EOSC 112: THE FLUID EARTH

TEMPERATURE AND RAINFALL

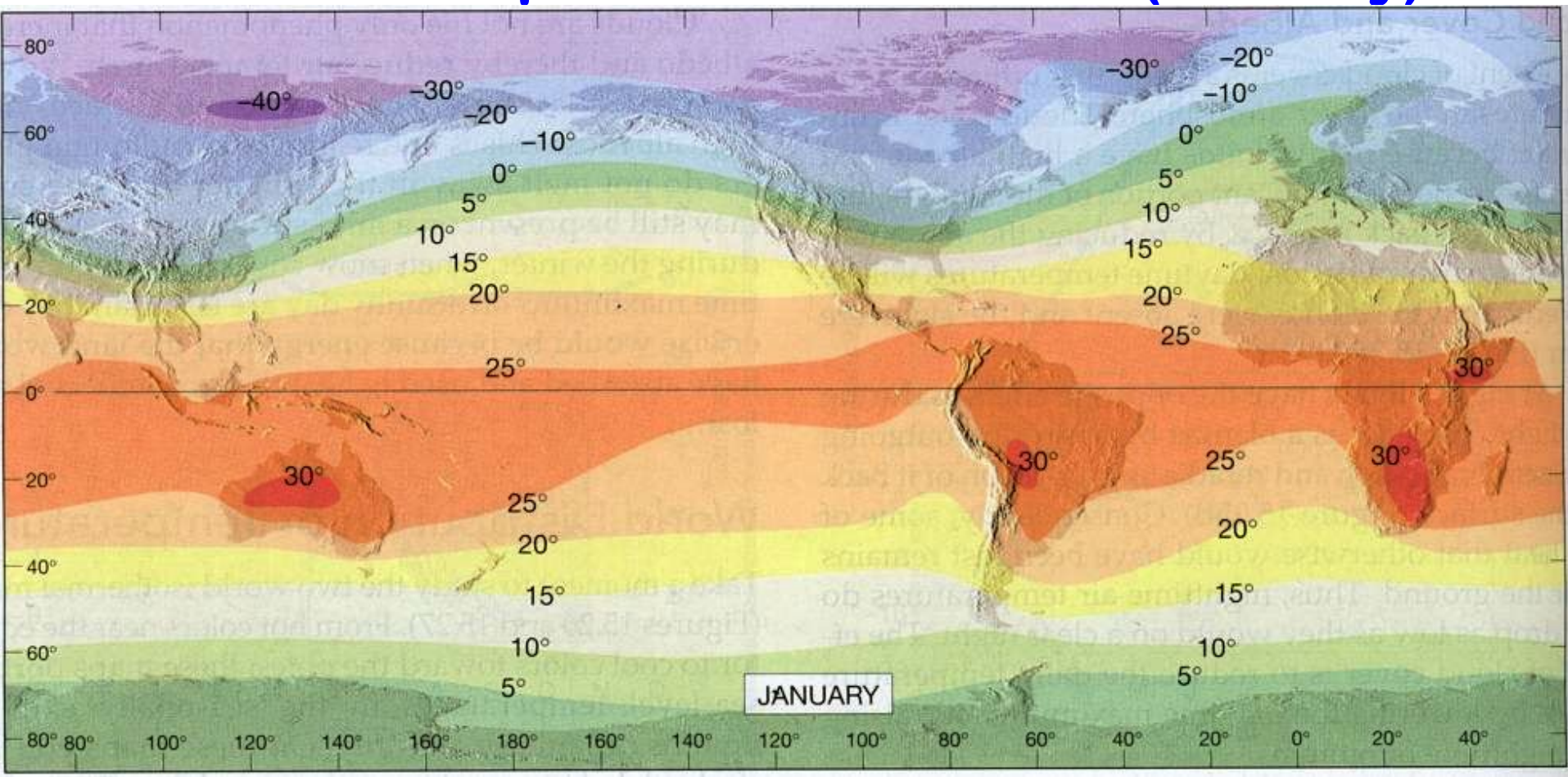
Atm4 Read: Kump et al. Chap.4, p. 68-80
Check: Rev. Ques. 1-6, 12; Problem: 2

Why do weather / climate vary around the globe?
Why is the response to a global climate perturbation not necessarily uniform around the globe?

