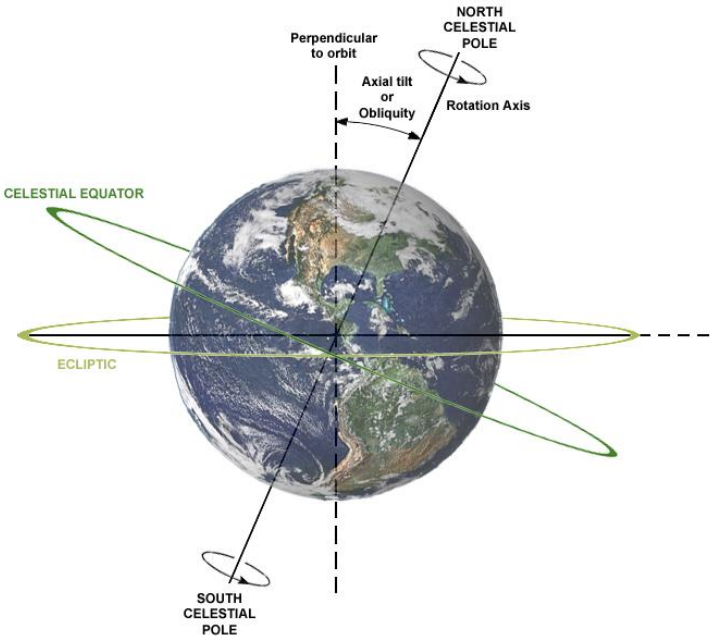
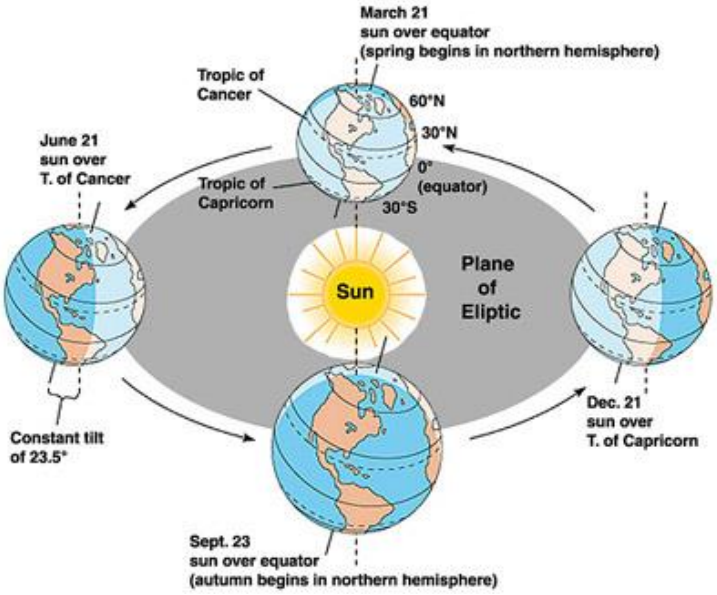
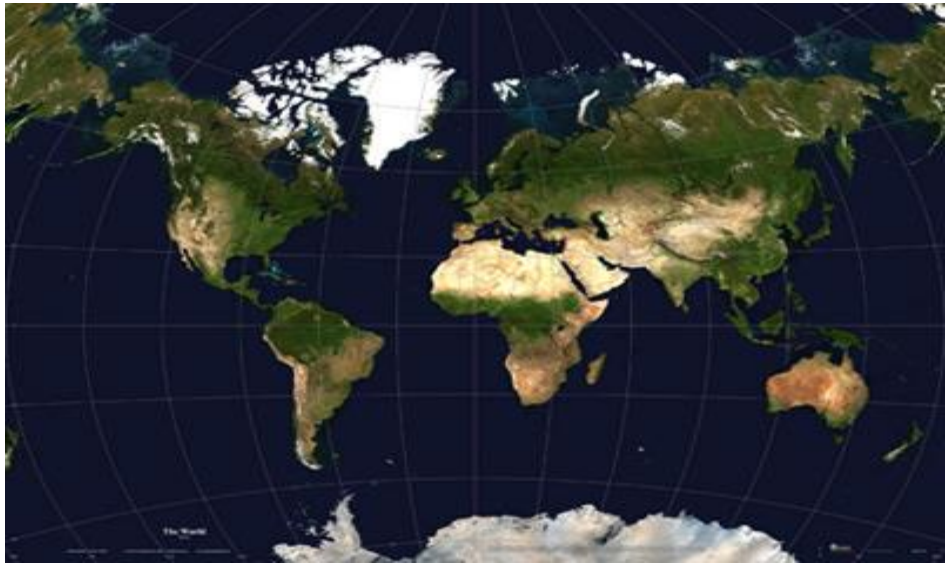
Planet Earth

