SATELLITE

BY

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What is Satellite?

- Satellites are objects which revolve around another object – in this case, the earth.

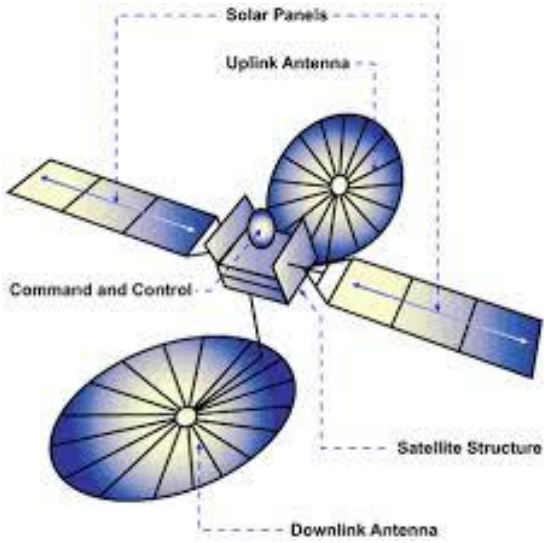
Example –natural satellite like moon, manmade satellites

- **“Satellite" refers to a machine that is launched into space and moves around Earth or another body in space.**

- An artificial body placed in orbit round the earth or another planet in order to collect information or for communication.

WHAT ARE THE PARTS OF A SATELLITE?

- Antenna
- Power source
- Camera



SATELLITES CHARACTERISTICS AND ORBIT

- ## Geostationary Orbit

Appear stationary in the sky for an observer on the ground
Orbital period- 1 sidereal day or 23 hrs 56 min 4 sec
Orbit Radius – 42164 km
Satellite Altitude – 35786 km

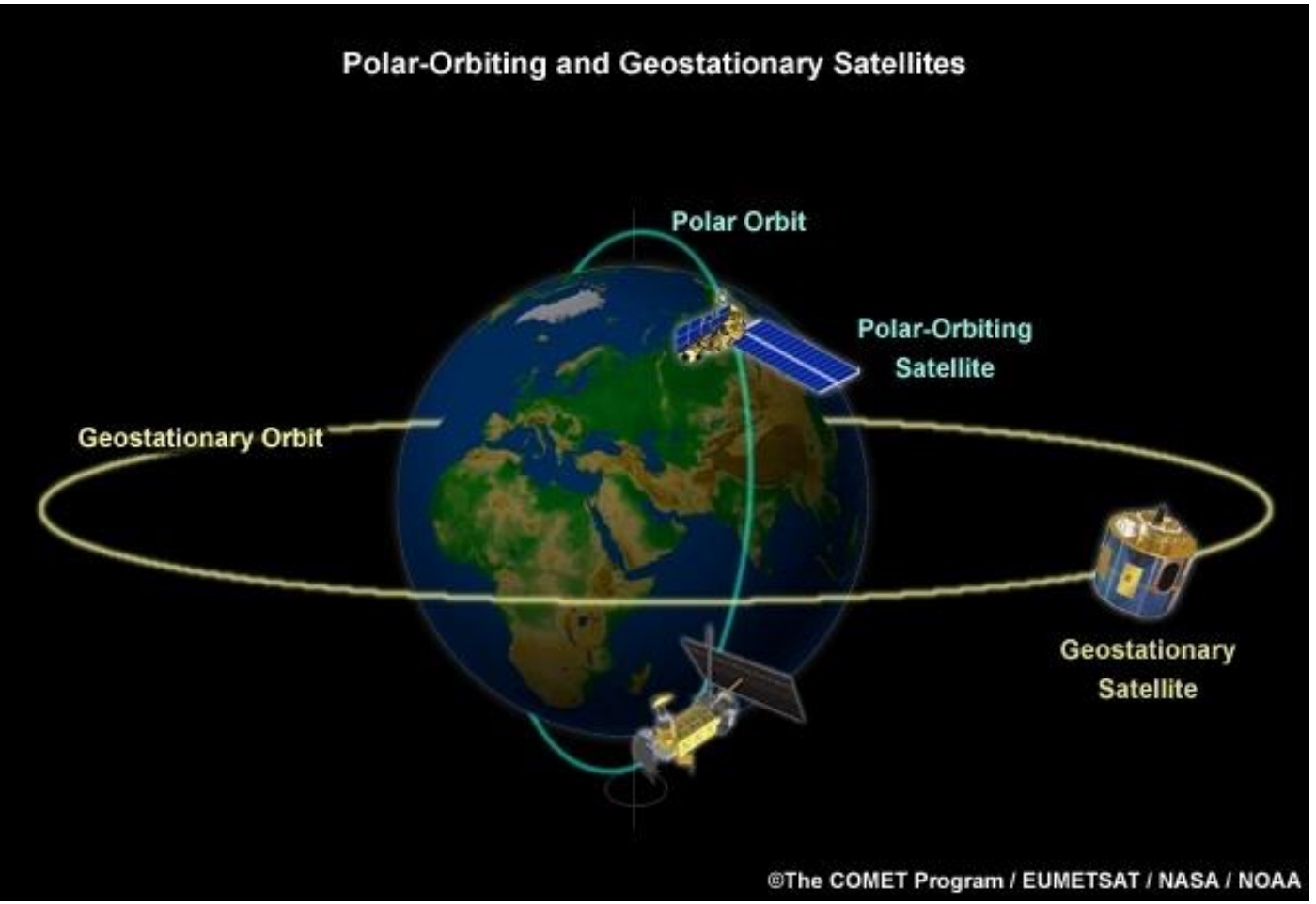
These satellites have revolutionized global communications, television broadcasting and weather forecasting, and have a number of important defense, rescue and research operation and intelligence applications.

