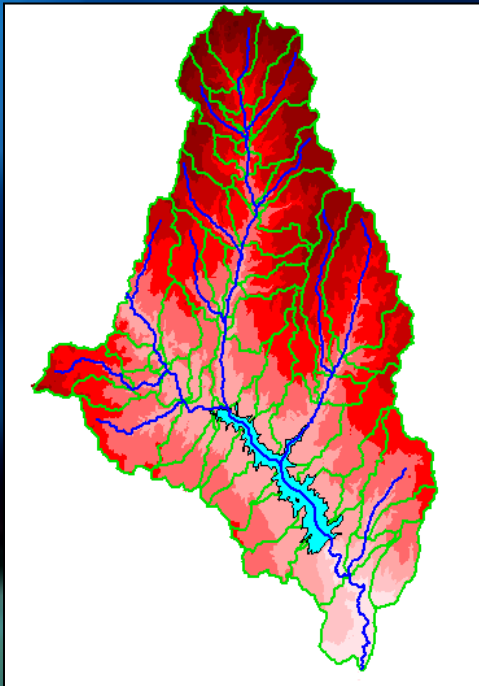


and GIS

Course Code: ENV-652

Topic: **Introduction to Remote Sensing**



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1. Introduction (Definitions)
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Remote Sensing

- The American Society for Photogrammetry and Remote Sensing adopted a combined formal definition of remote sensing as:
 - “the art, science, and technology of obtaining reliable information about physical objects and the environment, through the process of recording, measuring, and interpreting imagery and digital representations of energy patterns derived from non-contact sensor systems”.

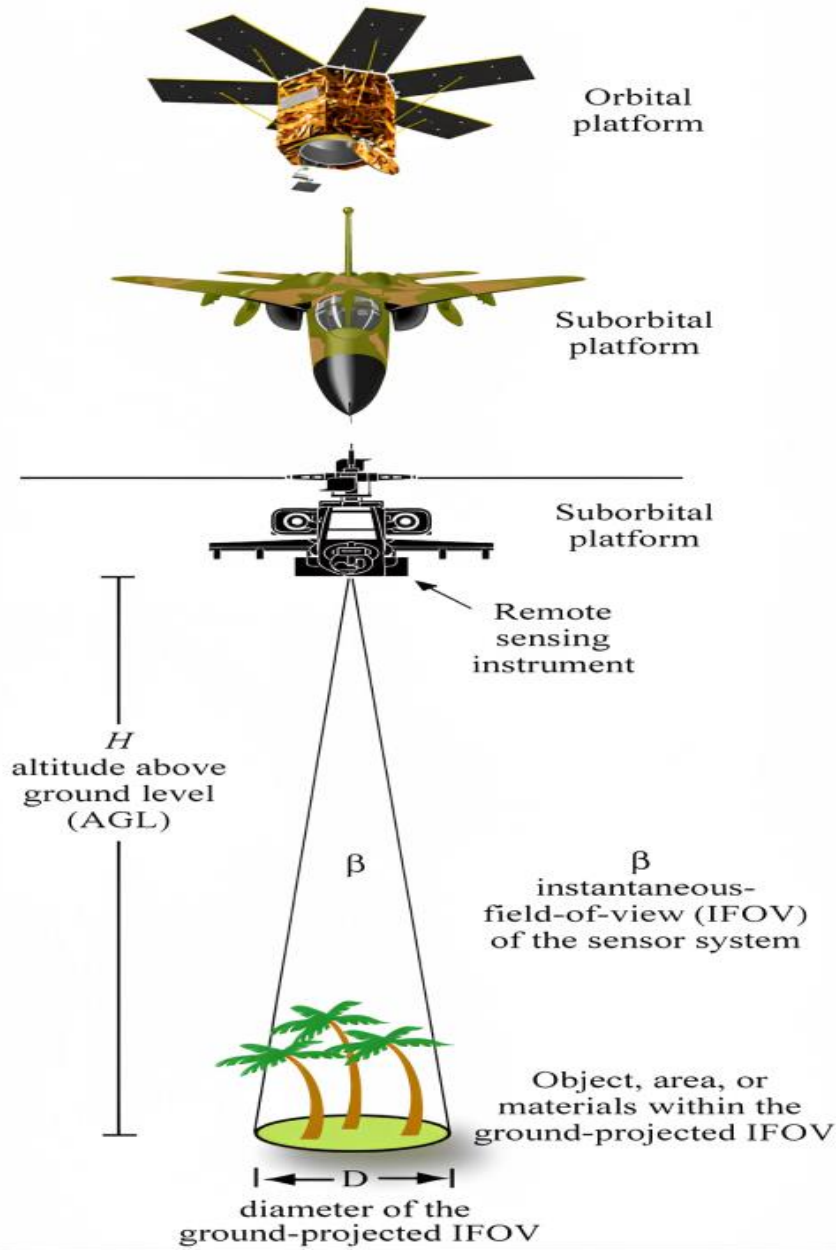
Remote Sensing

According to Arthur H. Robinson:

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 that is not in contact with the object, area, or phenomenon under investigation.