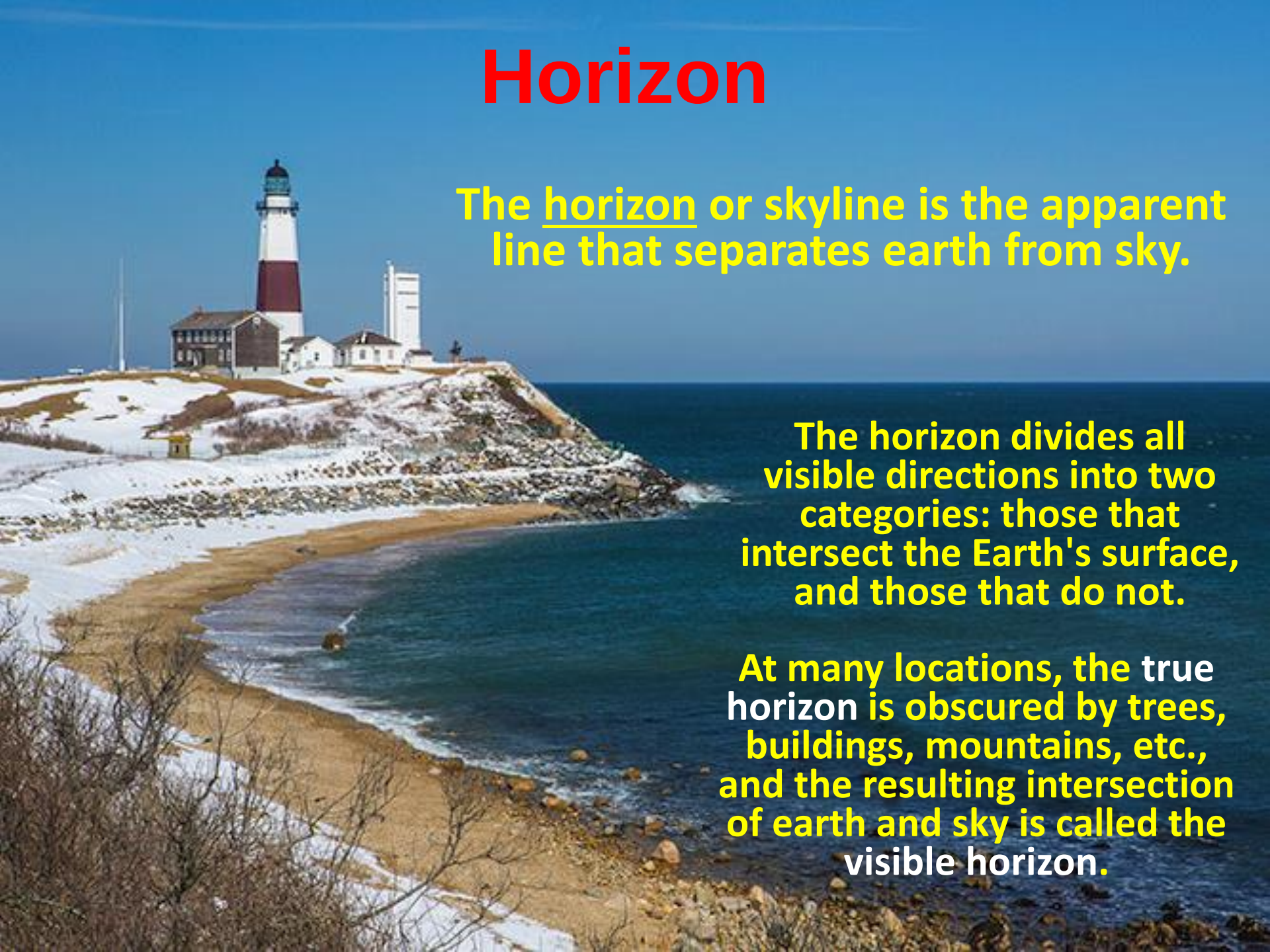
Part 2







Horizon



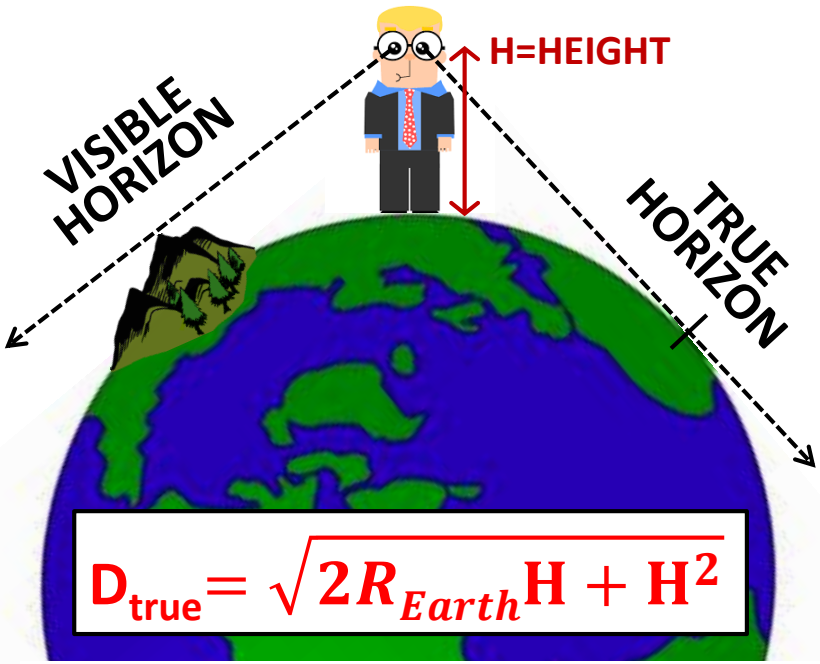
The horizon or skyline is the apparent line that separates earth from sky.

The horizon divides all visible directions into two categories: those that intersect the Earth's surface, and those that do not.

At many locations, the true horizon is obscured by trees, buildings, mountains, etc., and the resulting intersection of earth and sky is called the visible horizon.

How Far is the Horizon?

Historically, the distance to the horizon has long been vital to survival and successful navigation, especially at sea.

