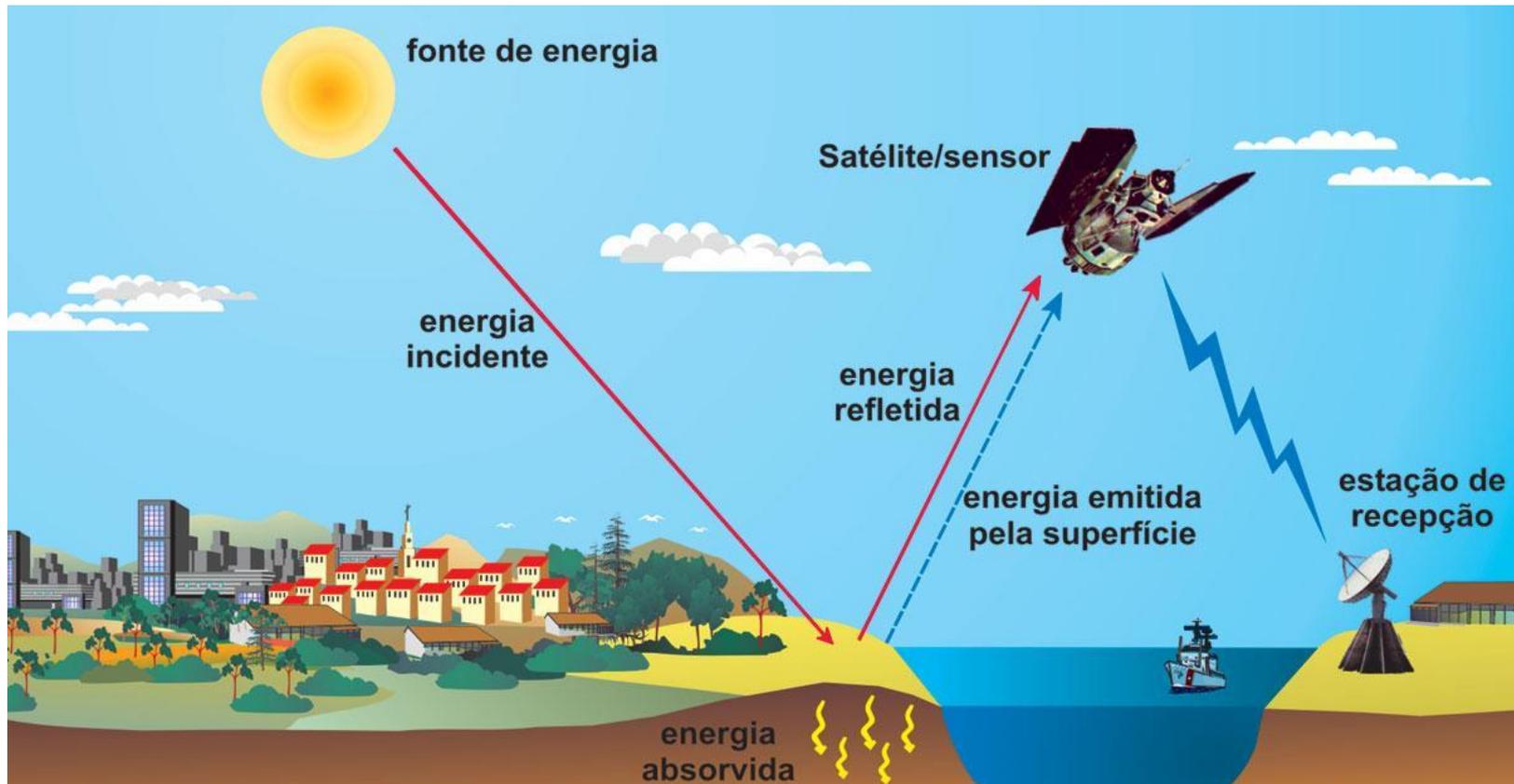




Remote Sensing

Definition

Obtaining information about an object, area or phenomenon of the earth's surface through the registration of electromagnetic energy (EMR) acquired by a sensor at a remote distance to create geospatial information