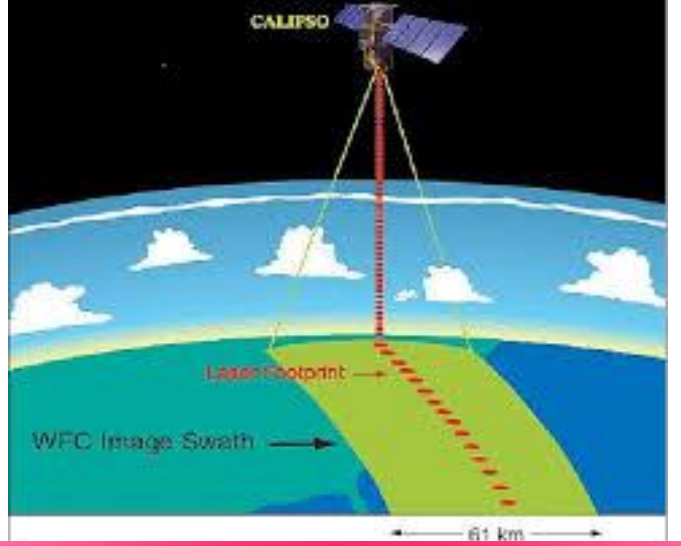
- ## Polar Orbit

A polar orbit is one in which a satellite passes above or nearly above both poles of the body being orbited (usually a planet such as the Earth, but possibly another body such as the Moon or Sun) on each revolution.

Orbital period-100 minutes
Satellite Altitude –between 700 and 800 km

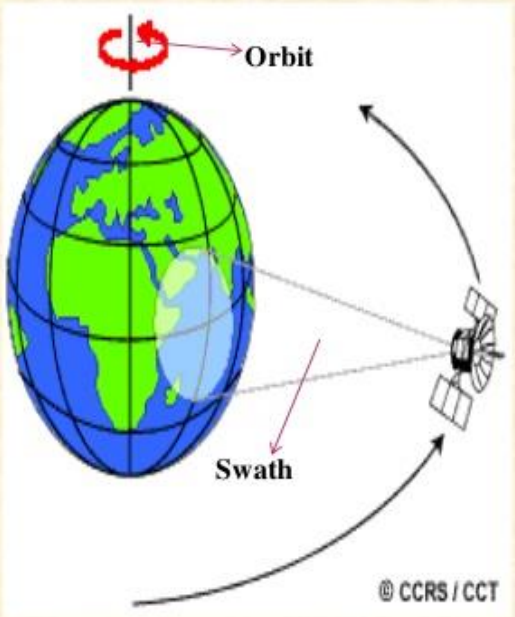
Polar orbits are often used for earth-mapping, earth observation, capturing the earth as time passes from one point, reconnaissance satellites, as well as for some weather satellites.