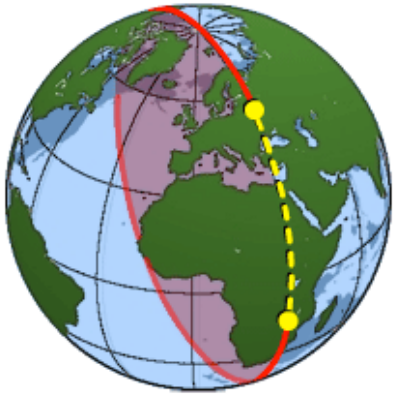


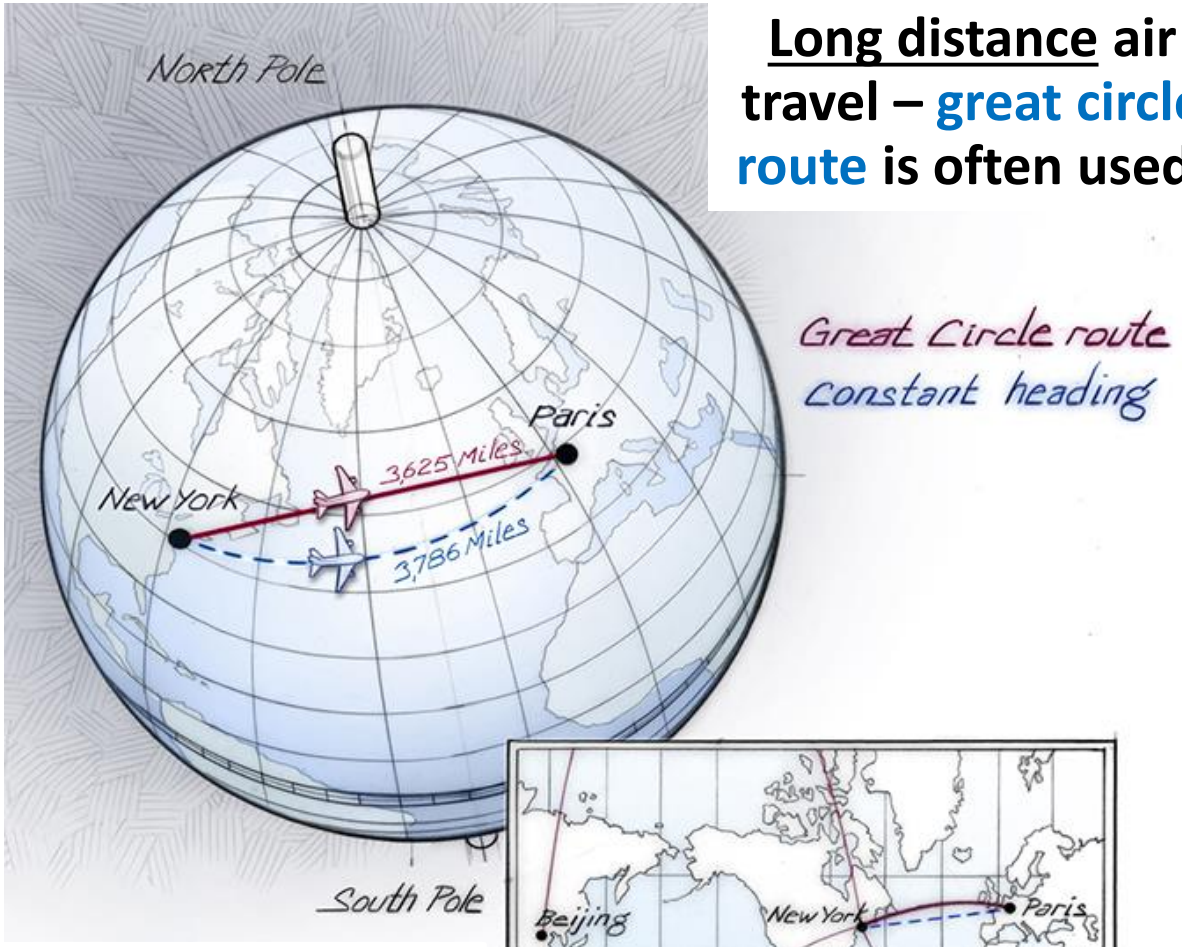
OBSERVER	HEIGHT	DISTANCE to TRUE HORIZON
On the ground	1.7 m (5 ft 7 in)	4.7 km (2.9 mi)
At the Eiffel Tower observation deck	276 m (906 ft)	58.7 km (37 mi)
Atop Mount Everest	8,848 m (29,029 ft)	336 km (209 mi)

In reality, one typically sees further along the Earth's curved surface than a simple geometric calculation allows for because of downward light refraction in the atmosphere. With standard atmospheric conditions, the difference is about 8%.

