

INTRODUCTION TO REMOTE SENSING

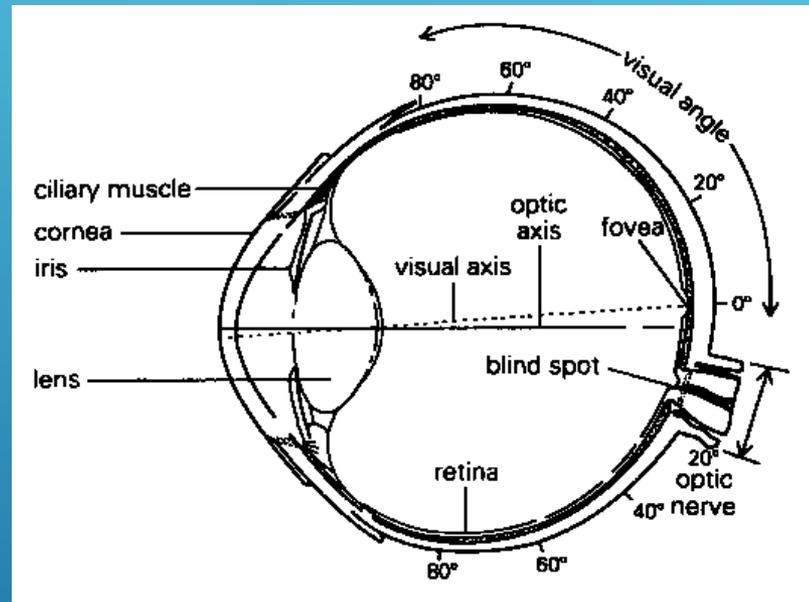


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WHAT IS REMOTE SENSING ?

- ▶ Remote – away from or at a distance
- ▶ Sensing – detecting a property or characteristic



REMOTE SENSING

The term "remote sensing," first used in the United States in the 1950s by Ms. Evelyn Pruitt of the U.S. Office of Naval Research



"Remote sensing is teaching us a new seeing".

