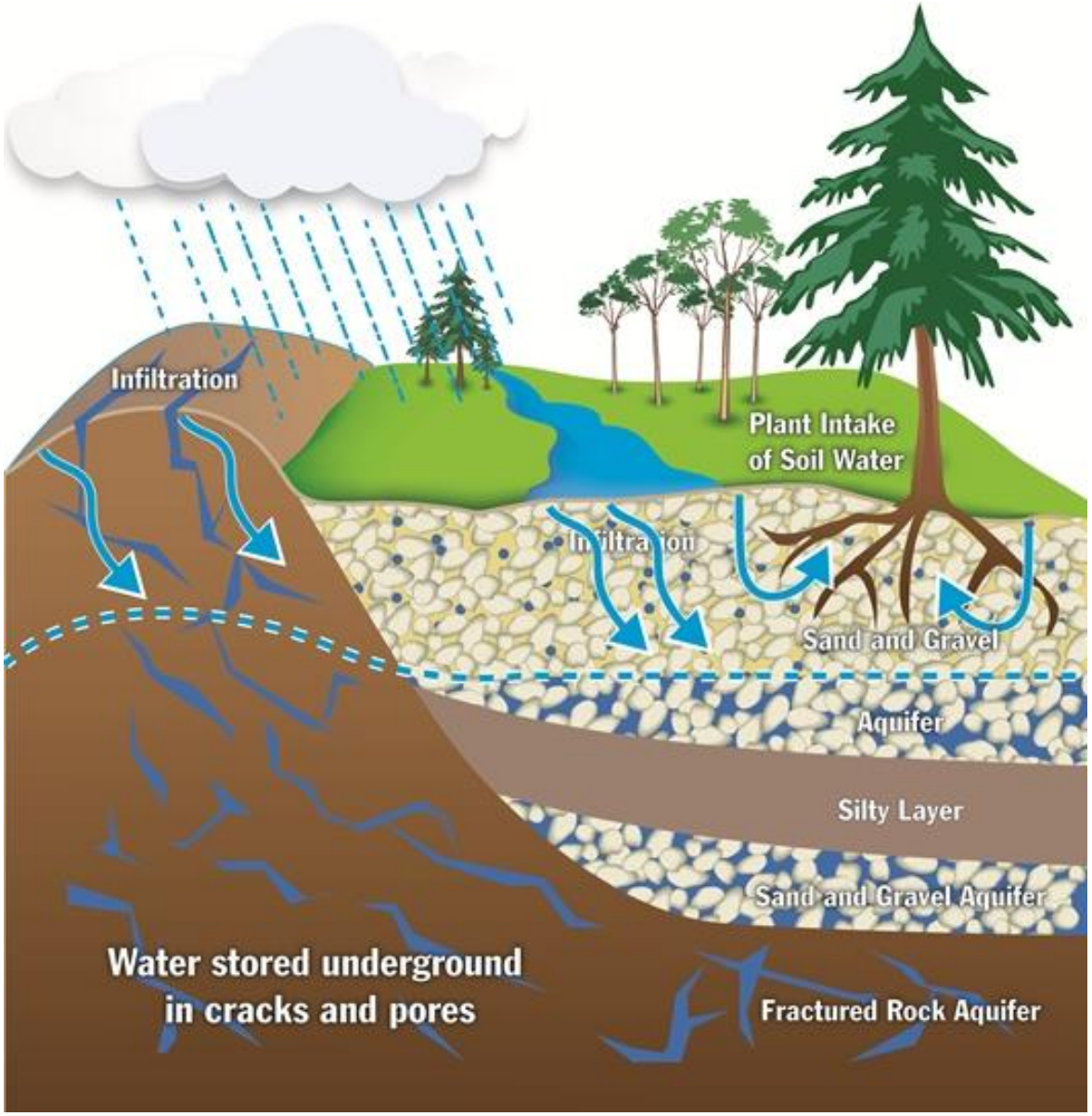
# Groundwater




**About 1/3 of all freshwater on the planet is found underground.**

**Part air part water unsaturated zone**

**Water table**

**Saturated zone: water fills all pores and cracks**

# Wetlands

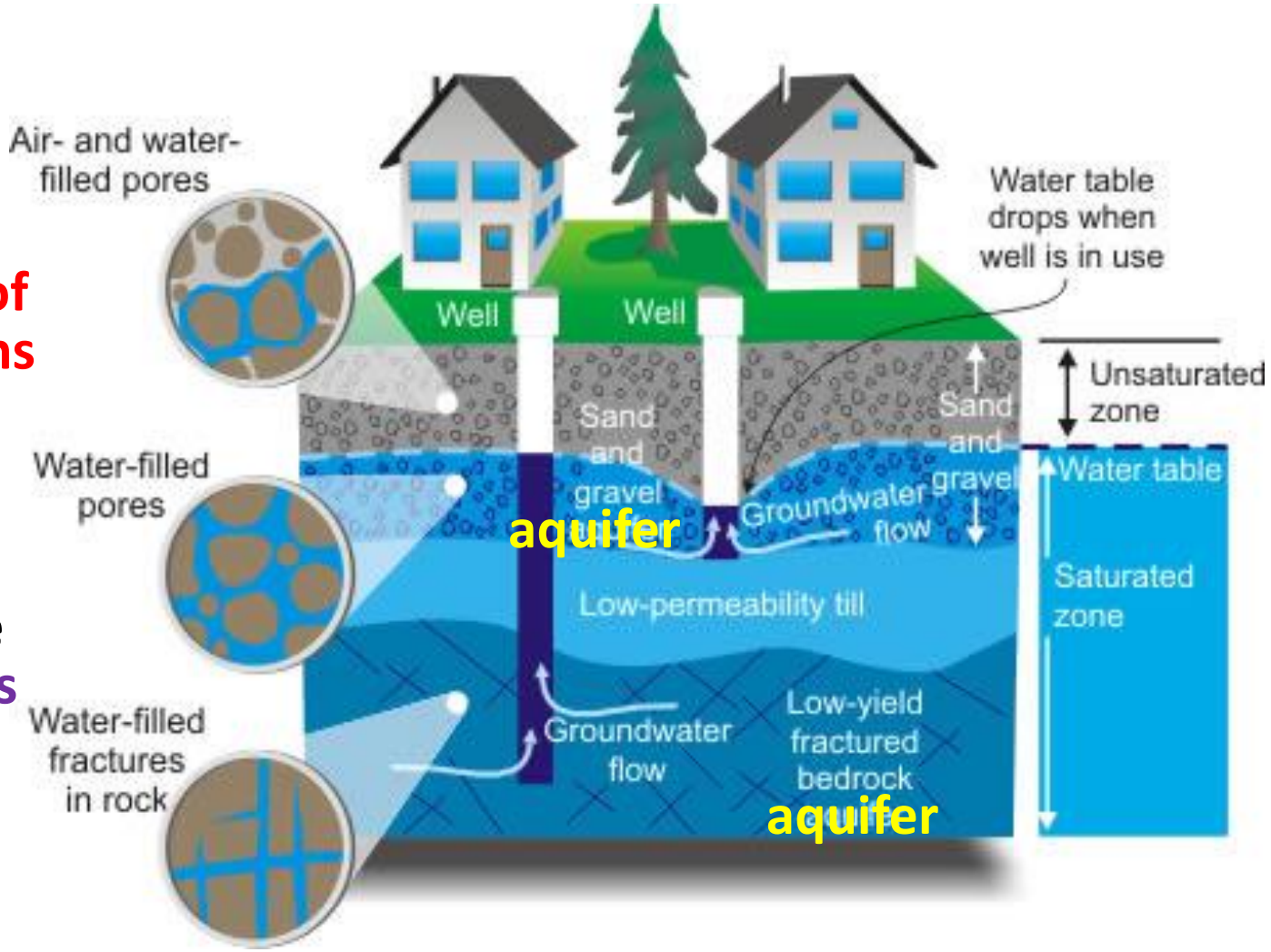
**Wetland is an area where the water table is at, near or above the land surface long enough during the year to support adapted plant growth.**

- **Swamp: a wetland dominated by trees**
- **Bog: a wetland dominated by peat moss**
- **Marsh: a wetland dominated by grasses**

