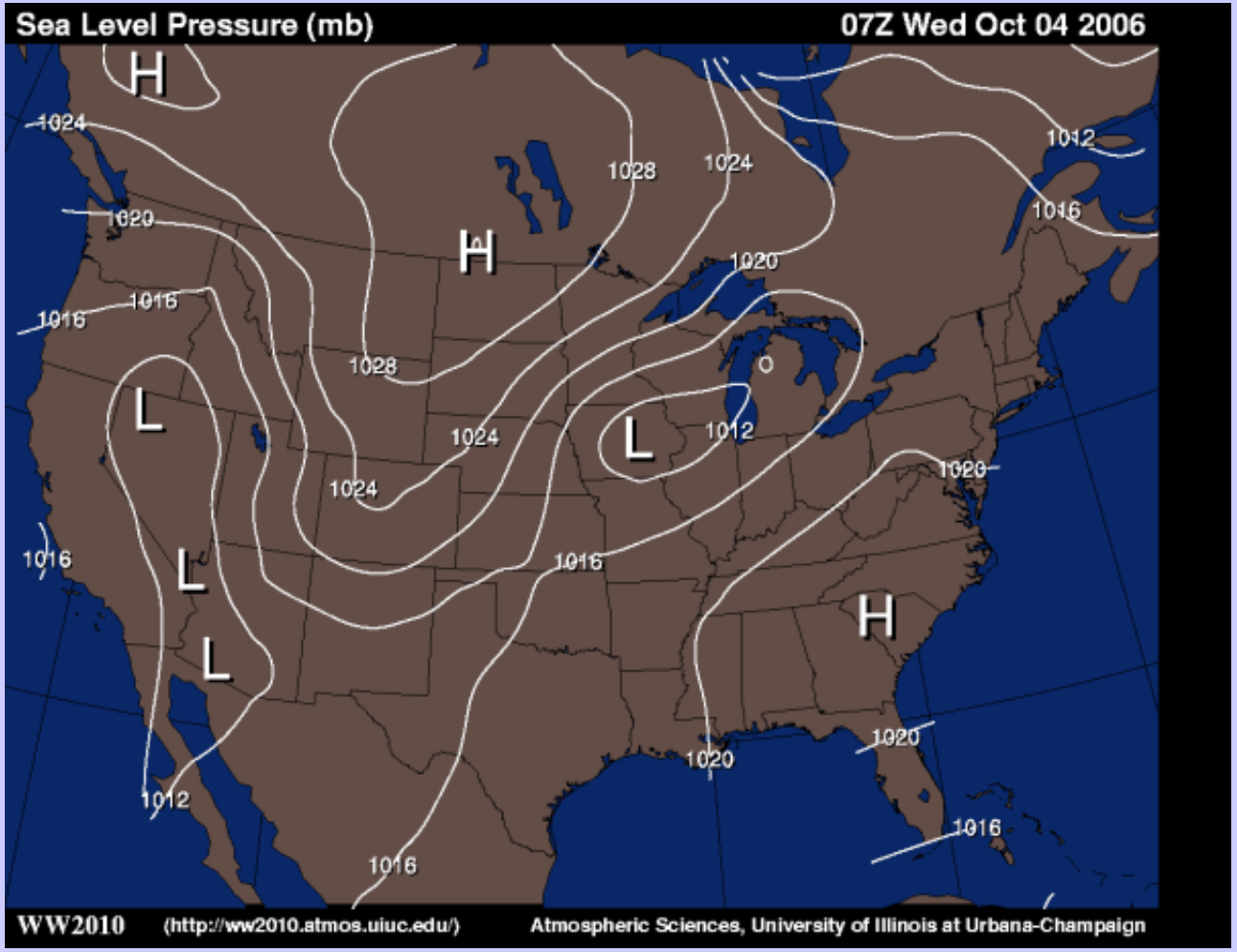
1. Atmospheric Pressure



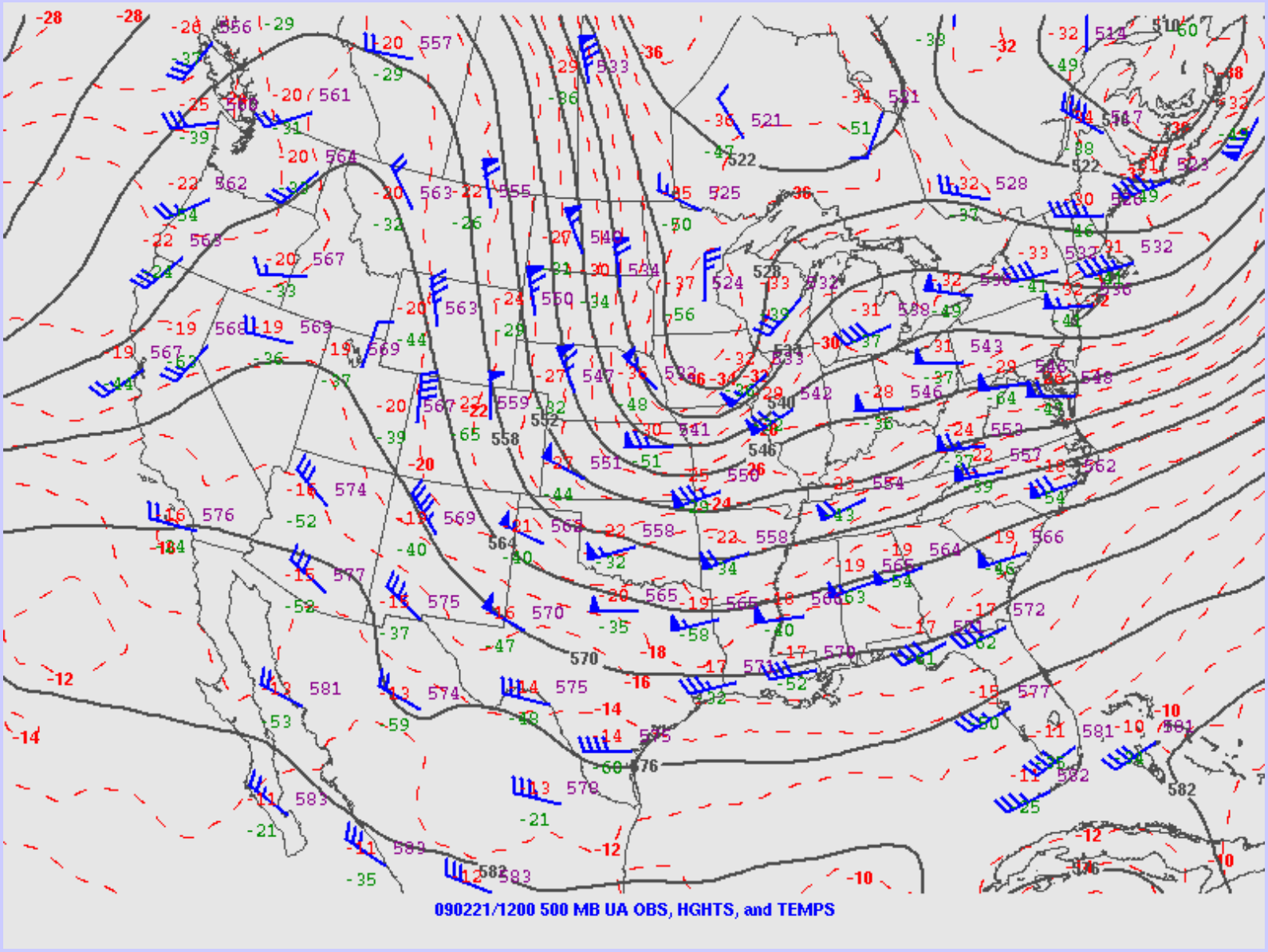
Atmospheric Pressure

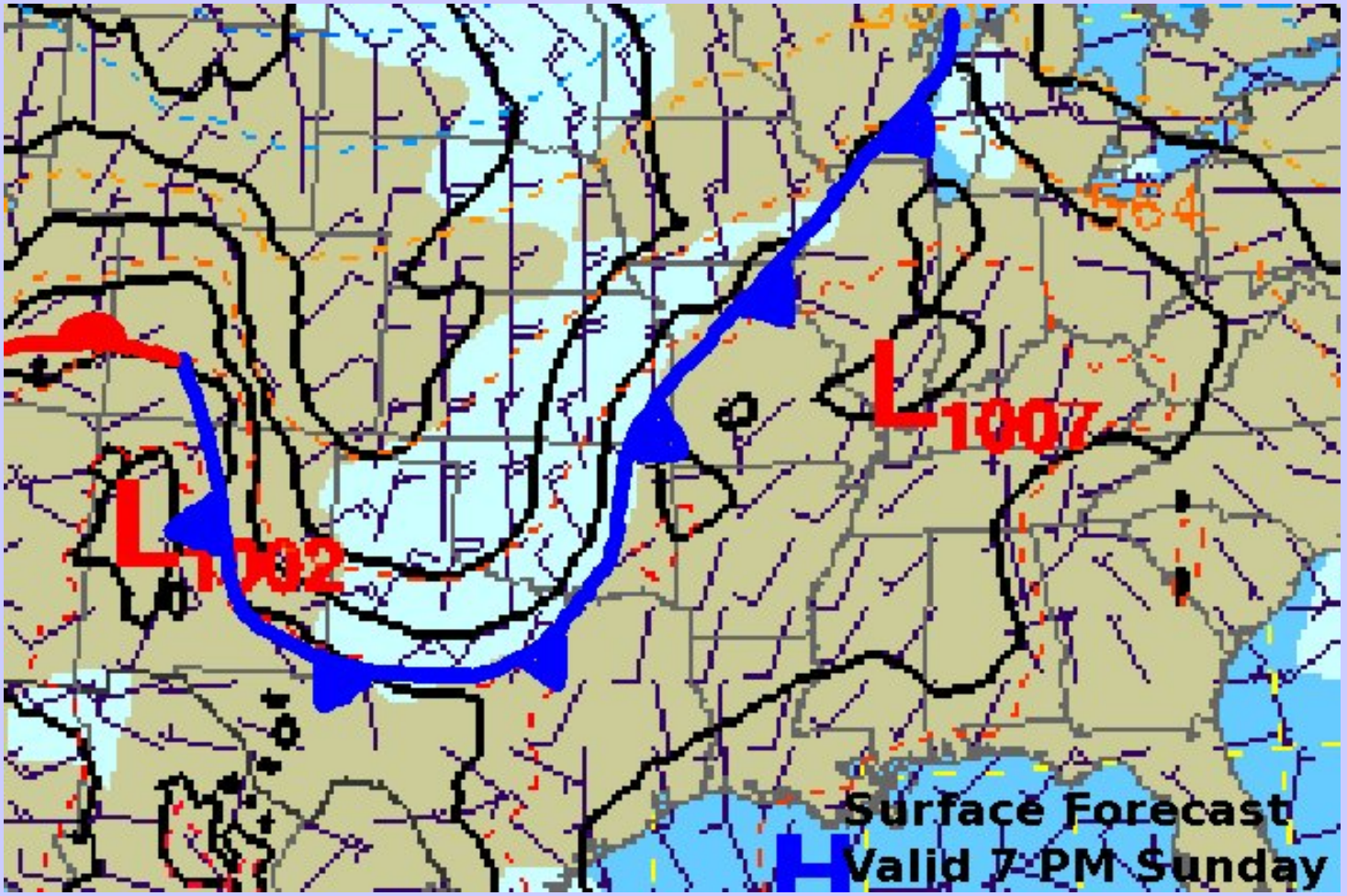


Atmospheric Pressure



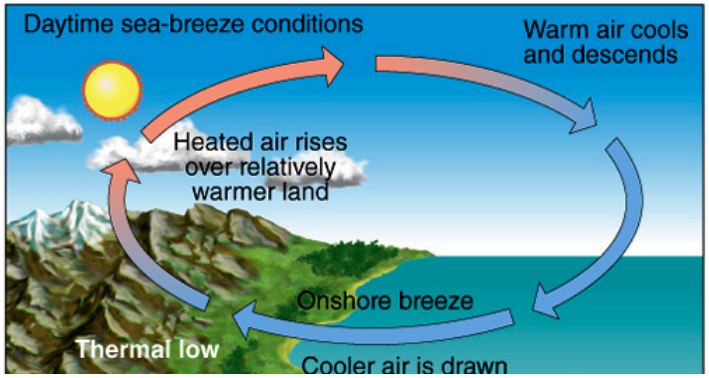