Distance on a Sphere

A **great circle** is the path of **shortest distance between two points on the surface of a sphere** (globe).



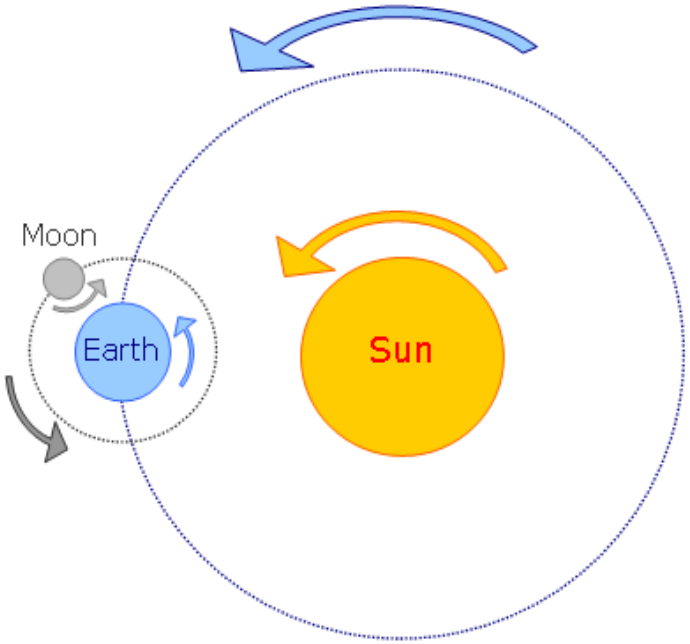


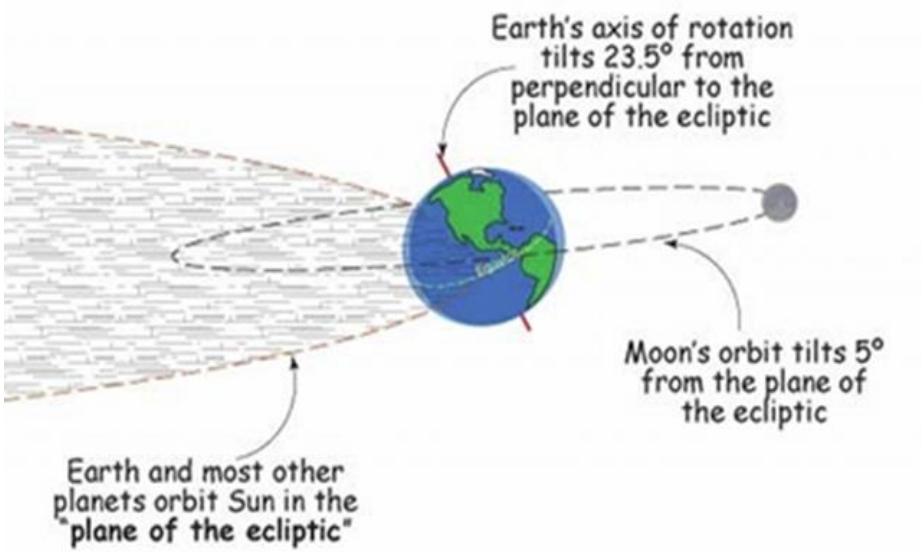
Long distance air travel – **great circle route** is often used.

The difference between *great circle* course and *rhumb line* course is most dramatic near the Poles.