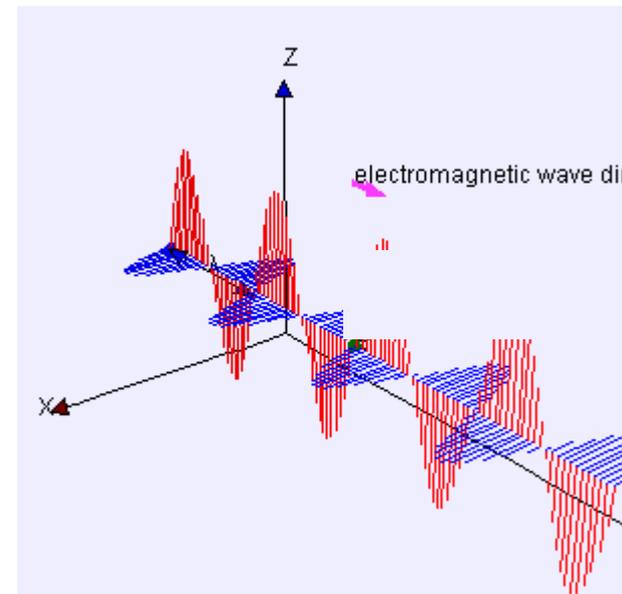
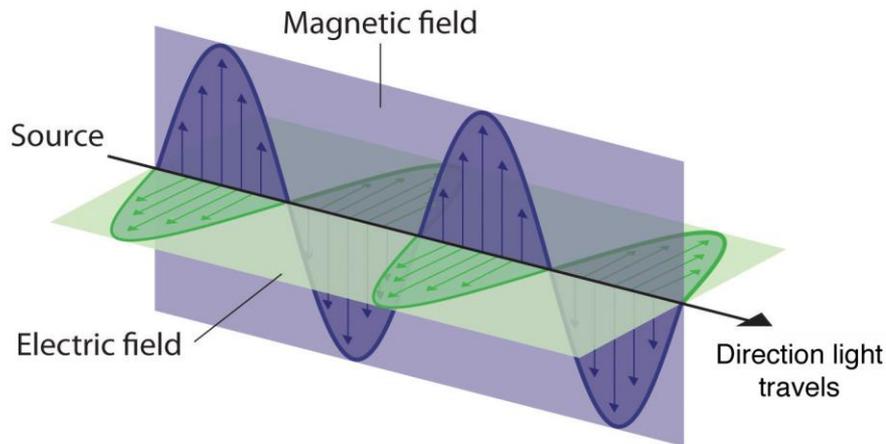


Source: Parque de Ciencia

Physical principles: electromagnetic energy

The electromagnetic energy is emitted from any element that has a higher temperature than absolute zero (0 Kelvin)

