

Optical Remote Sensing Basics



What are optical remote sensing systems?

Basic types of remote sensing sensors

Passive Sensors

Environmental source of the information carrier medium, such as electromagnetic radiation or noise.

Active Sensors

Artificial source of the information carrier medium, such LiDAR, RADAR or loudspeaker.

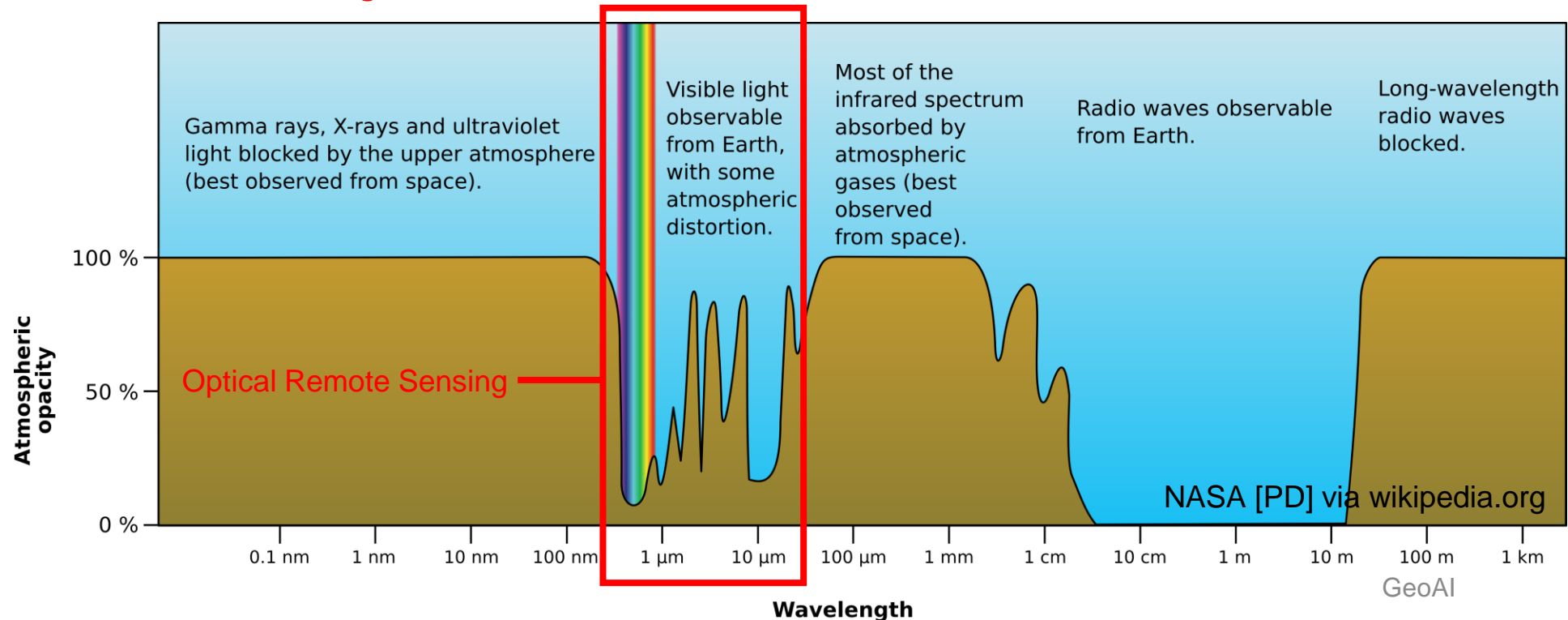
Basic types of remote sensing sensors

Passive Sensors

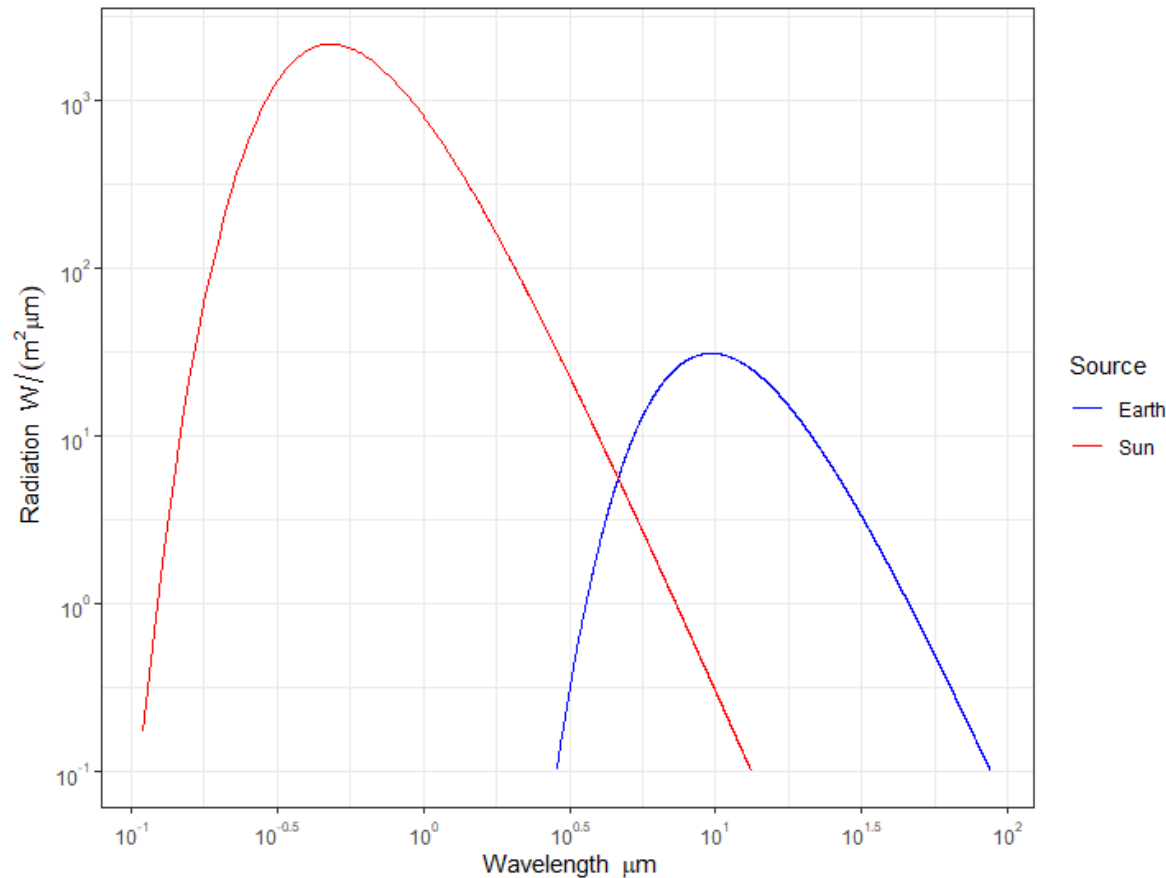
Environmental source of the information carrier medium, such as **electromagnetic radiation** or noise.

Active Sensors

Artificial source of the information carrier medium, such LiDAR, RADAR or loudspeaker.



Background: Illumination source



Stefan-Boltzmann law: $j^* = \sigma T^4$.

The emitted energy from a (near black) body is proportional to its temperature.
Hence, the sun emits more radiation than the earth.

Wien's law: $\lambda_{\max} = \frac{2897,8 \mu\text{m} \cdot \text{K}}{T}$

The wavelength of maximum emission from a (near black) body is inversely proportional to its temperature.
Therefore, this wavelength is around 0.5 μm for solar radiation and 10 μm for terrestrial radiation.

