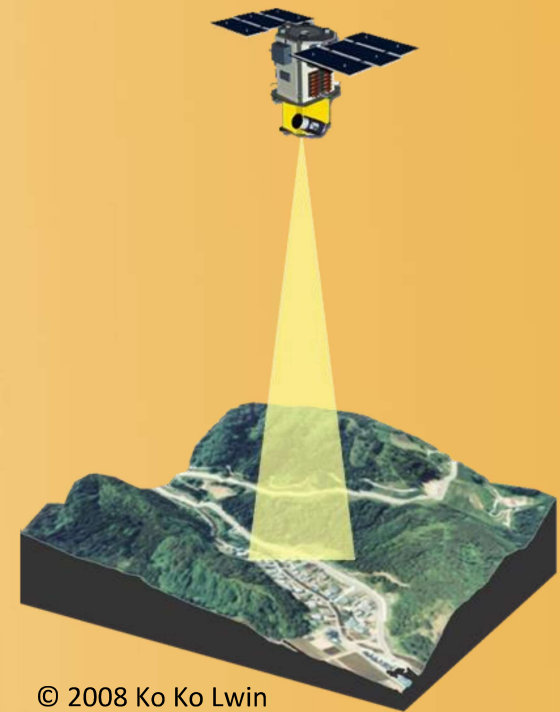


1. Remote Sensing Overview

1.1 Definition

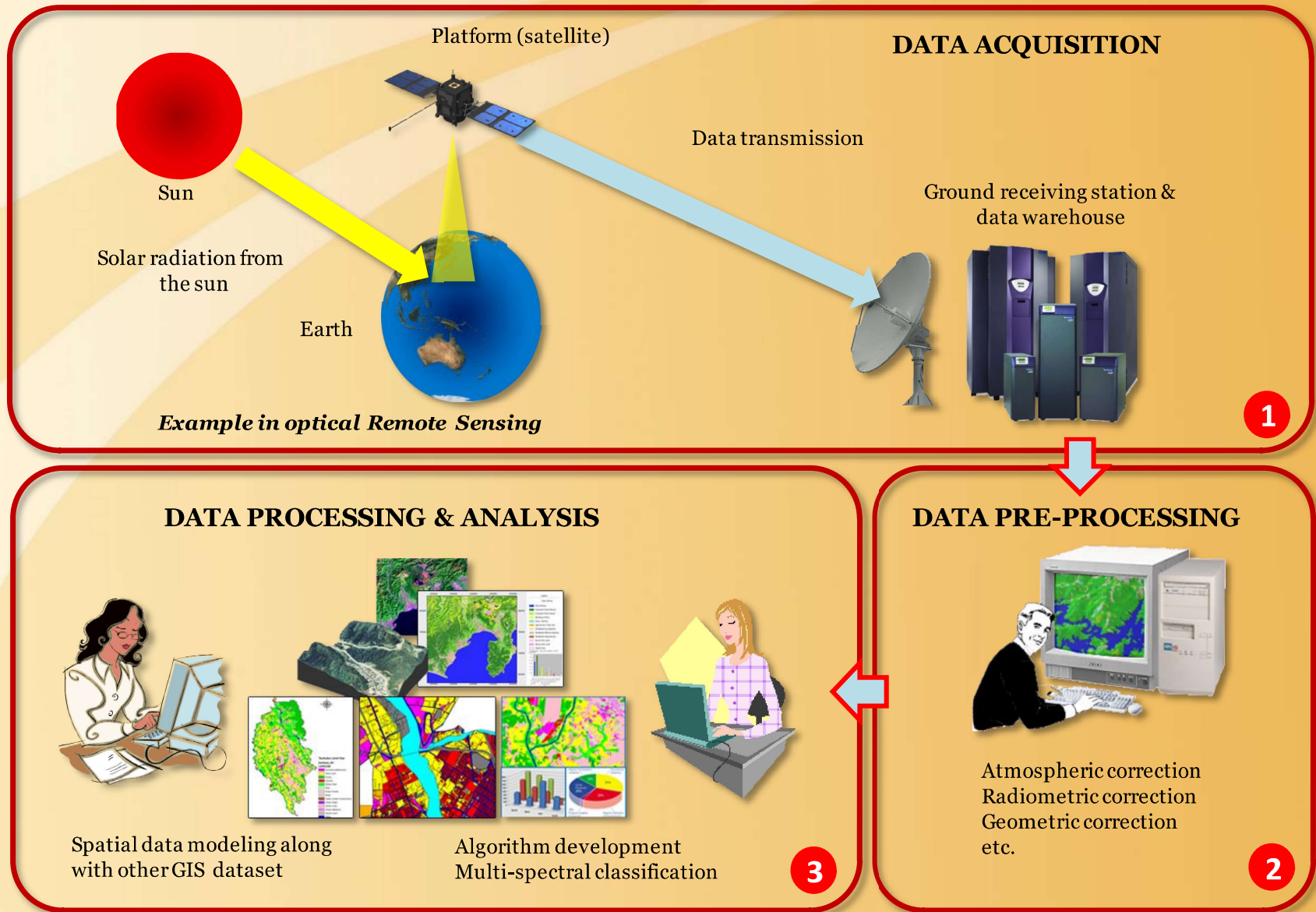
What is Remote Sensing? If you are reading this sentence, now you are doing Remote Sensing. In fact, any information acquired from the object without touching is Remote Sensing. Following is a scientific definition of Remote Sensing.