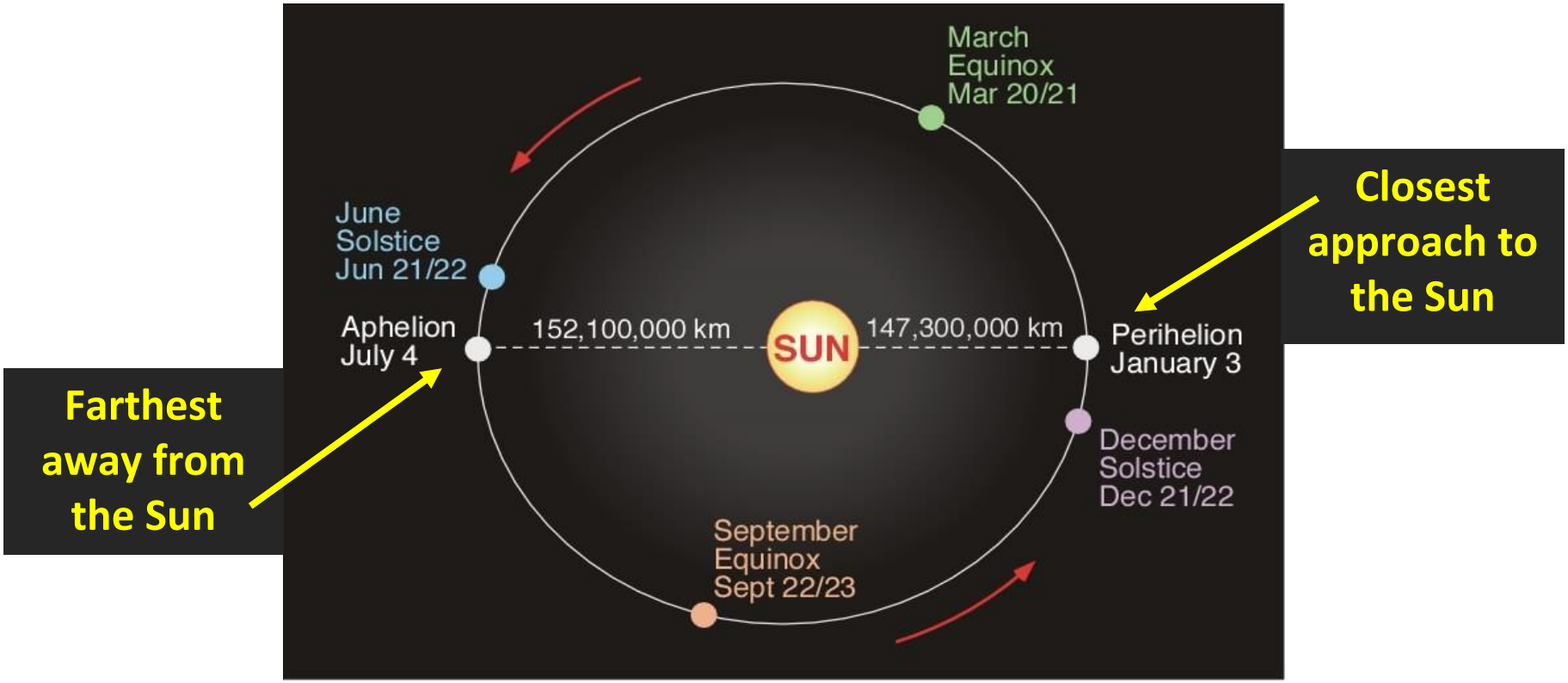
Sun, Earth and Moon Motions

- **The Solar System *revolves* around the Milky Way galaxy center.**
- **The Sun *rotates* on its own axis.**
- **Earth *revolves* around the Sun (1 year) and *rotates* on its own axis (1 day).**
- **The Moon *revolves* around Earth and *rotates* on its own axis (*synchronous* with Earth).**