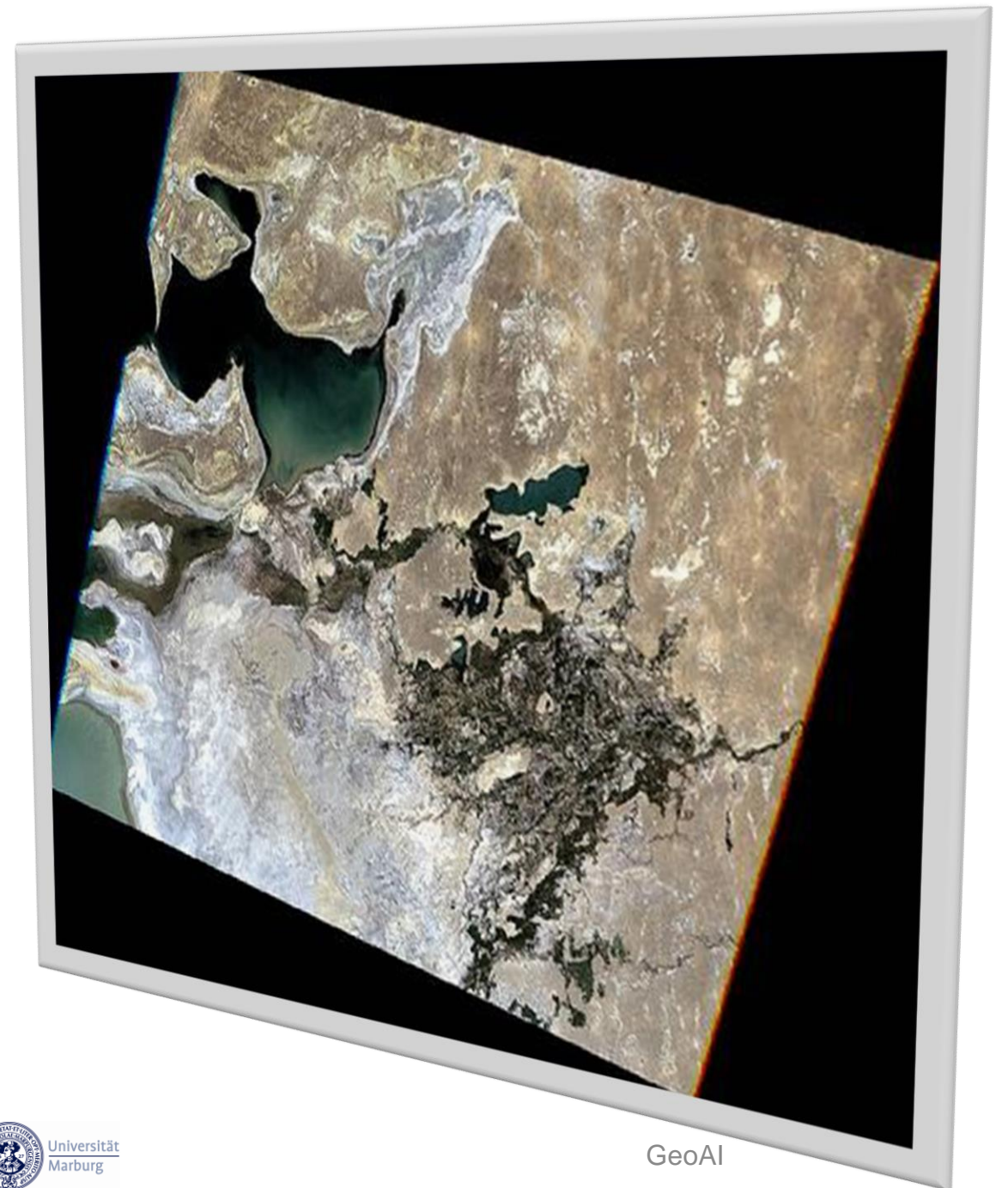
See you next time!