The **science of acquiring information about the earth** using instruments which are remote to the earth's surface, usually from aircraft or satellites. Instruments may use visible light, infrared or radar to obtain data. Remote sensing offers the ability to observe and collect data for large areas relatively quickly, and is an important source of data for GIS. (Source: digimap)



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1.2 Remote Sensing and GIS Work Flow



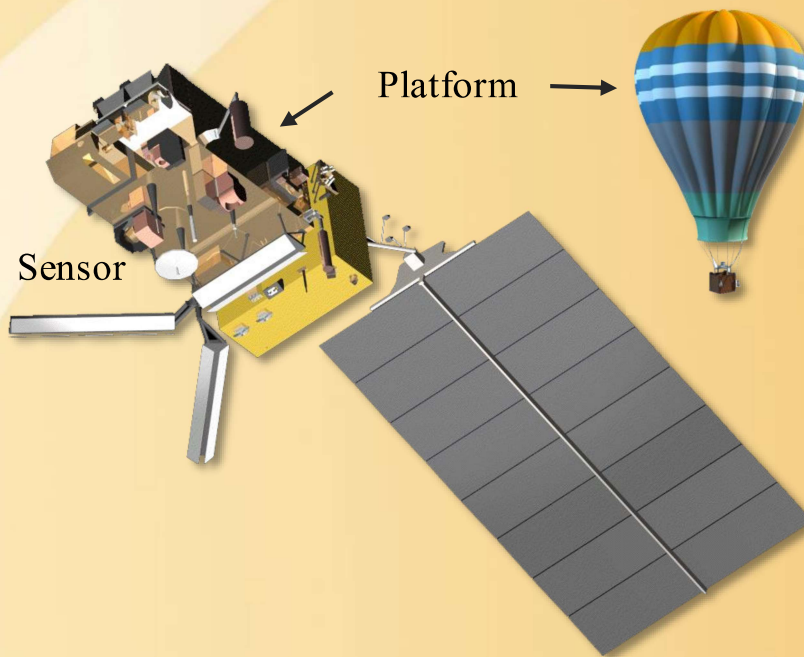
1.3 Components in Remote Sensing

Platform

The vehicle which carries a sensor. i.e. satellite, aircraft, balloon, etc...

Sensors

Device that receives electromagnetic radiation and converts it into a signal that can be recorded and displayed as either numerical data or an image.