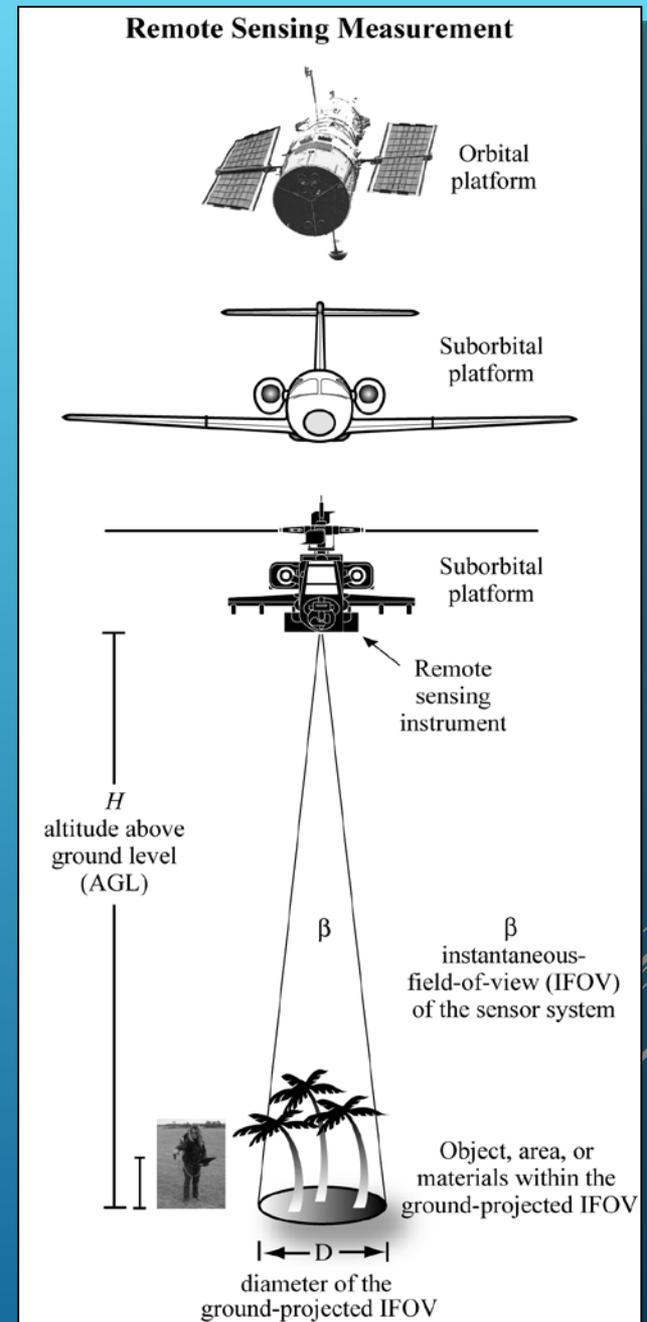


Remote sensing has been defined in many ways.

DEFINITIONS

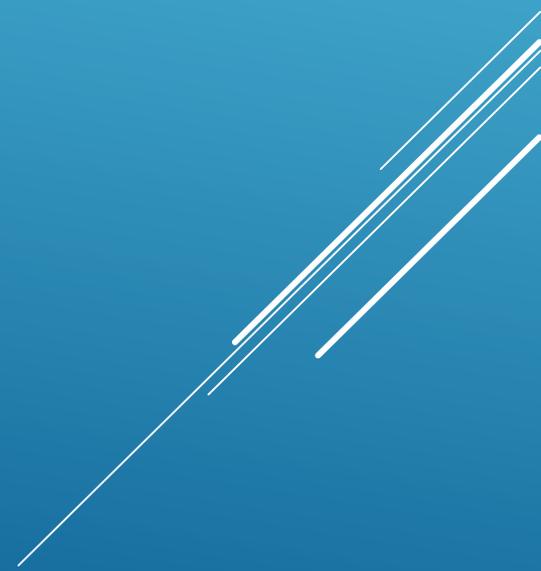
Remote sensing is "the acquisition of information about an object, without being in physical contact with that object"

DEFINITION (1)



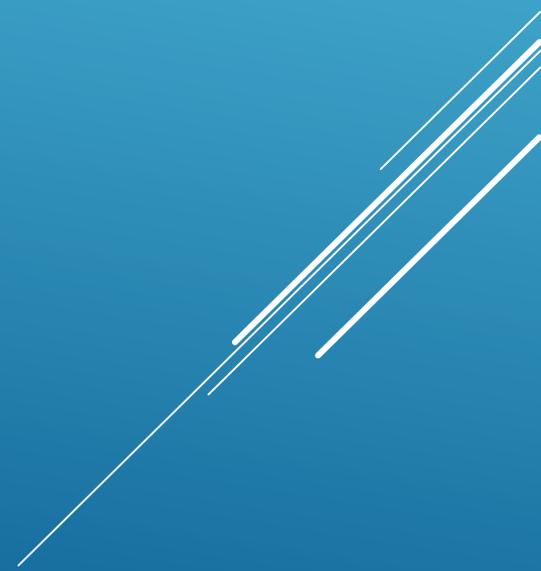
Remote sensing is "the ability to measure the properties of an object without touching it".

