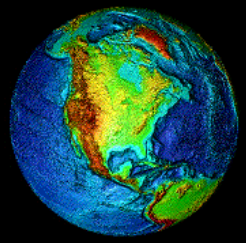
Components Acquisition generation of RS Data

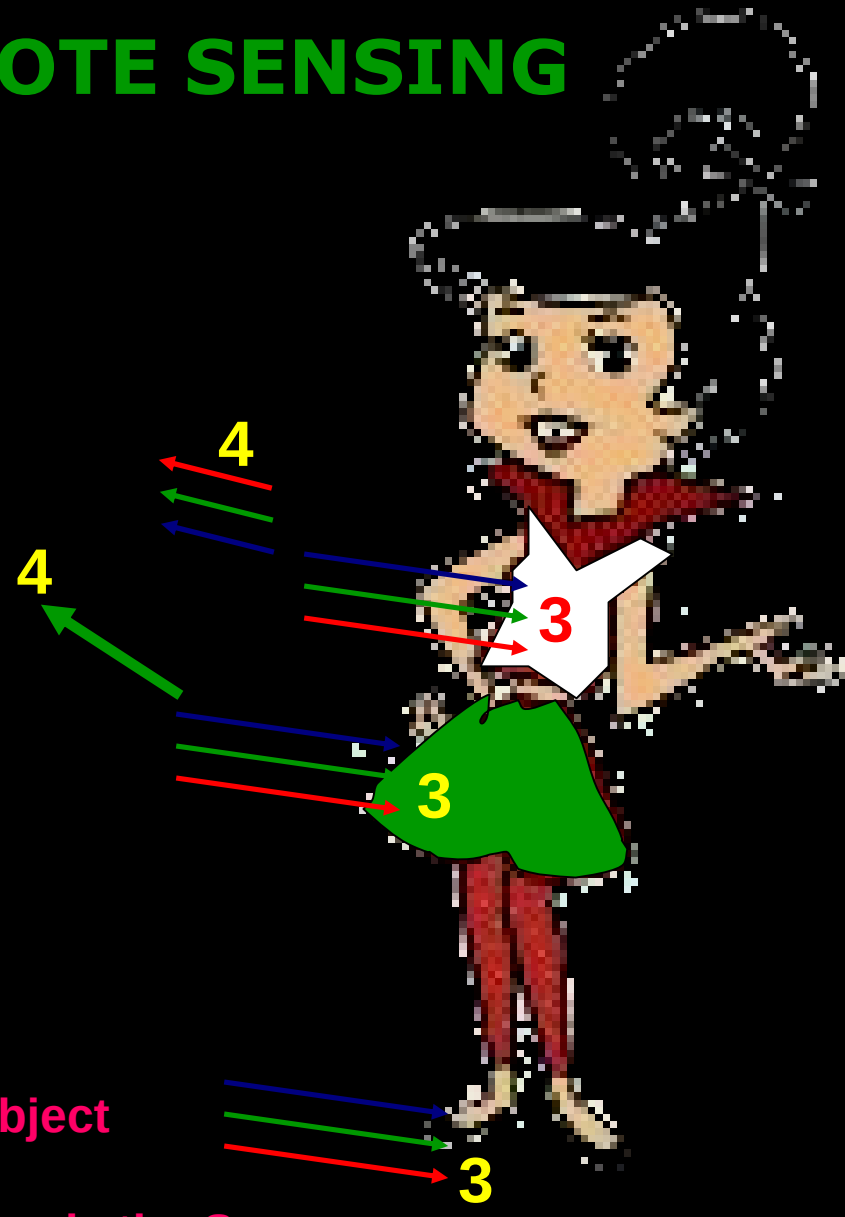


M.H. Mohamed Rinos
Senior Lecturer in GIS

Remote Sensing

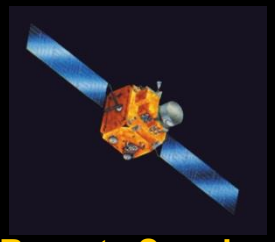
The fundamental principles of remote sensing derive from the characteristics and interactions of Electromagnetic radiation (EMR) as it propagates from source to sensor.