Optical Sensor Characteristics

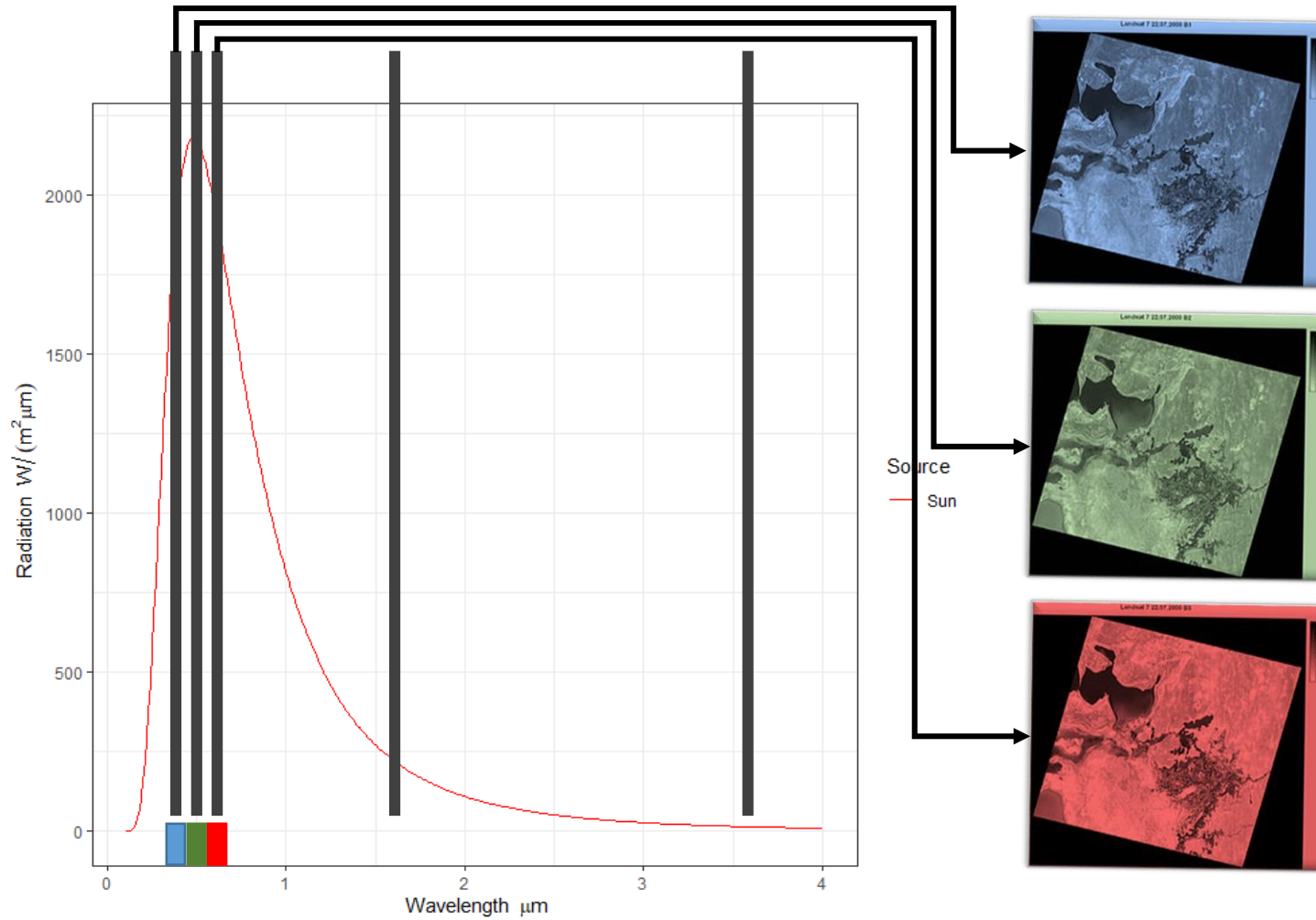


Characteristics of optical remote sensing systems?