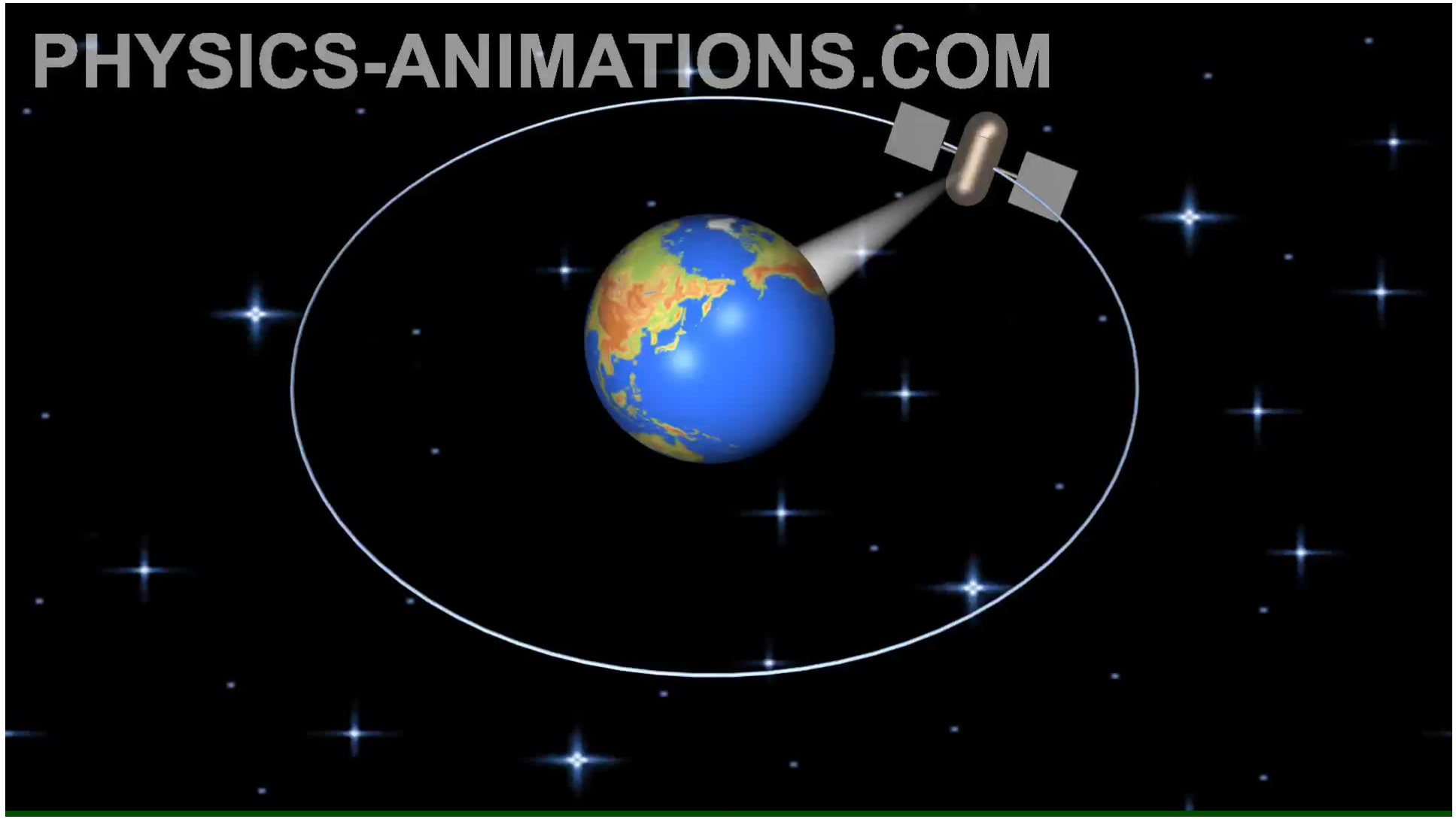




Satellite Characteristics: Orbits and Swaths

- The path followed by a satellite is referred to as its **orbit.**
- As a satellite revolves around the Earth, the sensor "sees" a certain portion of the Earth's surface.
- The area imaged on the surface, is referred to as the **swath.**