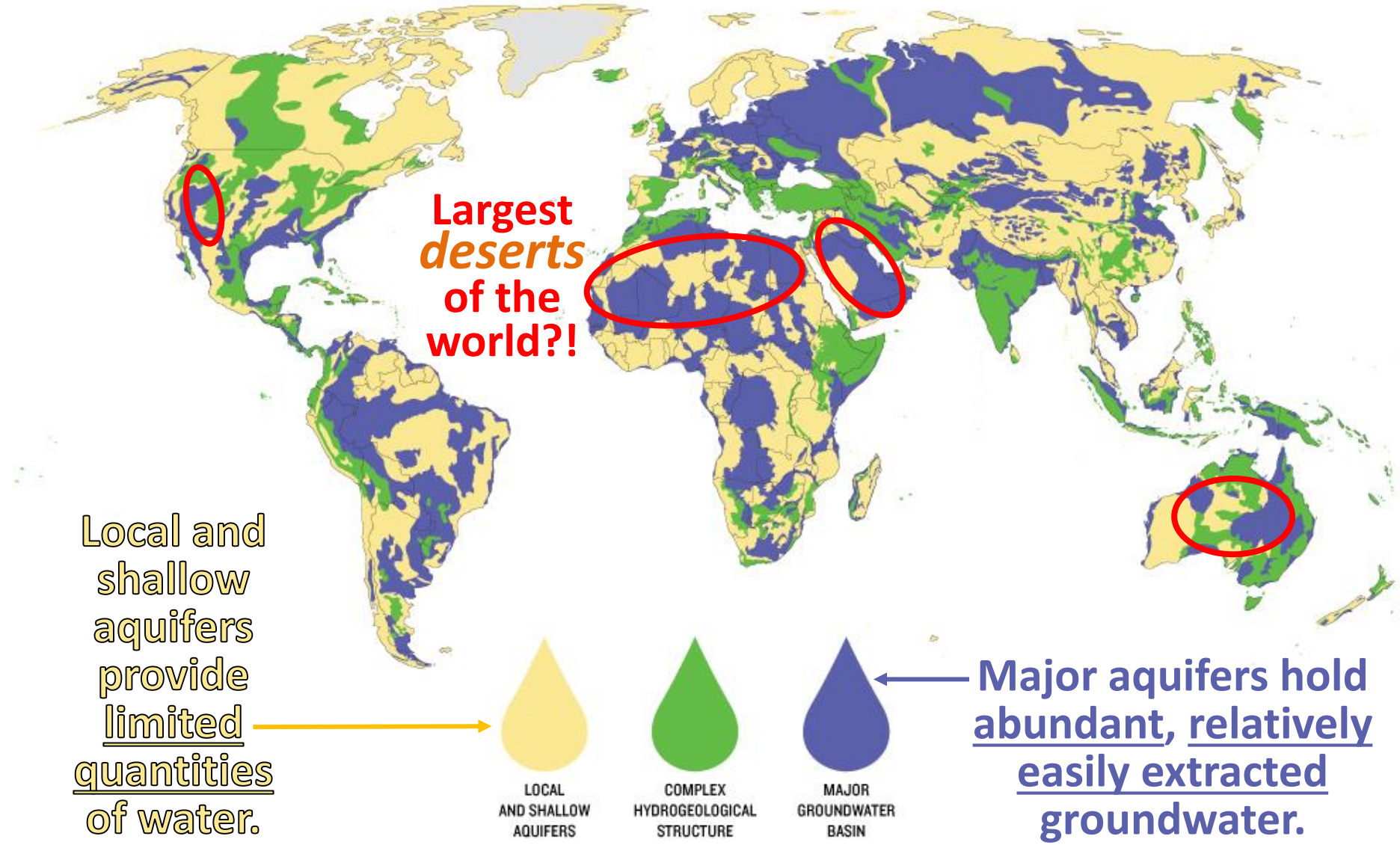
# Groundwater Aquifer

**<u>Aquifer</u> is an underground sand/gravel or rock layer that stores water and allows water to flow through it.**

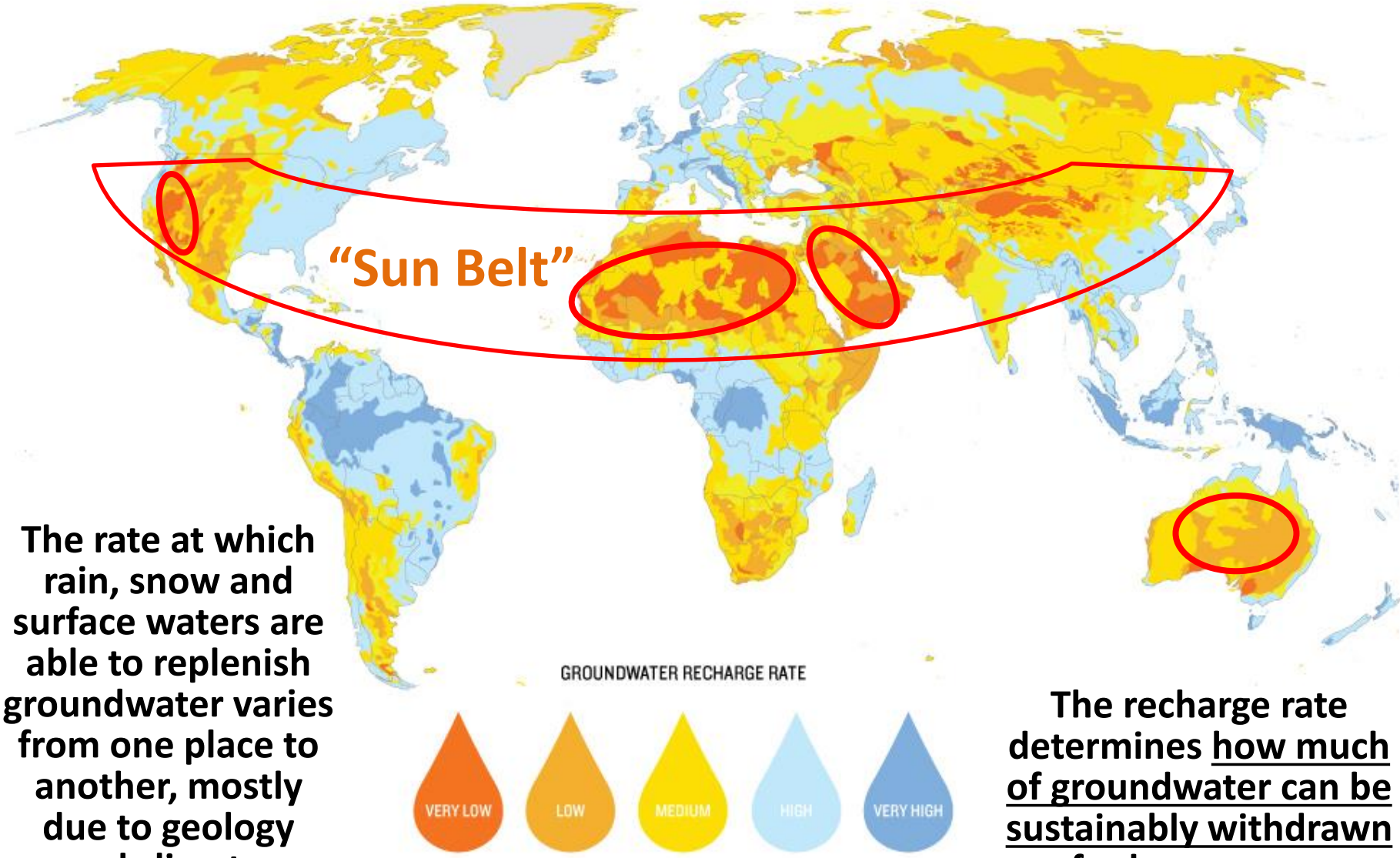
- **Drinking water supply.**
- **About half of all Americans get *most* of their water from wells.**
- **Aquifers are Long Island's only source of potable water.**