DEFINITION (2)



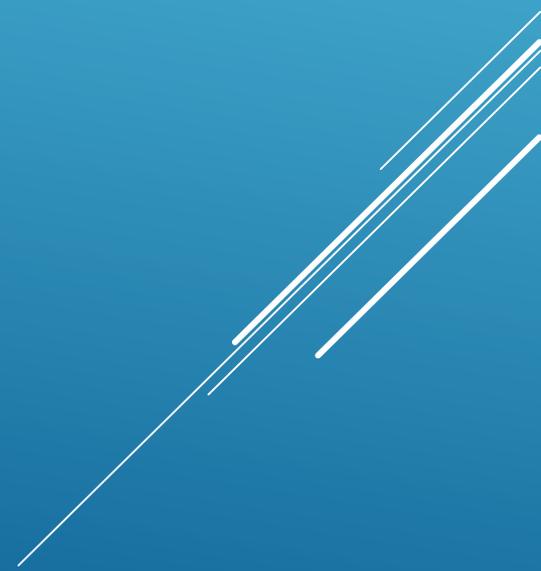
Remote sensing can be defined as "the collection of data about an object from a distance. Humans and many other types of animals accomplish this task with aid of eyes or by the sense of smell or hearing".

DEFINITION (3)

A decorative graphic consisting of several parallel white lines of varying lengths, slanted upwards from left to right, located in the bottom right corner of the slide.

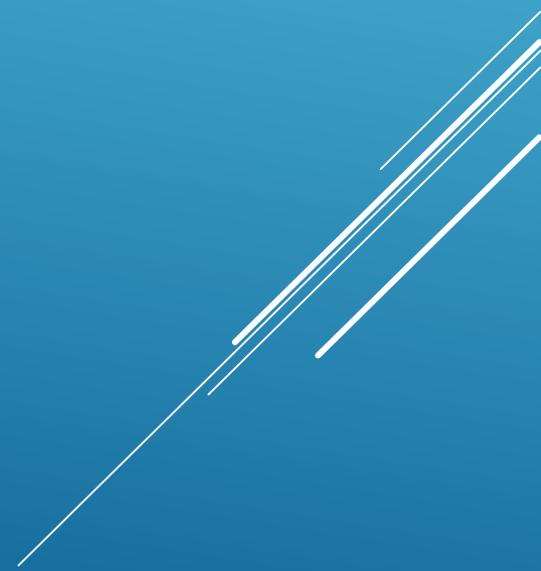
Remote sensing is "the examination, measurement, and analysis of an object without being in contact with it".

DEFINITION (4)



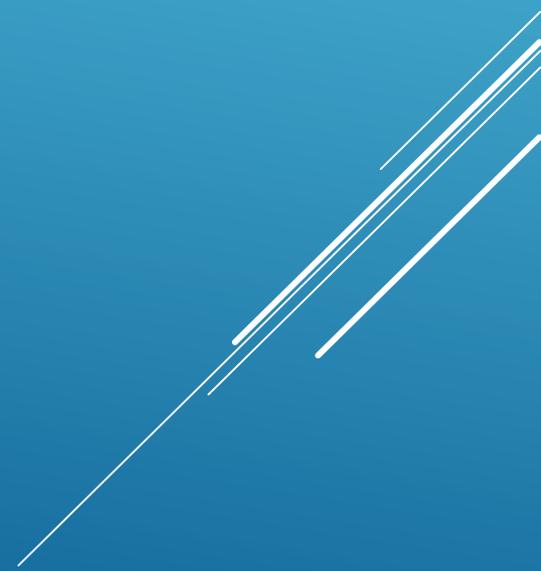
Remote sensing is "the science and art of obtaining information about an object, area, or phenomenon through the analysis of data acquired by a device not in contact with the object, area, or phenomenon in question".

DEFINITION (5)