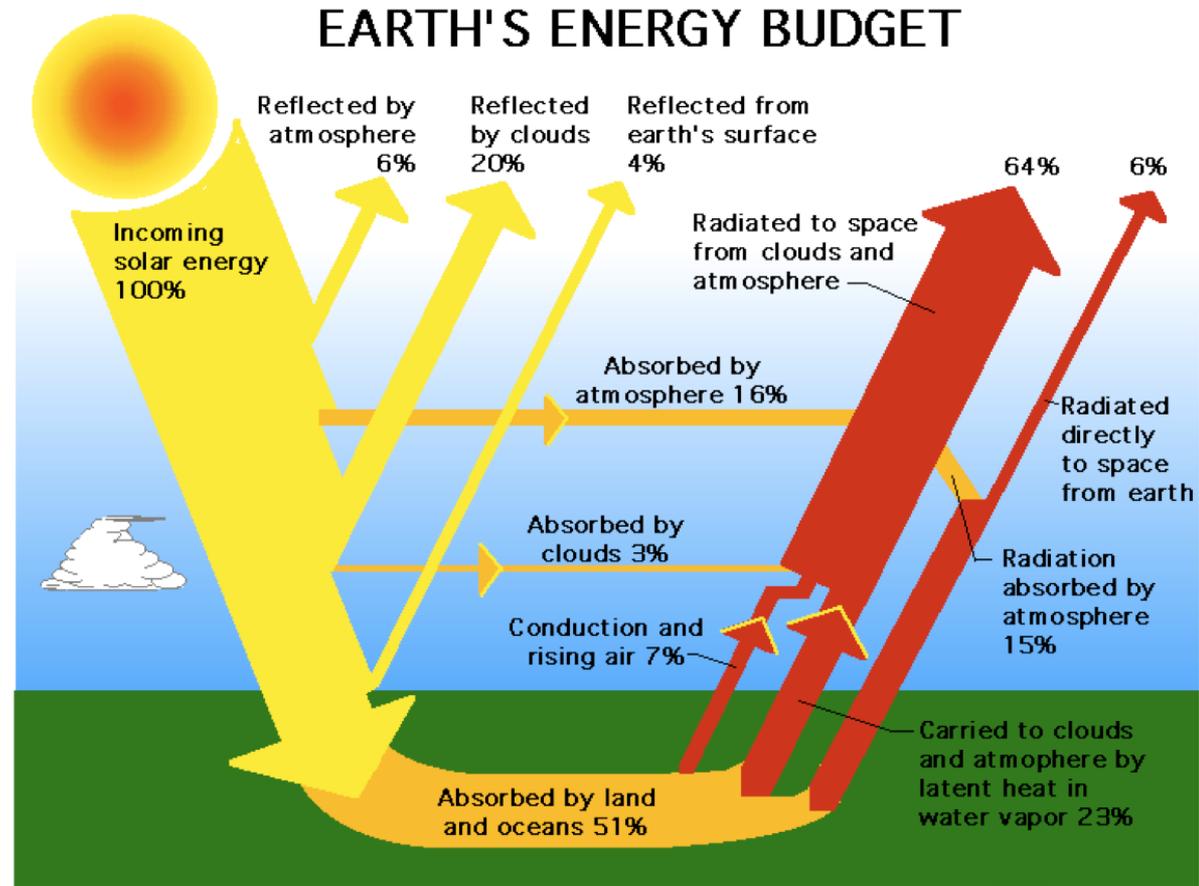
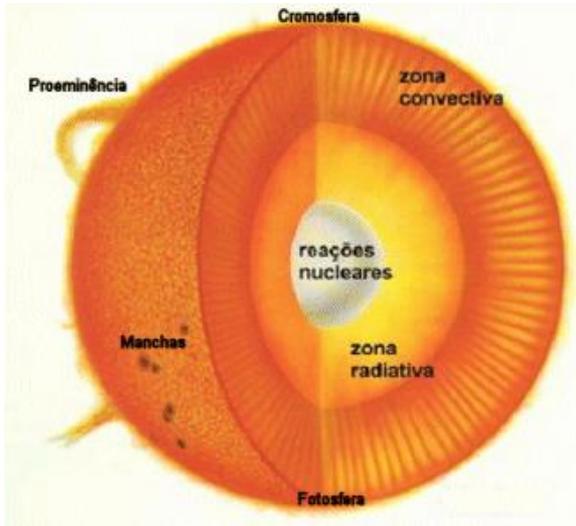
From a Quantic perspective, electromagnetic radiation (EMR) is conceived as the result of small energy pulses, and from a Wave perspective, EMR propagates in a wave shape formed by the oscillation of electric and magnetic fields



