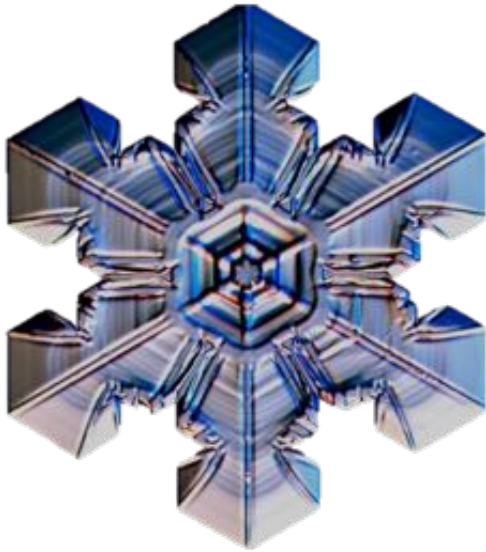


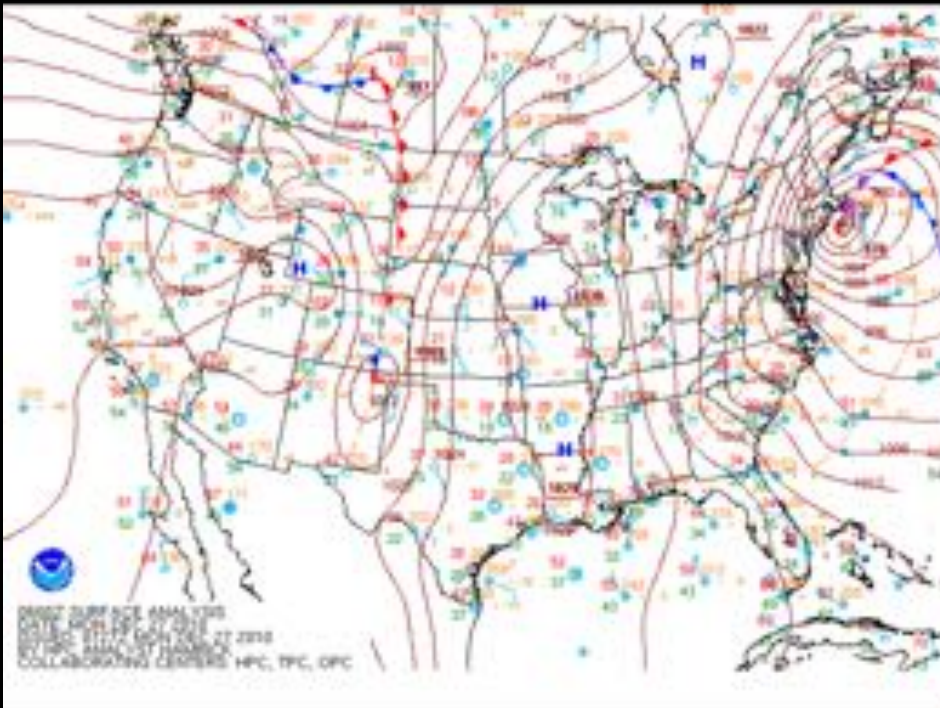


Ask a Geologist: Earth's Atmosphere



By: Lynne Trabachino

About Me: Lynne Trabachino





Earth's Atmosphere

- What is Earth's atmosphere?
- How does the atmosphere make life on Earth possible?
- What is in Earth's atmosphere?
- What are the layers of the atmosphere?
- How do scientists study the atmosphere?
- Visual events in the sky

Earth and its atmosphere are dynamic systems that are constantly changing



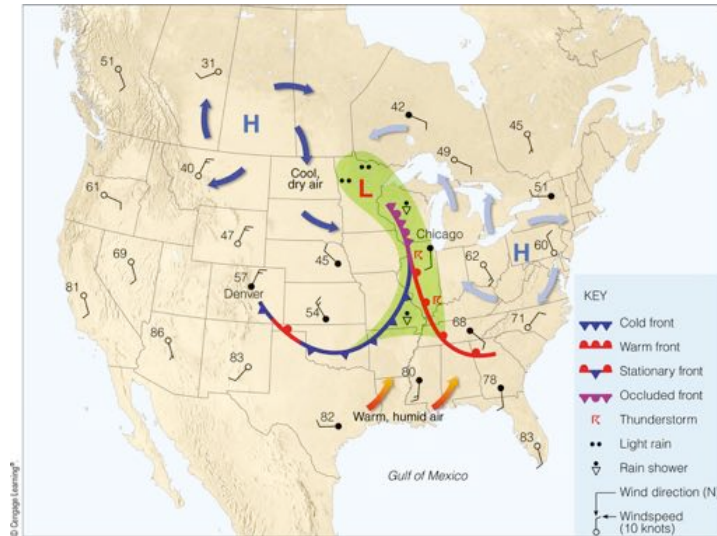
Weather: condition of the atmosphere at a specific place and time

Weather Elements:

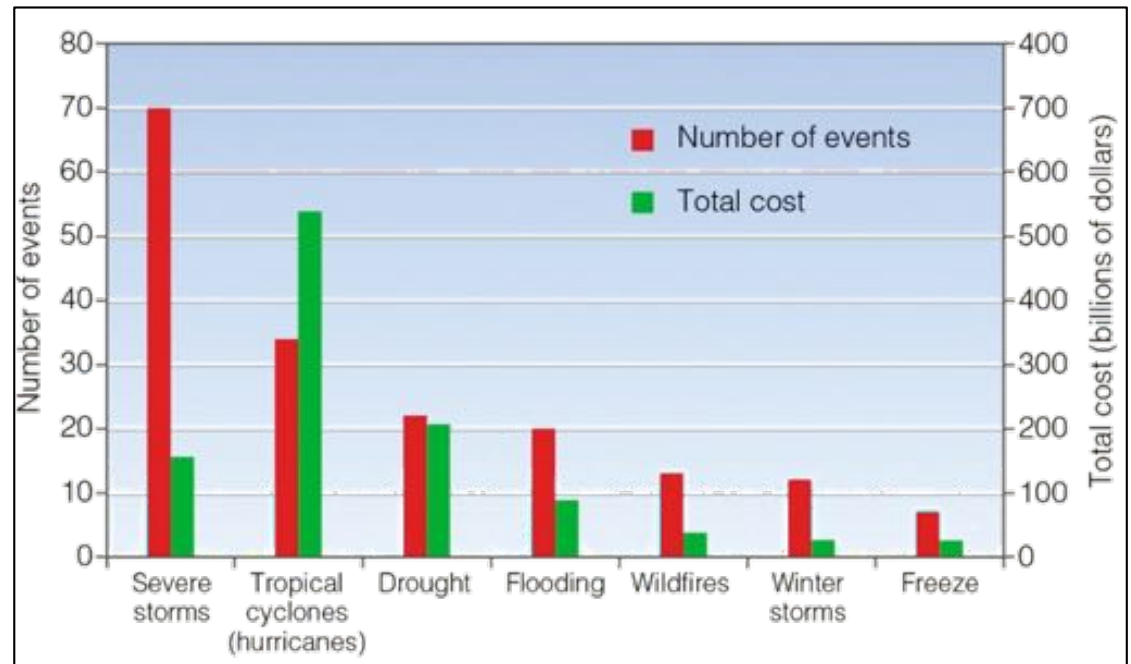
- Air temperature
- Pressure
- Humidity
- Clouds
- Precipitation
- Visibility
- Wind

Climate: average weather; weather elements observed over a specified time

Weather and climate play a major role in our lives



Clothing, crops, utilities, health effects, impacts of extreme events, fog, ...