SIX STAGES IN REMOTE SENSING

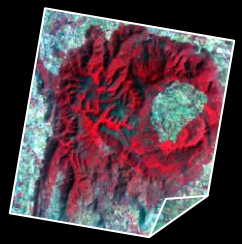


Stage-1. Source of energy
Stage-2. Transmission of EMR towards the Object
Stage-3. Interaction of EMR with the Object
Stage-4. Transmission of Interacted EMR towards the Sensor
Stage-5. Recording of the Image by the Detector
Stage-6. Analysis of the Imagery

Major Components in Remote Sensing



3. Remote Sensing System

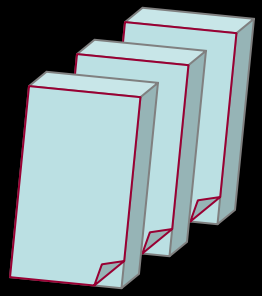


4. Image Interpreter

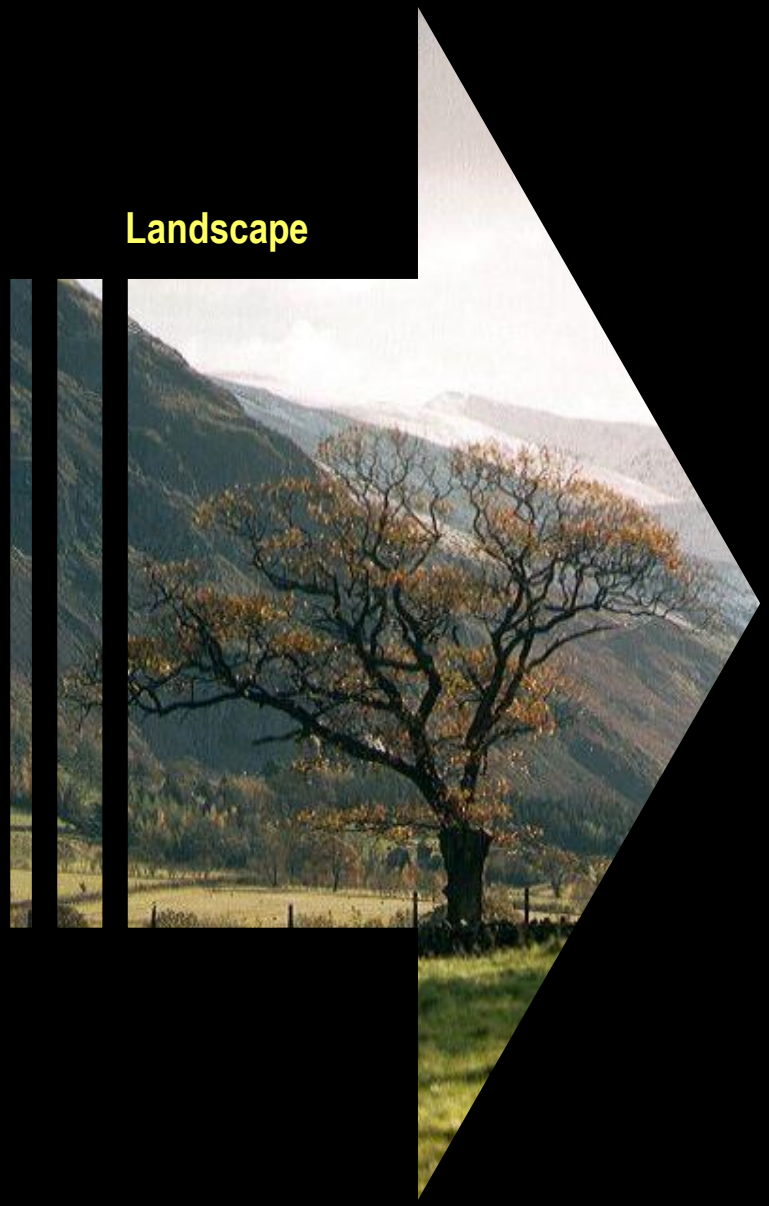
2. Atmosphere

1. Landscape

5. User



Major Components in Remote Sensing

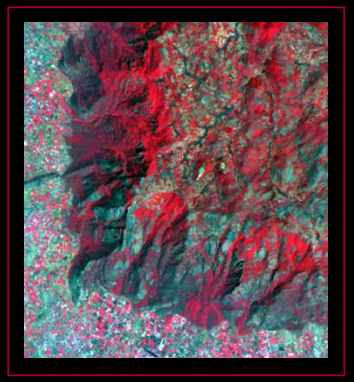


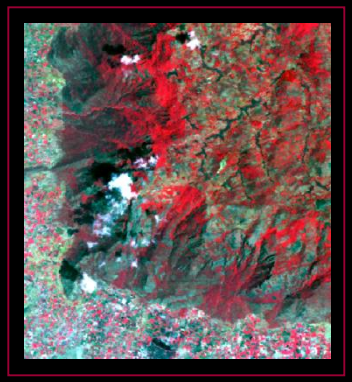
- Target component
- Most complex
- Comprises biological and Non-biological components

This is the most important Component because all our efforts and technologies are used to Ultimately understand and manage this component

