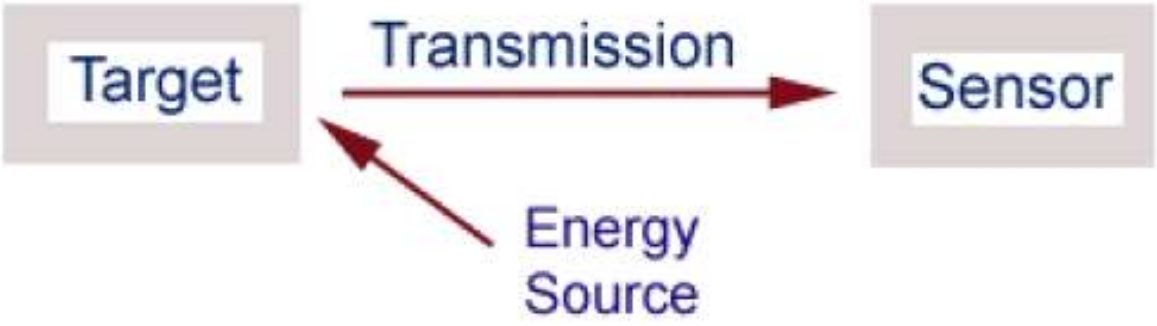
ACQUSITION & ANALYSIS DATA

While the definition of remote sensing describes a very wide array of technologies and types of research, all remote sensing technologies are based on certain common concepts, and all remote sensing systems consist of the same basic components. These four basic components of a remote sensing system include a target, an energy source, a transmission path, and a sensor.

The target is the object or material that is being studied. The components in the system work together to measure and record information about the target without actually coming into physical contact with it. There must also be an energy source, which illuminates or provides electromagnetic energy to the target. The energy interacts with the target, depending on the properties of the target and the radiation, and will act as a medium for transmitting information from the target to the sensor. The sensor is a remote

device that will collect and record the electromagnetic radiation. Sensors can be used to measure energy that is given off (or emitted) by the target, reflected off of the target, or transmitted through the target.



Once the energy has been recorded, the resulting set of data must be transmitted to a receiving station where the data are processed into a usable format, which is most often as an image. The image is then interpreted in order to extract information about the target. This interpretation can be done visually or electronically with the aid of computers and image processing software.

Weather satellite imaging of the Earth is a familiar example of a remote sensing system. The target in such a system is the Earth's surface, which gives off energy in the form of infrared radiation (or heat energy). This energy travels through the atmosphere and space and reaches the sensor, which is mounted on a satellite platform.

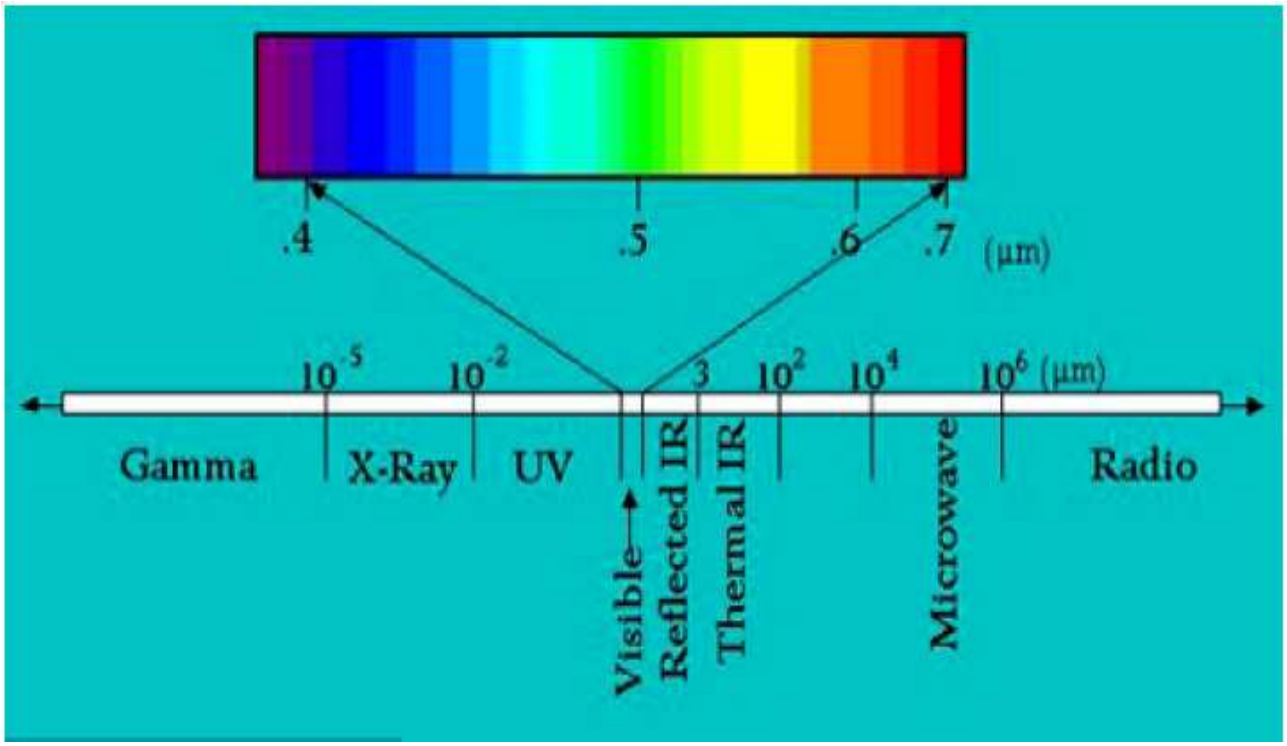
[Infrared Weather Satellite Image over continental U.S.]

Varying levels of this energy are recorded, transmitted to ground stations on the Earth, and converted into images that depict differences in temperature across the planet's surface. In a similar manner, other weather satellite sensors measure the visible light energy from the sun as it is reflected off the Earth's surfaces, transmitted through space to the satellite sensor, and recorded and sent to Earth for processing.

Remote sensing is not limited to investigations within our own planet. Most forms of astronomy are examples of remote sensing, since the

targets under investigation are such vast distances from Earth that physical contact is impossible. Astronomers therefore must collect and analyze the energy given off by these objects in space by using telescopes and other sensing devices.

Remote sensing uses instruments that house sensors to view the spectral and spatial relations of observable objects and materials at a distance, typically from above them, or in astronomy, by looking out. Geophysics (mainly gravity, magnetic, and seismic surveys; also external fields) is considered by many to be a form of remote sensing. Most methods are based on sensing of photons (quantum particles that have a wide range of energies; a specific photon will have some energy value that has its own unique corresponding frequency [number of cycles of a sine waveform per unit time]) in the **electromagnetic (EM) spectrum**.. Here is a simple EM Spectrum Chart, with different wavelength intervals named according to common usage in remote sensing (the wavelength units are in micrometers (μm); a micrometer is 1/1,000,000 of a meter.


.4
.5
.6
.7
(μm)
10^{-5}
10^{-2}
3
10^{2}
10^{4}
10^{6} (μm)
Gamma
X-Ray
UV
Visible
Reflected IR
Thermal IR
Microwave
Radio