

Chapter 1

Remote Sensing

What Is It?

Remote sensing can be defined as the use of electromagnetic radiation to record from a distance, data on the environment (often in the form of images), which can be interpreted to yield useful information. Put more simply, remote sensing means being able to monitor objects or events from far away. The design of remote sensing systems involves consideration of a number of factors such as:

- **The source of the electromagnetic radiation to be recorded:** This source may be natural in origin like the light of the sun and the heat emitted from the Earth, or it may be man-made like radar.
- **Target interaction:** The characteristics of the target will affect the amount and characteristics of the energy emitted or reflected from it.
- **Atmospheric interaction:** The atmosphere may distort or scatter electromagnetic radiation passing through it. In the case of space-to-space remote sensing this factor does not apply.

- **The sensor:** The device which records the energy reaching it from the target is a key element.
- **Data transmission:** Once sensed, the data must be transmitted from the sensor platform to the ground, where it is received and stored.
- **Analysis and interpretation:** Before the data can be used it must be processed and analyzed by computers and skilled human interpreters. This is a significant aspect that is often overlooked.

Remote sensors can be located on the ground, on ships, on aircraft and on spacecraft. This discussion focusses on those devices used on satellites.

A variety of space sensors detect electromagnetic energy. These include photographic cameras, return-beam vidicon cameras, infra-red detectors, and multispectral scanners. Radars and passive microwave sensors can also be used from space. In addition, electronic listening devices mounted on spacecraft can be used to detect communications transmissions and radar emissions.