One platform can carry more than one sensor. For example:

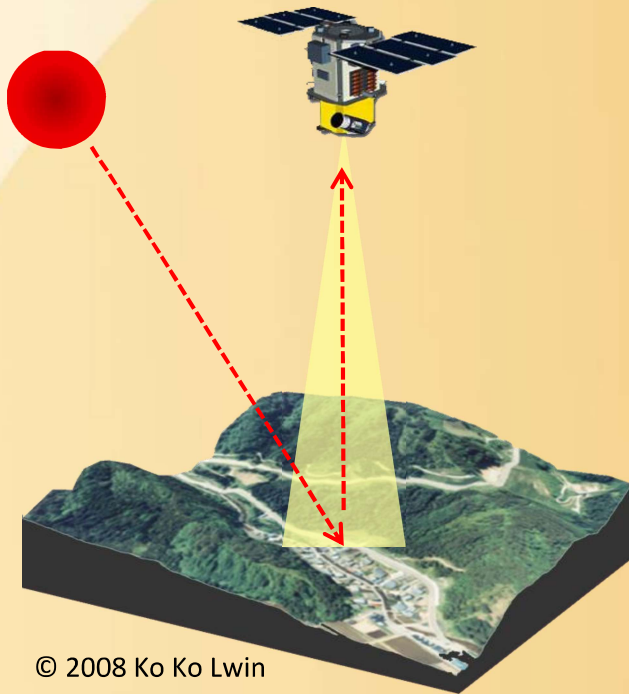
Platform Name	Sensor Name
Landsat TM	Thematic Mapper (Passive: Optical sensor)
Landsat ETM	Enhanced Thematic Mapper (Passive: Optical sensor)
ALOS	PRISM (Passive: Optical sensor) AVNIR-2 (Passive: Optical sensor) PALSAR (Active: Microwave sensor)

1.4 Types of Remote Sensing

Passive Remote Sensing and Active Remote Sensing

Passive Remote Sensing

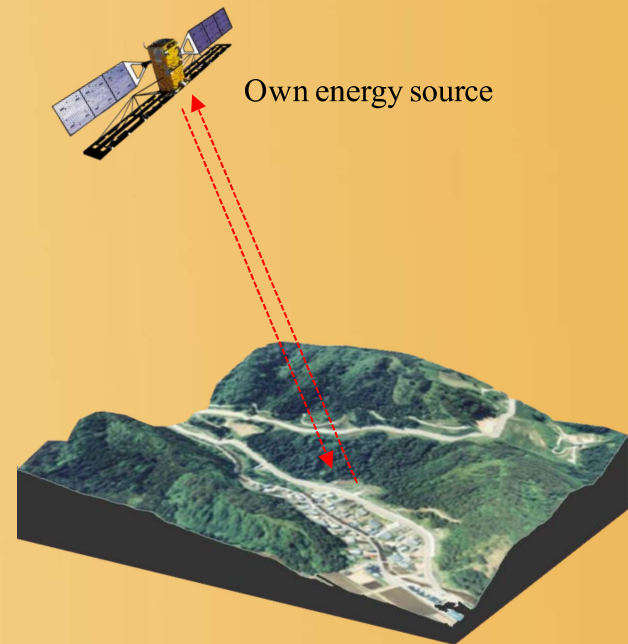
Remote sensing of energy naturally reflected or radiated from the terrain.



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Active Remote Sensing

Remote sensing methods that provide their own source of electromagnetic radiation to illuminate the terrain. Radar is one example.

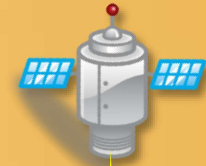


1.5 Multistage Remote Sensing Data Collection

Satellite based remote sensing

Advantages: Less geometric errors (platform is stable)

Disadvantages: Need to wait a time for certain event
Fixed spatial resolution



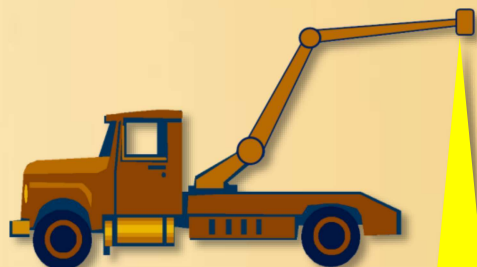
Aerial surveying

Advantages: Acquire any times any events
Variable spatial resolution by changing flight altitude and camera focal length
Disadvantages: High geometric errors;
require sophisticated geometric correction model
Costly for specific area, specific purpose



Ground based remote sensing GBRS or Low Altitude Remote Sensing

Scientific experiment purposes
(e.g. study about canopy, soil contamination, etc.)