Isobar map

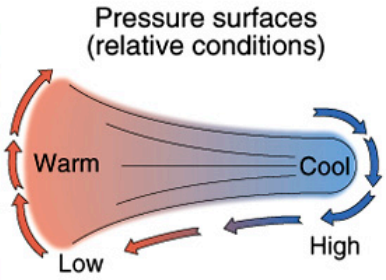

090221/1200 500 MB UA OBS, HGHTS, and TEMPS


L 1007
L 1002
564
Surface Forecast
Valid 7 PM Sunday

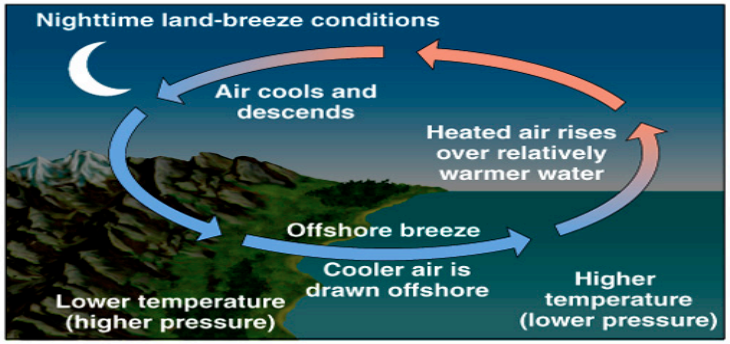
Local winds

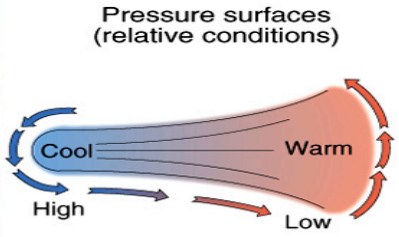
