

Winter Storm Anyone?

A Weather Map Example

And this?



And why is it *windy* here?

What's this?

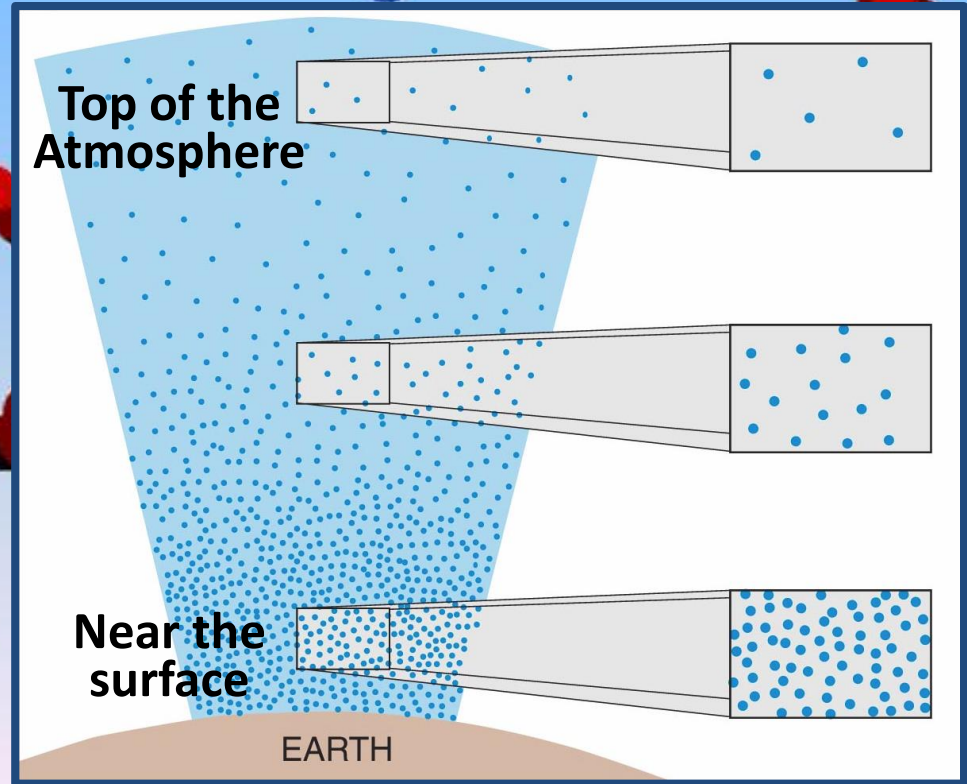
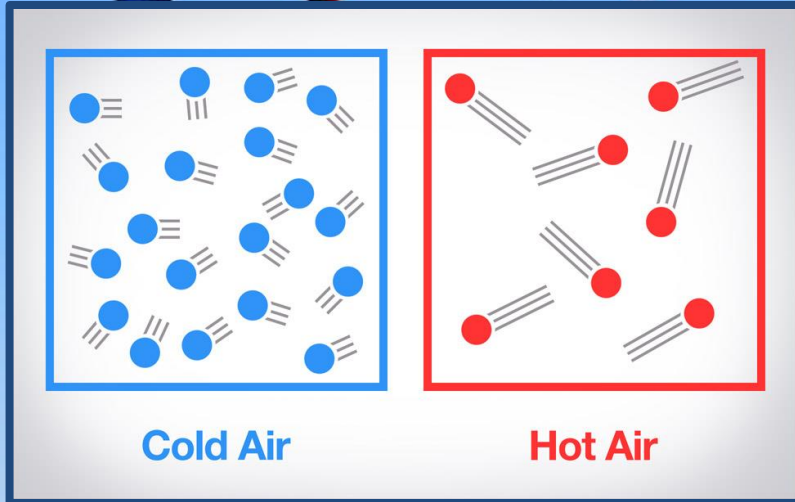
What is Weather?

Weather is the **state of the atmosphere**: hot or cold, wet or dry, calm or stormy, clear or cloudy.