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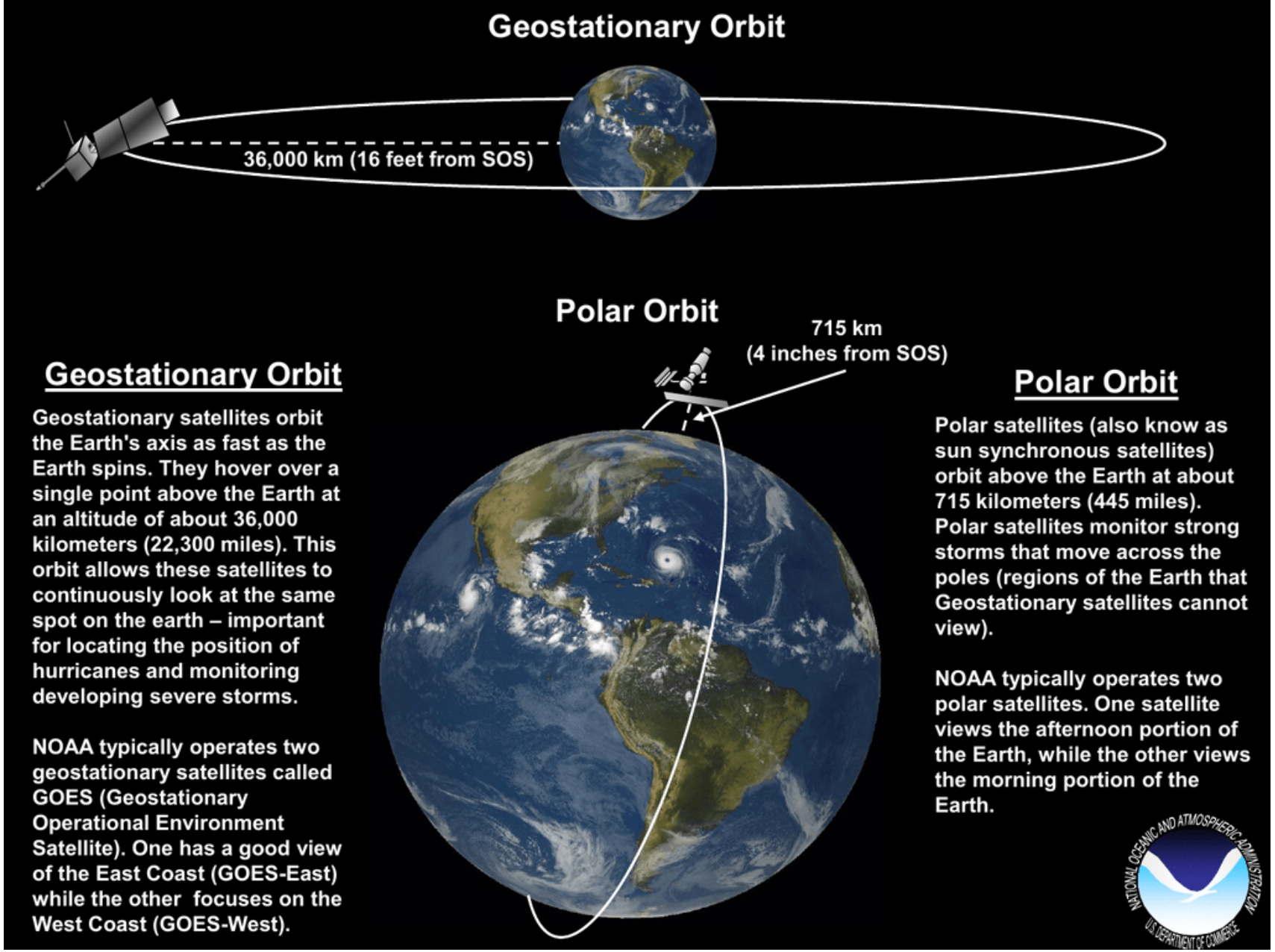
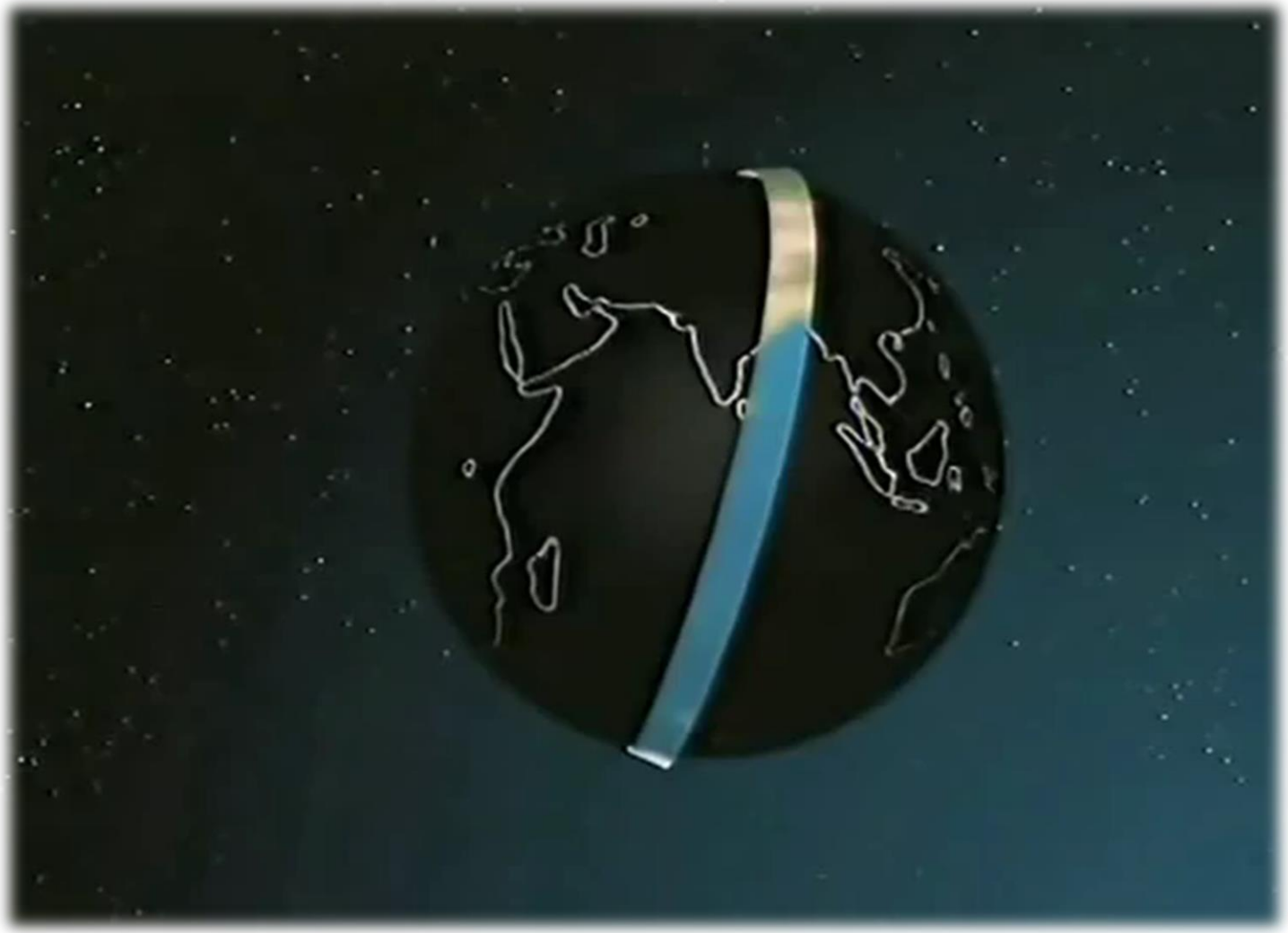


Most of the remote sensing satellite platforms today are in near-polar orbits, which means that the satellite travels northwards on one side of the Earth and then toward the southern pole on the second half of its orbit. These are called ascending and descending passes, respectively.