Land – sea breezes





Daytime: sea breeze



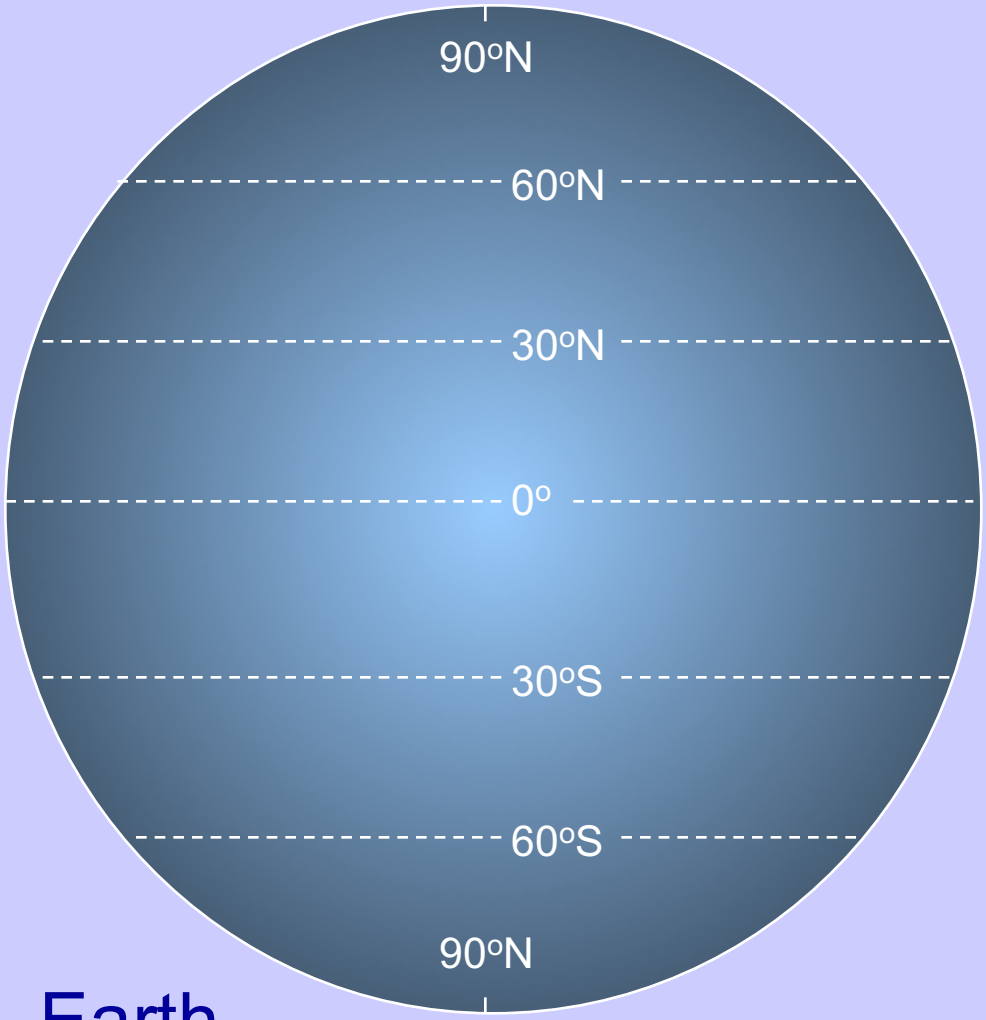


Night time: land breeze

3. Global circulation patterns

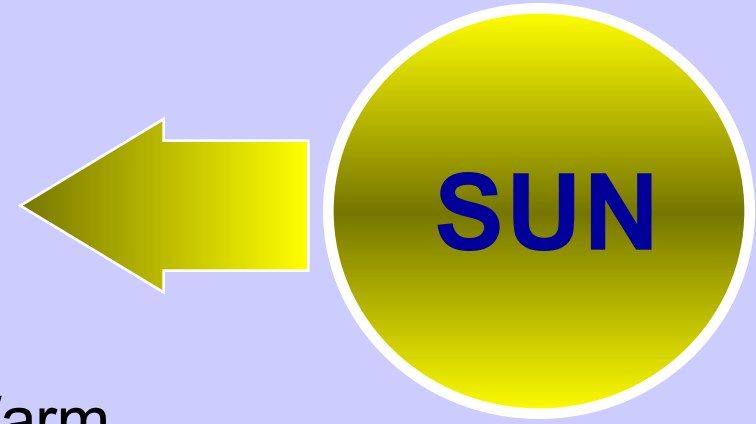
http://www.bergonia.org/History/Hist-maps/columbusmap.gif