Major Components in Remote Sensing

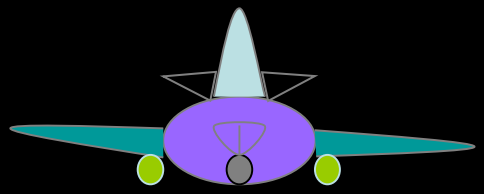
- Via media between Landscape/ satellite, Satellite/ground station
- Any disturbing factor in this component for example clouds will negatively affect data acquisition





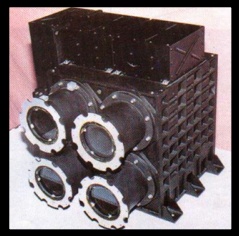
Major Components in Remote Sensing

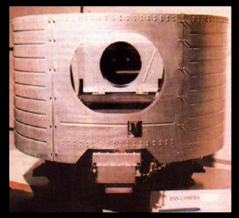
Remote Sensing System



A device that records information on earth features

Two Types





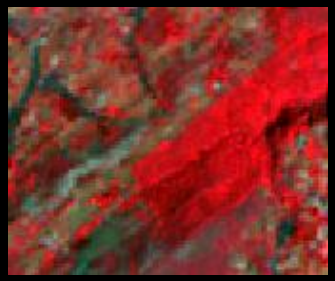
- **Aerial Photography:** Similar to normal Photography – the camera is in the Flying aeroplane at a height of 1.5 km and it gives a 3D nature

- **Satellite:** The sensors are fixed on a satelite revolving at a height of 800 – 900 km

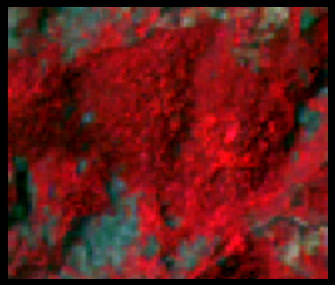
Major Components in Remote Sensing

Image Interpreter

The scientist who delineates the imagery is called Image interpreter.
He gives meaning to the image based on the Tone, Texture, Size, Shape, etc.



Tone



Texture

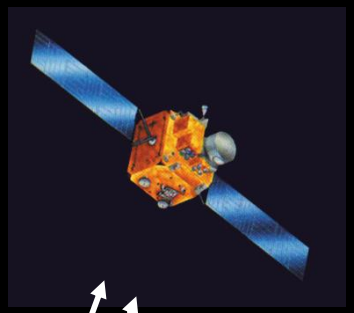
Size &
Shape

Major Components in Remote Sensing

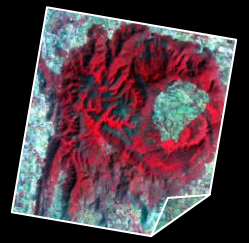
User

Persons or Government officials who plan
the resource management
with the help of satellite data are called user