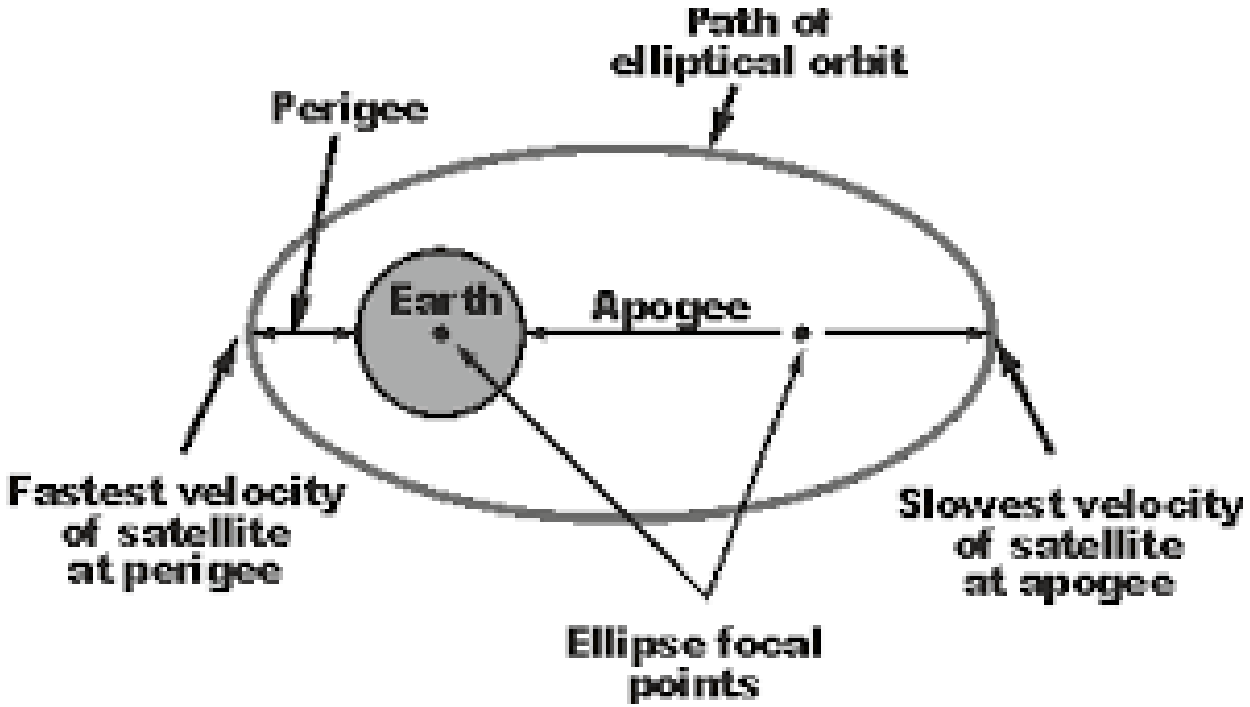


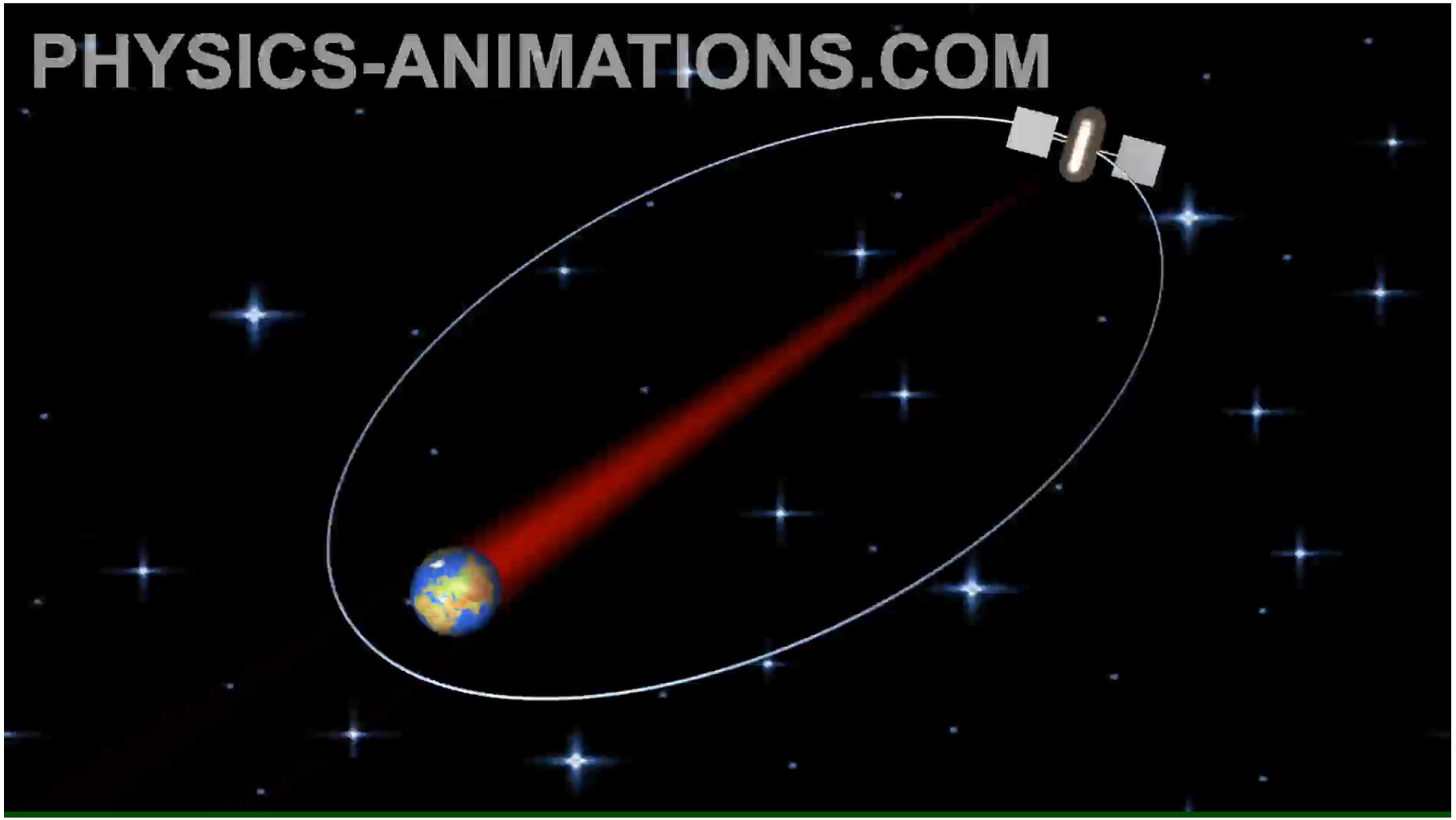
- Many of the satellites in NASA's Earth Observing System have a nearly polar orbit.
- In this highly inclined orbit, the satellite moves around the Earth from pole to pole, taking about 99 minutes to complete an orbit.
- During one half of the orbit, the satellite views the daytime side of the Earth.

