

# **BASIC CONCEPTS** **OF** **REMOTE SENSING**

# PRINCIPLES OF REMOTE SENSING

- DIFFERENT OBJECTS REFLECT OR EMIT DIFFERENT AMOUNT OF ENERGY IN DIFFERENT BANDS OF THE ELECTROMAGNETIC SPECTRUM DIFFERENTLY
  - DEPENDS ON THE PROPERTIES OF
    - THE TARGET MATERIAL
    - THE INCIDENT ENERGY (ANGLE OF INCIDENCE, INTENSITY AND WAVELENGTH ETC.)
  - UNIQUENESS OF THE REFLECTED OR EMITTED ELECTROMAGNETIC RADIATION IS USED TO DETECT AND DISCRIMINATE THE OBJECTS OR SURFACE FEATURES

# SENSOR & PLATFORM IN REMOTE SENSING

❑ **Sensor:** A device used to detect the reflected or emitted electromagnetic radiation

❖ **Cameras and scanners**

❑ **Platform:** A vehicle used to carry the sensor

❖ **Aircrafts and satellites**

# STAGES IN REMOTE SENSING

**A. Emission of electromagnetic radiation**

- The Sun or an EMR source located on the platform

**B. Transmission of energy from the source to the object**

- Absorption and scattering of the EMR while transmission

**C. Interaction of EMR with the object and subsequent reflection and emission**

**D. Transmission of energy from the object to the sensor**

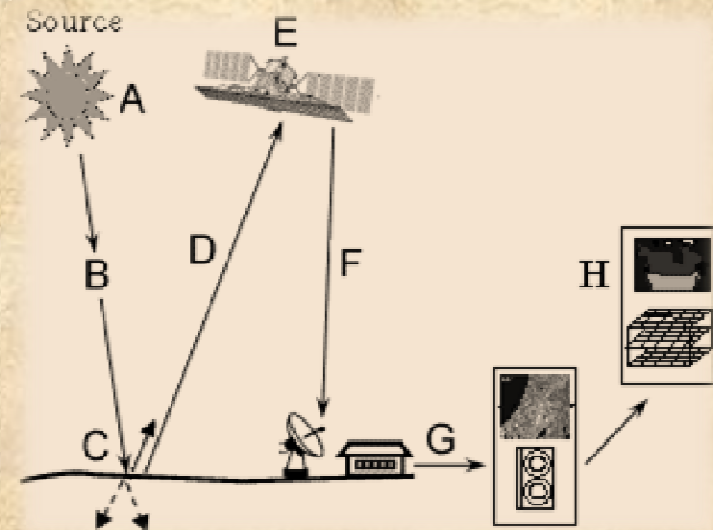
**E. Recording of the energy at the sensor**

- Photographic or non-photographic

**F. Transmission of the recorded information to ground station**

**G. Processing of the data into digital or hard copy image**

**H. Analysis of data**

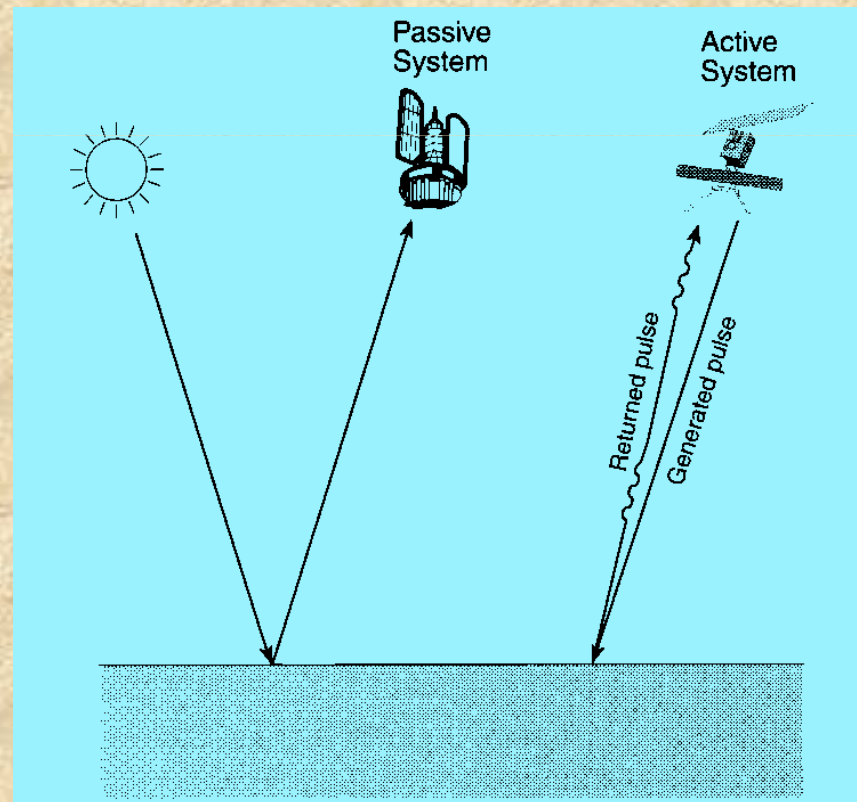




# Passive/ Active Remote Sensing

## A simple analogy:

- **Passive remote sensing** is similar to taking a picture with an ordinary camera
  - **Active remote sensing** is analogous to taking a picture with camera having built-in flash
- flash



# PASSIVE REMOTE SENSING

- ❑ SOURCE OF ENERGY IS THAT NATURALLY AVAILABLE
  - Solar energy
  - Energy emitted by the Earth etc.
- ❑ MOST OF THE REMOTE SENSING SYSTEMS WORK IN PASSIVE MODE USING SOLAR ENERGY
  - Solar energy reflected by the targets at specific bands are recorded using sensors
  - For ample signal strength received at the sensor, wavelengths capable of traversing through the atmosphere without significant loss, are generally used
- ❑ THE EARTH WILL ALSO EMIT SOME RADIATION SINCE ITS AMBIENT TEMPERATURE IS ABOUT 300° K.
  - Passive sensors can also be used to measure the Earth's radiance
  - Not very popular as the energy content is very low

# ACTIVE REMOTE SENSING

- **Active remote sensing: Energy is generated and emitted from a sensing platform towards the targets**
- **Energy reflected back by the targets are recorded**
- **Longer wavelength bands are used**
- **Example: Active microwave remote sensing (radar)**
  - **Pulses of microwave signals are sent towards the target from the radar antenna located on the air / space-borne platform**
  - **The energy reflected back (echoes) are recorded at the sensor**