Source: Fu-Kwun Hwang

Physical principles: electromagnetic energy

Main source for earth's surface remote sensing

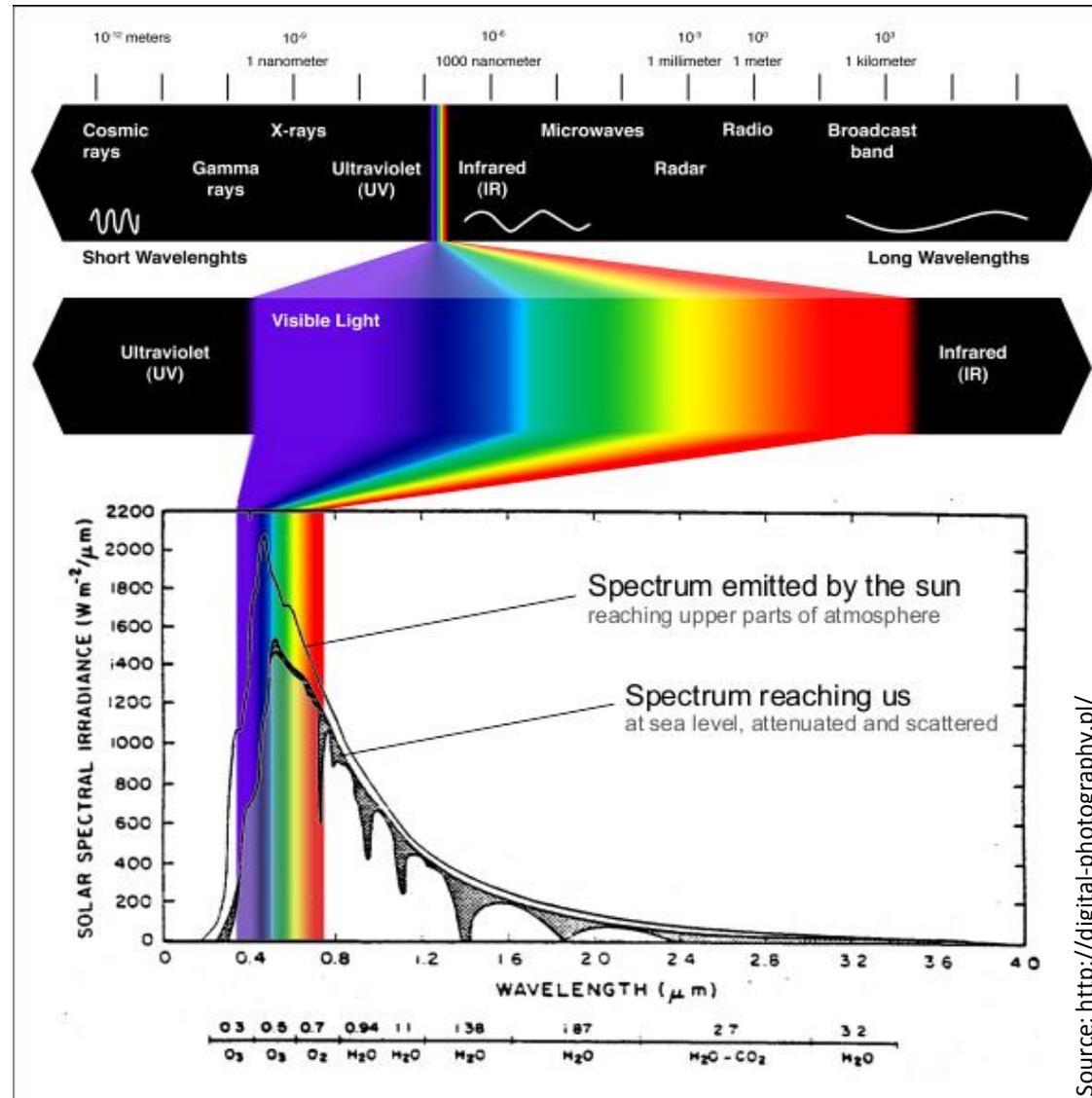


Source: NASA

Source: NASA

Physical principles: electromagnetic energy

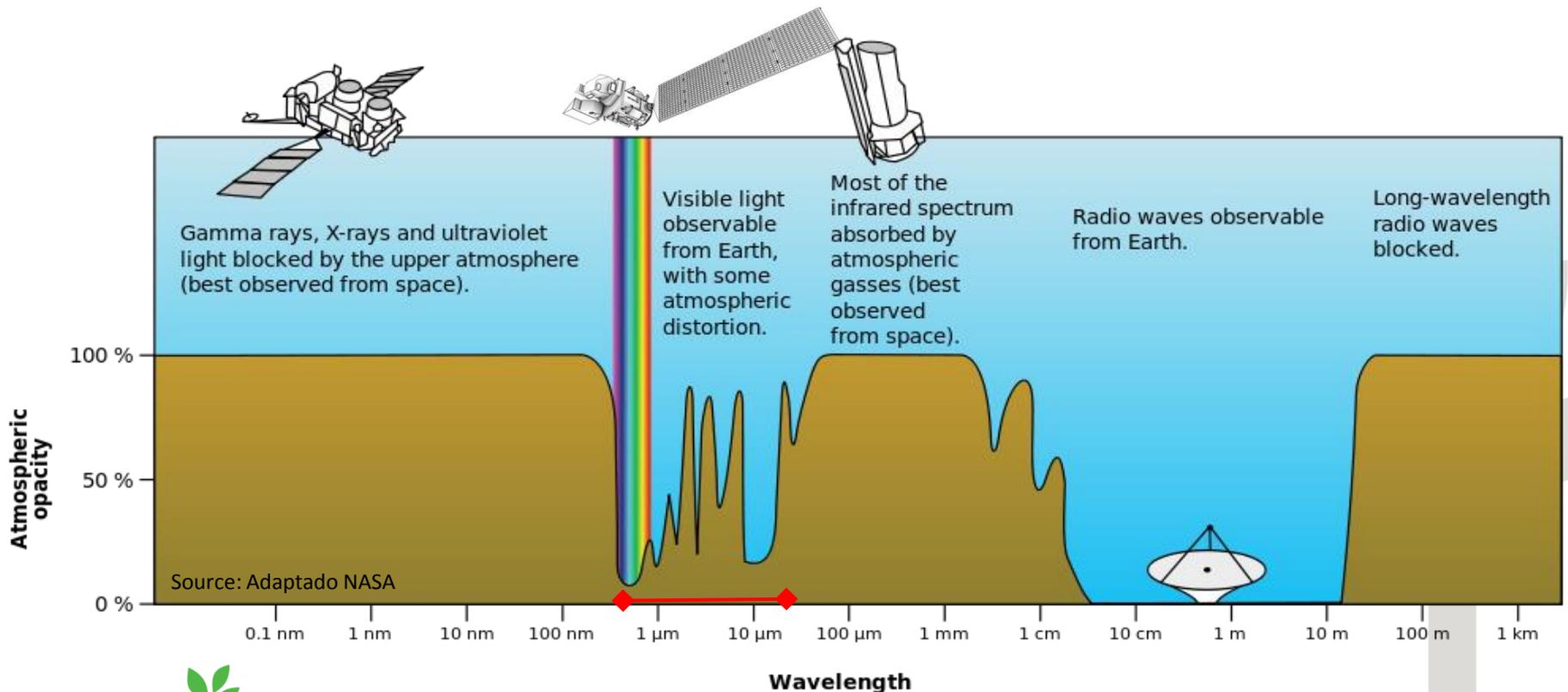
- The maximum available energy is between 0.4 and 0.7 μm (Visible)
- There are opaque areas that doesn't allow the EMR passage (ATM absorption)
- The areas where the atmosphere is transparent to EMR is called atmospheric window
- 0.4-2.5 μm the reflected flux is used and more than 6 μm the emitted heat flux is used