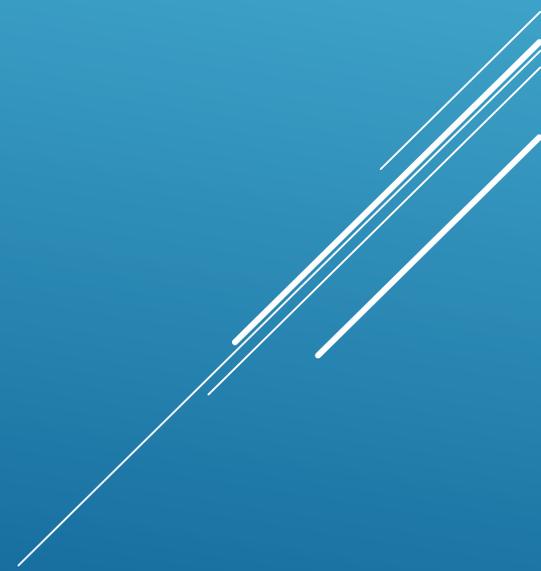
Remote sensing is "the science (and to some extent, art) of acquiring information about the Earth's surface without actually being in contact with it. This is done by sensing and recording reflected or emitted energy and processing, analyzing, and applying that information".

DEFINITION (6)



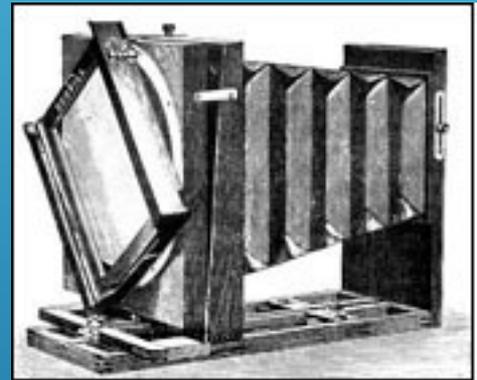
Remote sensing is by definition "the science of gathering information about phenomena using devices that are not in contact with the object. Currently remote sensing technologies include a number of differing air and space borne instruments that gather data about the earth and its features".

DEFINITION (7)



BRIEF HISTORY OF REMOTE SENSING

- ▶ 1839, the first photographs.
- ▶ 1849, used photography in topographic mapping.
- ▶ 1858, balloons were being used to acquire photography of large areas.

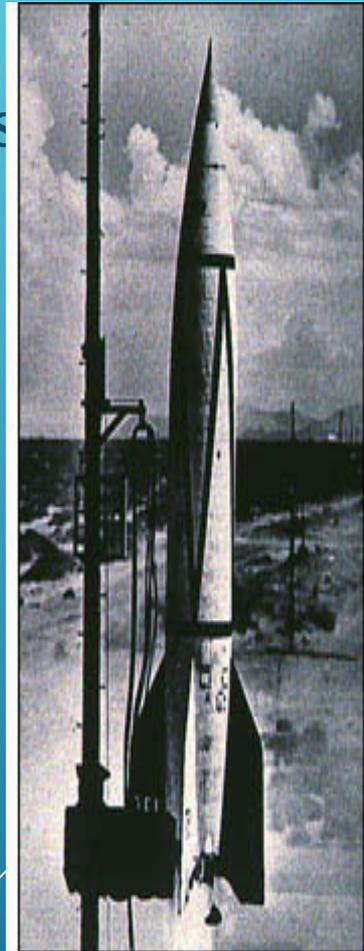


1925-1945

- ▶ Mid 1930s, color photography.
 - ▶ Aerial photography became widespread during World War II, with improved lenses and platform stability, enemy positions and military installations could be identified from aircraft.
 - ▶ Radar
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- A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, set against the blue background.