Objectives:

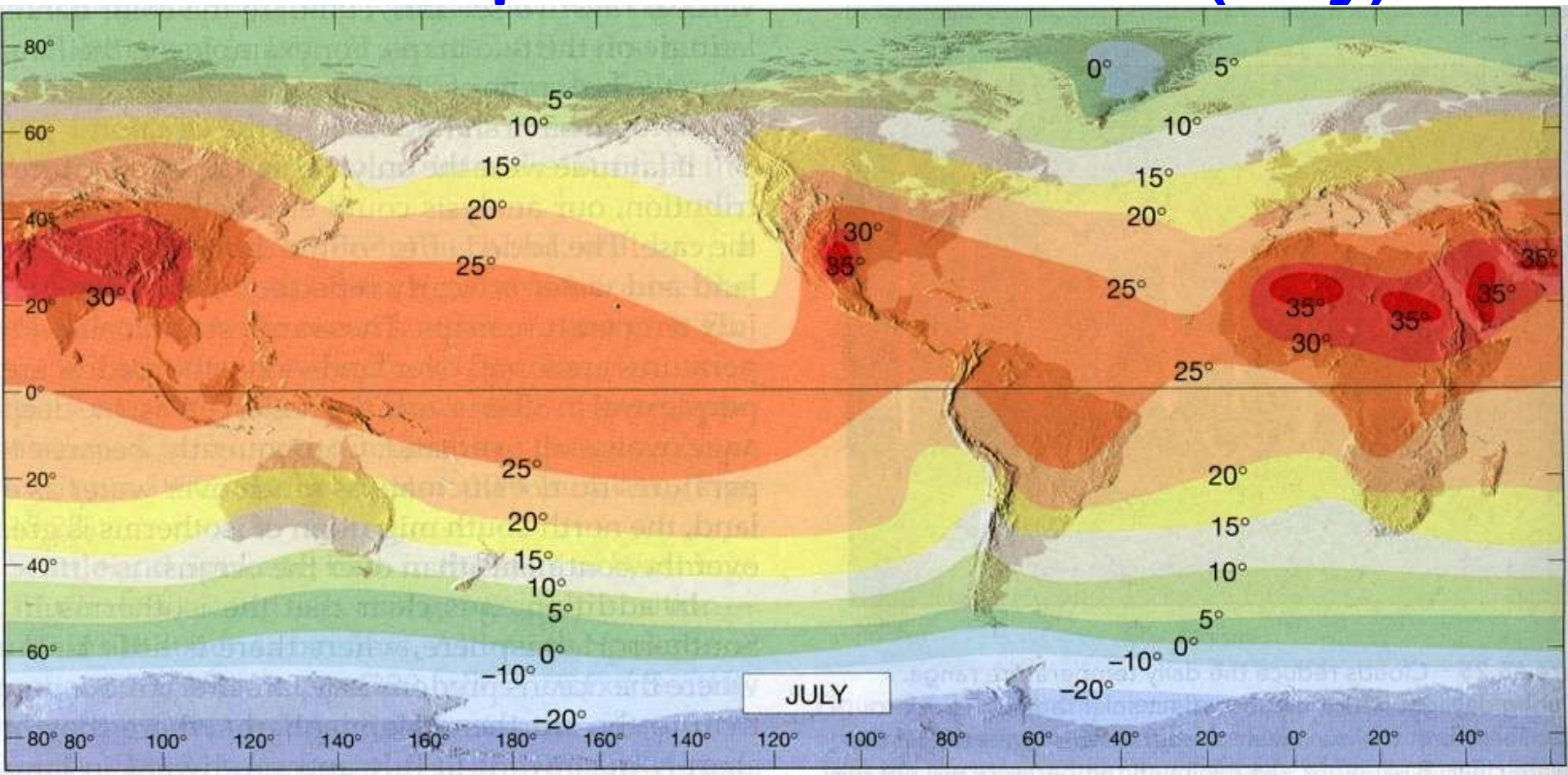
1. **To describe the global distribution of T and rainfall;**
2. **To describe the hydrological cycle.**