Cold
High
Pressure



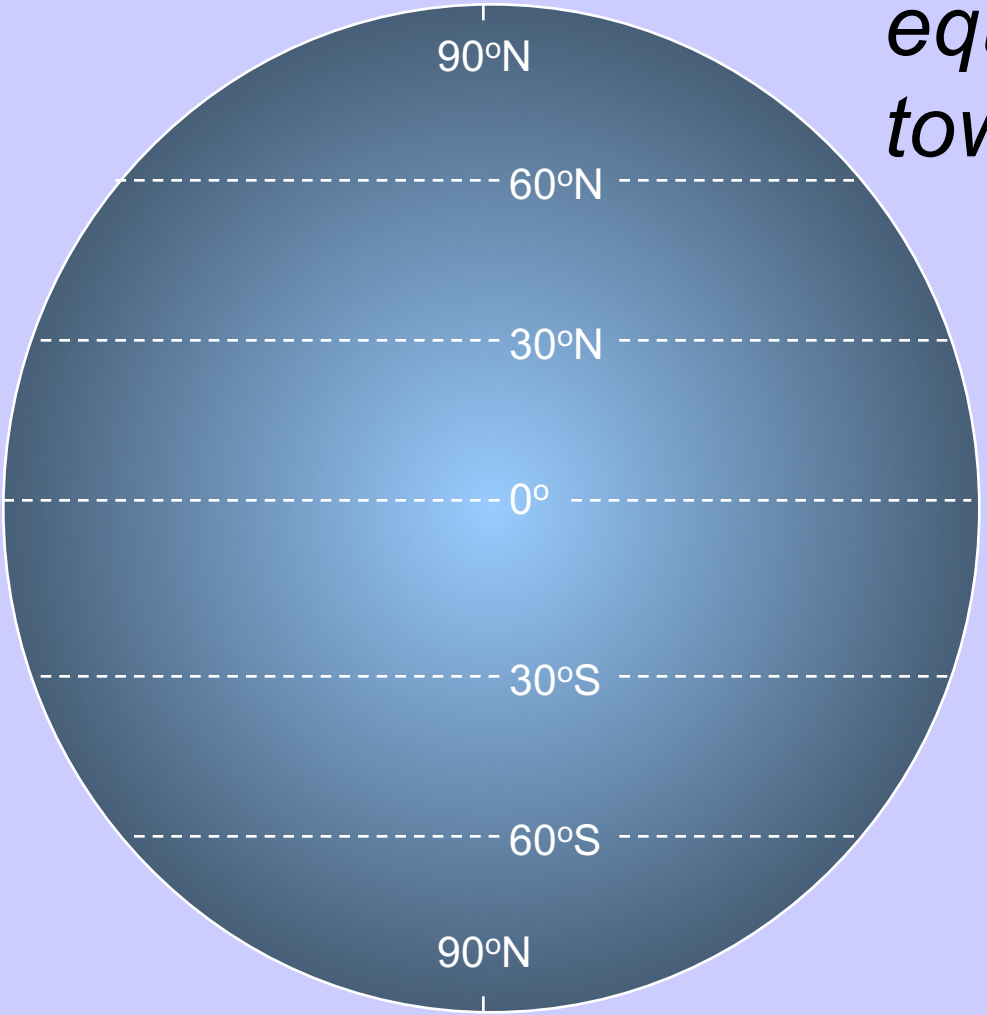
Earth

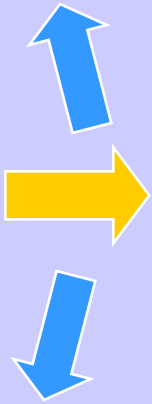
Solar radiation creates variation in heating / atmospheric pressure