Remote Sensing

Remote Sensing Measurement

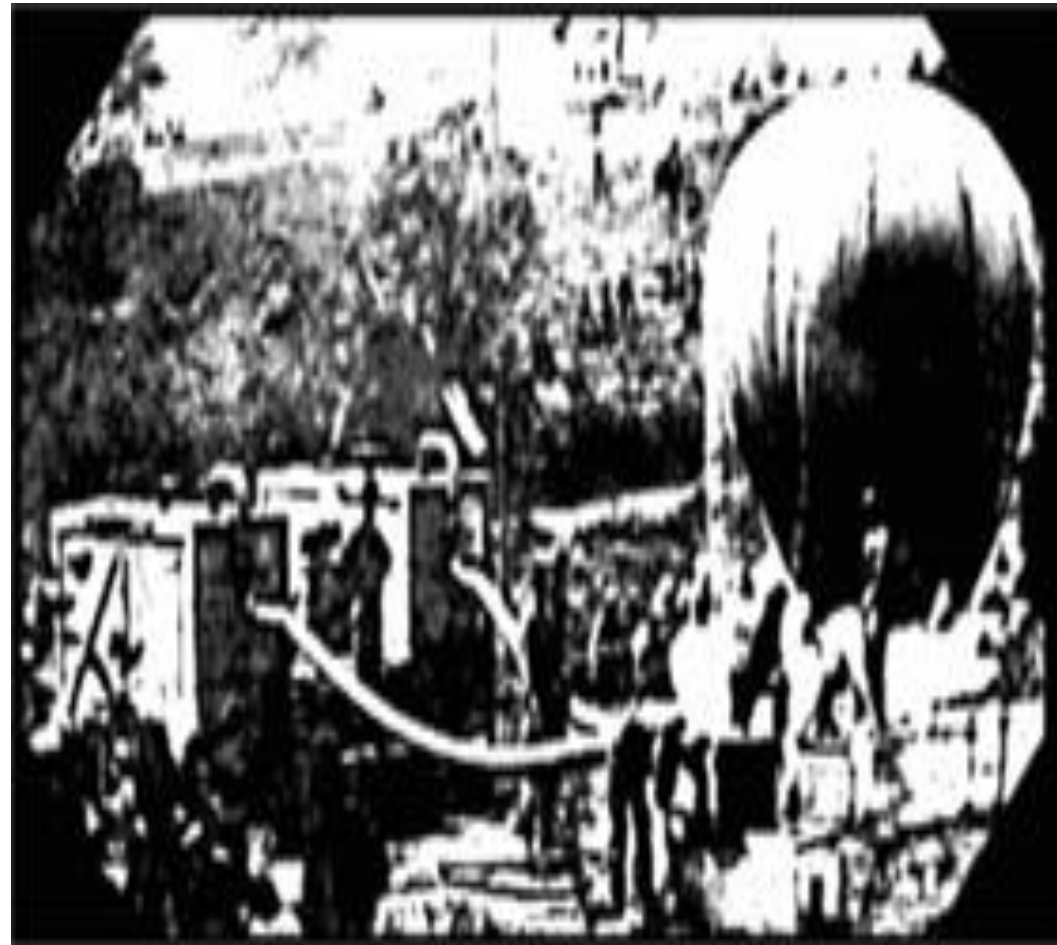
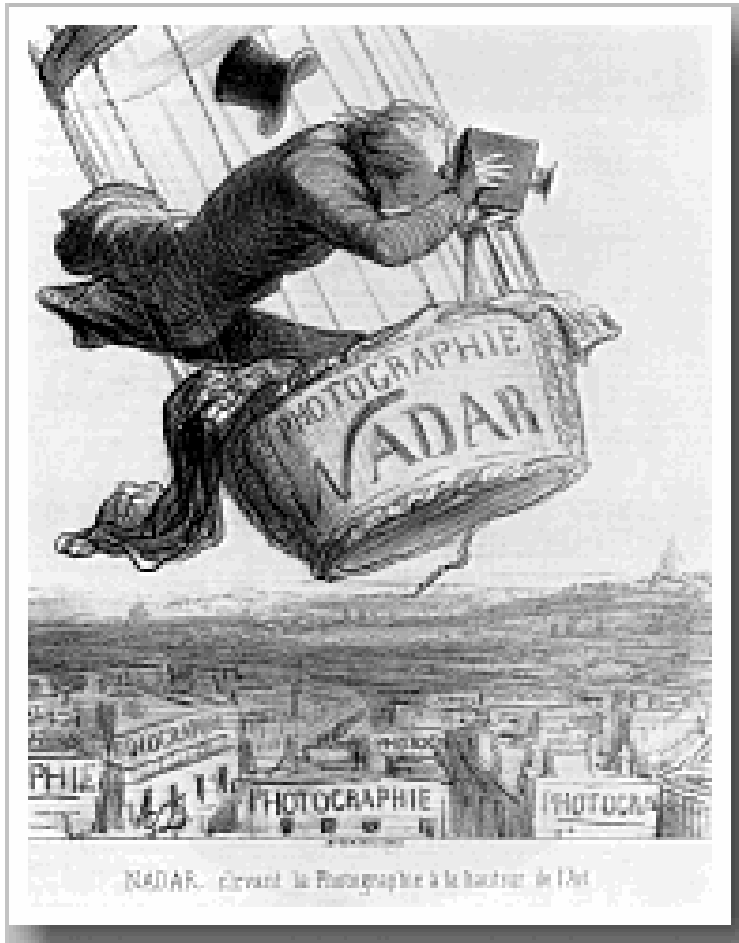