Acquisition of Remote Sensing Data

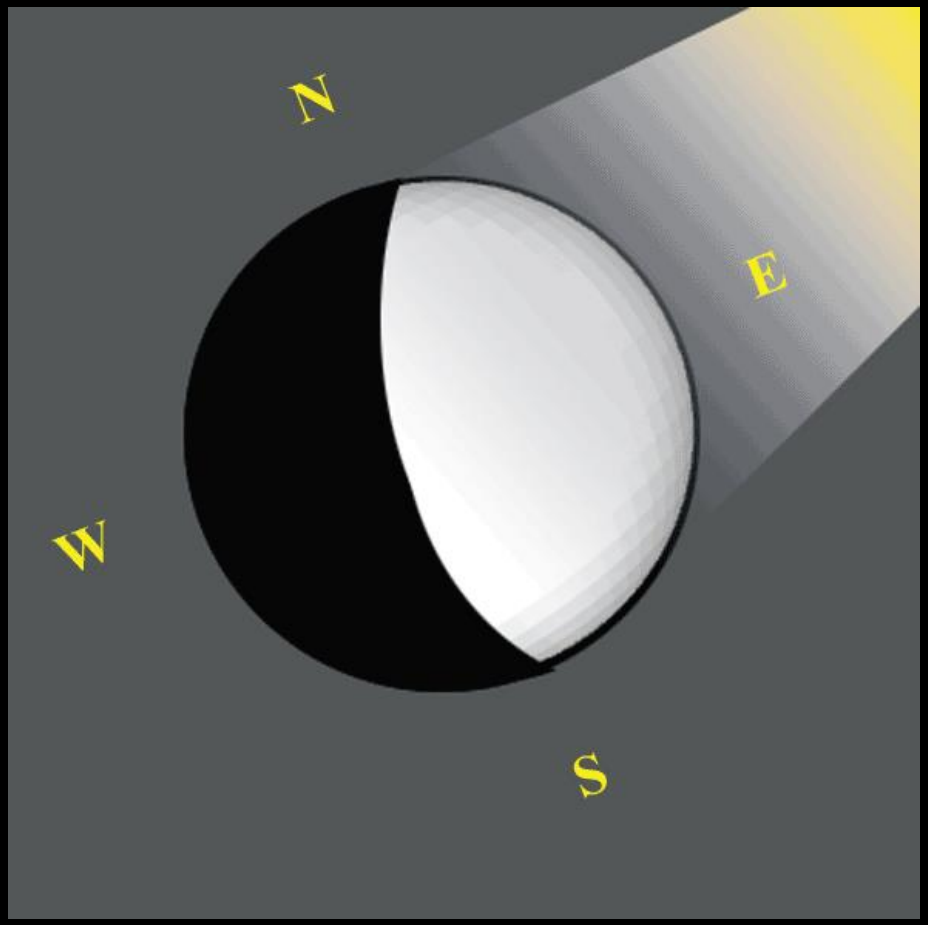


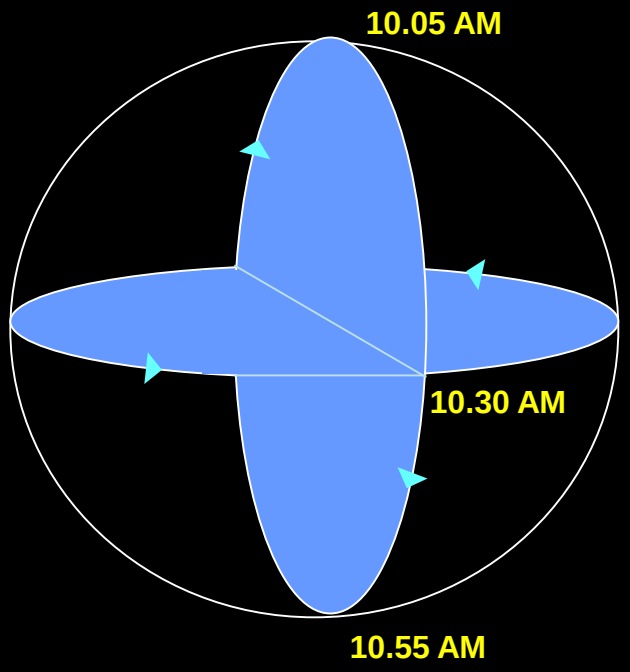
Ground station



Spectral signature

Spectral signature





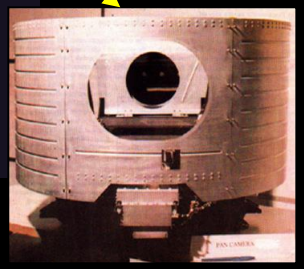
111 min. – one full cycle

55.5 min – descending node

55.5 min – ascending node