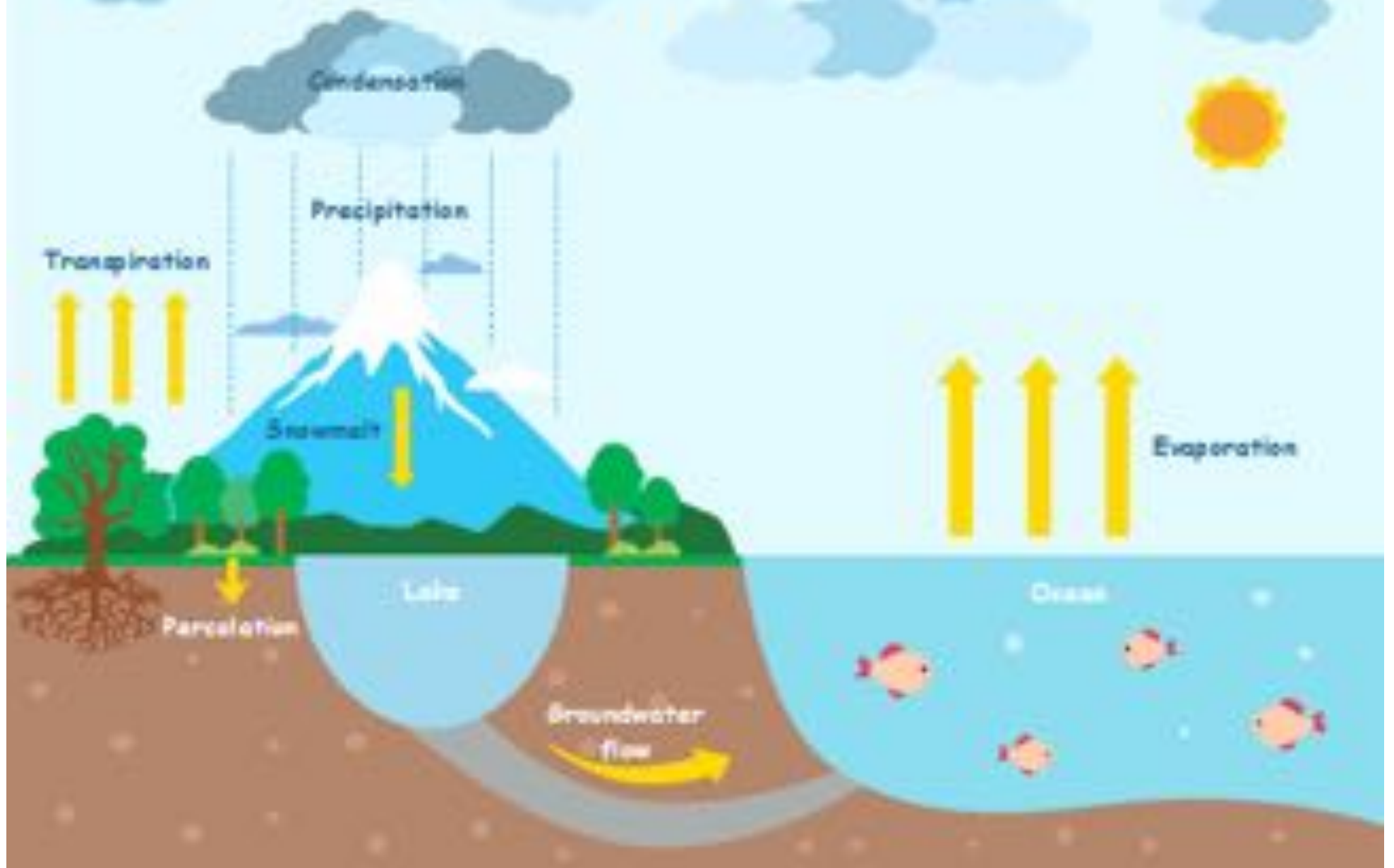
Components of Earth's Atmosphere



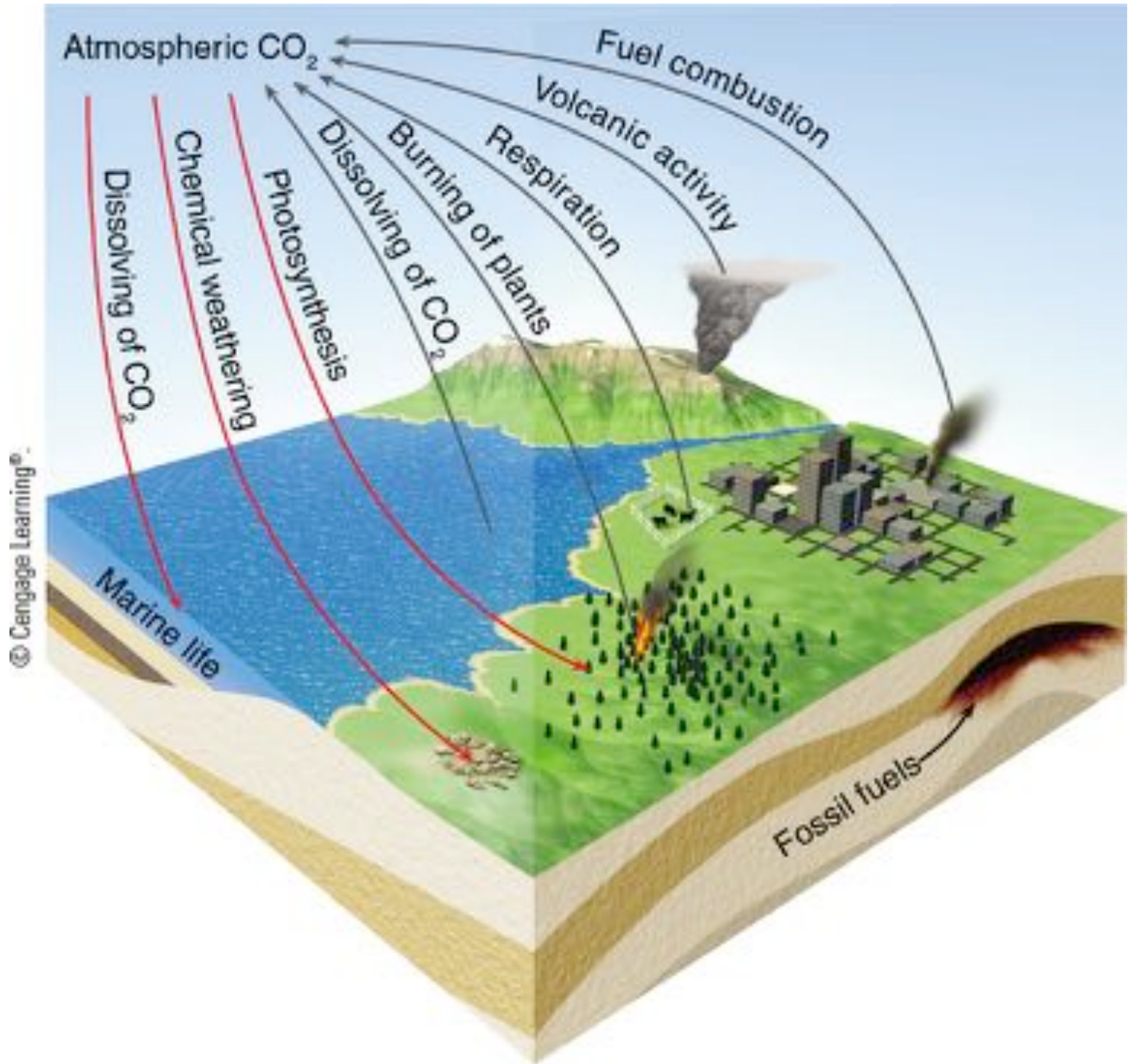
Composition of the Atmosphere near Earth's Surface

PERMANENT GASES			VARIABLE GASES			
Gas	Symbol	Percent (by Volume) Dry Air	Gas (and Particles)	Symbol	Percent (by Volume)	Parts per Million (ppm)
Nitrogen	N₂	78.08	Water vapor	H₂O	0 to 4	
Oxygen	O₂	20.95	Carbon dioxide	CO₂	0.0405	405
Argon	Ar	0.93	Methane	CH ₄	0.00018	1.8
Neon	Ne	0.0018	Nitrous oxide	N ₂ O	0.00003	0.3
Helium	He	0.0005	Ozone	O₃	0.000004	0.04
Hydrogen	H ₂	0.00006	Aerosols		0.000001	0.01-0.15
Xenon	Xe	0.000009	CFCs & HCFCs		0.00000001	0.0001

The Hydrologic Cycle (Water Cycle)