Source: <http://digital-photography.pl/>

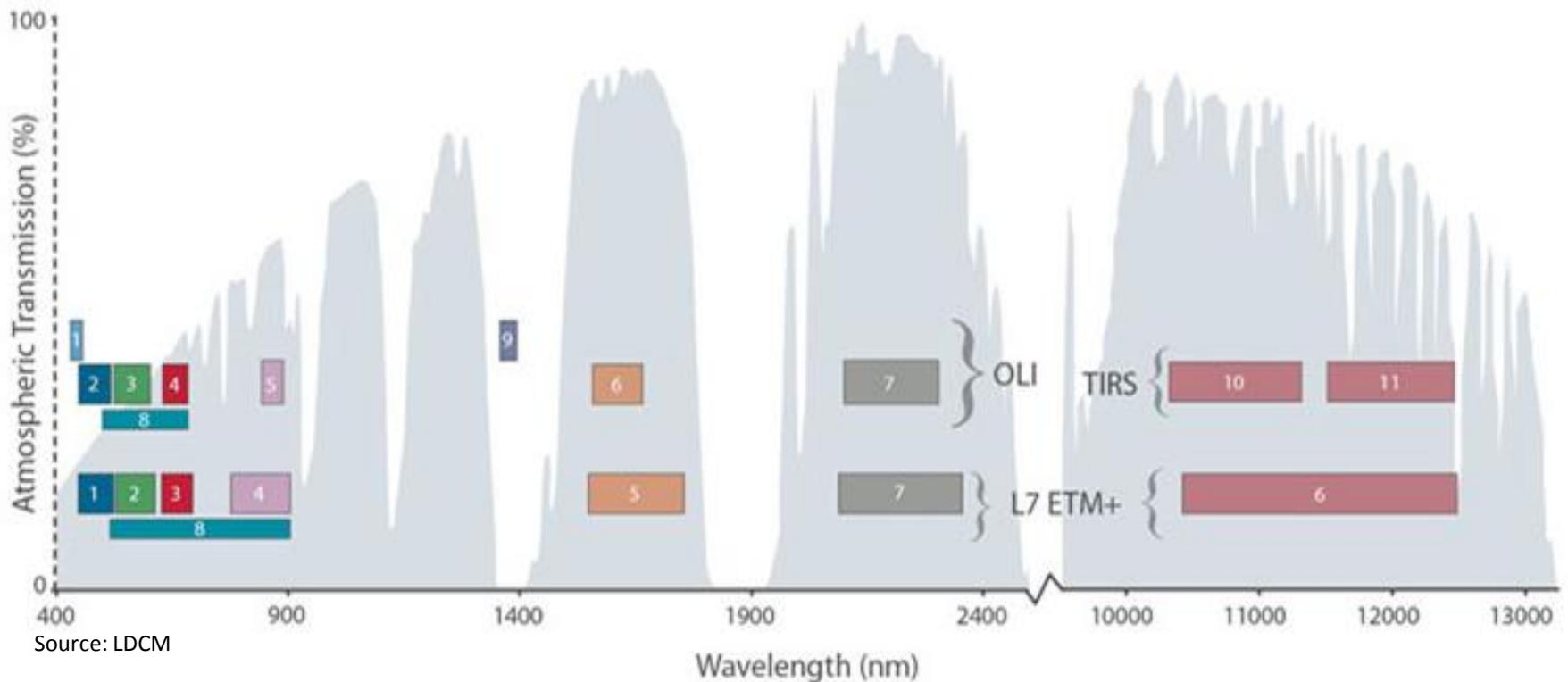
Physical principles: atmospheric windows

Regions of the electromagnetic spectrum which have a good transmittance
Practically all the remote sensing activities are developed at these spectral wavelengths