12 – 13 cycle / day

IRS 1D SATELLITE

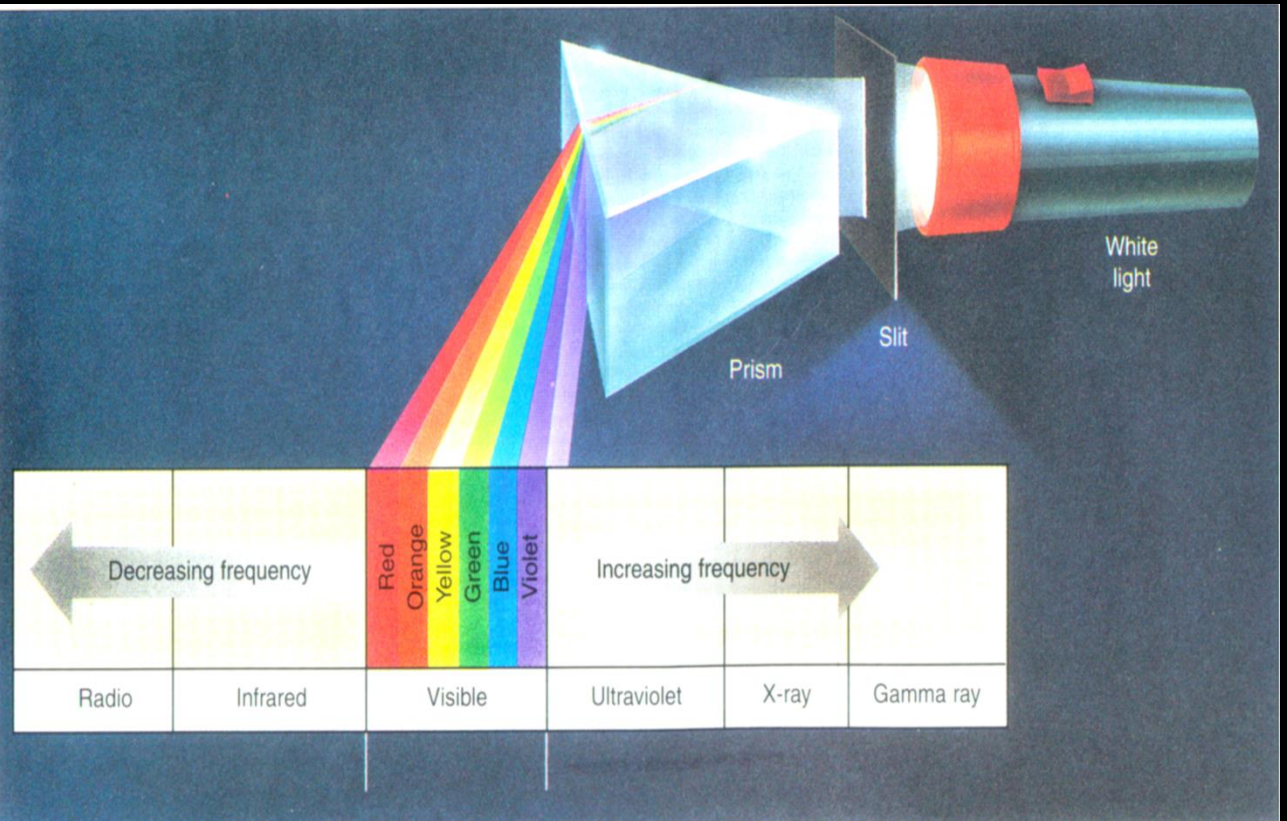


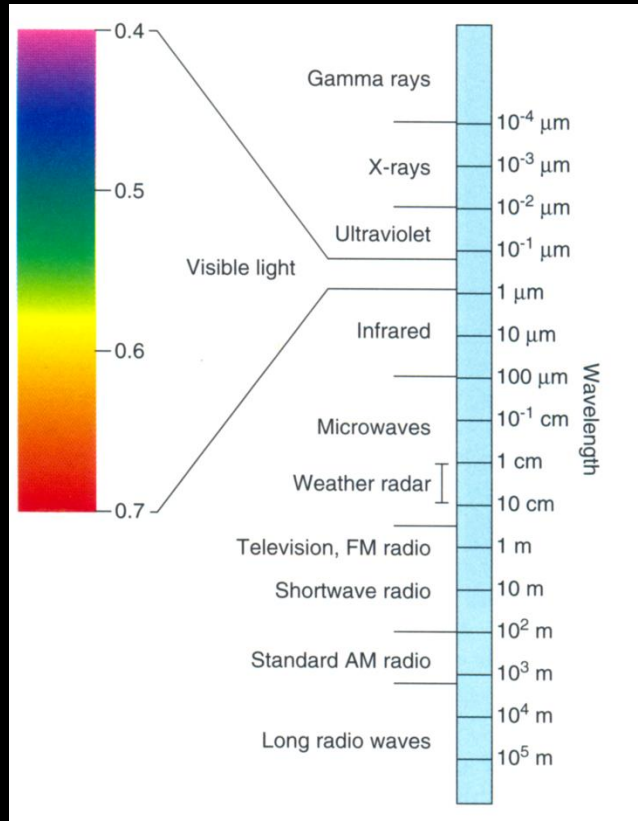
LISS III

WiFS

PAN

Electromagnetic spectrum: Energy is carried through space as electromagnetic waves. one of the familiar electromagnetic waves is visible light.