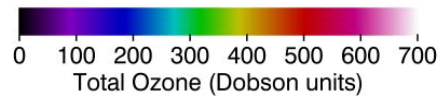
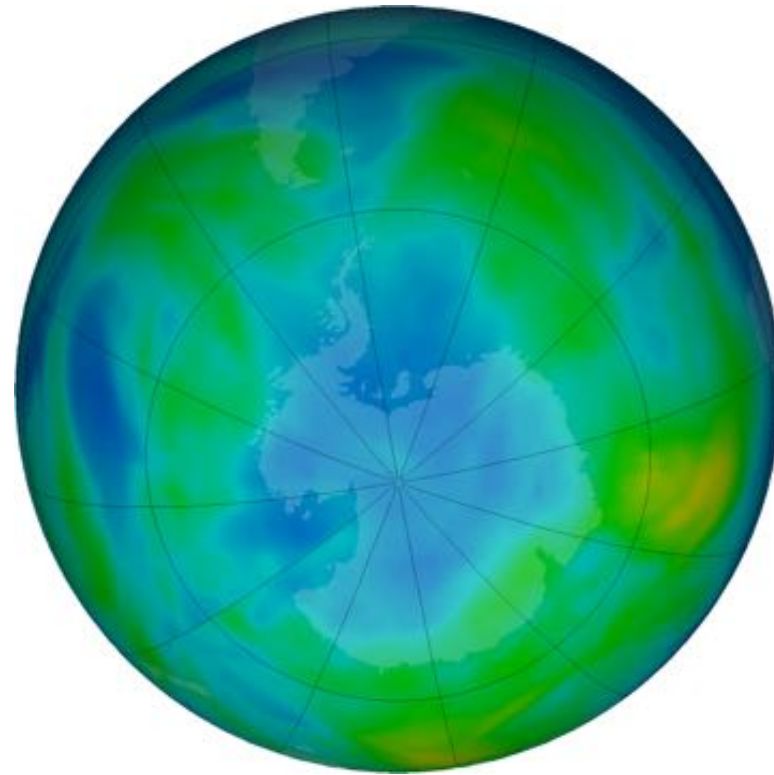