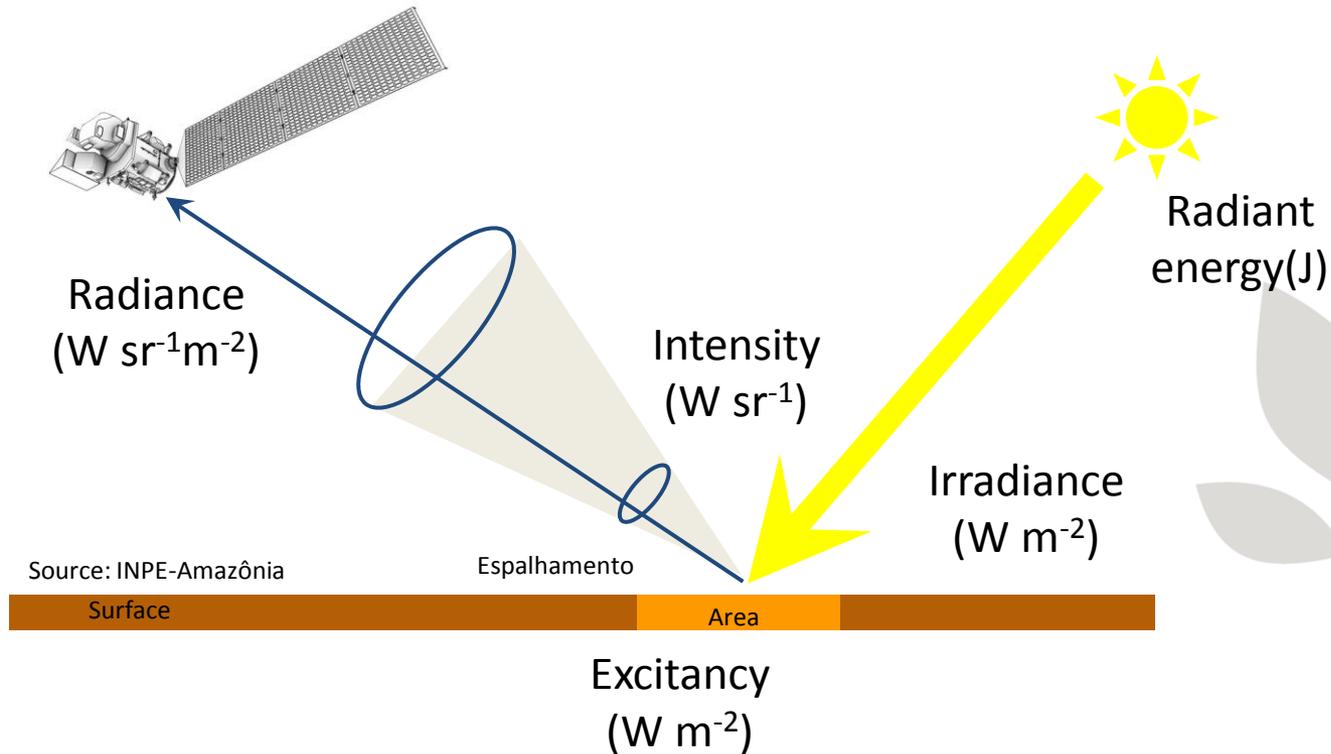
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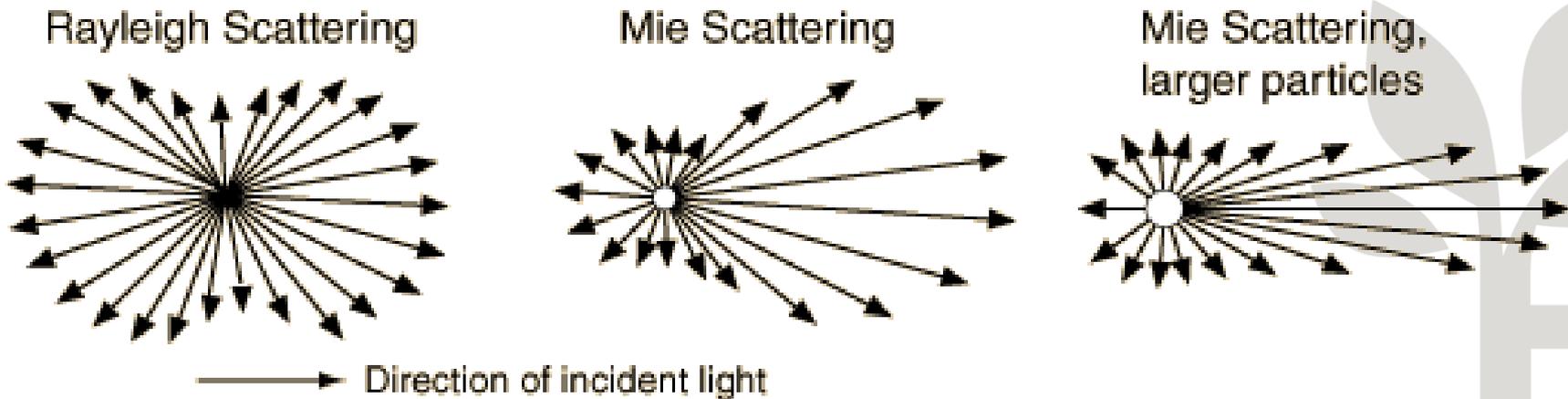
What it is interesting to Remote Sensing?