- A remote sensing instrument collects information about an object within the **instantaneous-field-of-view (IFOV)** of the sensor system without being in direct physical contact with it. The sensor is located on a satellite platform.

History of Remote Sensing

- The history of remote sensing dates back to the mid-19th century when photographers used balloons to capture aerial images.
- However, the field truly began to develop during World War I, when airplanes were equipped with cameras for military reconnaissance.
- During the 20th century, advances in technology led to the development of more sophisticated sensors and platforms, such as satellites.
- Today, remote sensing plays a critical role in various fields, providing valuable data for scientific research, resource management, and decision-making processes.

Historical Review: Balloons

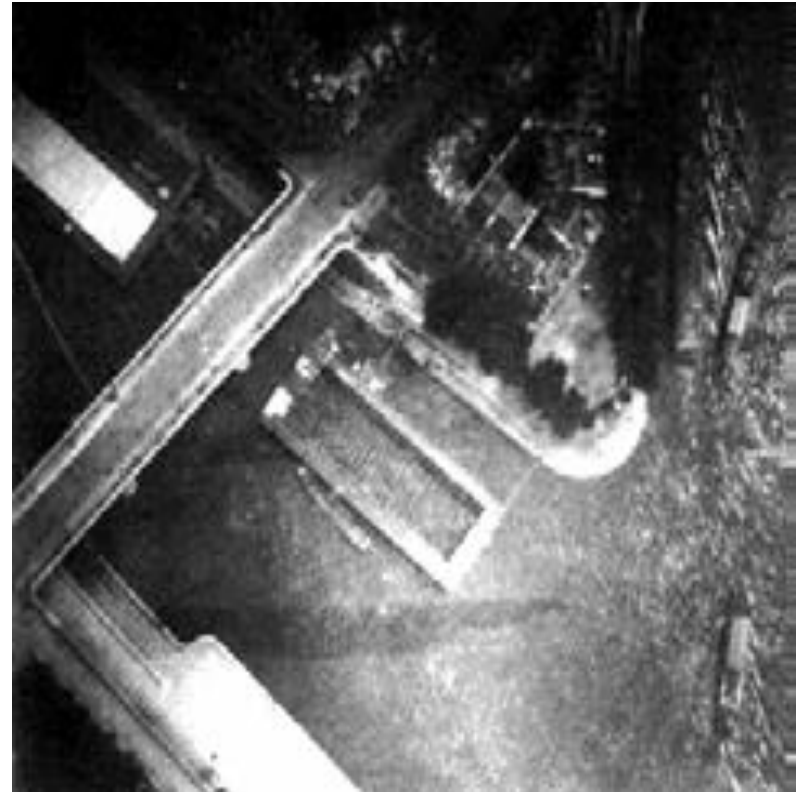


First image was captured in 1859

Historical Review: Balloons



Boston from a Balloon (1860)



St. Luis Island, Paris
Captured by Balloon, 1860

Historical Review: Kites



Aerial Photography from a Kite, 1880



Labrugauere, France from a kite (1889)

Historical Overview: Pigeons



Historical Overview: Planes (1908)