Carbon Dioxide



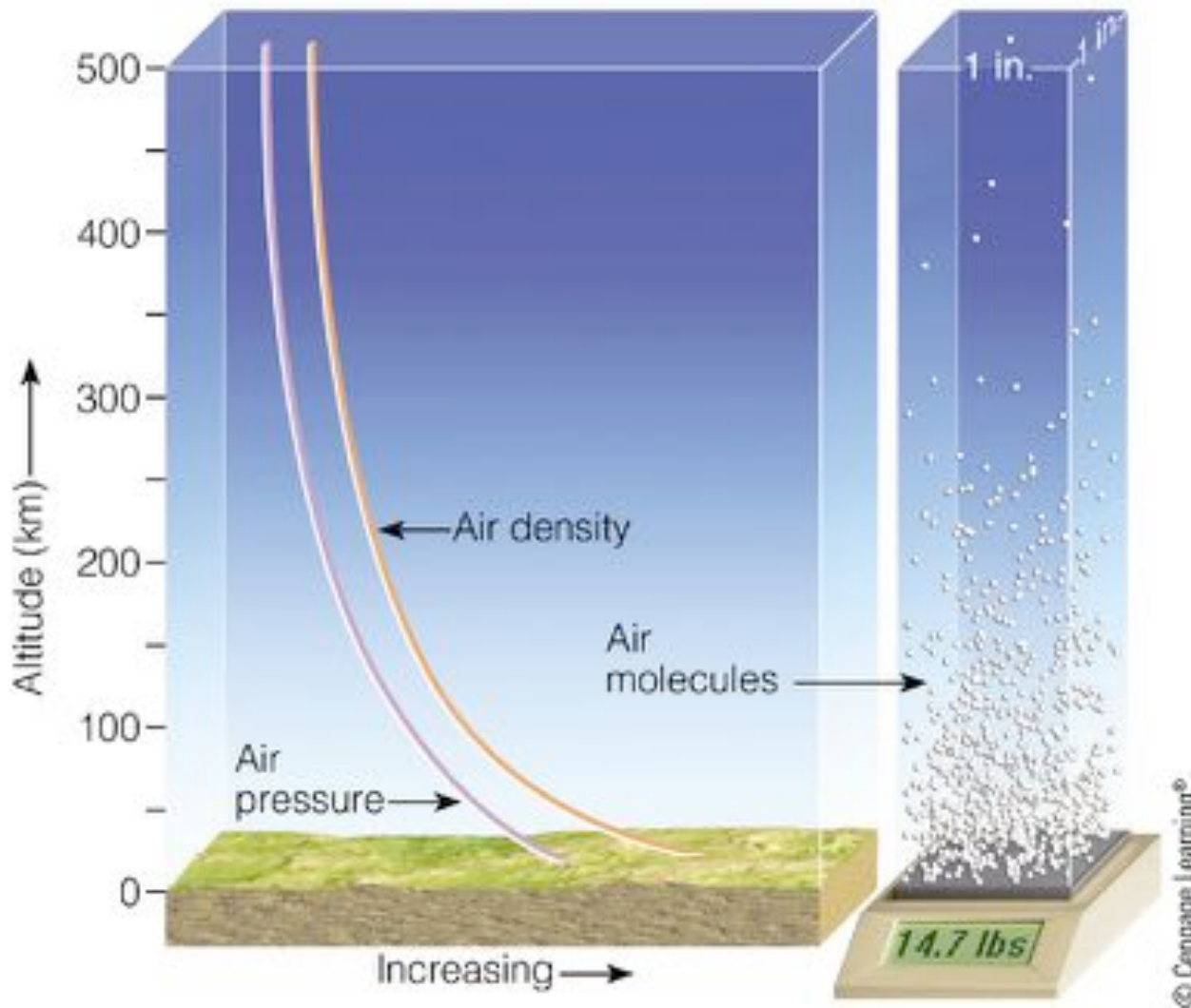


Ozone



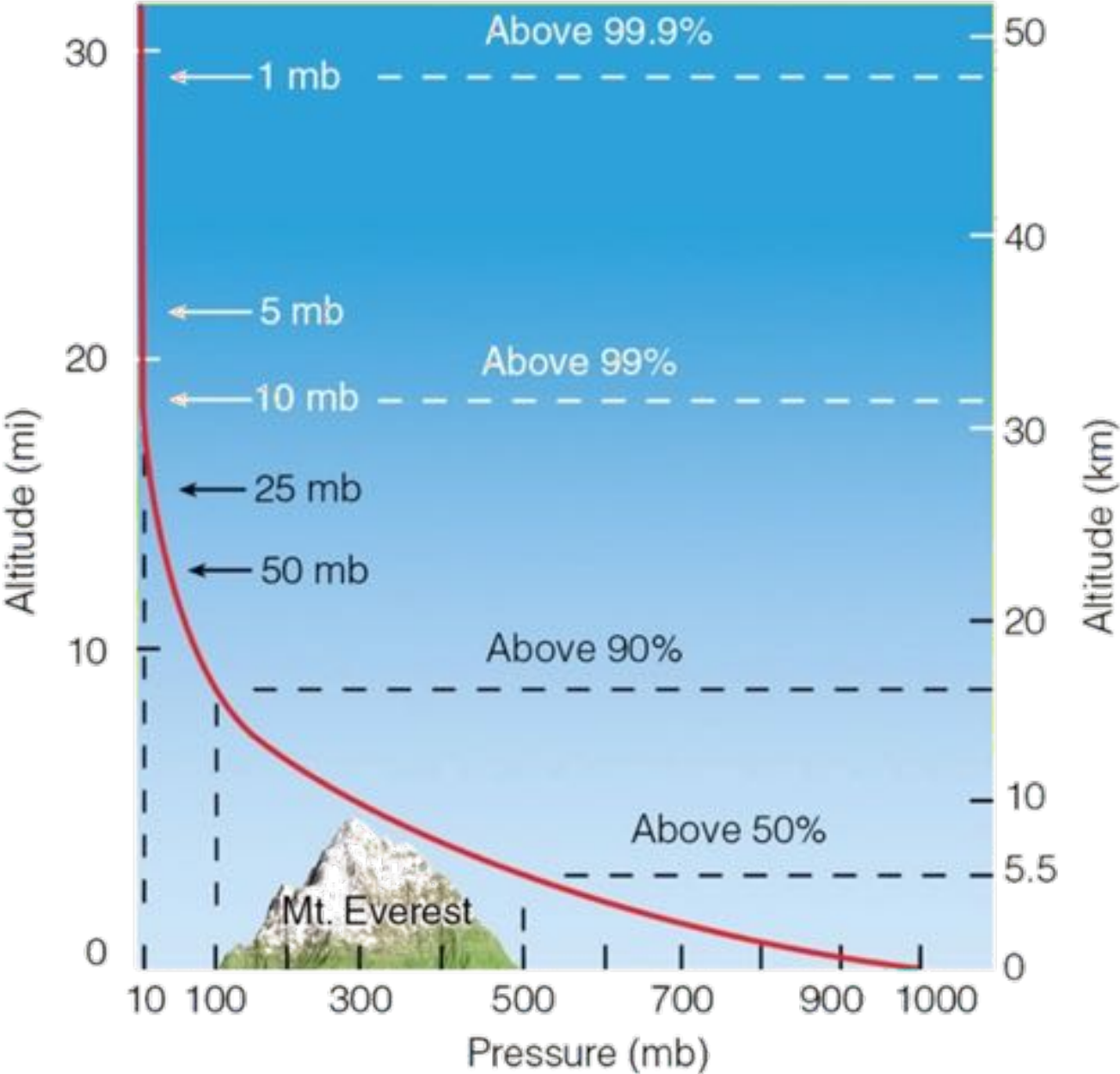
False-color view of total ozone over the Antarctic pole. The purple and blue colors are where there is the least ozone, and the yellows and reds are where there is more ozone.