# Global Groundwater Resources



# Groundwater Recharge

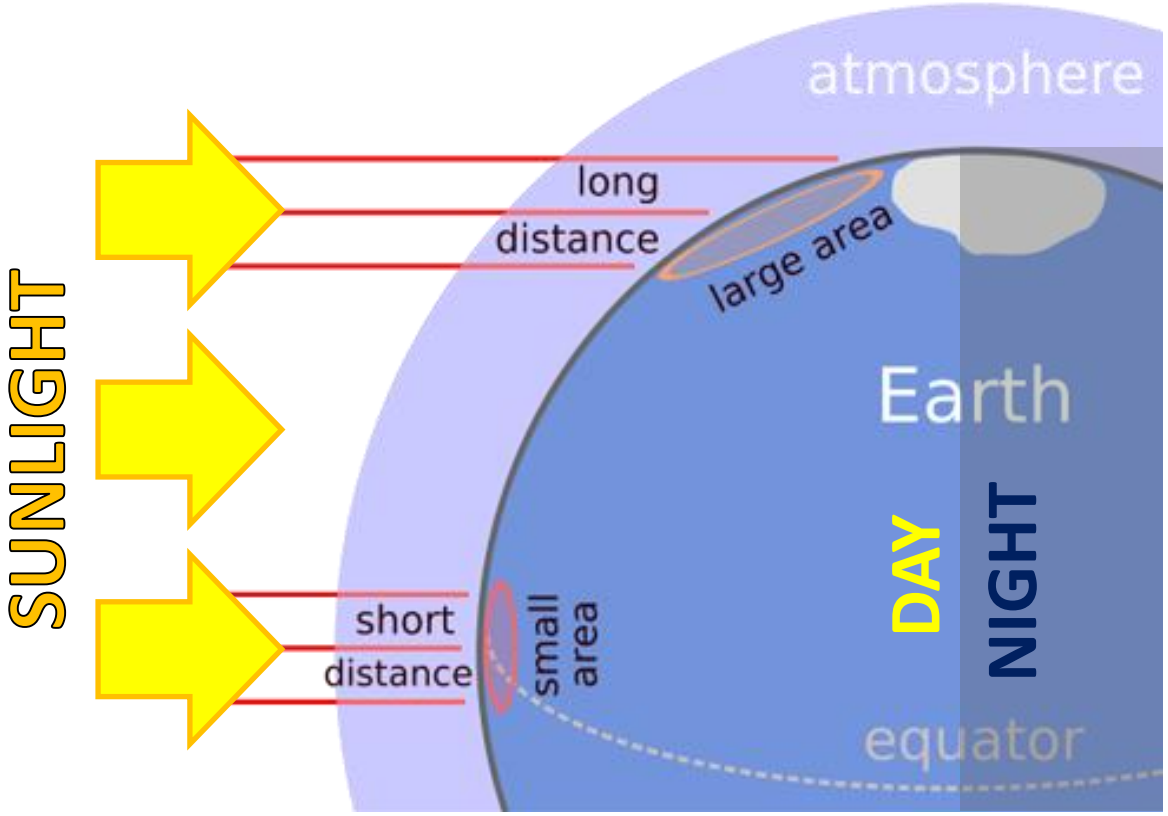



**The rate at which rain, snow and surface waters are able to replenish groundwater varies from one place to another, mostly due to geology and climate.**

**The recharge rate determines <u>how much of groundwater can be sustainably withdrawn</u> for human use.**

# Angle of Sunlight

**Due to the Earth's curvature, the amount of sunlight (*energy*) reaching any given point on the surface varies greatly with latitude.**




- **Regions near the Equator receive most direct, that is concentrated Sun rays.**
- **At high latitudes, the same amount of the incoming Sun energy is spread over much greater area of surface.**

**Sun Belt deserts combine relatively low average precipitation with high moisture removal due to very effective evaporation.**

# Atmospheric Water

**Atmospheric water plays a crucial role in the weather.**


← **Clouds and precipitation**

(water droplets and ice crystals or a mixture of the two)