New York

Historical Overview, Rockets



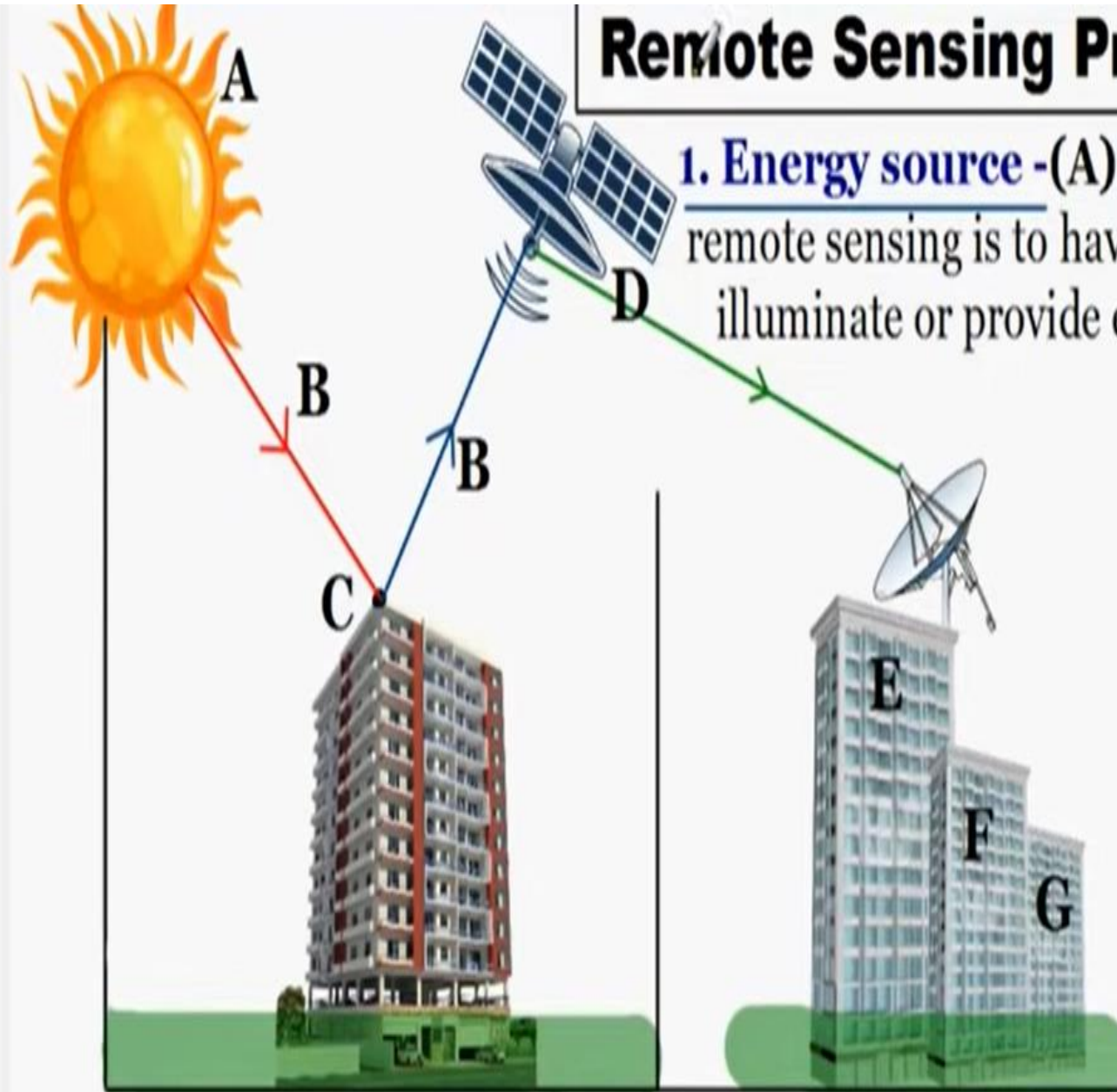
Historically, the first photos were taken from a small rocket, from a height of about 100 meters, were imaged from a rocket designed by **Alfred Nobel** launched in **1897** a Swedish landscape