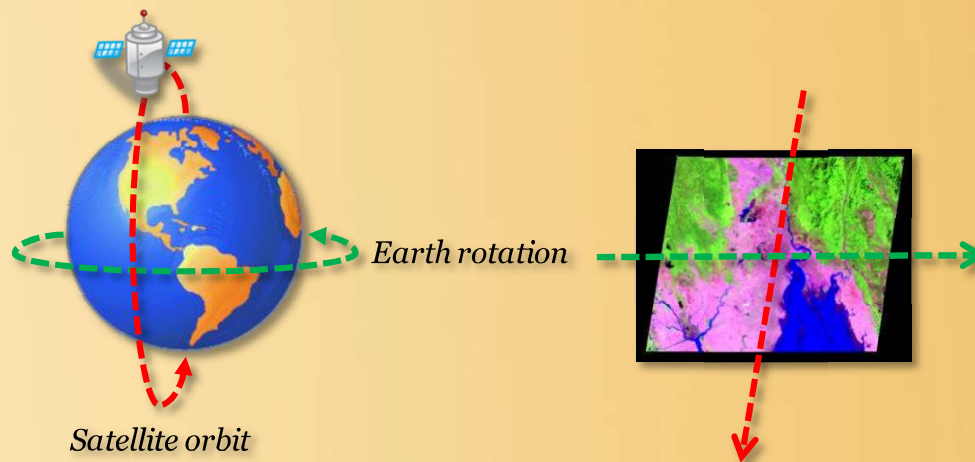
Earth surface

1.7 Types and Uses of Satellites

Types of satellites can be classified by their orbit characteristics.

Type 1: Low Earth Orbits/Satellites: Normally used in spy satellite (Military purposes)

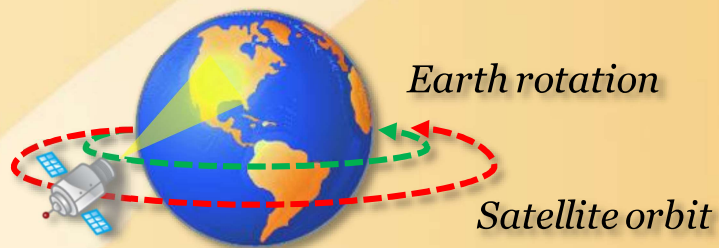
Type 2: Sun-synchronous Orbits/Satellites: a polar orbit where the satellite always crosses the Equator at the same local solar time. Most of the earth resources satellites are sun-synchronous orbit.



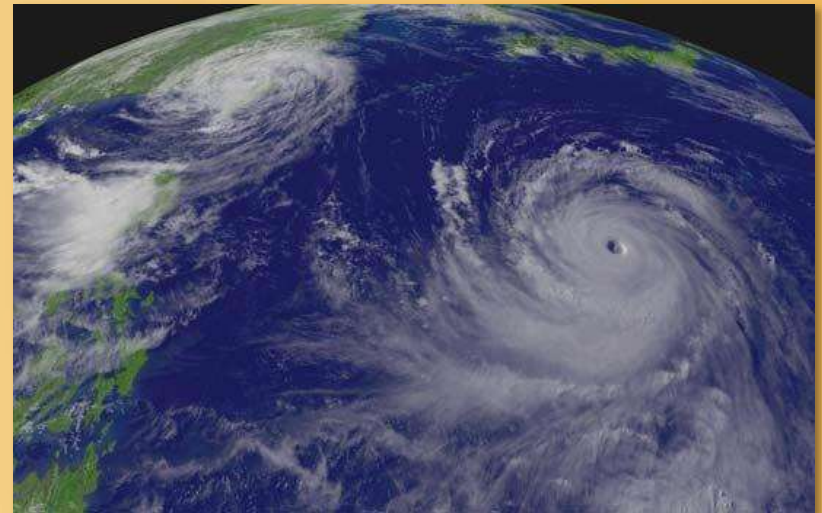
Examples

Landsat TM/ETM
SPOT
ALOS
IKONOS
QuickBird

Type 3: Geostationary Orbits/Satellites: Satellites at very high altitudes, which view the same portion of the Earth's surface at all times. Especially used in metrological applications.