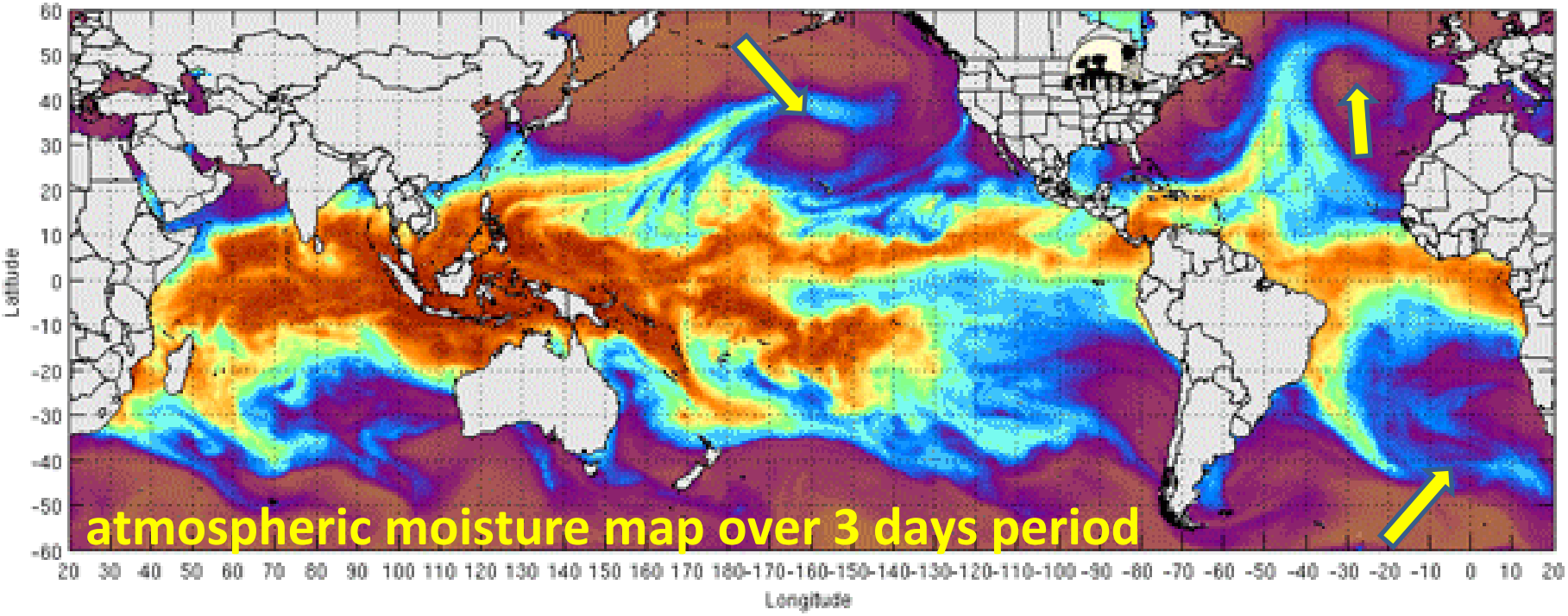
**Water vapor** →

(gas lighter than air; continuously generated by evaporation and removed by condensation)


- The mean global amount of water vapor in the atmosphere is roughly sufficient to cover the surface of the planet with a layer of liquid water about one inch (25 mm) deep.
- On average, the residence time of a water molecule in the troposphere is about 9 to 10 days.

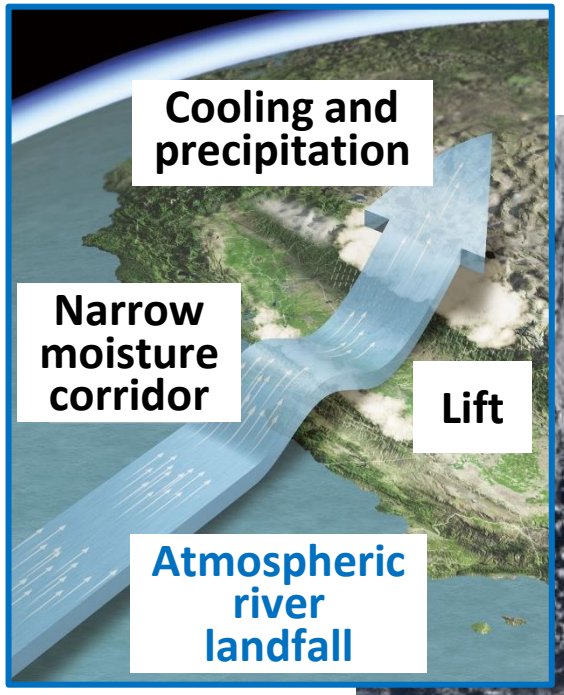
# Rivers in the Sky?