Historical Overview: Satellites

Apollo-8, First photo of Earth
from space, 1968



Remote Sensing Process

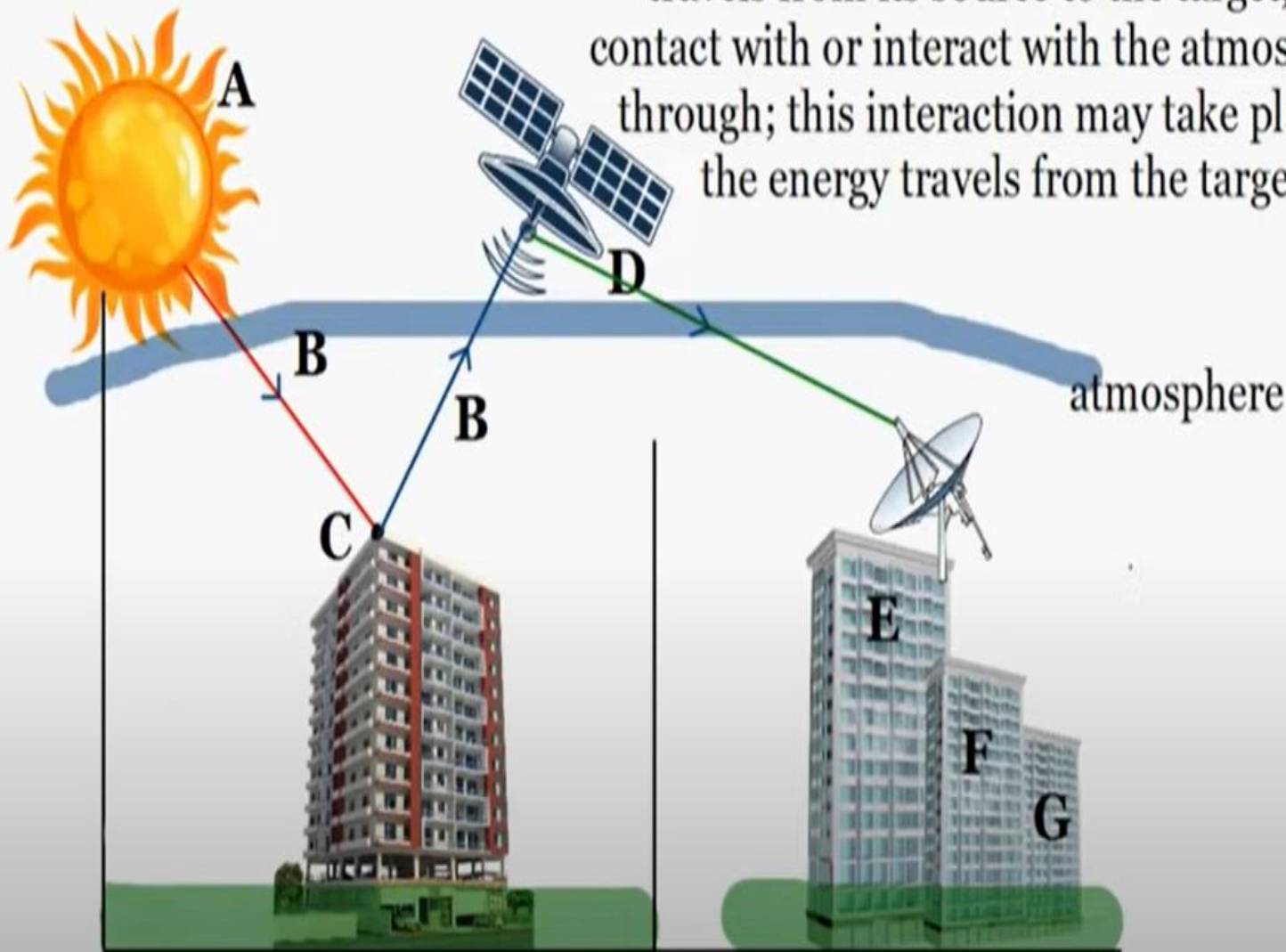


Remote Sensing Process : 7 Steps

1. Energy source - (A) The first requirement for remote sensing is to have an energy source which illuminate or provide electromagnetic energy to the target of interest.