1. Mean air temperature at sea level (January)



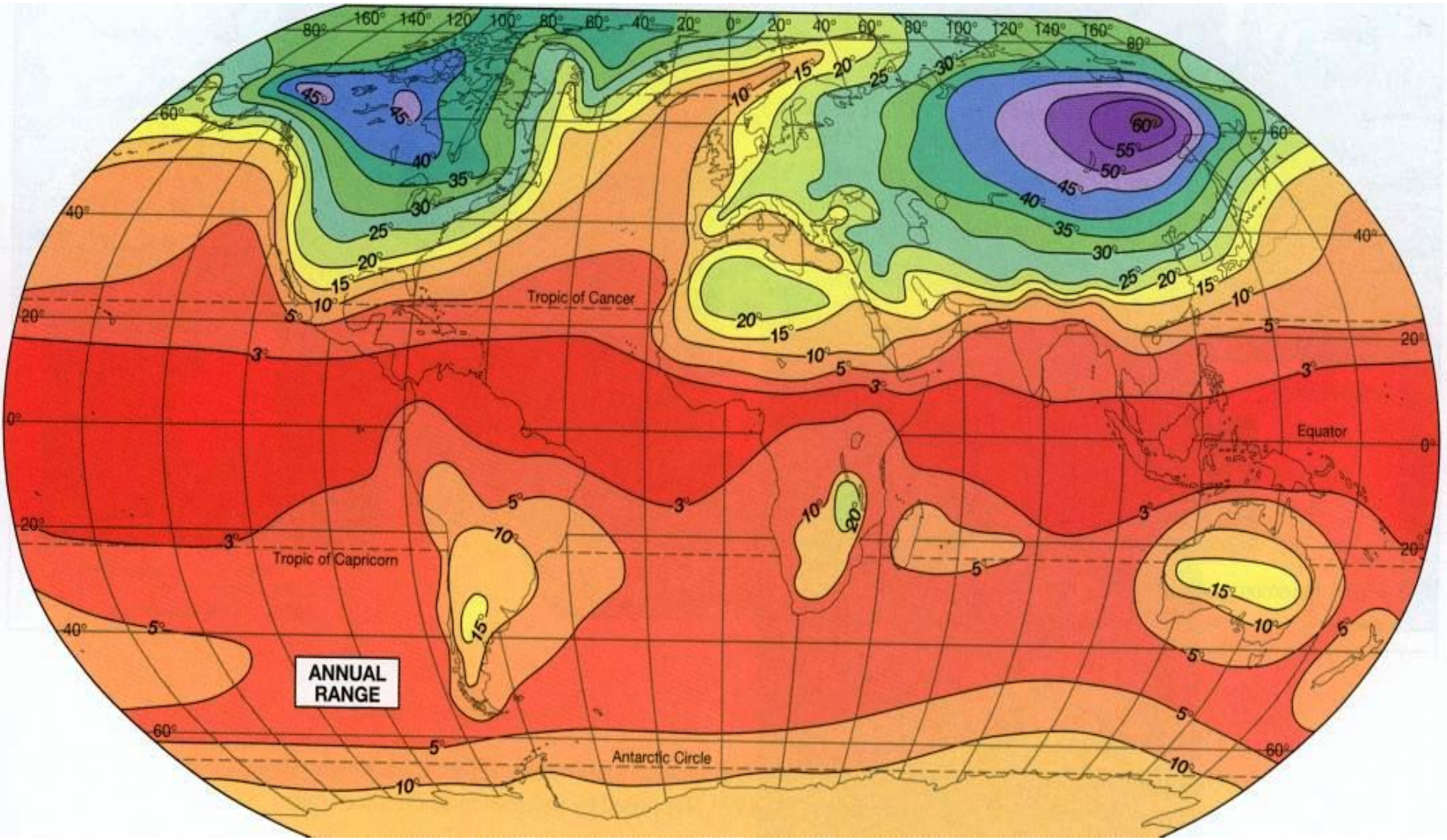
- Wind patterns affect distribution of T (e.g. wave-like aspect of isotherms)