Air Pressure and Air Density

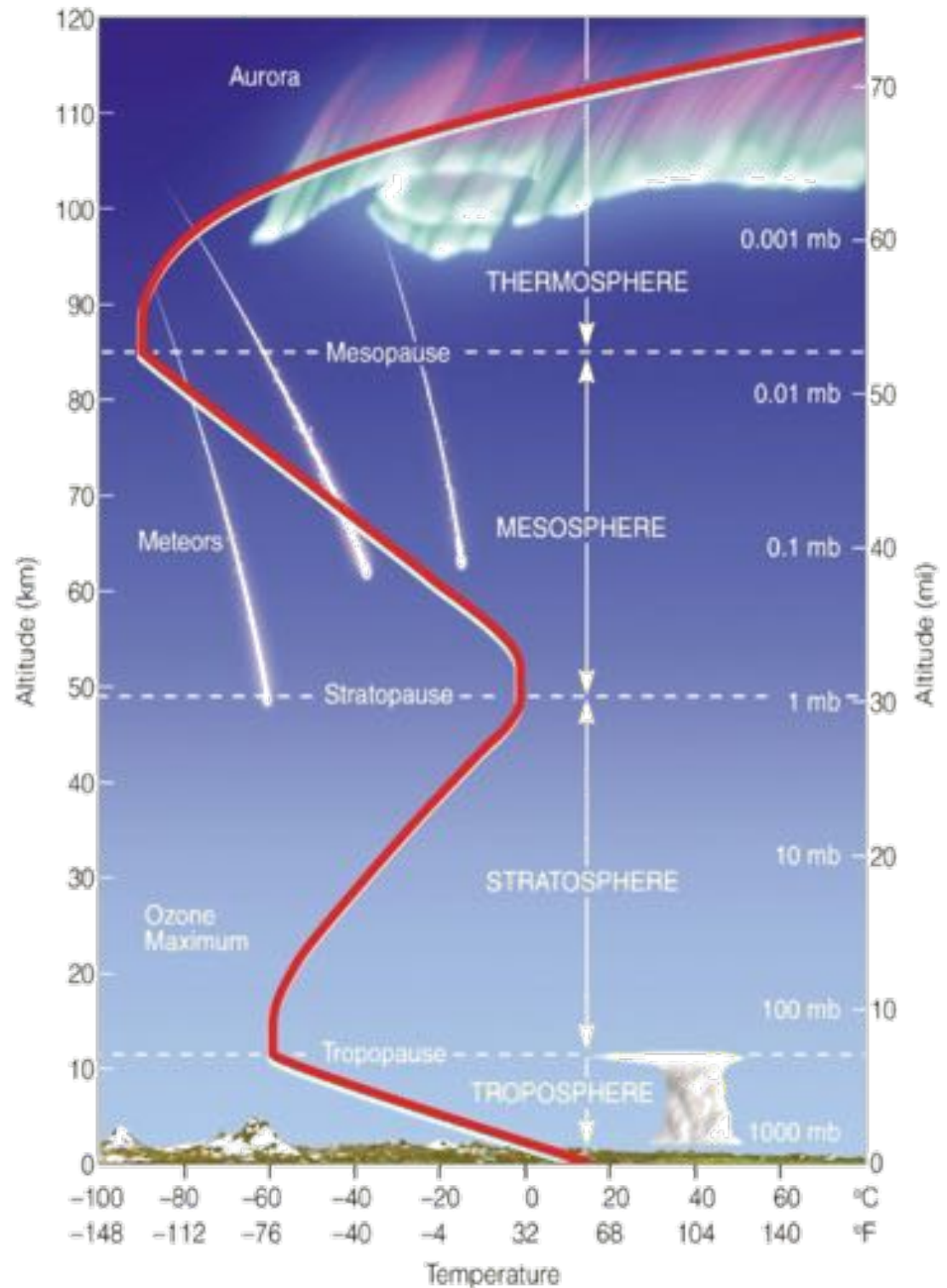


- Air is held near Earth by gravity
- Air molecules have weight

Atmospheric pressure decreases rapidly with height



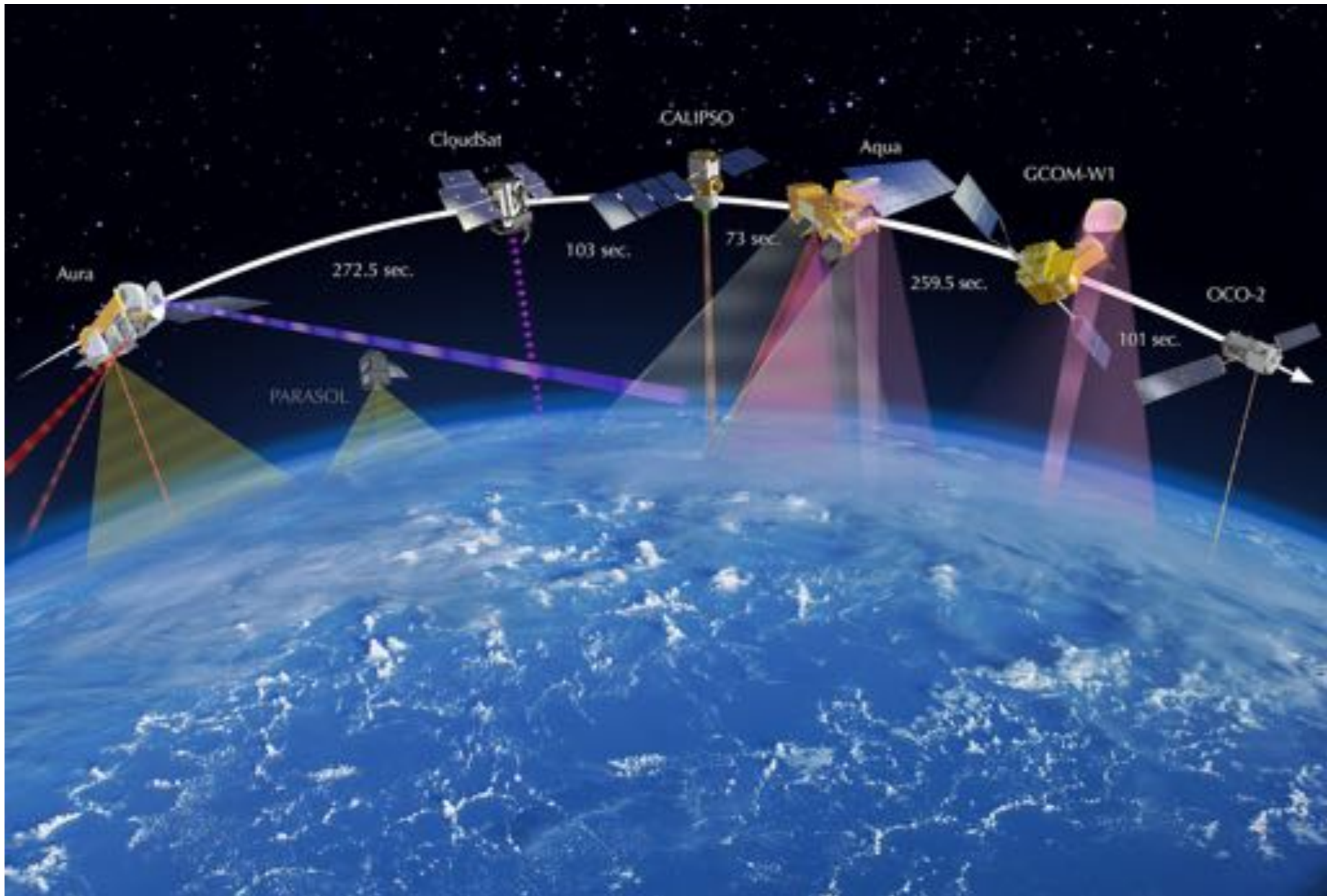
Atmosphere layers defined by air temperature



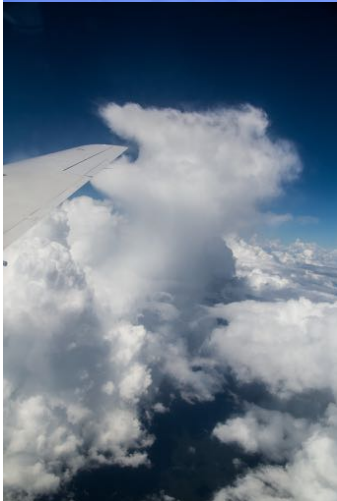
How do scientists study the atmosphere?