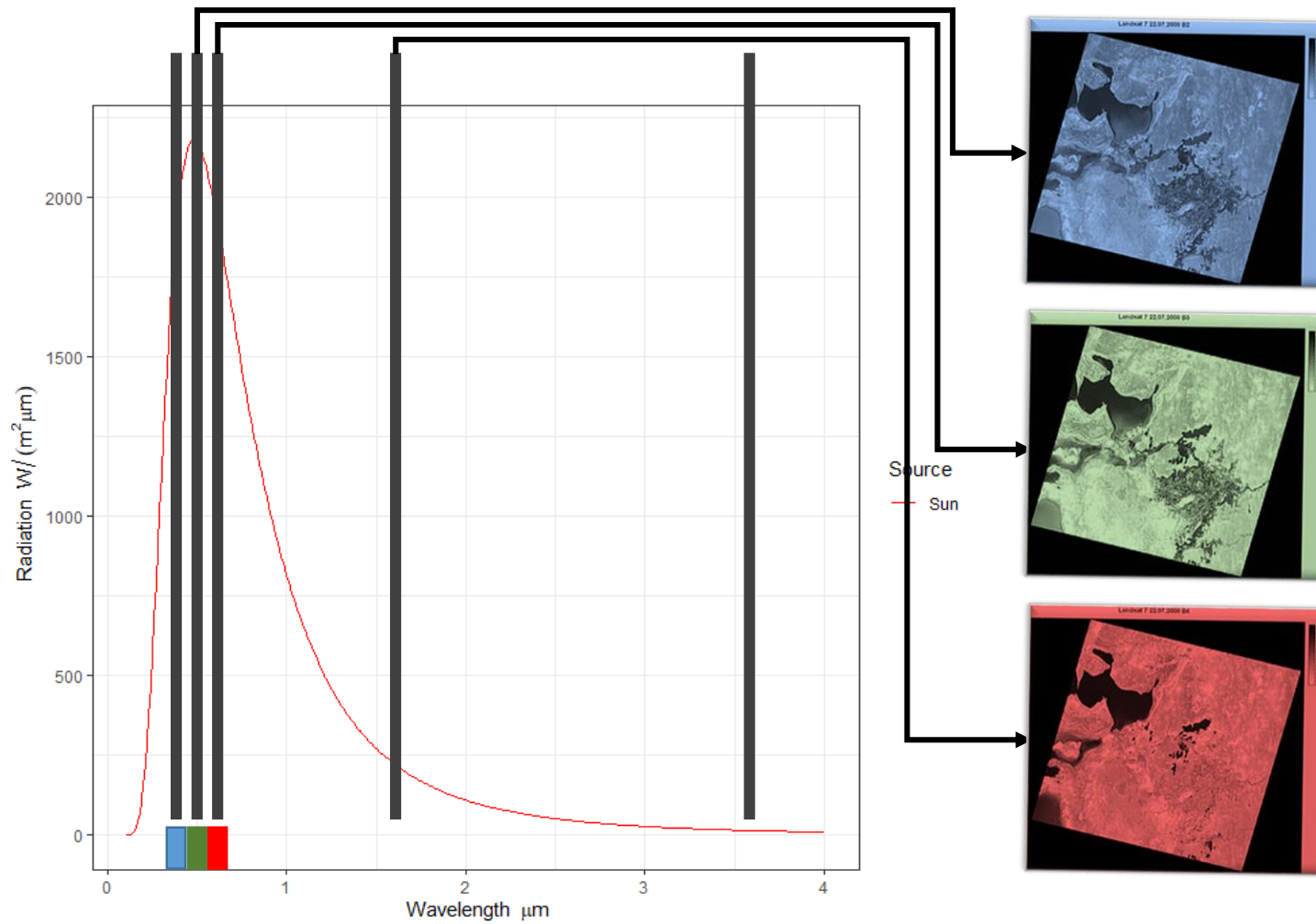
Spectral Resolution



Spectral Resolution



Spectral Resolution



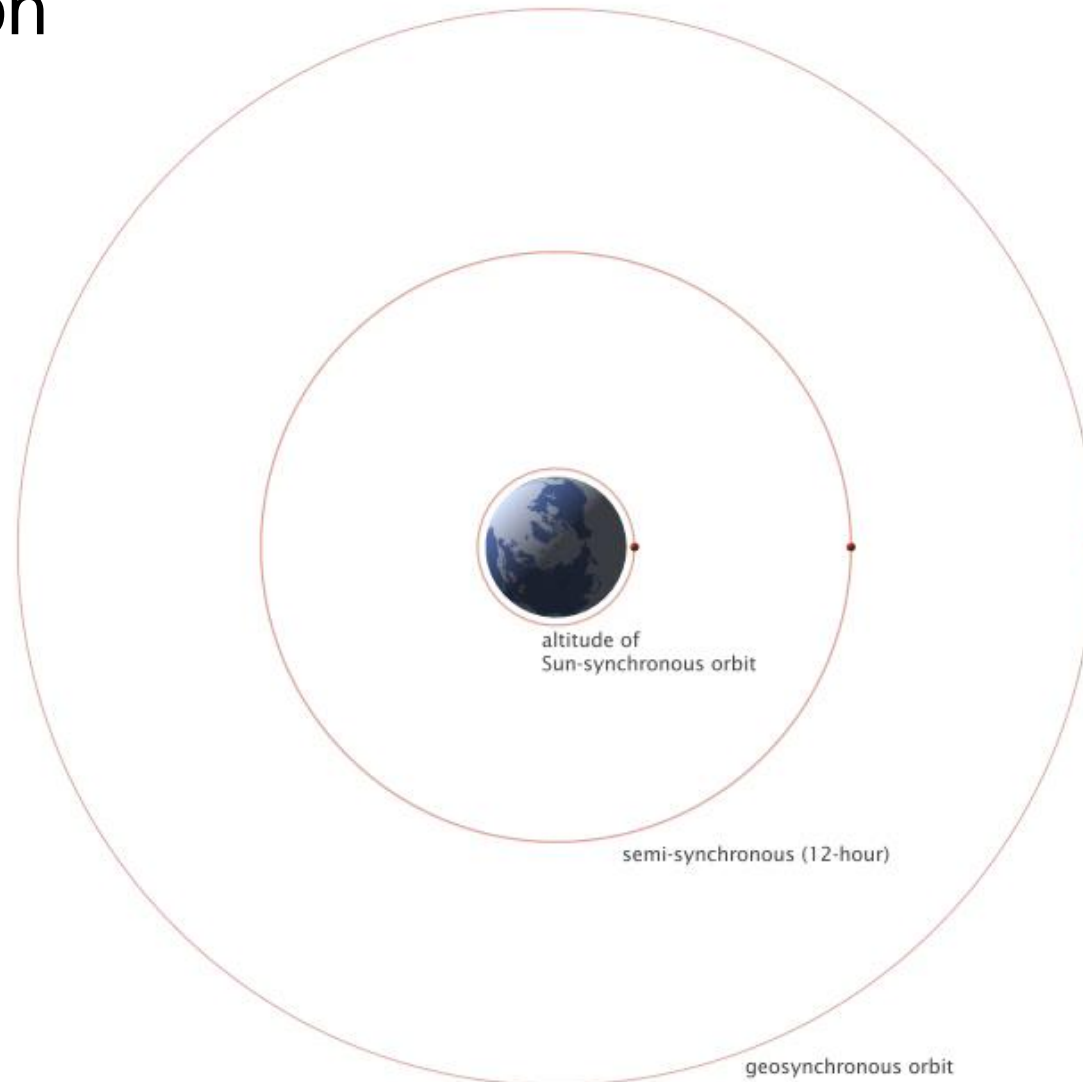
Spatial Resolution



Spatial Resolution