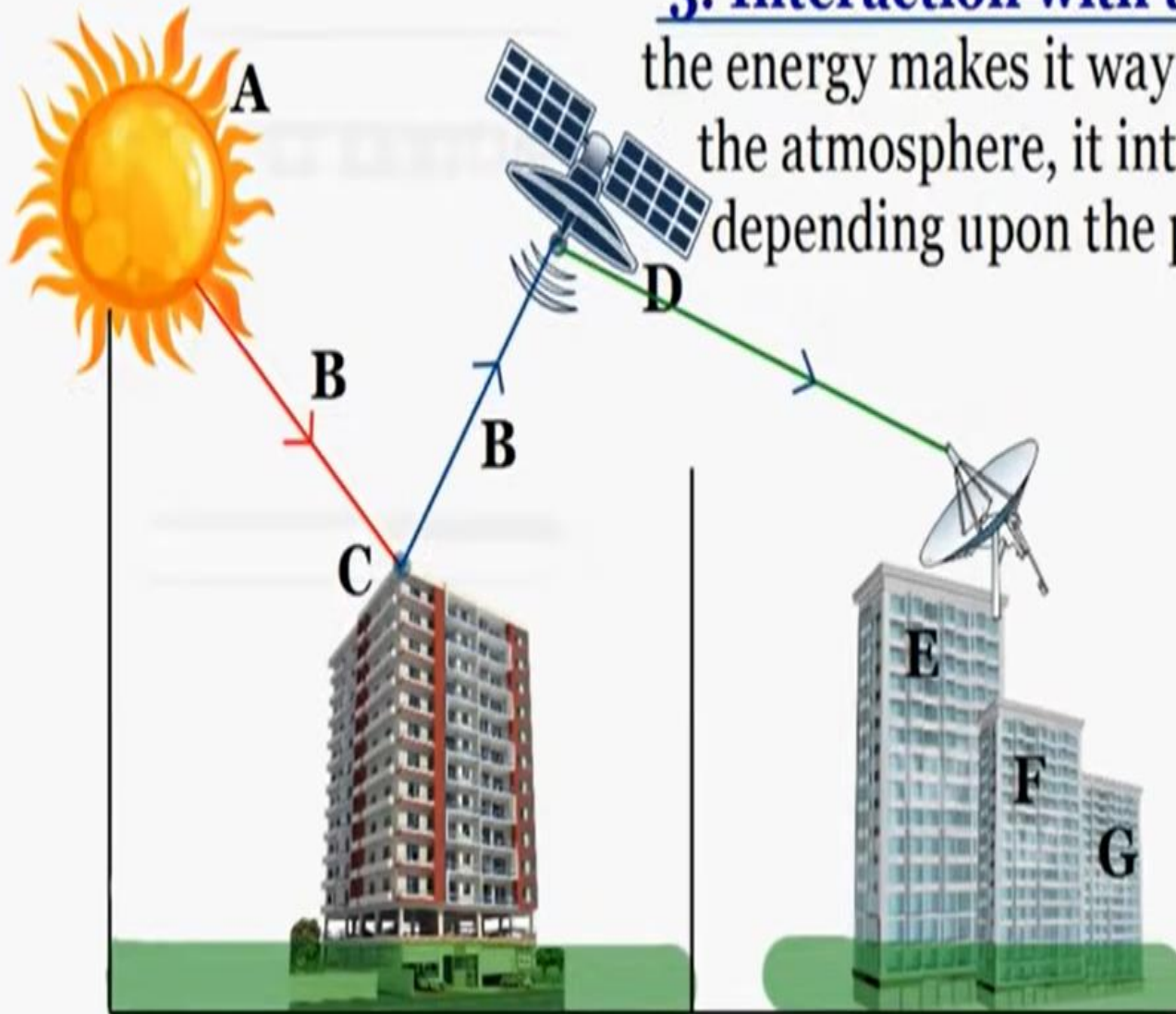
Remote Sensing Process

2. Radiation and atmosphere - (B) As the energy travels from its source to the target, it will come in contact with or interact with the atmosphere it passes through; this interaction may take place a second as the energy travels from the target to the sensor.



Remote Sensing Process

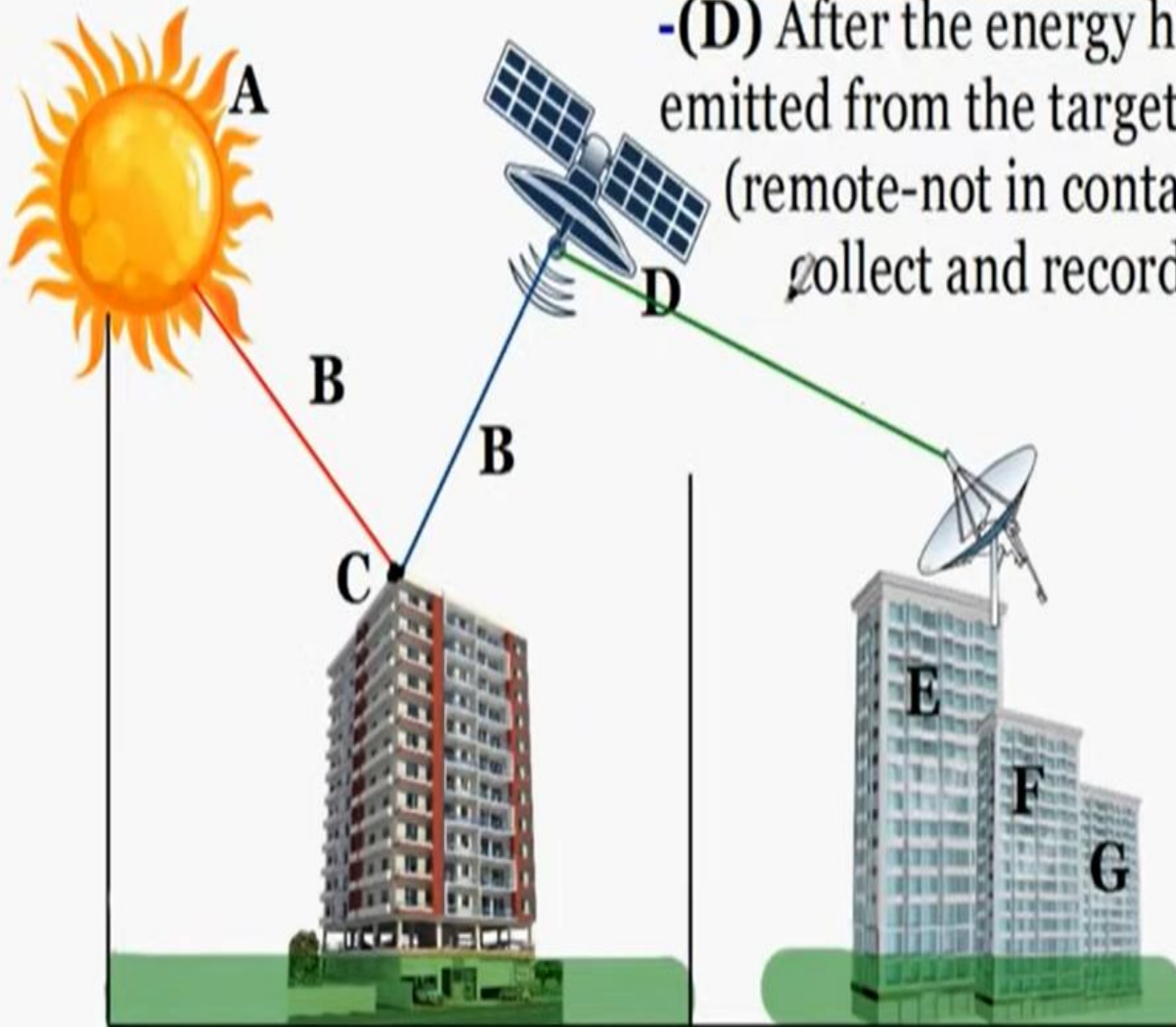
3. Interaction with the target - (C) Once the energy makes it way to the target through the atmosphere, it interacts with the target depending upon the properties of both the target & radiation