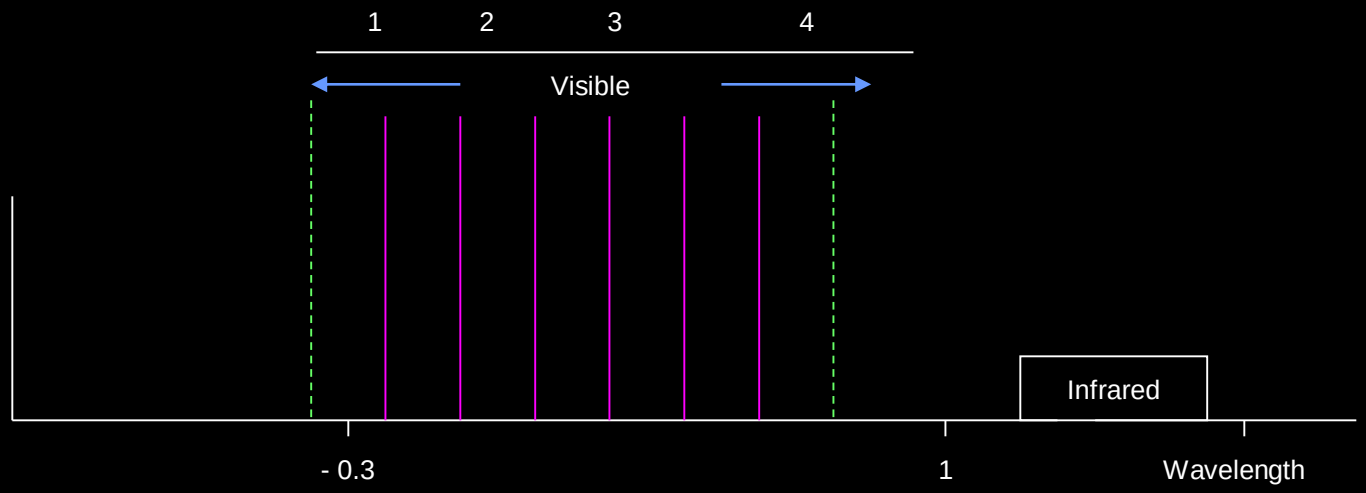




It can be explained in terms of wavelength as well as in terms of DN-value

The part of the electromagnetic spectrum which is used in Remote sensing is divided into a specific number of segments (which varies from sensor to sensor) for example in IRS 1C LISS III following are the bands

Bands		
	Blue	(Normally ignored)
1	Green	(0.52 – 0.59)
2	Red	(0.62 – 0.68)
3	Near Infra	(0.77 – 0.86)
4	Short Wave Infra Red (SWIR)	(1.55 – 1.70)



Bands and their Uses:

Band – 1: (0.52 – 0.59) μm: Designed to measure green reflectance peak of vegetation. Useful for vegetation discrimination and vigor assessment

Band – 2: (0.63 – 0.68) μm : Designed for chlorophyll absorption detection important for vegetation discrimination

Band – 3: (0.77 – 0.86) μm : Useful for determining vegetation type, vigor, and biomass content. Also useful for delineating water bodies and for soil moisture discrimination

Band – 4: (1.55 – 1.70) μm : Indicative of soil and vegetation moisture content. Also useful for differentiating snow from clouds.

Types of Satellites

Geostationary: **Satellites rotate around the earth at the same speed as the earth rotates on its axis. Thus these satellites remain stationary at an altitude of about 36,000 km with reference to earth's particular location**

Eg. INSAT Series

Purpose: Meteorology and Communication

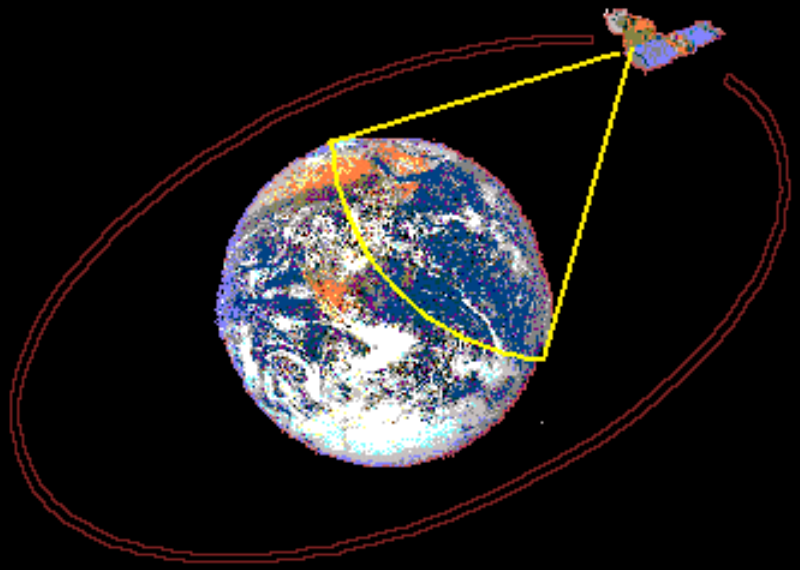
Sun-Synchronous: **These satellites are at lower altitude (700 – 900 km), operate in a near circular, sun synchronous, near polar orbit so as to get the systematic and repetitive acquisition of data of the full earth's surface under nearly constant illumination condition.**

Eg. **IRS** Series

Purpose: Resources Mapping

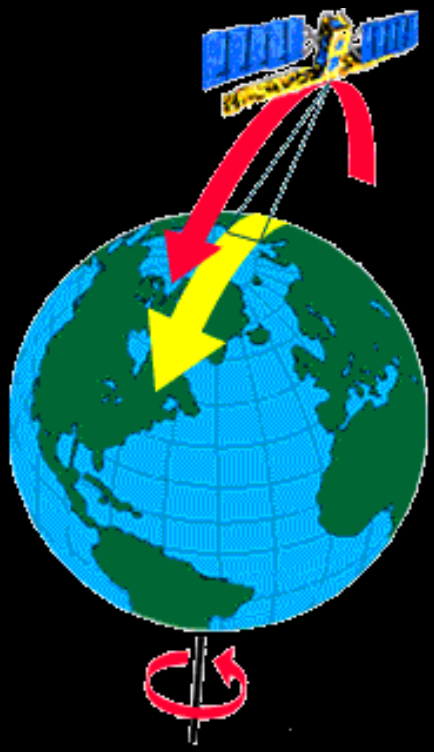
GEOSTATIONARY ORBITS

- Altitudes of approximately 36,000 km
- Revolve at speeds which match the rotation of the Earth so that they seem stationary, relative to the Earth's surface
- This allows the satellites to observe and collect information continuously over specific areas