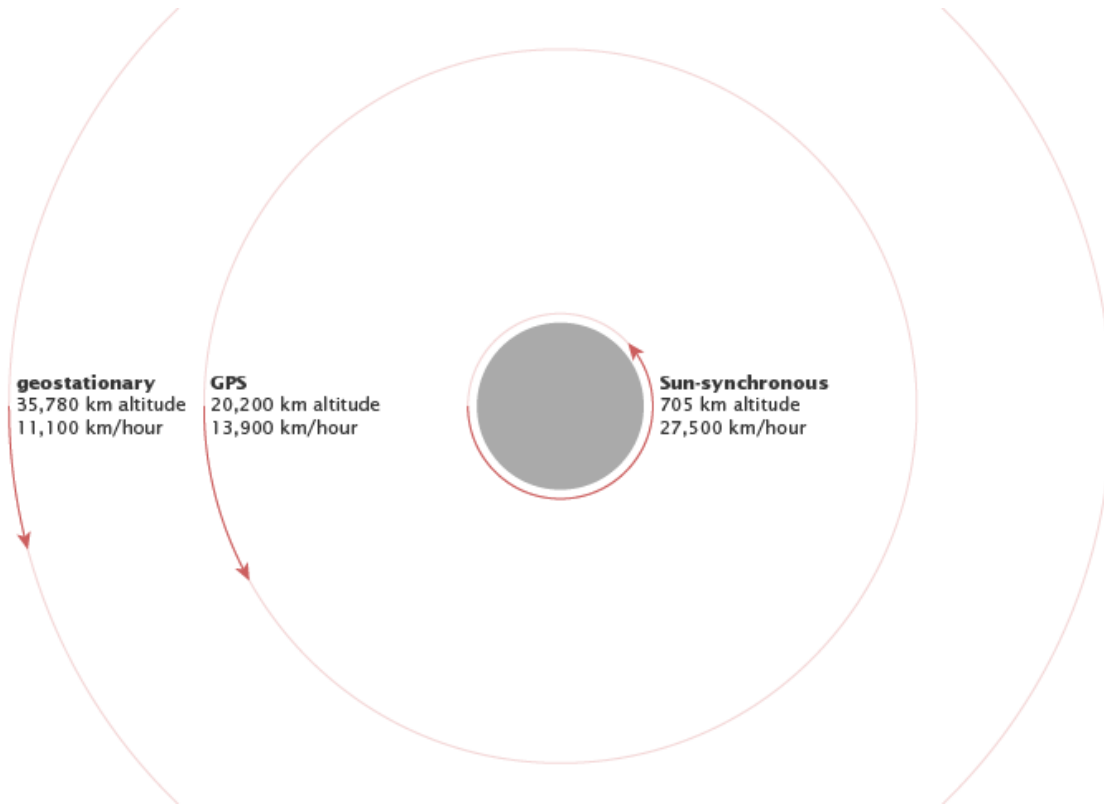


Temporal Resolution



Credits: NASA Earth Observatory,
<https://earthobservatory.nasa.gov/>

Temporal Resolution

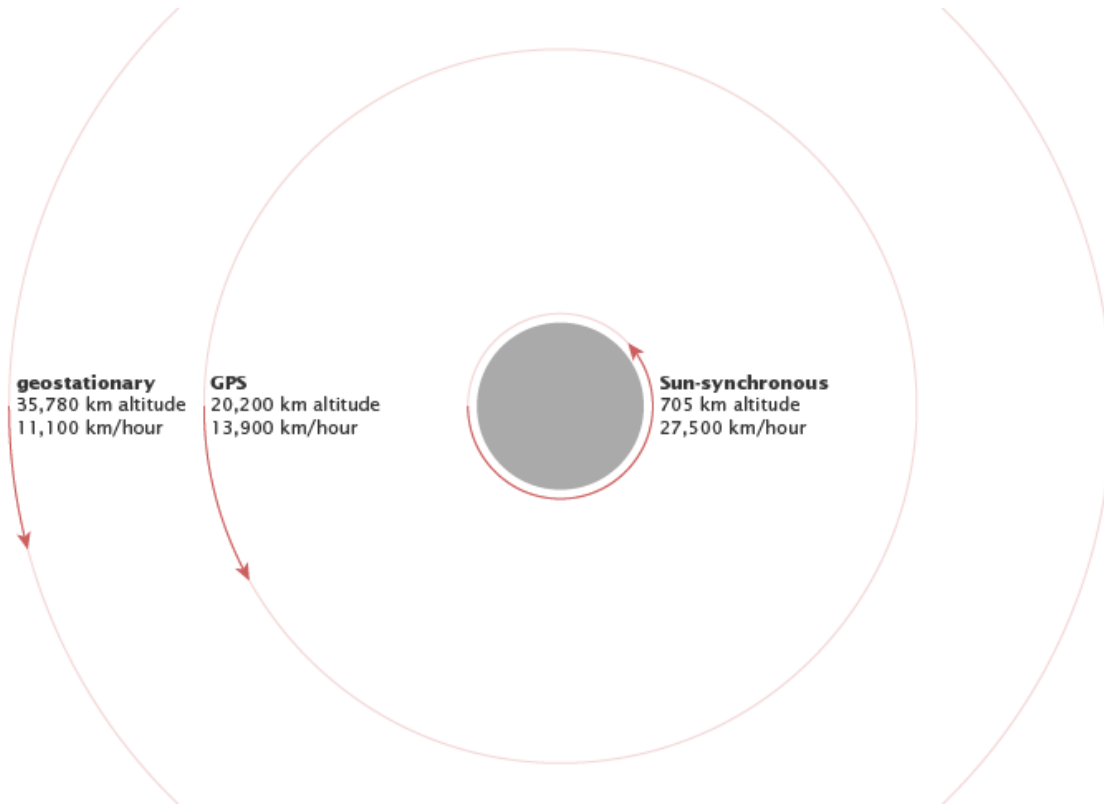


Geostationary orbit