Observations from Satellites



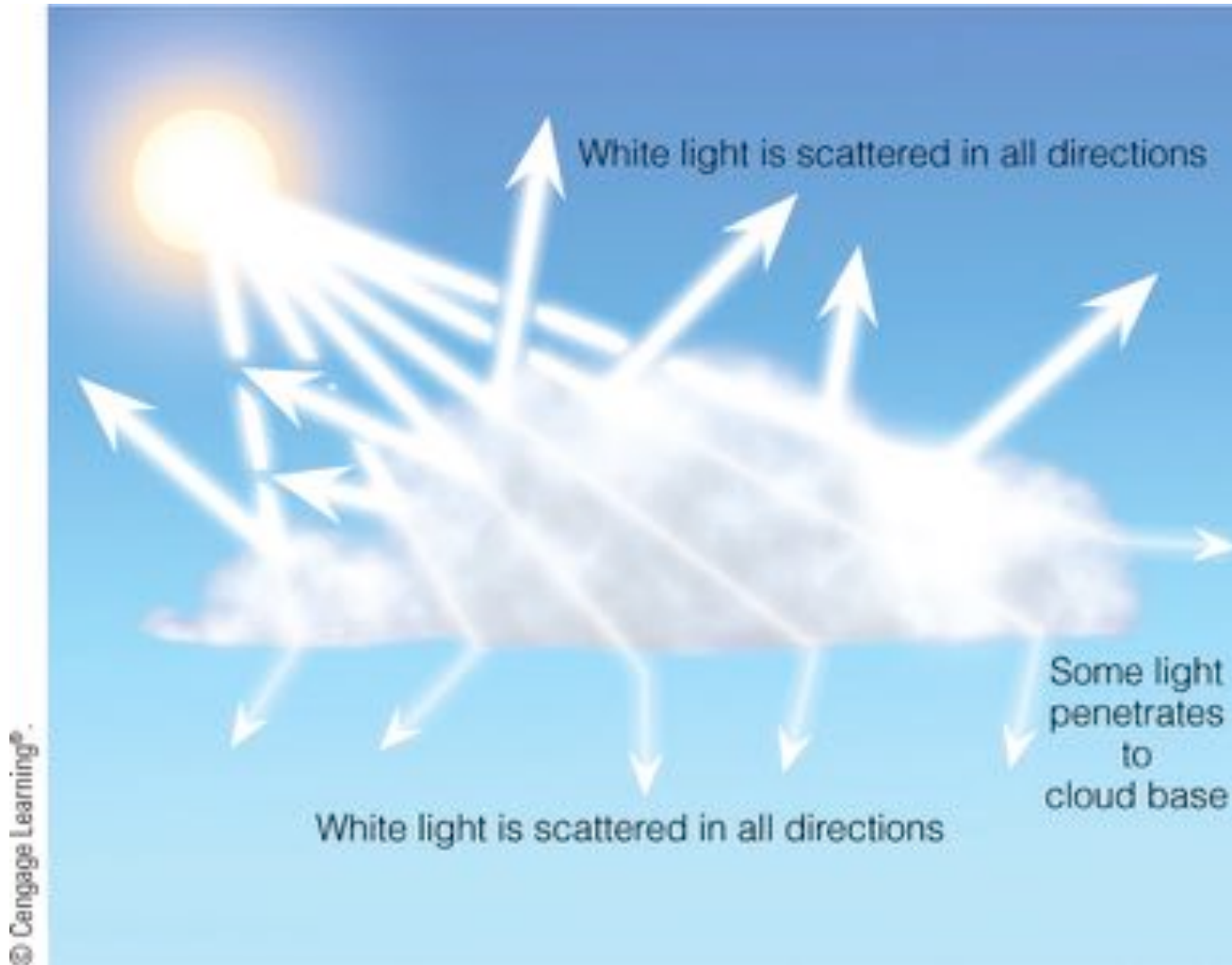
Atmospheric Observatories on the Ground



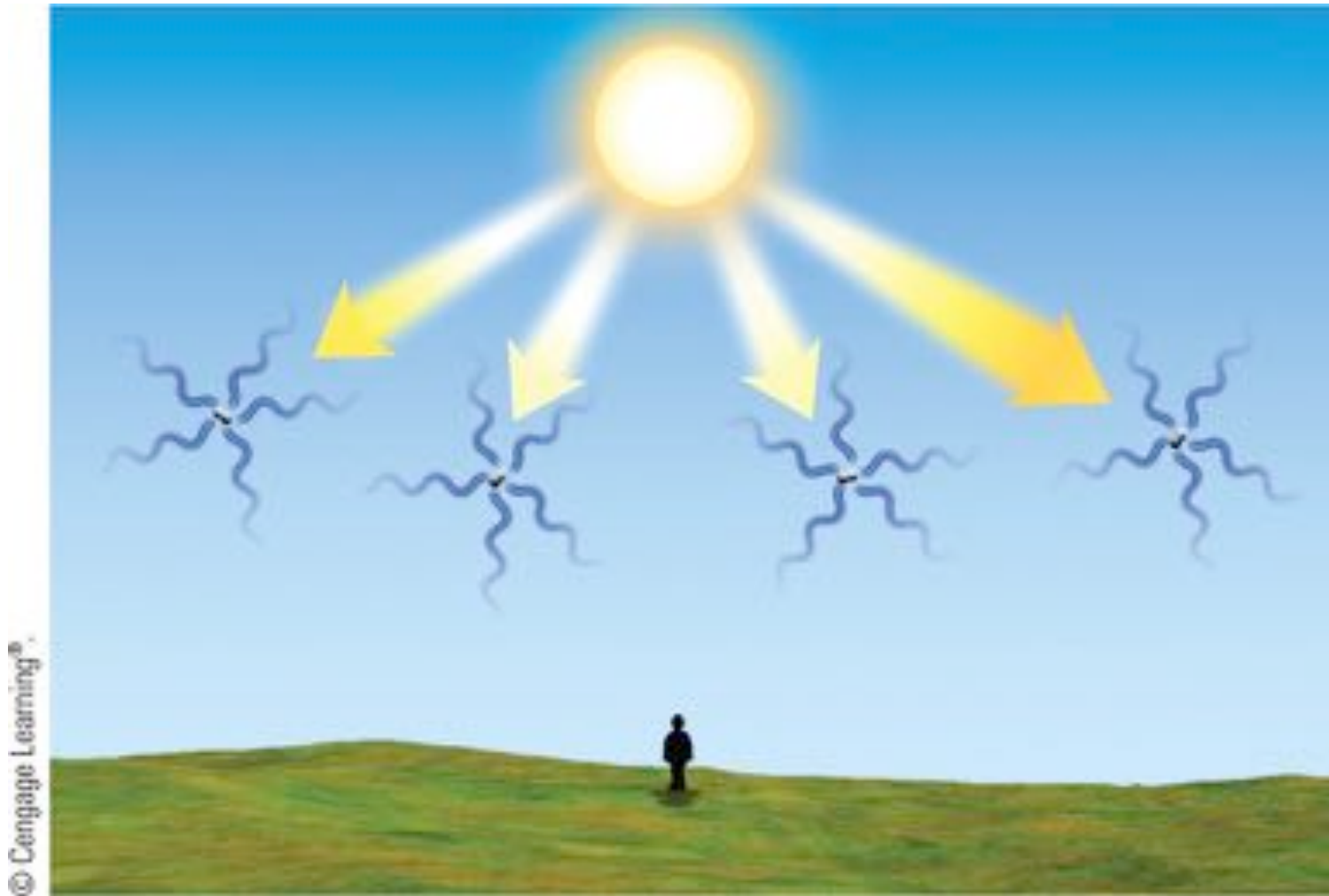


Light, Color, and Atmospheric Optics

Why are clouds white?



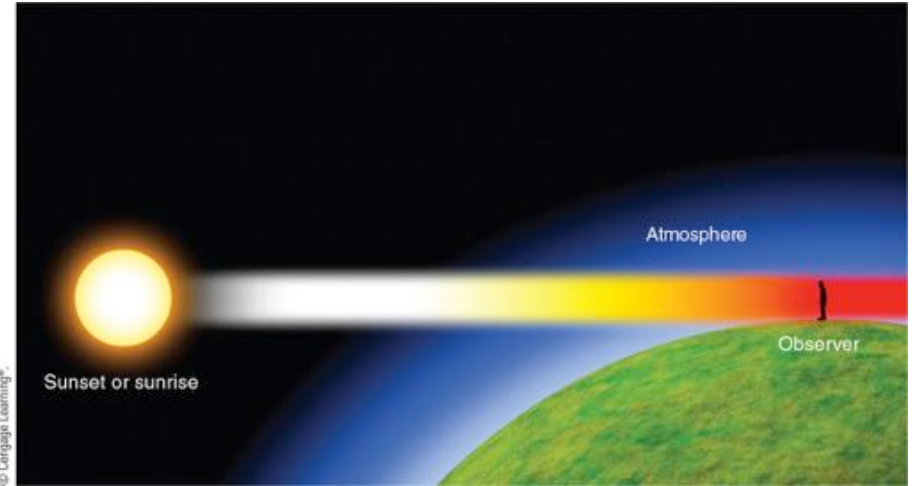