Mean air temperature at sea level (July)



- Cool Californian Current => cools adjacent land
- Hottest regions at ~20°-30° (not at Eq.)
  - High P, subsiding air, clear sky, low humidity => hot deserts

Annual T range

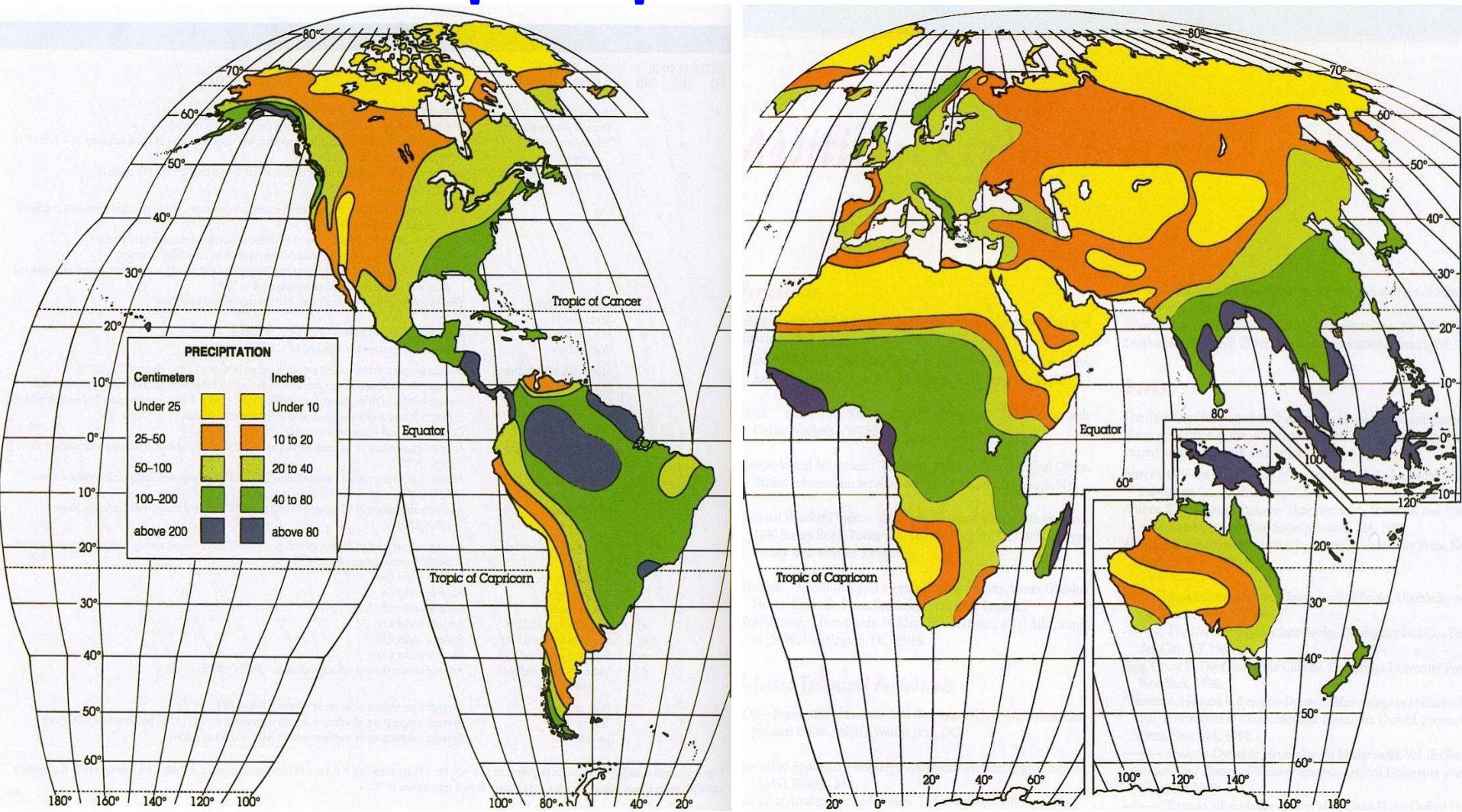


- Largest T range over land.

Temp. records