• Elliptical Orbit

In an elliptical orbit, the satellite's velocity changes depending on where it is in its orbital path. When the satellite is in the part of its orbit closest to the Earth, it moves faster because the Earth's gravitational pull is stronger. The satellite is moving the fastest at the low point of an elliptical orbit.

An elliptical orbit can be useful to a communications satellite because it allows the satellite to travel over a specific region for a long portion of its orbit.

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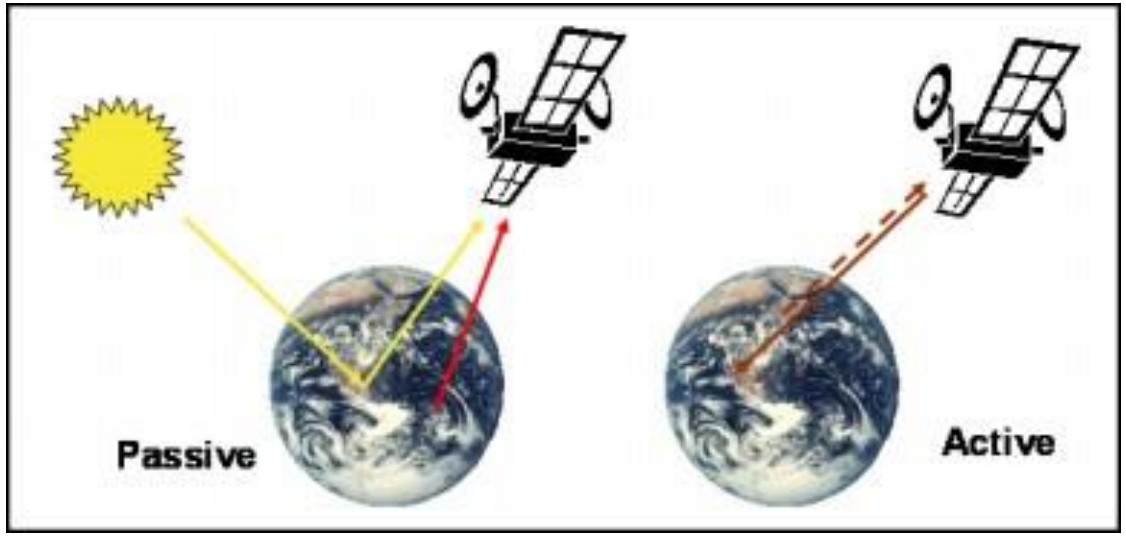
SENSORS