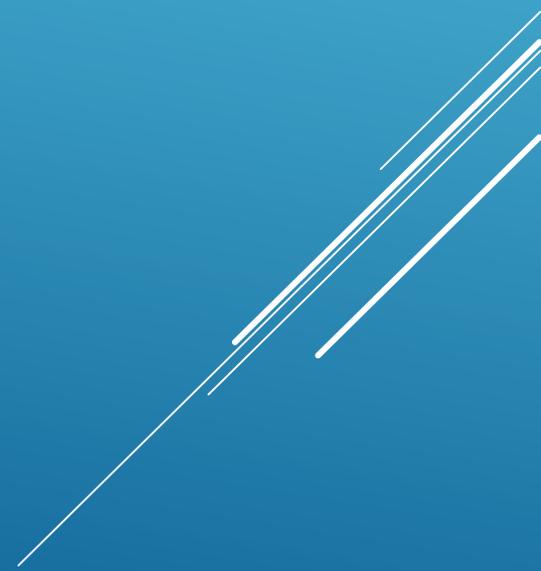
1945-1960

- ▶ Cameras were launched on rockets as this science expanded in the post-World War II era.
- ▶ In 1957, the Russians launched the first successful Earth satellite, Sputnik 1
- ▶ In 1958, the US launched its first satellite, Explorer 1.
- ▶ In 1959, the first satellite with a meteorological instrument (Vanguard 2) was launched.
- ▶ In 1960, the first satellite images ever made of the earth comes from the TIROS 1

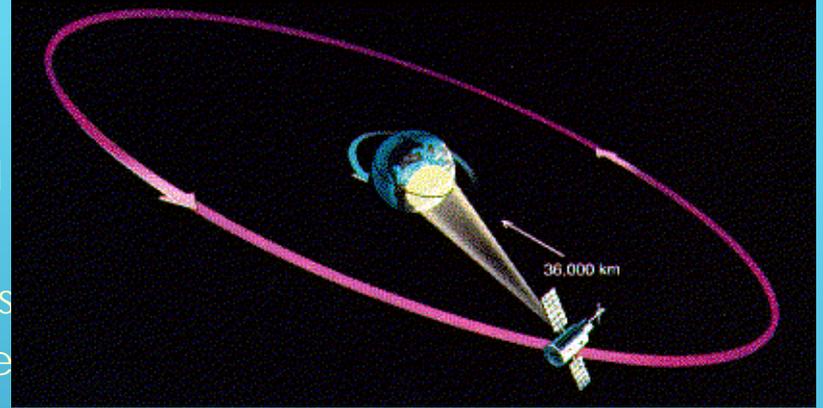


- ▶ This was the age of instrument development.
- ▶ In 1964, the Nimbus satellite series of experimental meteorological remote sensing was initiated.
- ▶ By 1966, meteorological satellites moved from being experimental to being operational with the introduction of the ESSA series of satellites which included Automatic Picture.
- ▶ The Defense Meteorological Satellite Program (DMSP) was started by the U.S. Air Force in 1966.
- ▶ 1972, Landsat 1 (also referred to as Earth Resources Technology Satellite).