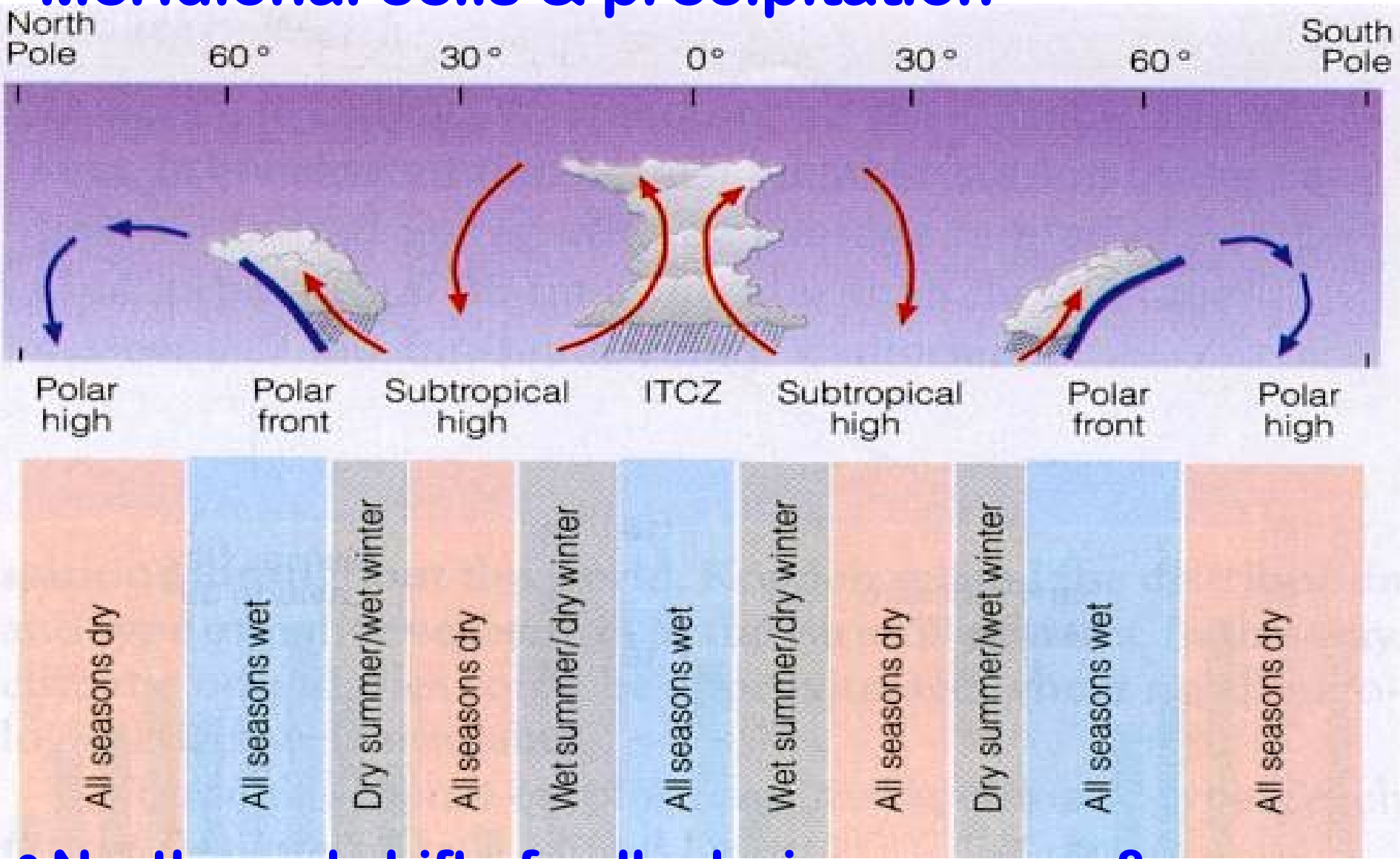
- High T records:
  - World: El Azizia, Libya (32°N) 58°C, in 1922
  - Western Hem.: Death Valley, CA (36°N) 57°C
  - Canada: Midale, SK (49°N) 45°C
- Low T record:
  - World: Vostok, Antarctica (78°S) -89°C, 1983
  - N.Hem.: Verkhoyansk, Russia (67°N) -68°C
  - N.America: Snag, Yukon (62°N) -63°C.