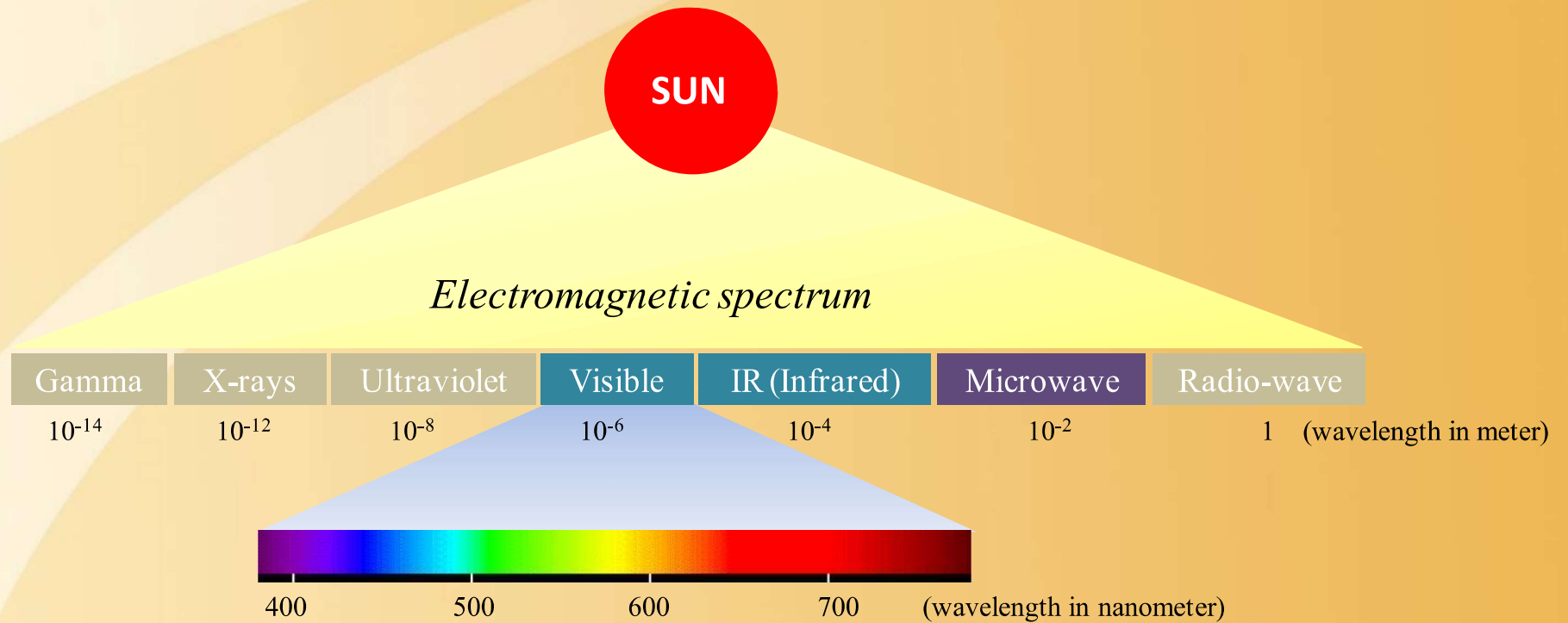



- *Fixed position on specific location*
- *Same speed as earth rotation speed*
- *Wide area coverage*
- *Especially designed for weather monitoring*