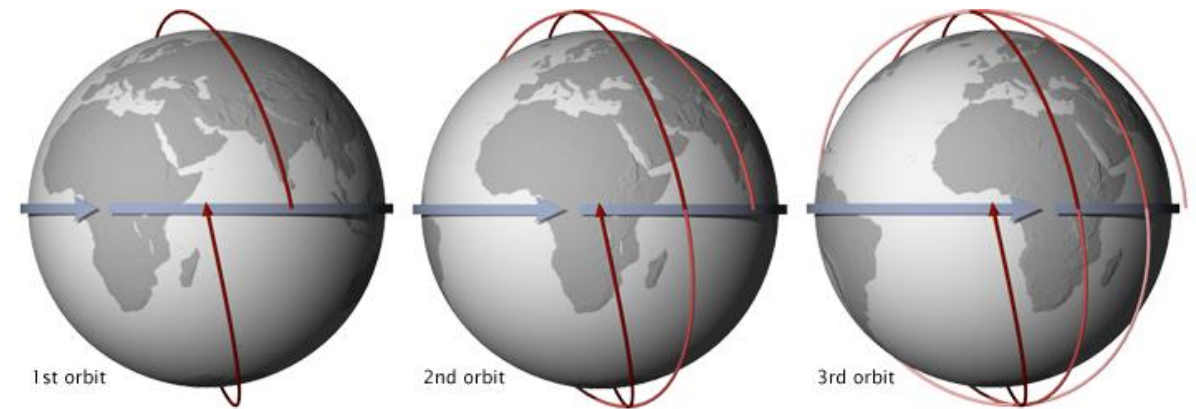


Credits: NASA Earth Observatory, <https://earthobservatory.nasa.gov/>

Temporal Resolution



Sun-synchronous, low earth orbit



Credits: NASA Earth Observatory, <https://earthobservatory.nasa.gov/>

In a Nutshell

Optical remote sensing systems are characterized by their

- Spectral resolution
- Spatial resolution
- Temporal resolution



See you next time!