Mean annual precipitation



- Driest regions near 30° and poles: high P, subsiding air.

Meridional cells & precipitation



- **Northward shift of cells during summer & southward shift during winter => precip. changes**

Additional comments

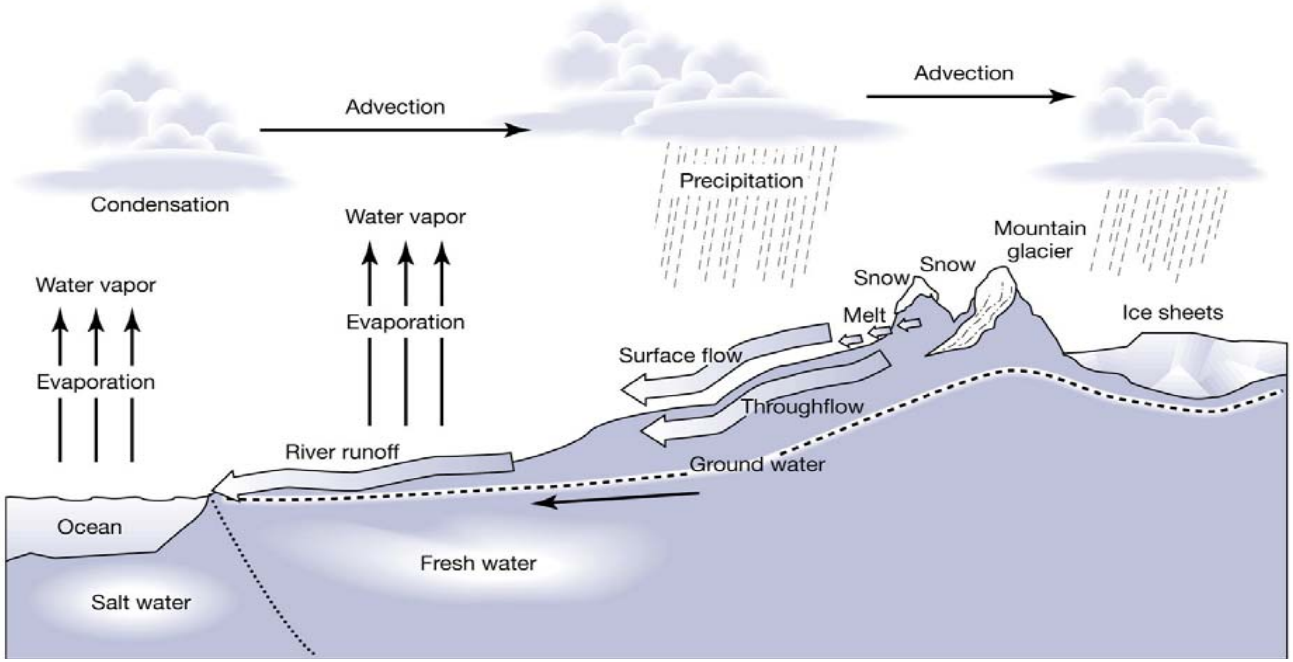
- Dry "rain shadow" past mountain ranges
  - e.g. east of Rockies, Andes
- Interior of continents far from oceans: drier
- Cold coastal currents