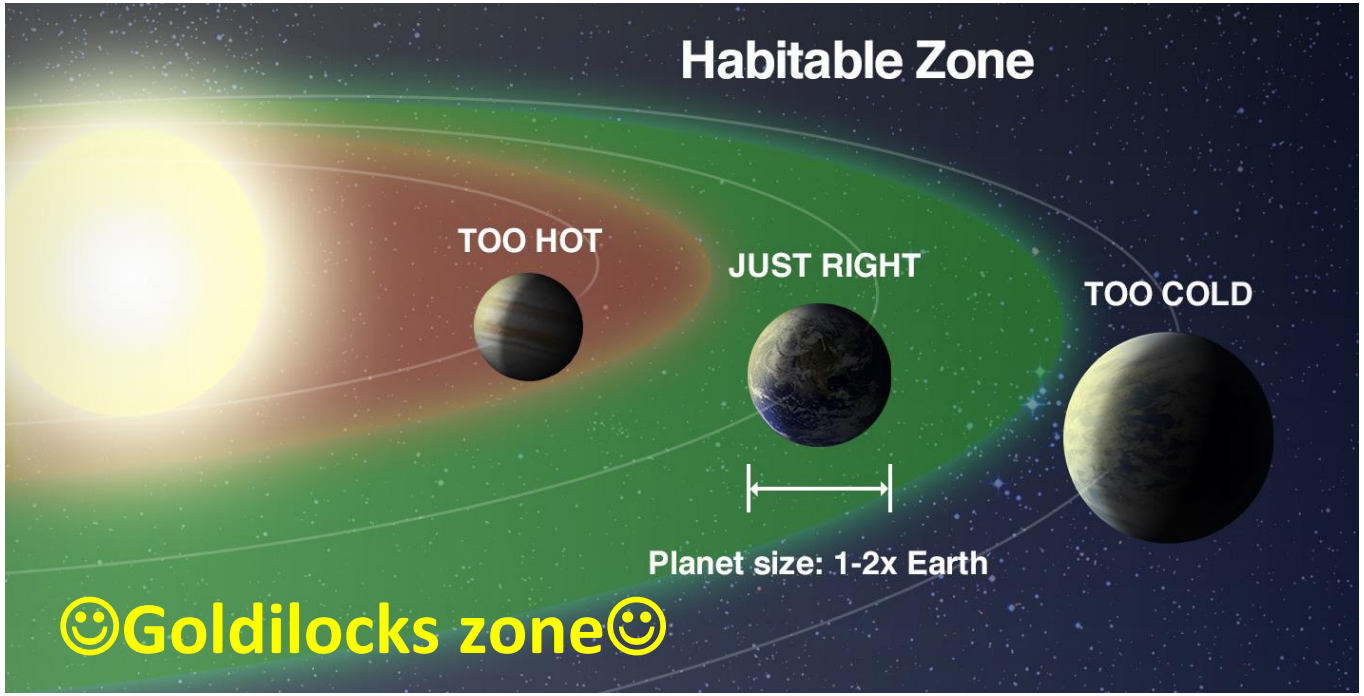
Earth Orbit



- The **orbit** of the Earth is ***almost*** **a perfect circle**: our mean distance to the Sun is about **150 million km** (~93 million mi) or about 25,000 times bigger than the radius of the planet itself.
- The **orbital speed** of the Earth (how fast it travels along its orbit around the Sun) is about **30 km/s** (~67,000 mph).