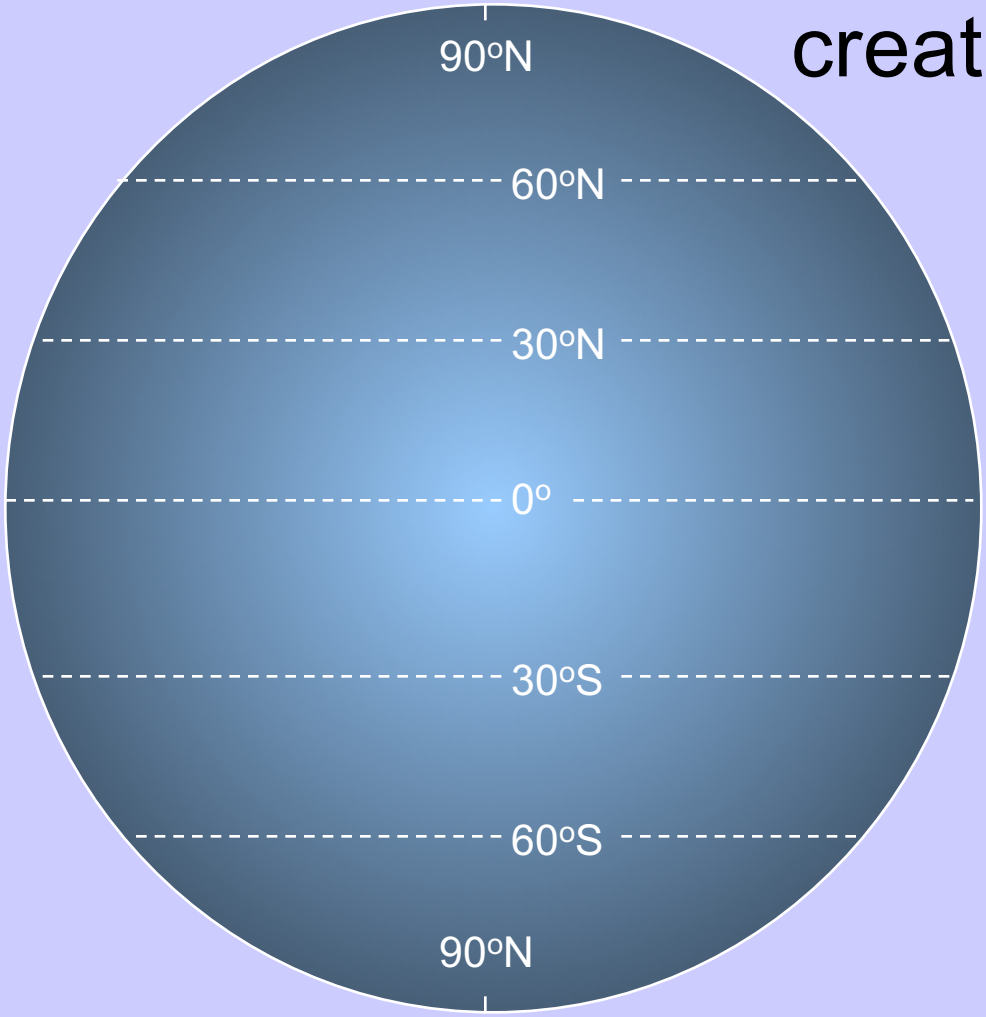
Warm
Low Pressure

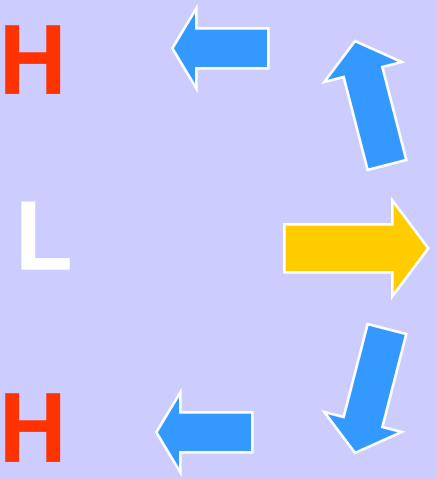
Warm air rises at equator and flows towards the poles

