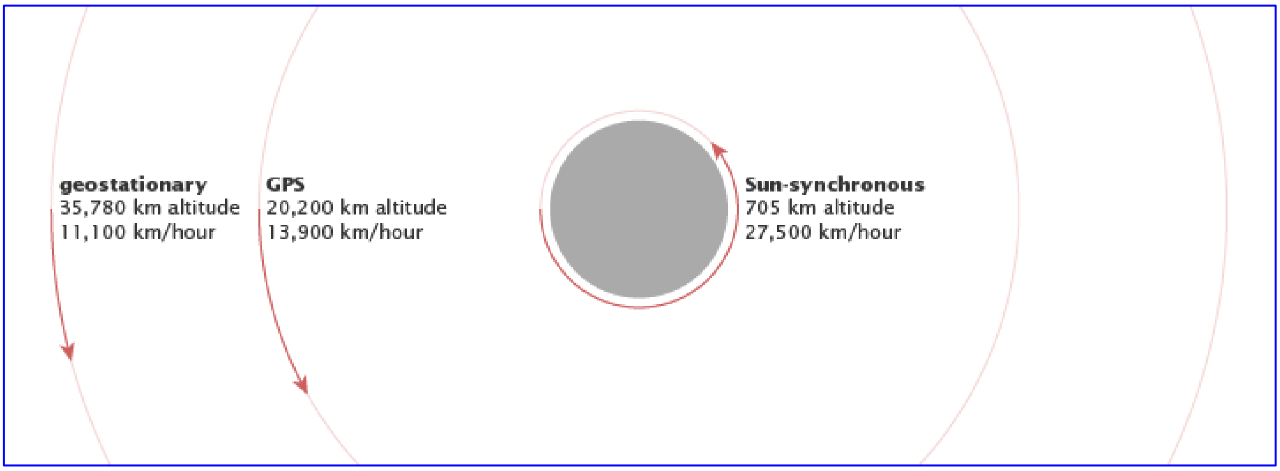
Satellites

https://earthobservatory.nasa.gov/features/OrbitsCatalog/page1.php
[…] There are essentially three types of Earth orbits: high Earth orbit, medium Earth orbit, and low Earth orbit. Many weather and some communications satellites tend to have a high Earth orbit, farthest away from the surface. Satellites that orbit in a medium (mid) Earth orbit include navigation and specialty satellites, designed to monitor a particular region. Most scientific satellites, including NASA's Earth Observing System fleet, have a low Earth orbit.

One way of classifying orbits is by altitude. Low Earth orbit starts just above the top of the atmosphere, while high Earth orbit begins about one tenth of the way to the moon. (NASA illustration by Robert Simmon)

The height of the orbit, or distance between the satellite and Earth's surface, determines how quickly the satellite moves around the Earth. An Earth-orbiting satellite's motion is mostly controlled by Earth's gravity. As satellites get closer to Earth, the pull of gravity gets stronger, and the satellite moves more quickly. NASA's Aqua satellite, for example, requires about 99 minutes to orbit the Earth at about 705 kilometers up, while a weather satellite about 36,000 kilometers from Earth's surface takes 23 hours, 56 minutes, and 4 seconds to complete an orbit. At 384,403 kilometers from the center of the Earth, the Moon completes a single orbit in 28 days.



The higher a satellite's orbit, the slower it moves. Certain orbital altitudes have special properties, like a geosynchronous orbit, in which a satellite travels around the Earth exactly once each day. The length of each red arrow in this diagram represents the distance traveled by a satellite in an hour. View animation. (NASA illustration by Robert Simmon.)

Changing a satellite's height will also change its orbital speed. This introduces a strange paradox. If a satellite operator wants to increase the satellite's orbital speed, he can't simply fire the thrusters to accelerate the satellite. Doing so would boost the orbit (increase the altitude), which would *slow* the orbital speed. Instead, he must fire the thrusters in a direction opposite to the satellite's forward motion, an action that on the ground would slow a moving vehicle. This change will push the satellite into a lower orbit, which will increase its forward velocity.