- Active sensors
- Passive sensors



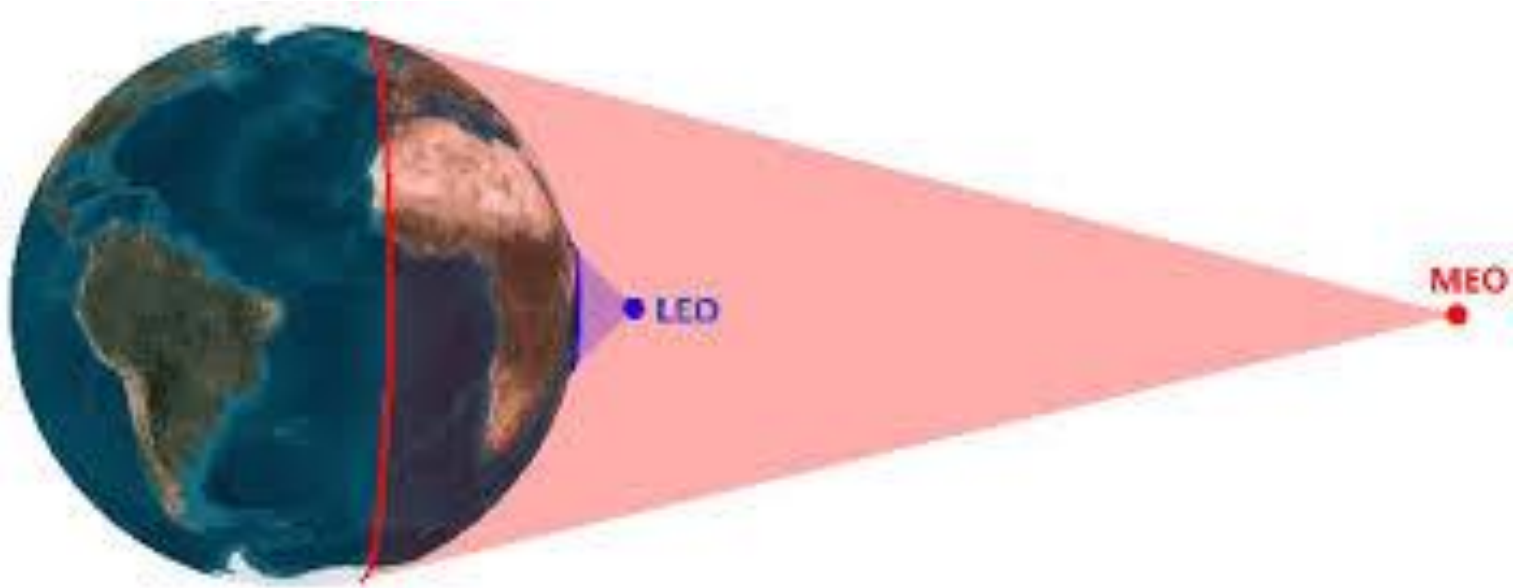
TYPES OF SATELLITES

- Low Earth Orbits
- Sun-Synchronous orbits
- Geosynchronous satellites
- Geostationary satellites

Low Earth Orbits

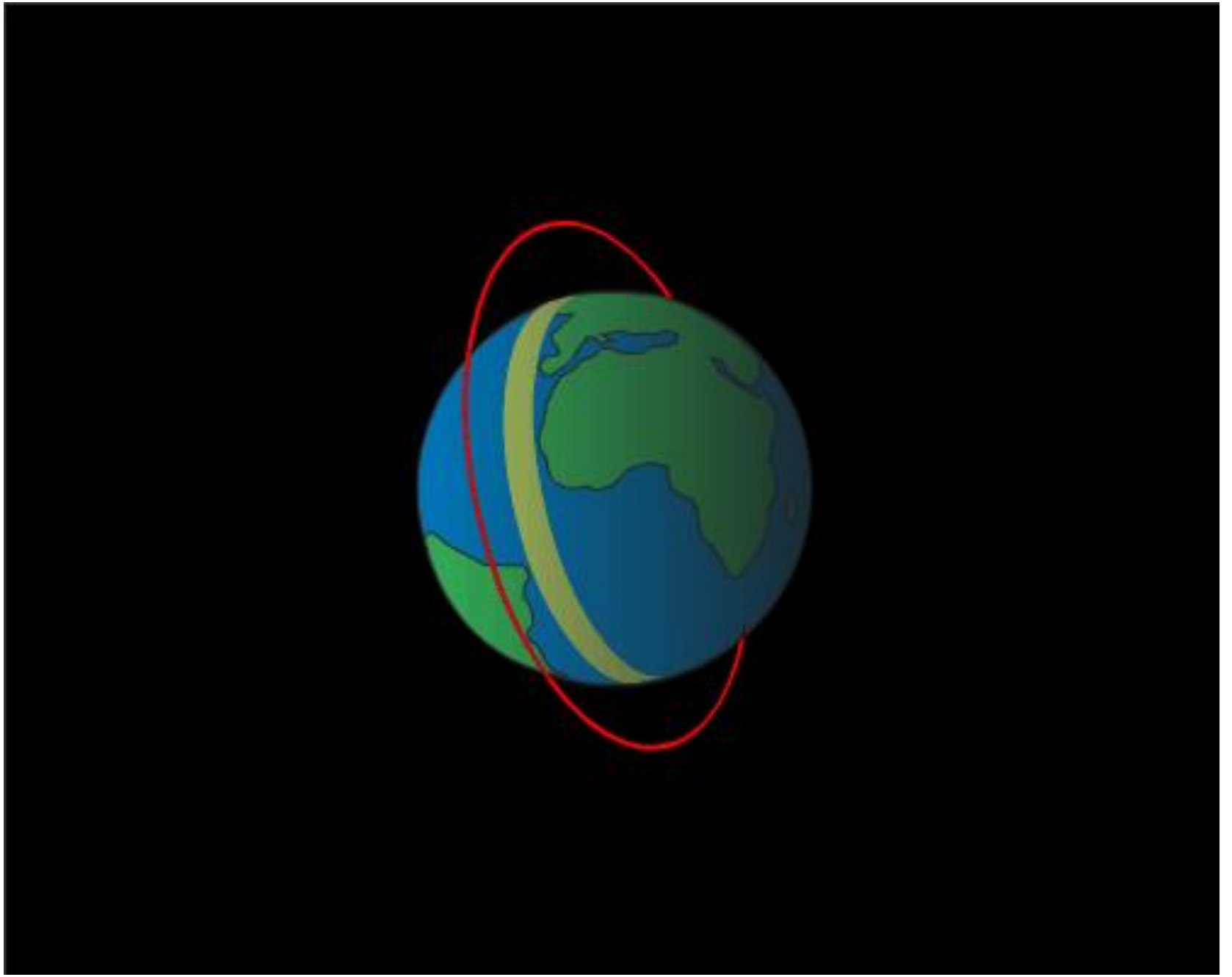
- Low-Earth orbit (often known as LEO) encompasses Earth-centered orbits with an altitude of 2,000 or less.
- For the purposes of the Commercial Use Policy, low-Earth orbit is considered the area in Earth orbit near enough to Earth for convenient transportation, communication, observation and resupply.
- High resolution image is possible