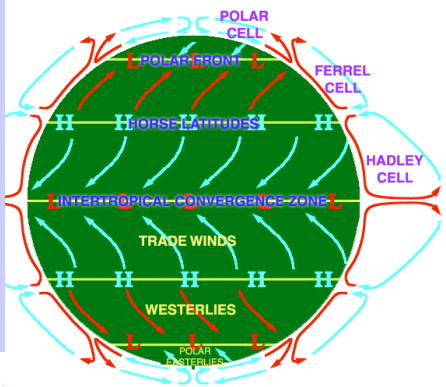




Cold air sinks at 30° N and S latitude creating high pressure

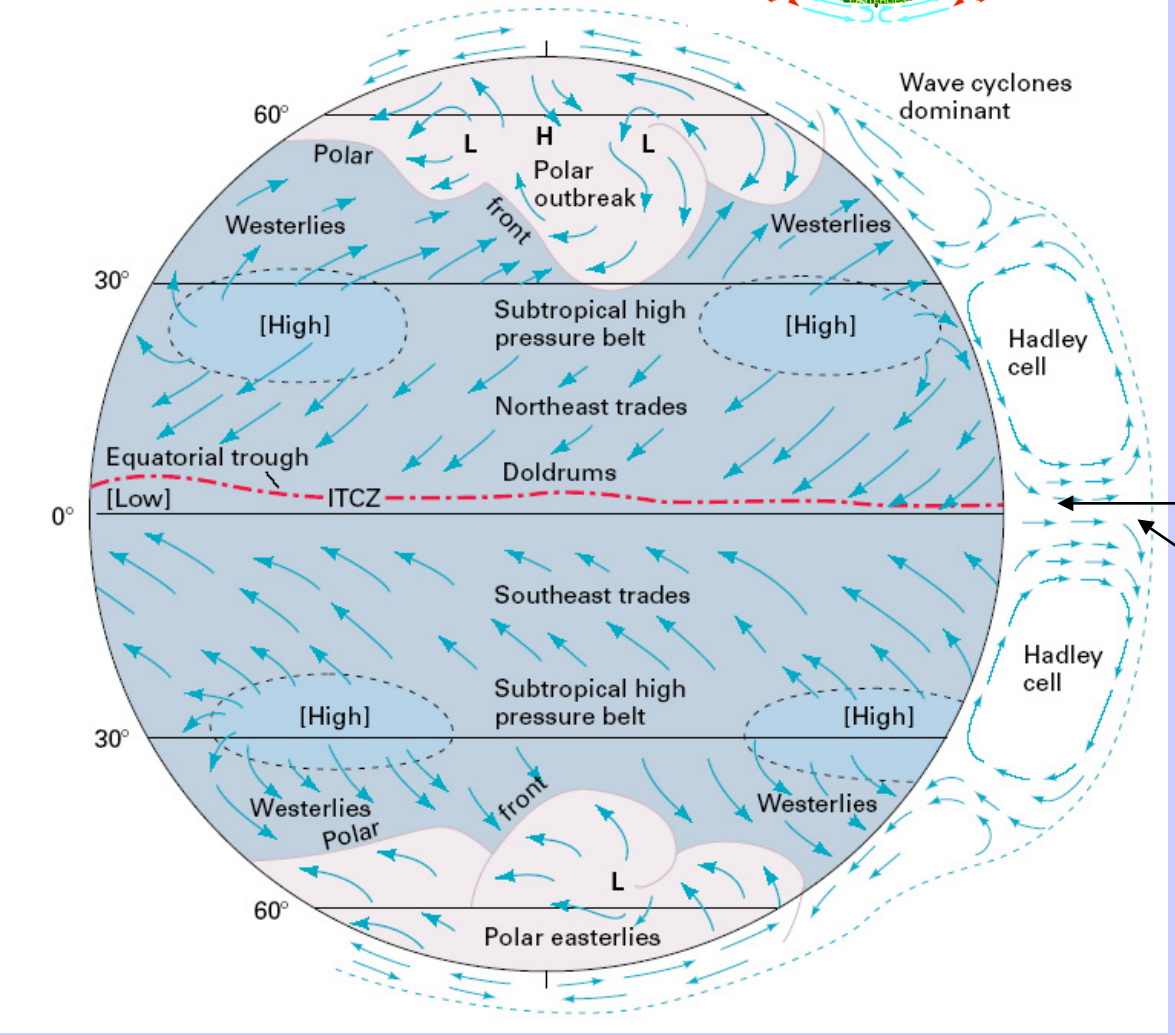






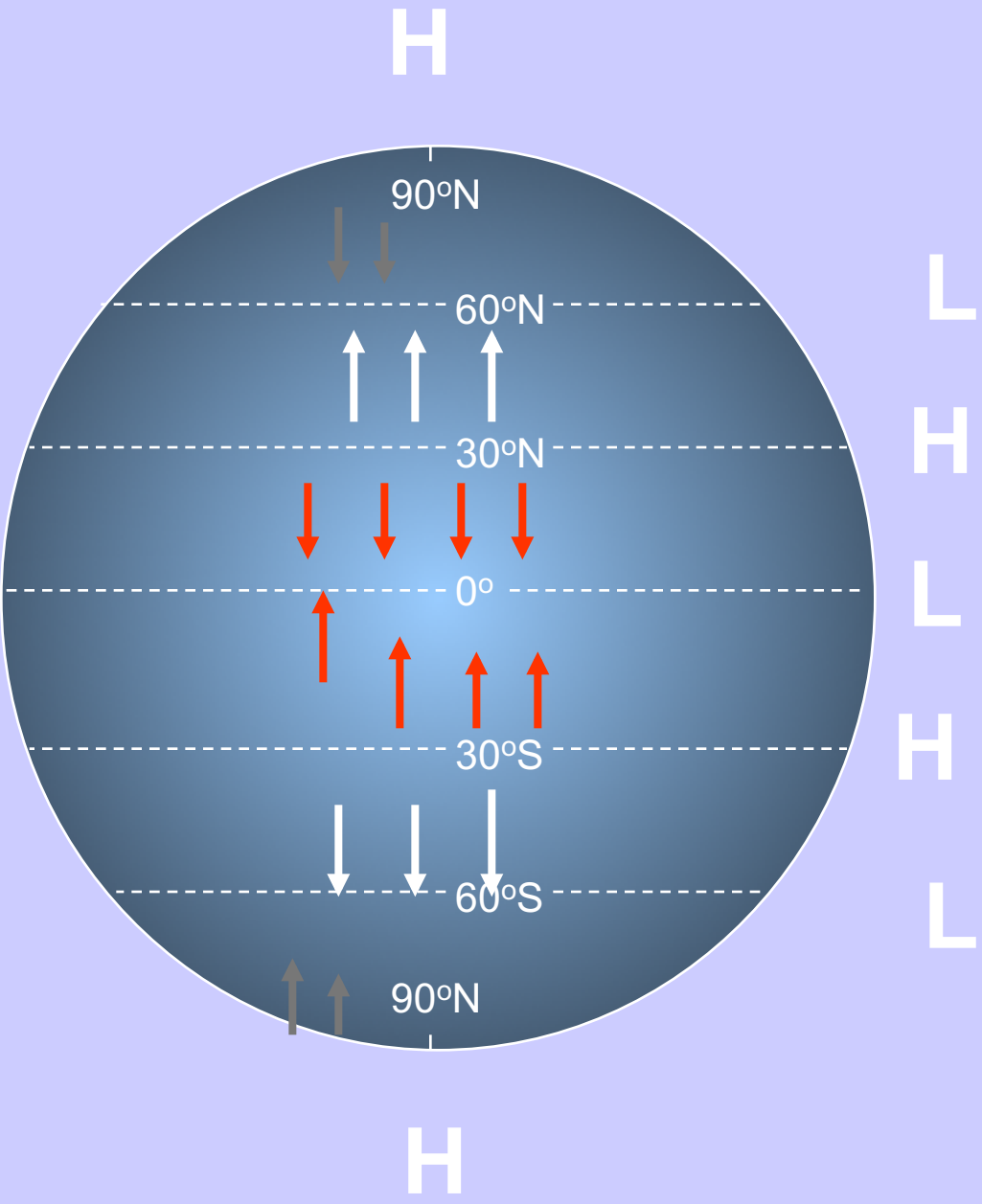
Low pressure at 0^o , 60^o latitude

high pressure at 30^o , 90^o latitude

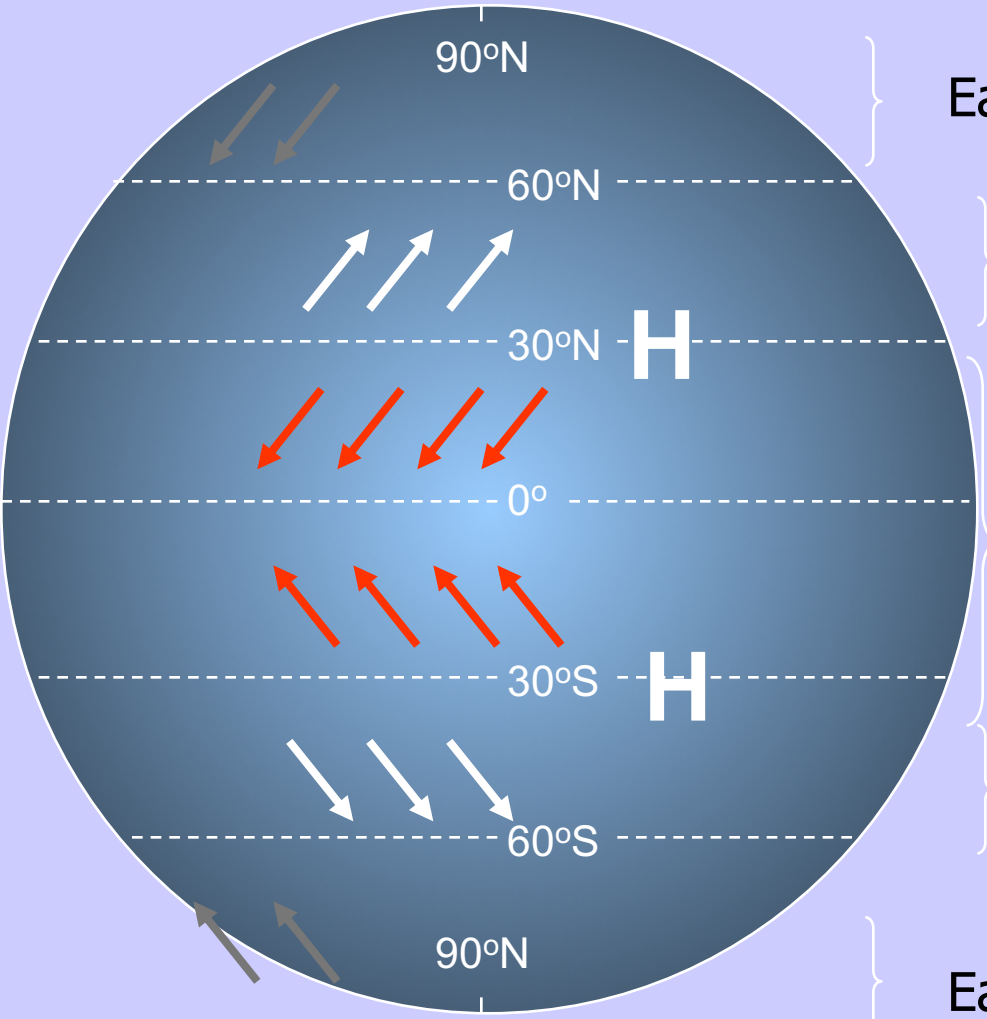


ITCZ=Inter-Tropical Convergence Zone

Hadley cells: well developed low pressure cells in the tropics



Pressure gradients influence development of global wind patterns



Easterly winds

Westerly winds

Easterly winds (trade winds)