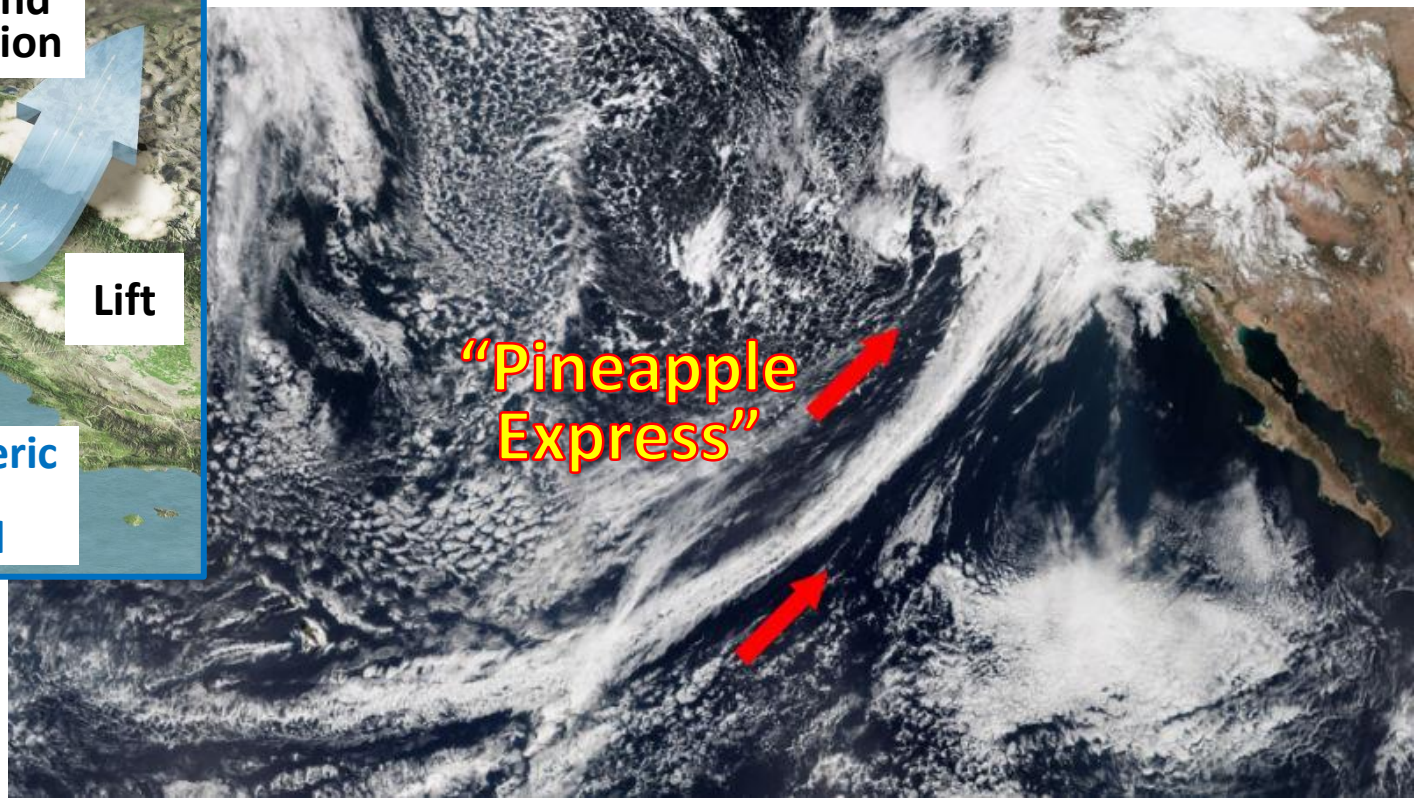
## An atmospheric river is a moving narrow corridor of concentrated moisture in the atmosphere.




- get their start over warm tropical waters
- flow eastwards and towards the poles about a mile above the ocean surface
- may extend for thousands of miles, but are only a few hundred miles wide
- can transport up to 10 times more water than the Mississippi river!
- when making landfall, often release a lot of precipitation

# California:
## from drought to flood




- **Not enough atmospheric rivers: the region gradually falls into drought which may last *years*.**
- **Too many atmospheric rivers: floods can occur.**