1960-1972



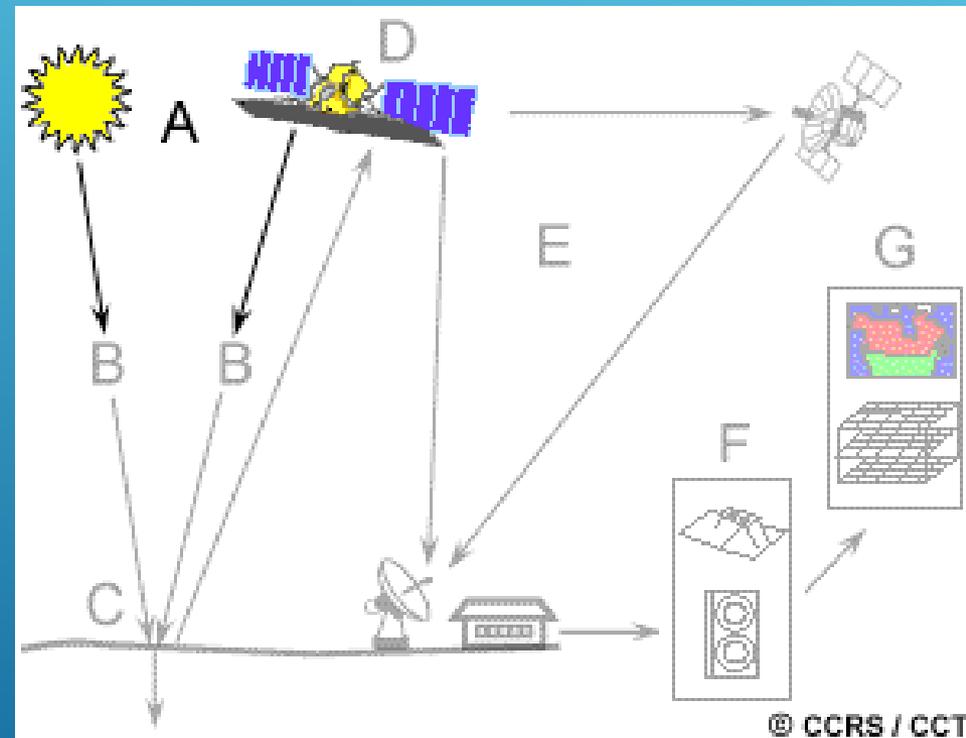
- ▶ **1975:** The Synchronous Meteorological Satellite 2 (SMS-2) was launched.
- ▶ **1976:** Laser Geodynamic Satellite I.
- ▶ **1978:** The Heat Capacity Mapping Mission (HCMM) satellite was launched.
- ▶ **1978:** Seasat demonstrated techniques for remote sensing of the Earth's oceans.
- ▶ **1978:** Nimbus 7, the final satellite in that series, was launched.
- ▶ **1984:** The Earth Radiation Budget (ERBE) satellite began its study of how the Earth absorbs and reflects the Sun's energy.
- ▶ **1991:** The Upper Atmosphere Research Satellite (UARS) began its study of the chemistry and physics of the Earth's atmosphere.
- ▶ Today, the **GOES** (Geostationary Operational Environmental Satellite) system of satellites provides most of the remotely sensed weather information for North America.

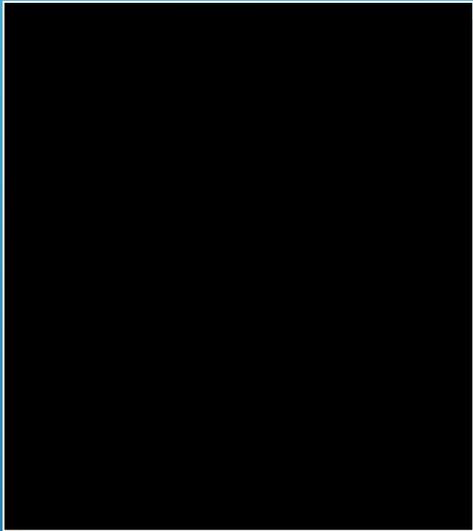


1972-PRESENT

THE ELEMENT OF THE REMOTE SENSING PROCESS

- 1) Energy Source or Illumination
- 2) Radiation and the Atmosphere
- 3) Interaction with the Target
- 4) Recording of Energy by the Sensor
- 5) Transmission, Reception, and Processing
- 6) Interpretation and Analysis
- 7) Application