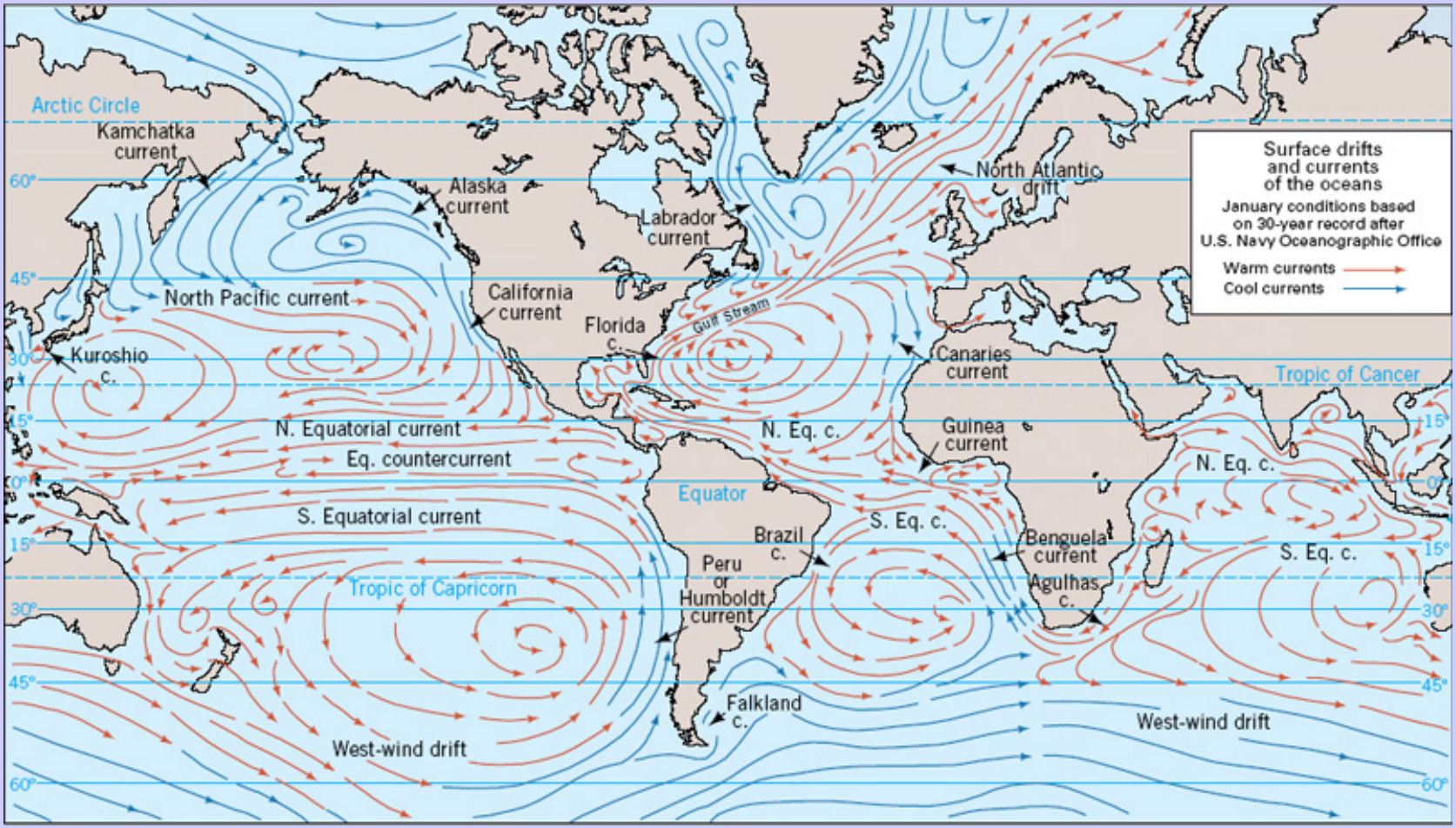
Westerly winds

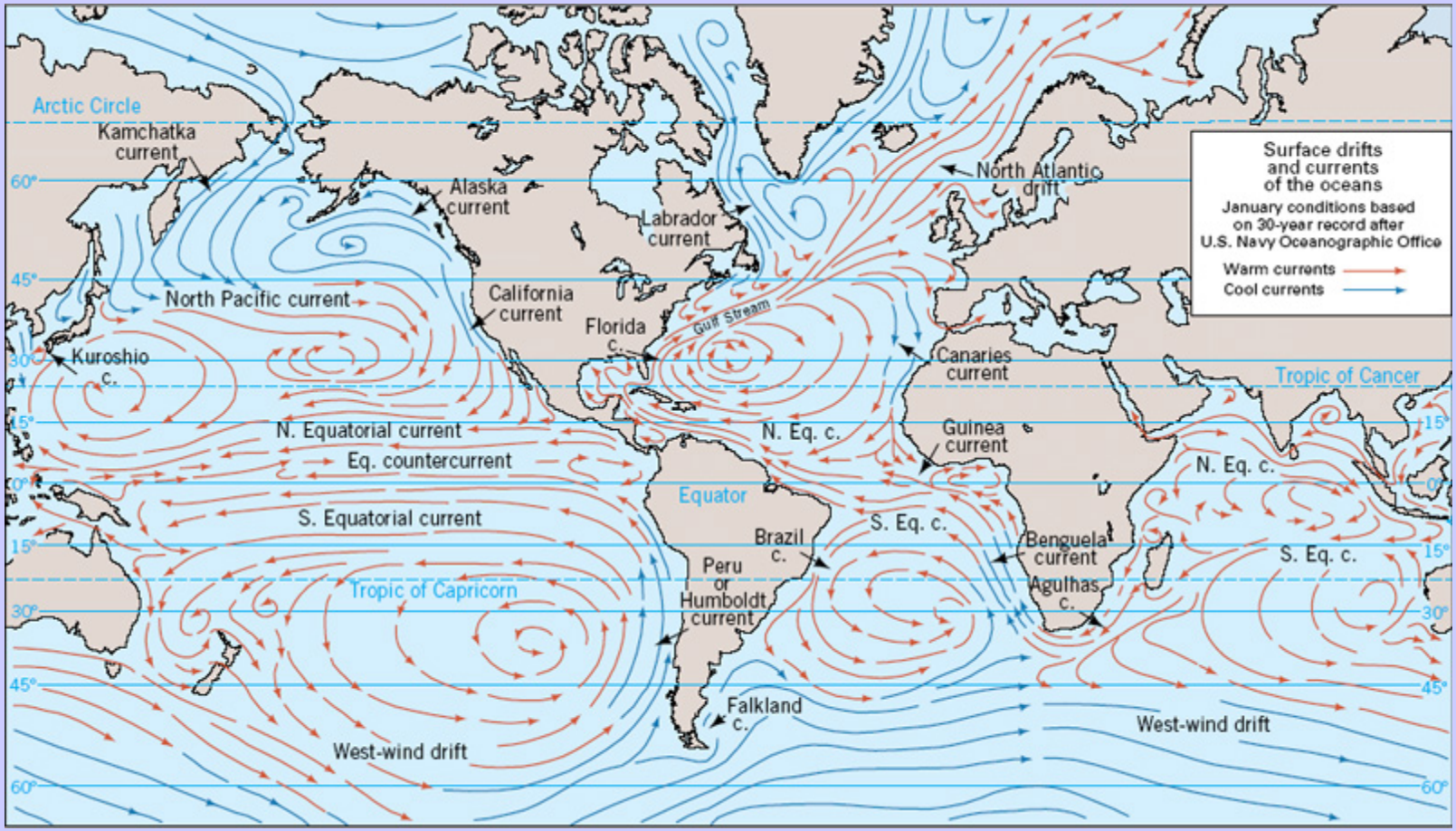
Easterly winds

4. Ocean circulation patterns

Ocean currents

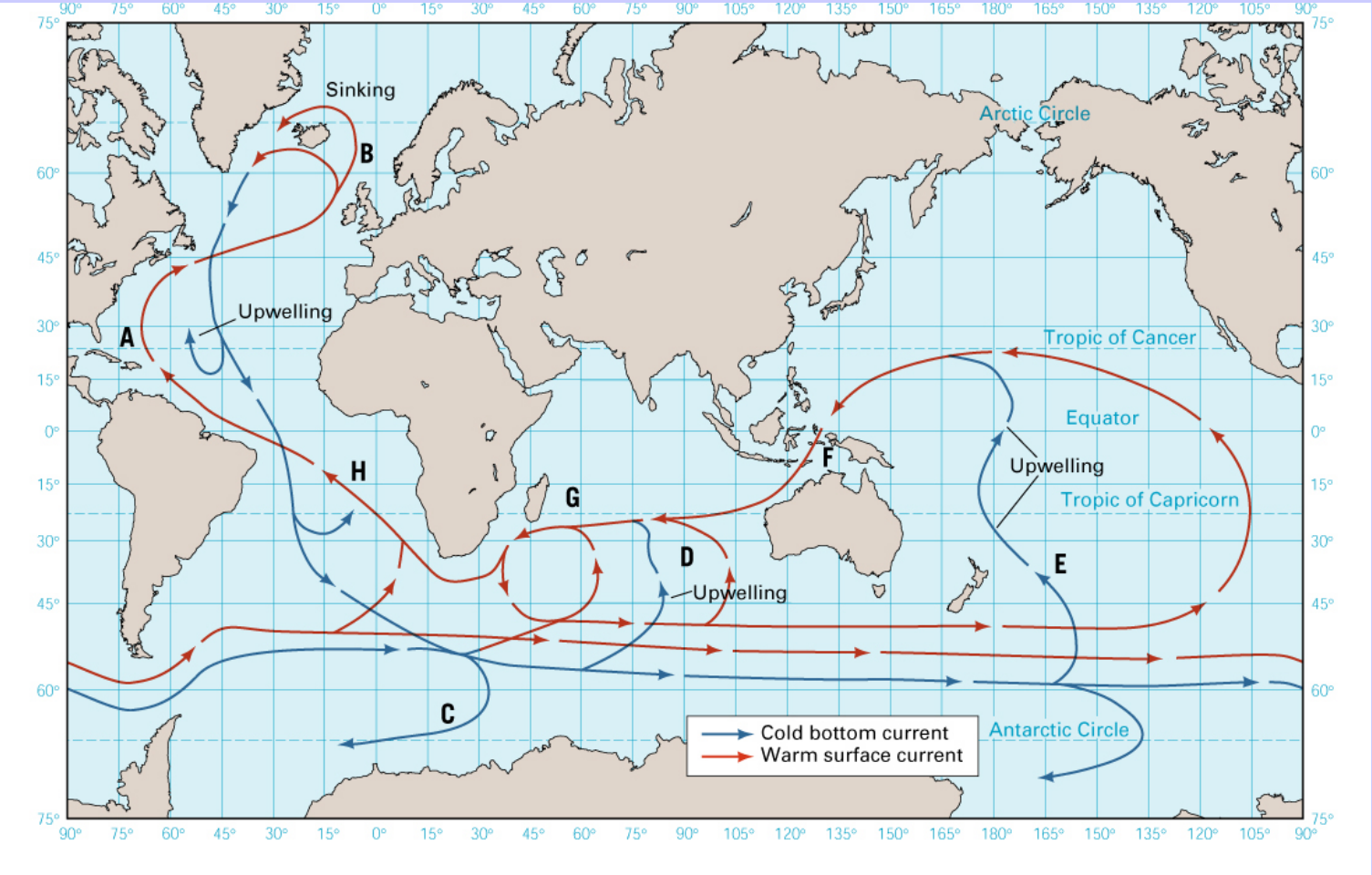
- large continuously moving loops (gyres)
- produced by winds, Coriolis effect and land masses





Ocean circulation exposes east coasts of continents to warm currents, west coasts to cold currents

Ocean upwelling



Summary

- Variation in heating causes variation in atmospheric pressure conditions
- Variation in atmospheric pressure causes air to move (H → L)
- Local-scale wind patterns occur with variation in heating, pressure

Summary (continued)

- Direction of air movement affected by pressure gradient, Coriolis effect, and friction
- In No. Hemisphere L pressure systems (cyclones) circulate counterclockwise in, H pressures systems (anticyclones) circulate clockwise out

Summary (continued)

- Global variation in heating produces L pressure at 0^o and 60^o, H pressure at 30^o and 90^o
- H and L pressure systems drive global wind patterns (easterlies between 30^o N and 30^o S; westerlies between 30-60^o N and S)

Summary (continued)

- Ocean currents influenced by winds, Coriolis effect and land masses
- Ocean circulation exposes east coasts of continents to warm currents, west coasts to cold currents