Low Earth Orbiting
Satellite (GPM)
Low Earth Orbit
65 deg inclination
Geostationary
Satellite
Geostationary Orbit


LEO
MEO

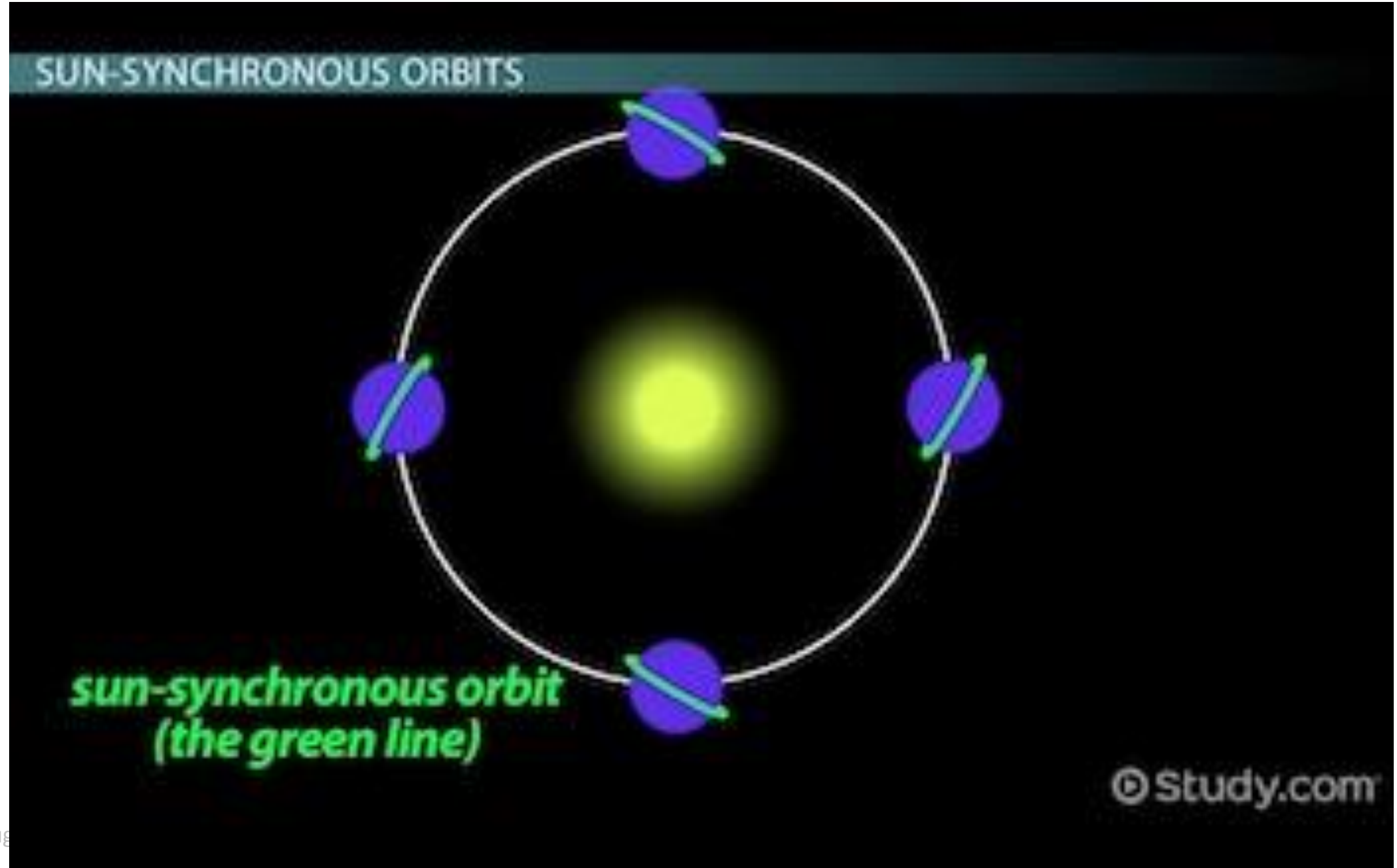
Sun-Synchronous orbits

- Sun-synchronous orbit (SSO) is a particular kind of polar orbit. Satellites in SSO, travelling over the polar regions, are synchronous with the Sun.
- Angle of inclination of the orbit with respect to the sun through out the year is same.
- This means they are synchronised to always be in the same 'fixed' position relative to the Sun.
- Always crosses the equator precisely the same local sun time.



Geosynchronous satellites

- Geosynchronous satellite is placed in the geostationary orbit with an orbital period matching the Earth's rotation period.
- These satellites take 23 hrs 56 min 4 sec to complete one rotation around the earth.
- However, the orbital plane for a typical geosynchronous satellite is generally not the equatorial plane.


SUN-SYNCHRONOUS ORBITS
sun-synchronous orbit
(the green line)
Study.com

Geostationary satellites

- Geostationary satellite is a satellite that revolves from west to east during a period of revolution.
- Geostationary satellite is placed in orbit at a distance of around 35,800 km from the earth's surface.
- The time period of a geostationary satellite is 23 hrs 56 min 4 sec