Remote Sensing Process

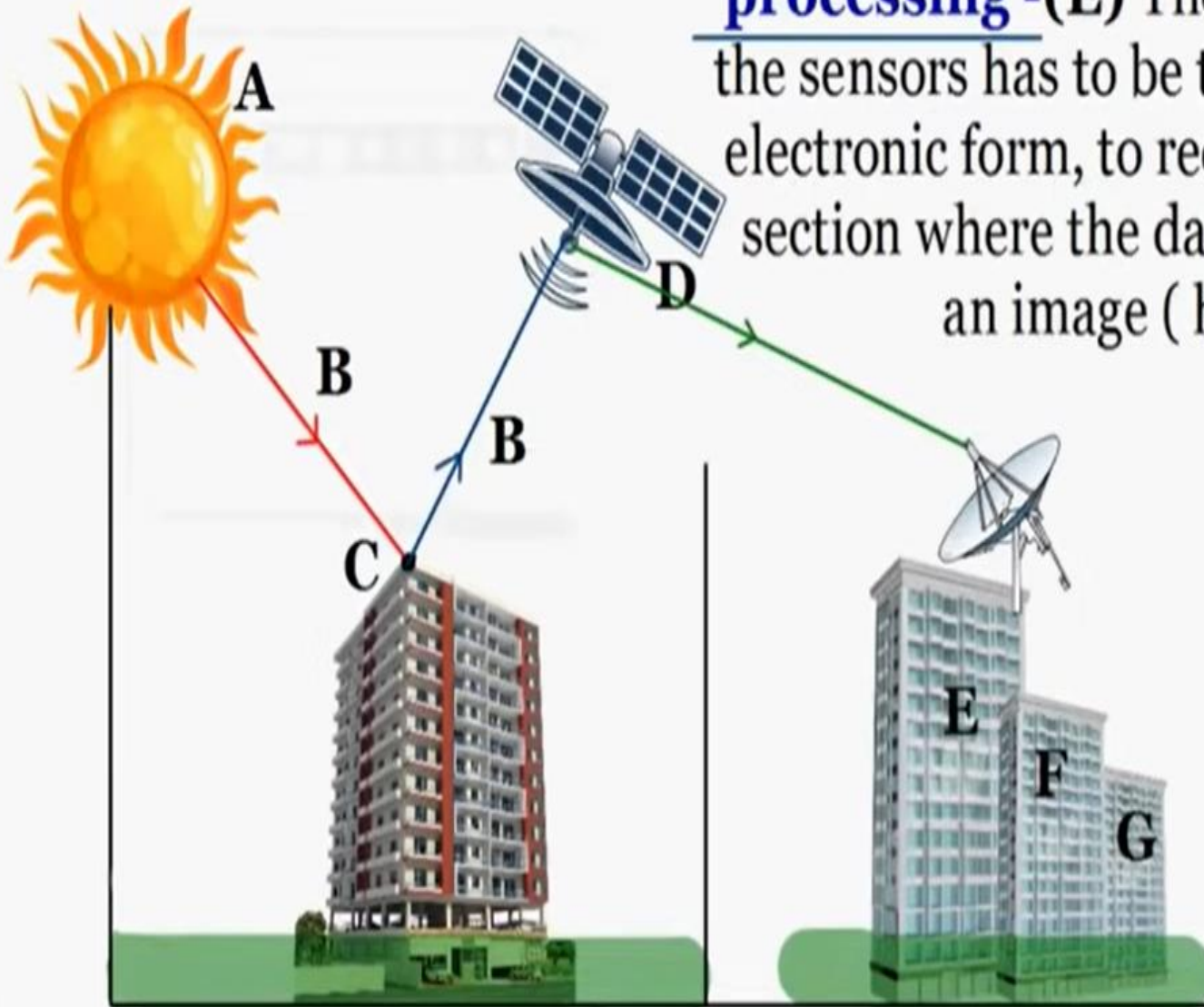
4. Recording of energy by the sensors

-(D) After the energy has been scattered by, emitted from the target, we require a sensor (remote-not in contact with the target) to collect and record the electromagnetic radiation.