Circumstellar Habitable Zone

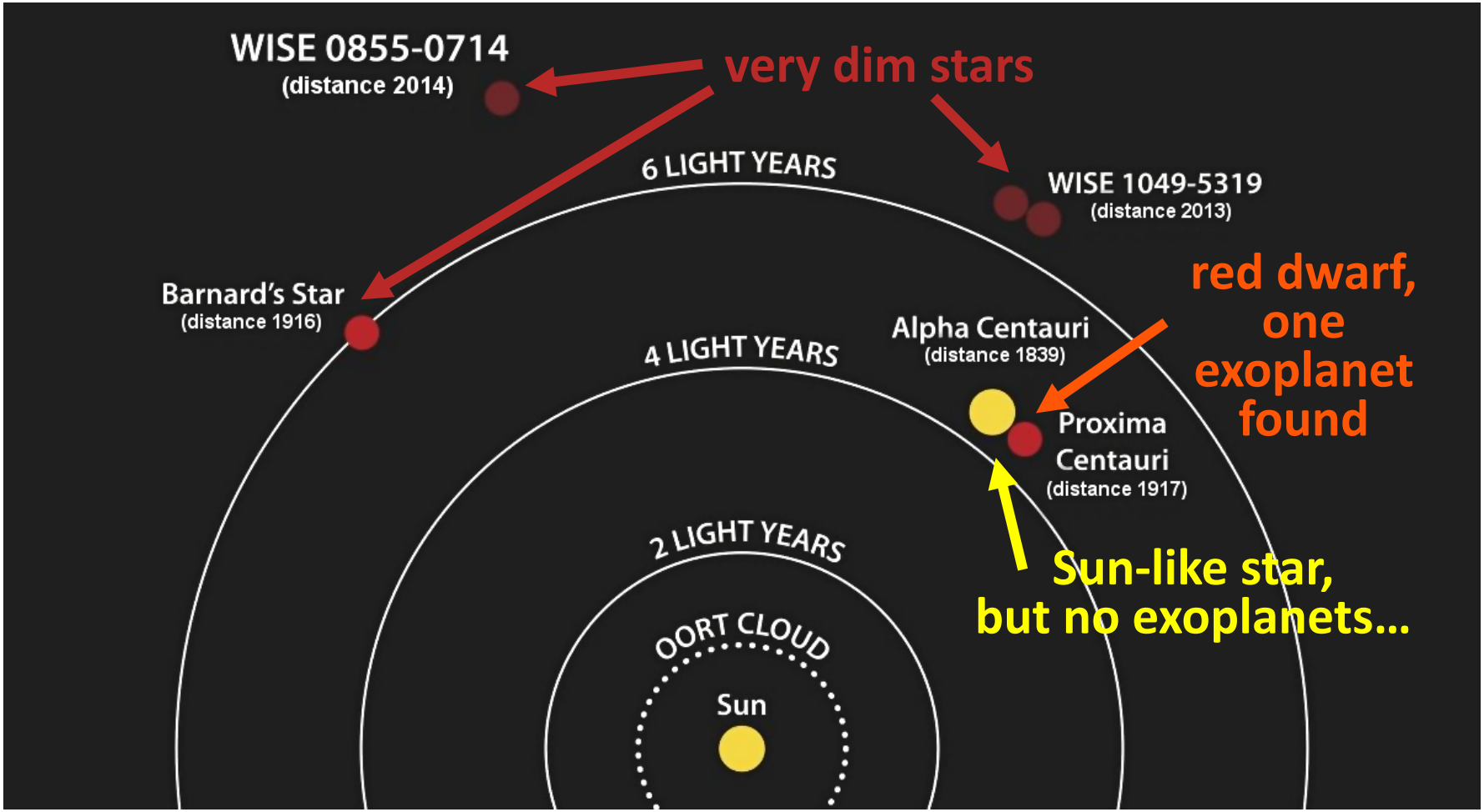
- In astronomy and astrobiology, the range of orbits around a star within which a planetary surface can support liquid water (*however concept is still evolving*).
- CHZ depends on the size and energy of a star and planet type.



There may be at least 500 million habitable worlds in the Milky Way!

- NASA Kepler Mission: a space observatory (telescope) performing search for Earth-size *exoplanets* orbiting other stars.

Sun's Closest Neighbors



The closest Earth-like exoplanet may be the one orbiting in the habitable zone of a Sun-like star *Tau Ceti* some 12 light-years away.

Ecliptic Plane

Imaginary plane containing the Earth's orbit around the Sun.