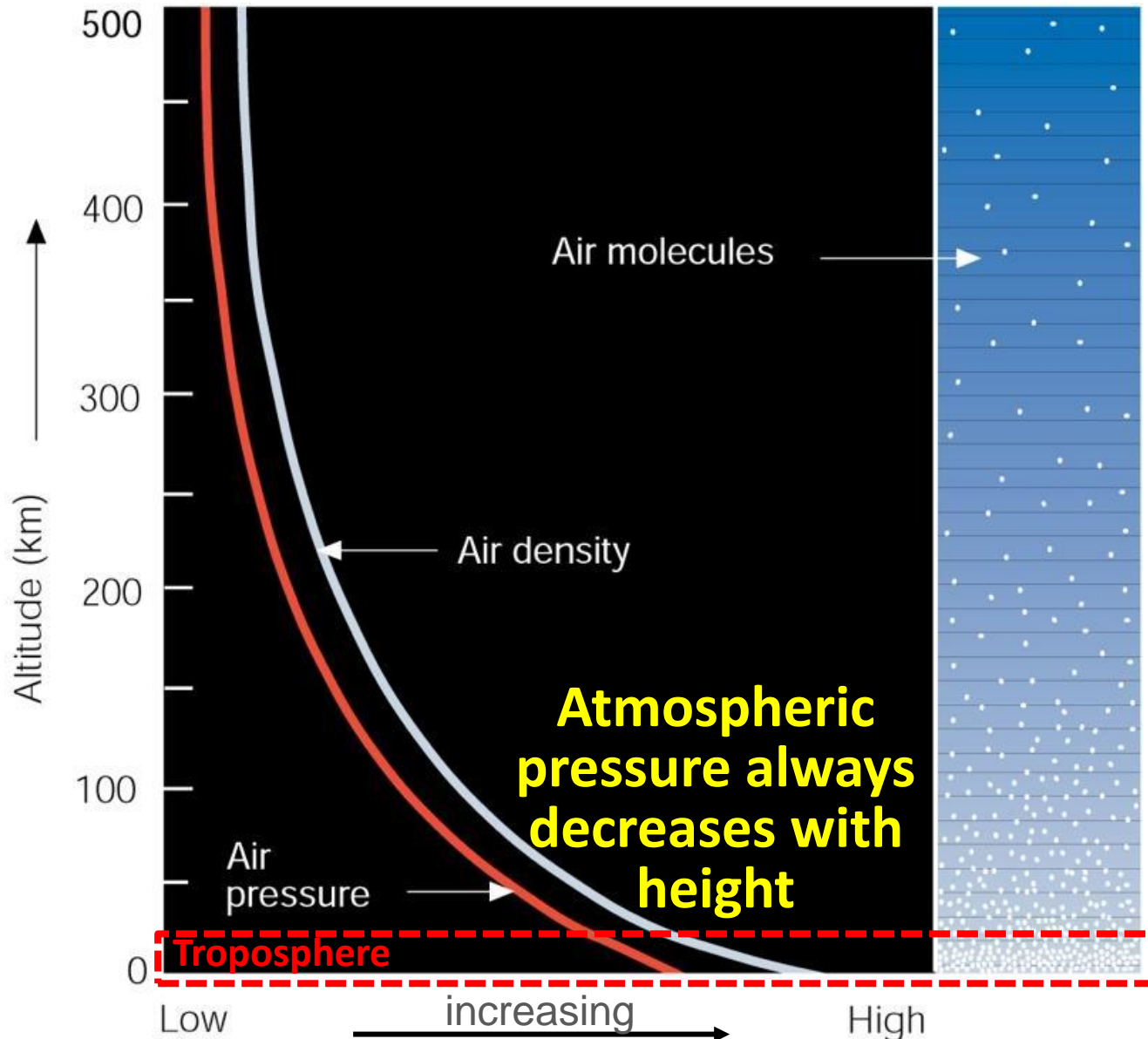


- Most weather phenomena occur in the **troposphere**:
 - On Earth, the *common weather phenomena* include wind, clouds, rain, snow, fog and dust storms.
 - *Less common* events include *natural disasters* such as tornadoes, hurricanes, typhoons and ice storms.
- Weather is one of the fundamental processes that shape the Earth through *weathering* and *erosion*.
- Weather is **driven by air pressure differences between one place and another**; in turn, air pressure itself is defined by **temperature and moisture**.

The air is made up of *molecules*: particles that are in constant motion.



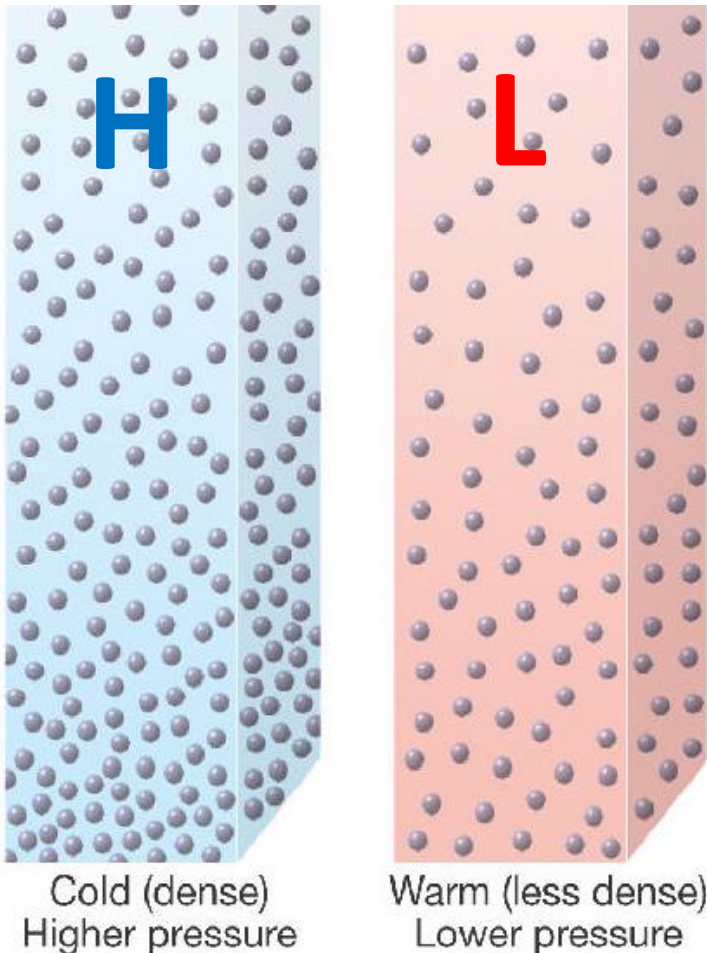
Air Density and Pressure



- Air **density** is the amount of air (*mass* of air molecules) in a given space (*volume*).
- The amount of *force* exerted over an *area* of surface is called **pressure**.