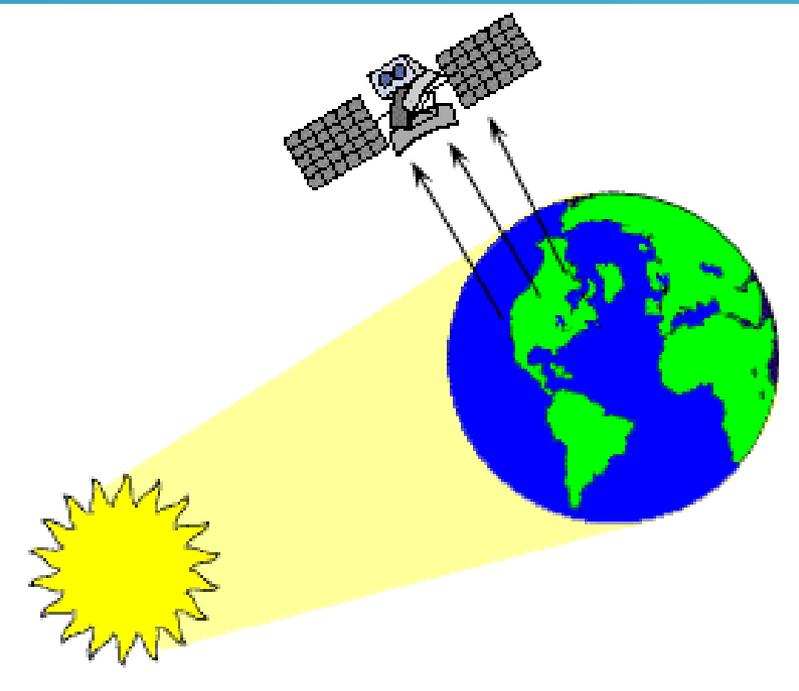
OF



THE



ACTIVE AND PASSIVE REMOTE SENSING SYSTEMS

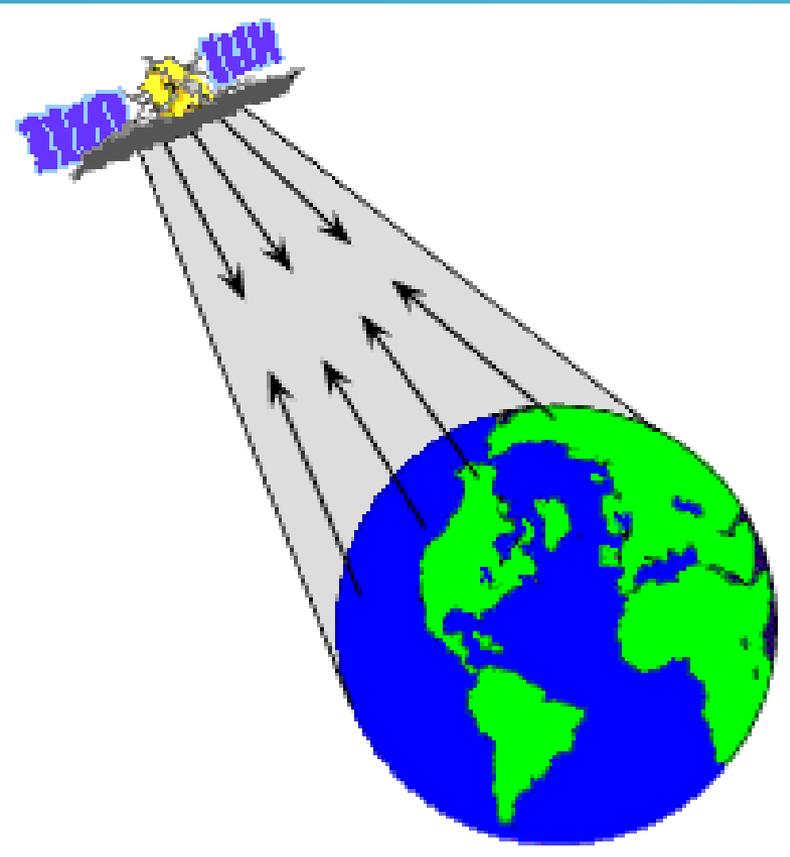


- ▶ **Passive:** The sensor records energy that is reflected or emitted from the source, such as light from the sun. This is also the most common type of system.

PASSIVE REMOTE SENSORS

- ▶ *Radiometer*
 - ▶ *Imaging Radiometer*
 - ▶ *Spectrometer*
 - ▶ *Spectroradiometer*
- 

ACTIVE AND PASSIVE REMOTE SENSING SYSTEMS



- ▶ Active: where the object is illuminated by radiation produced by the sensors, such as radar or microwaves.

ACTIVE REMOTE SENSORS

- ▶ *Radar (Radio Detection and Ranging)*
 - ▶ *Scatterometer*
 - ▶ *Lidar (Light Detection and Ranging)*
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