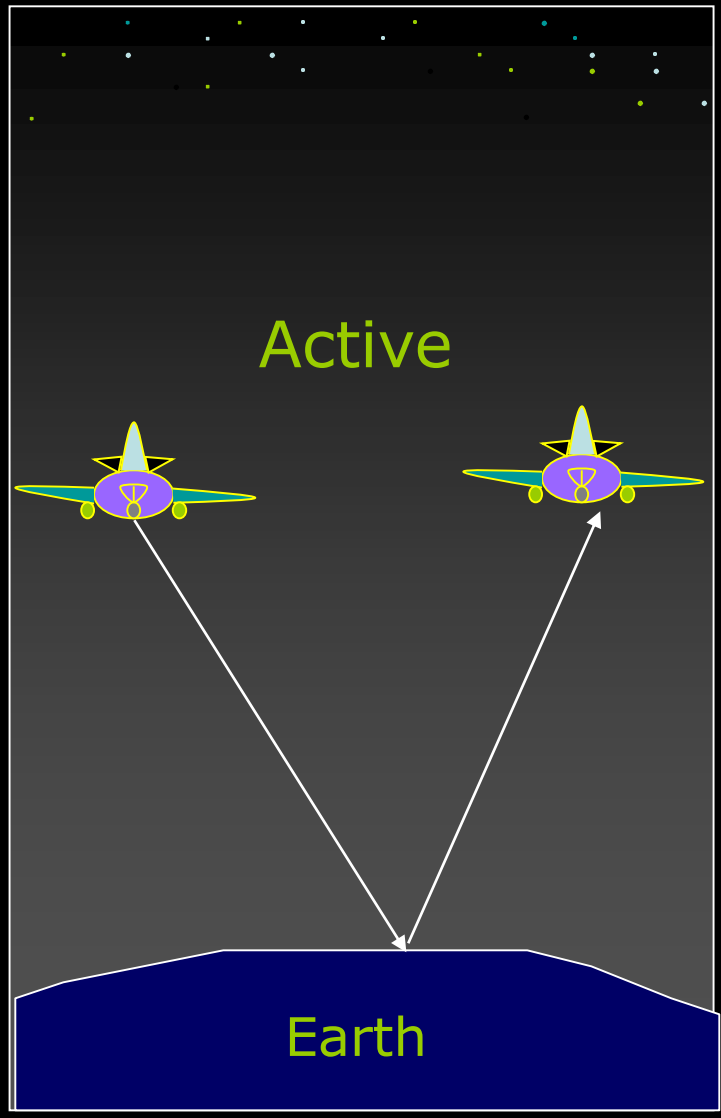


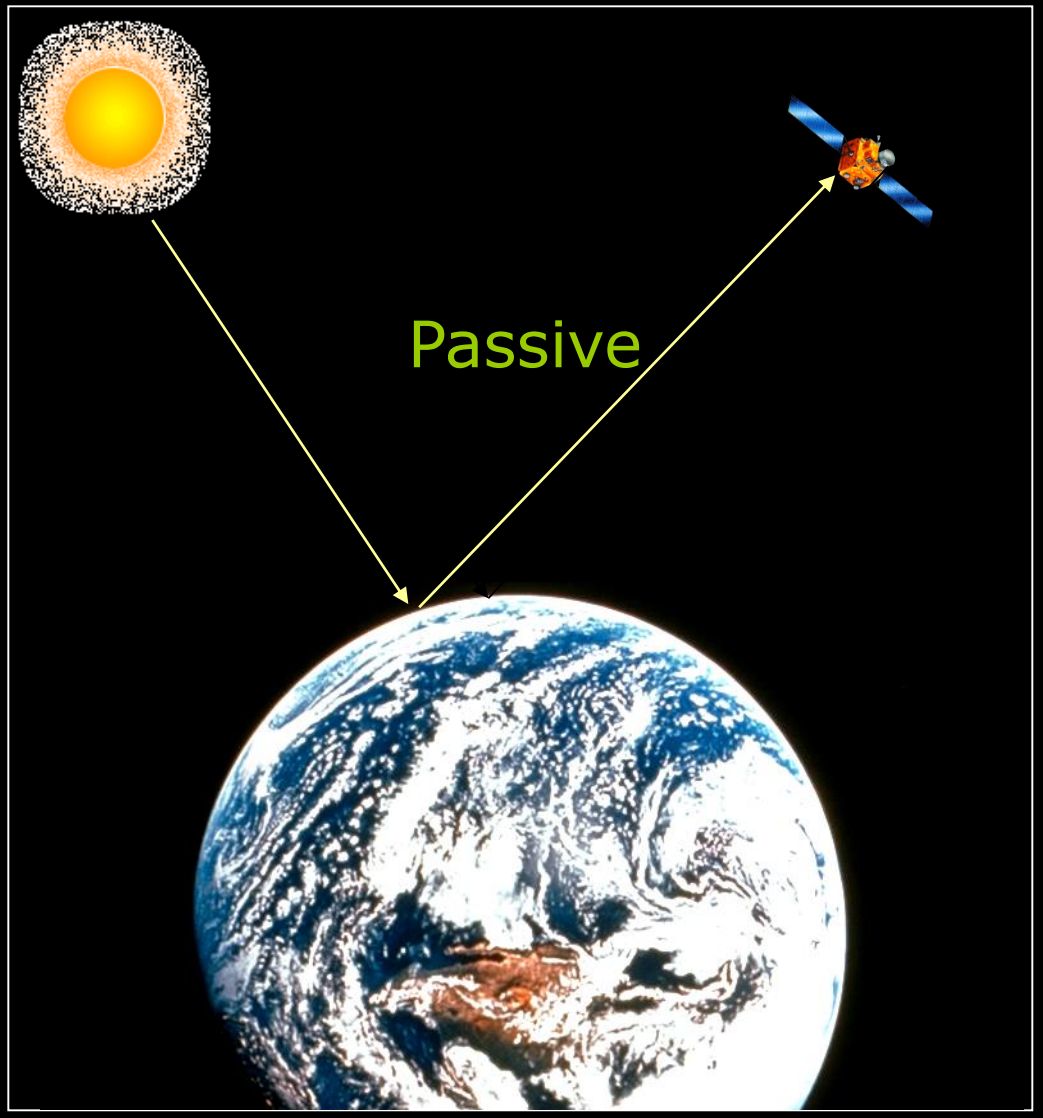
NEAR-POLAR ORBITS

- The orbit is inclined relative to polar axis.
- Some of these satellites' orbits are also sun-synchronous. This means that they cover each area of the world at a constant local time of day called local sun time.



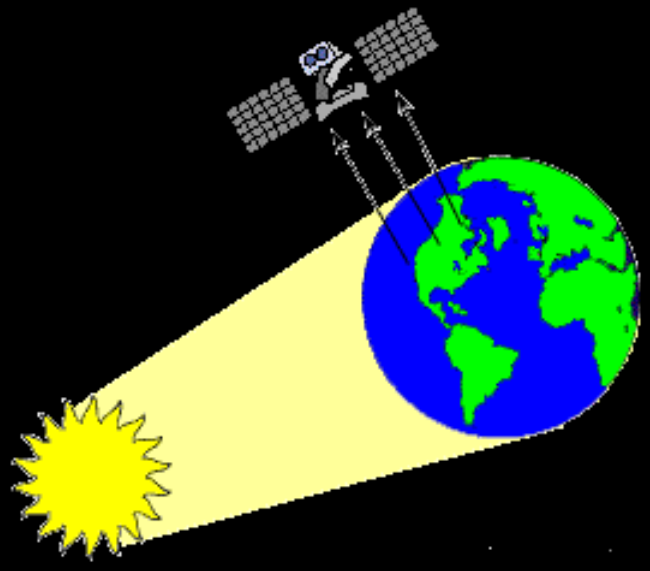
Types of Remote Sensing





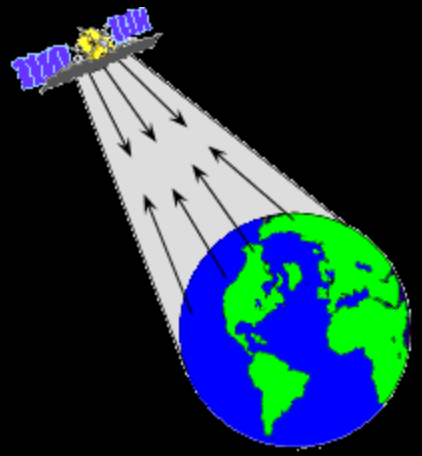
PASSIVE SENSORS

- Remote sensing systems which measure energy that is naturally available are called **passive sensors**.
- Passive sensors can only be used to detect energy when the naturally occurring energy is available.



ACTIVE SENSORS

- **Active sensors**, on the other hand, provide their own energy source for illumination.
- The sensor emits radiation which is directed toward the target to be investigated.
- Eg: RADAR



Thank You