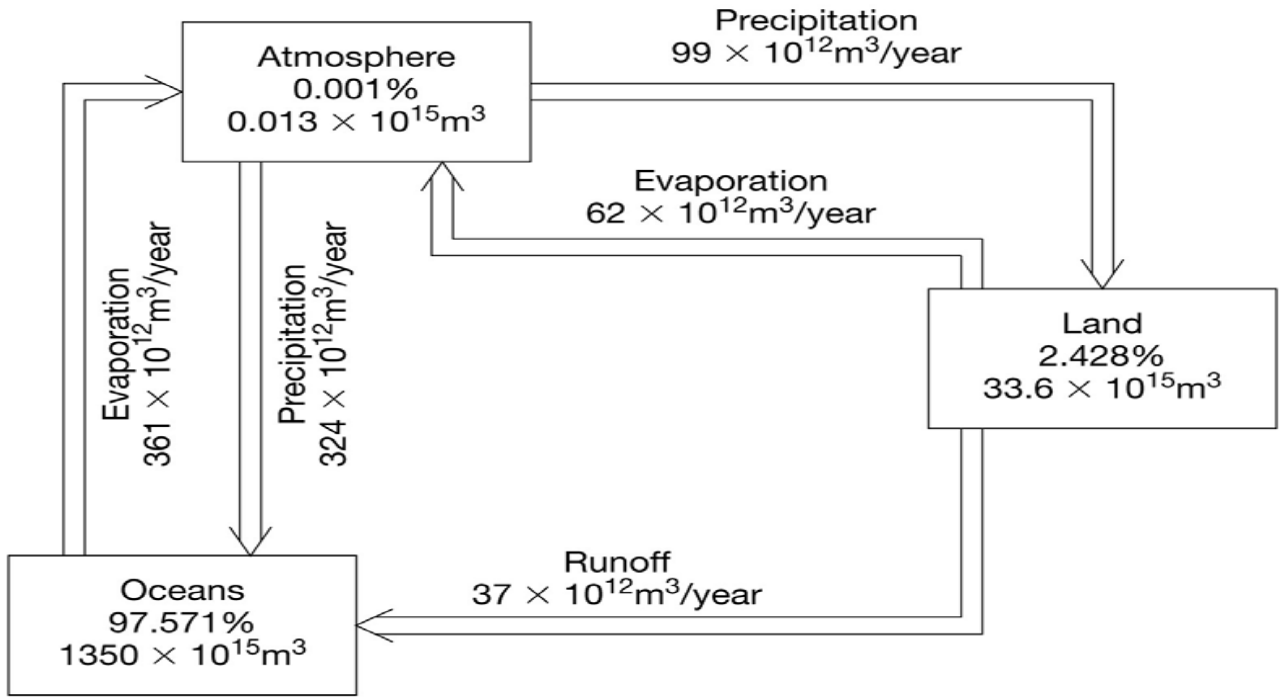
  => less evaporation & cool air

  => less convection & precipitation over adjacent land.
  - e.g. Baja California in Mexico, or
  - Namib Desert along SW Africa.

2. Hydrological Cycle

- Water: 97.5% in ocean,
  2.5% on land, 0.001% in atmosphere
- Water on land:
  - 3/4 in polar ice sheets.
    - Greenland ice sheet melted => 6m global sea level (SL) rise
    - Antarctic ice sheet melted => 60m SL rise
  - Some in glaciers, ground water
  - < 1% in lakes, rivers, soils.





(b)