Radiance: Radiant intensity per unit area in a given direction
($W\ sr^{-1}\ m^{-2}$)



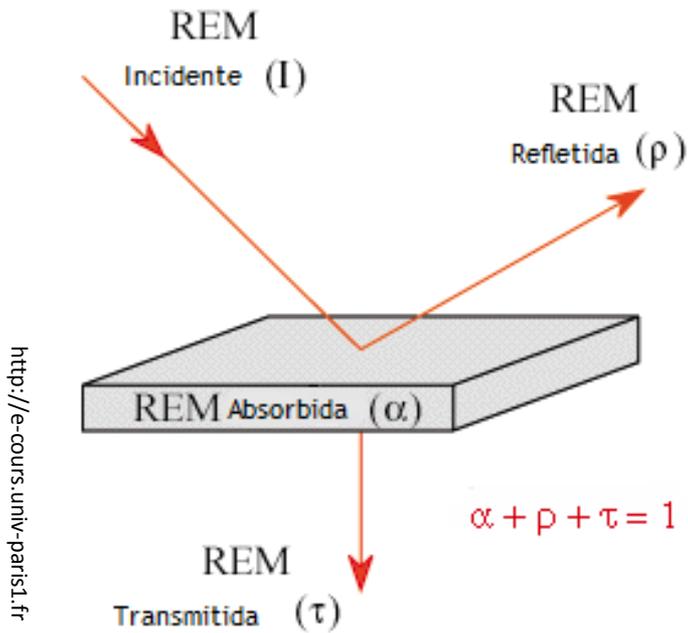
The Three Dispersion Types

- **Rayleigh scattering:** particles present in the atmosphere (nitrogen, oxygen, dust) are much smaller than the wavelength radiation
- **Mie scattering :** (dust, smoke, water vapor) in the atmosphere have the same size as the wavelength. (Lower parts of the atmosphere)
- **Non Selective Dispersion:** particles present in the atmosphere (water droplets) much larger than the wavelength



Source: www.studyblue.com

Electromagnetic Radiation and Surface Interactions



Irradiance: $I = P_{inc} / A_s$

Reflectance: $R_f = E_r / E_i$

Absorptance: $A_b = E_{Ab} / E_i$

Transmittance: $T_m = E_t / E_i$

$\lambda\alpha$: Absorption coefficient at the wavelength λ

$\lambda\rho$: Reflection coefficient at the wavelength λ

$\lambda\tau$: Transmission coefficient at the wavelength λ

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FOREST MONITORING