2. Remote Sensing Data Acquisition

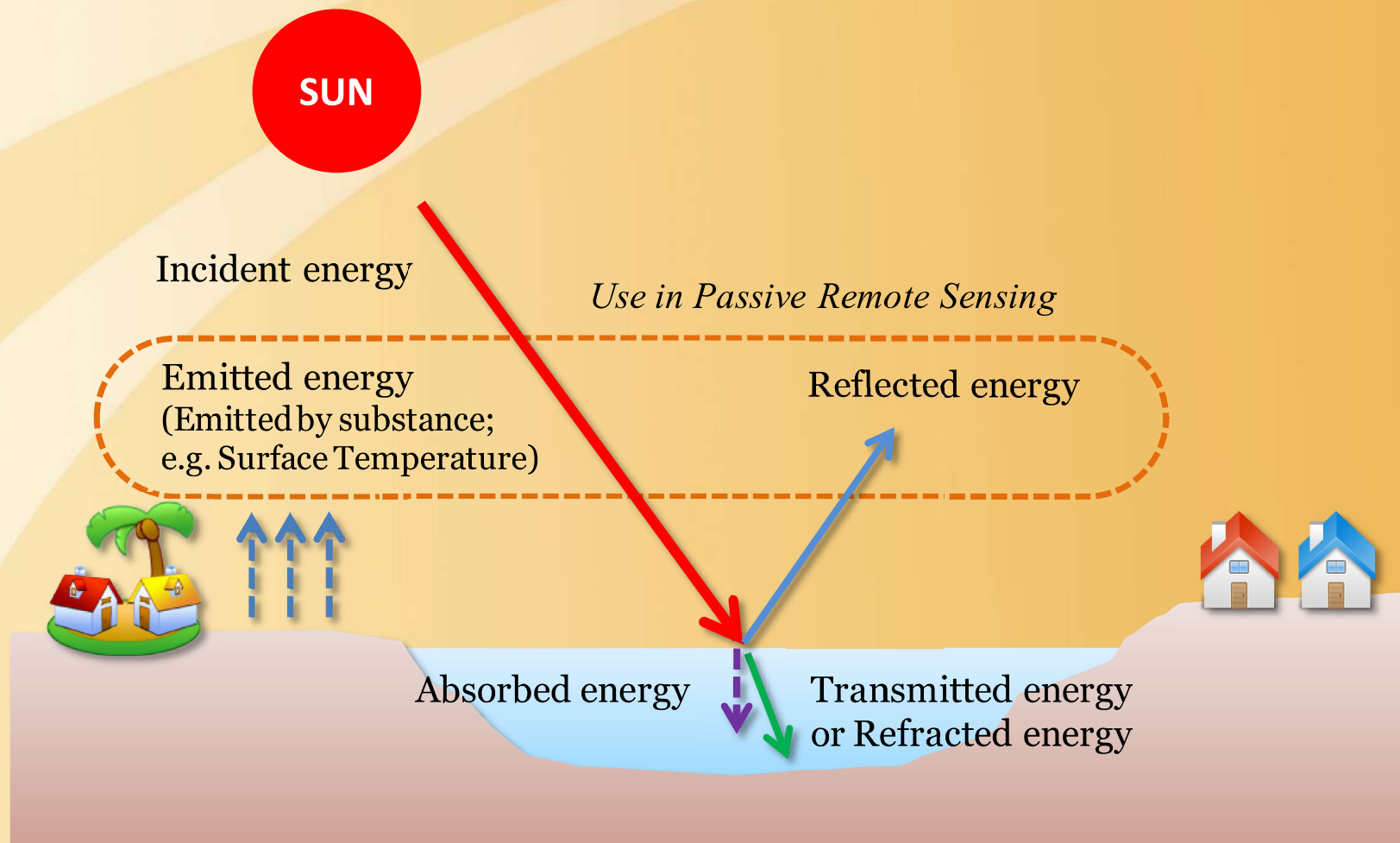
2.1 Electromagnetic Waves Used in Remote Sensing



 Optical remote sensing (Passive Remote Sensing)

 Microwave remote sensing (Active Remote Sensing)

2.2 Properties of Electromagnetic Waves



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