Why is the sky blue?



Why are sunsets red?



© C. Donald Ahrens



Rainbows

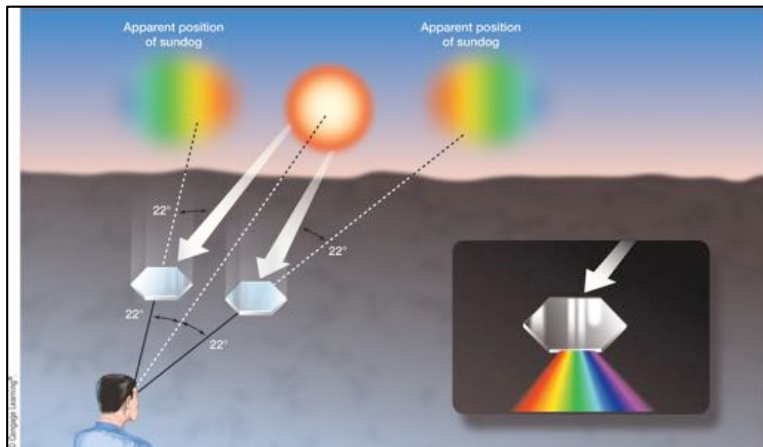


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Ice Halos



Sundogs and Sun Pillars





Question Time!