Gravity pulls gases toward the surface creating air pressure!

Air Pressure Differences



- In the troposphere, air pressure differences can occur due to:
 - the Sun angle at any particular spot
 - surface temperature differences (higher altitudes are cooler than lower altitudes)
- As air **warms**, it **expands** and becomes **less dense** creating **lower air pressure (L)**.
- **Cool** air **sinks** and becomes **denser** creating **higher air pressure (H)**.

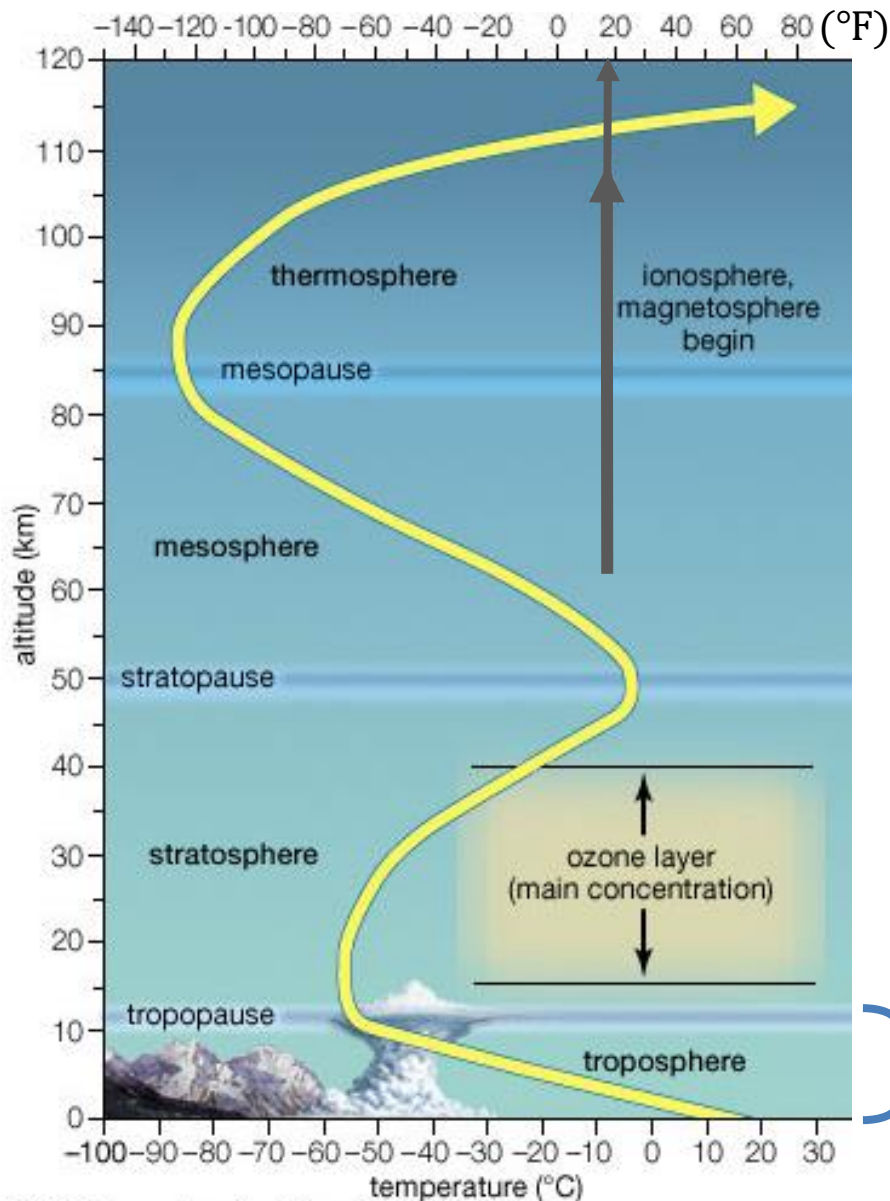
Differences in air pressure cause **wind**:
flow of tropospheric air on a large scale.

Atmospheric Temperature

has a complex profile governed by many factors including:

- incoming solar radiation
- humidity
- ozone presence
- altitude

Troposphere, the lowest atmospheric layer, plays the role of a “planetary comforter” thanks to the *greenhouse effect*.



What is Greenhouse Effect?

The warming of the atmosphere by absorbing and emitting infrared radiation while allowing shortwave radiation to pass through.

The gases mainly responsible for the Earth's atmospheric greenhouse effect are **water vapor** and **carbon dioxide**.