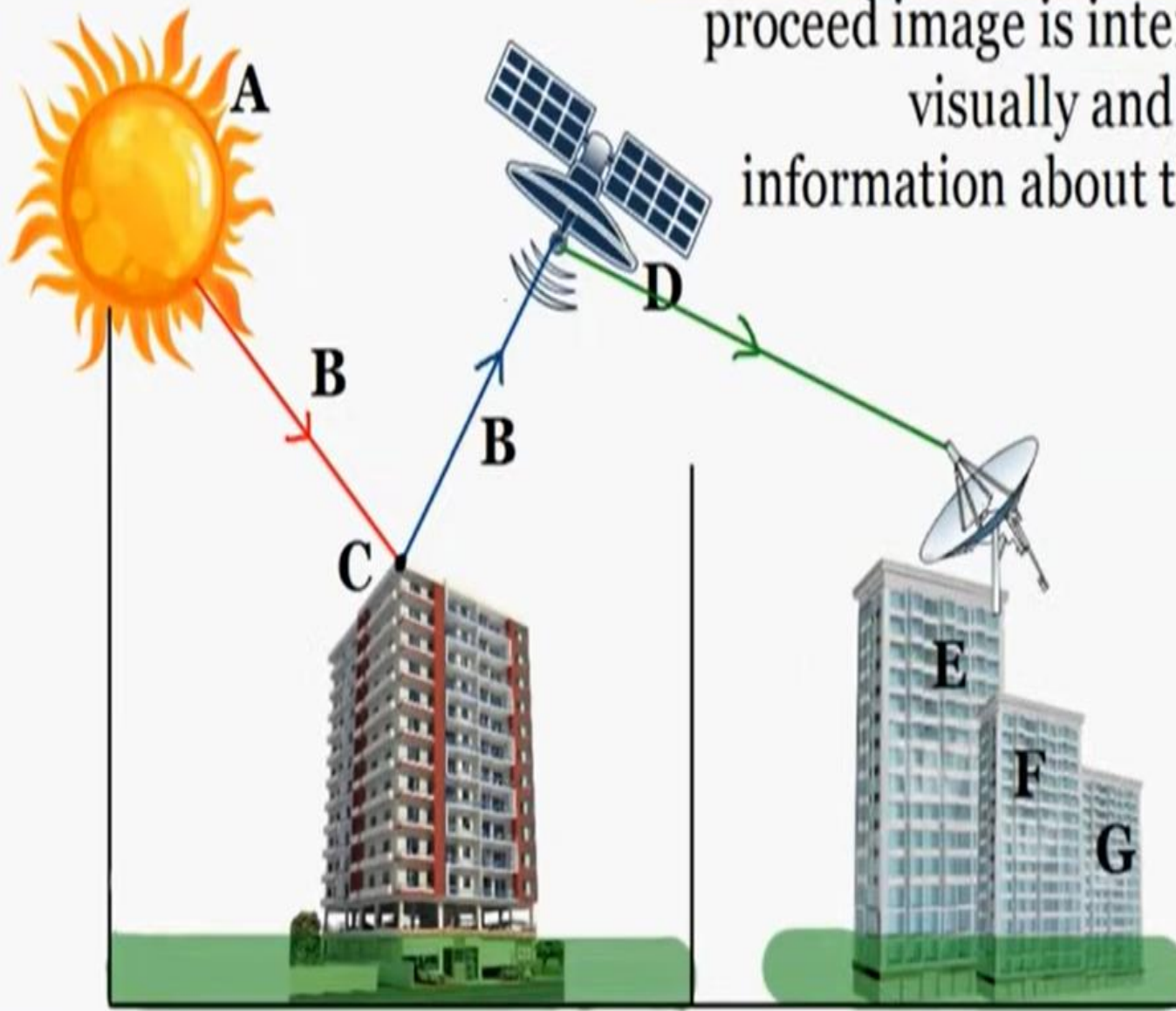
Remote Sensing Process

5. Transmission, reception and processing - (E) The energy required by the sensors has to be transmitted, often in electronic form, to receive and processing section where the data are produced into an image (hard copy & digital).



Remote Sensing Process

6. Interpretation and analysis - (F) The proceed image is interpreted in two types visually and digitally. To extract information about the target which was illuminated.



Remote Sensing Process

7. Application - (G) The final element of remote sensing process is achieved when we apply the information - we have been able to extract from the imagery about the target in order to better understand and reveal some new information.

