Remote sensing platforms and its Types

Major Components of Remote Sensing Technology

- Energy Source
- Passive System: sun, irradiance from earth's materials;
- Active System: irradiance from artificially generated energy sources such as radar.
- Platforms:(Vehicle to carry the sensor) (truck, aircraft, space shuttle, satellite, etc.)
- Sensors:(Device to detect electro-magnetic radiation) (camera, scanner, etc.)
- Detectors: (Handling signal data) (photographic, digital, etc.)
- Processing:(Handling Signal data) (photographic, digital etc.)
- Institutionalisation: (Organisation for execution at all stages of remote-sensing technology: international and national orrganisations, centres, universities, etc.)

Platforms

- Platforms provide a vantage point for the sensors used in remote sensing → Place where sensors are placed
- Platforms may be as simple as a ladder through trolley, balloons, aircraft and to highly sophisticated satellite systems.
- In general, three types of platforms are of interest for remote sensing
  i. **Ground,**
  ii. **Airborne and**
  iii. **Space borne observation platforms**.

Ground observation platforms

- **Ground observation platforms** (Hand held, portable masts, a trolley mounted) are used for experimental purpose in designing sensors, characterizing spectral reflectance and emissivity of different objects. These platforms provide an altitude of up to 15m.

Air borne platforms

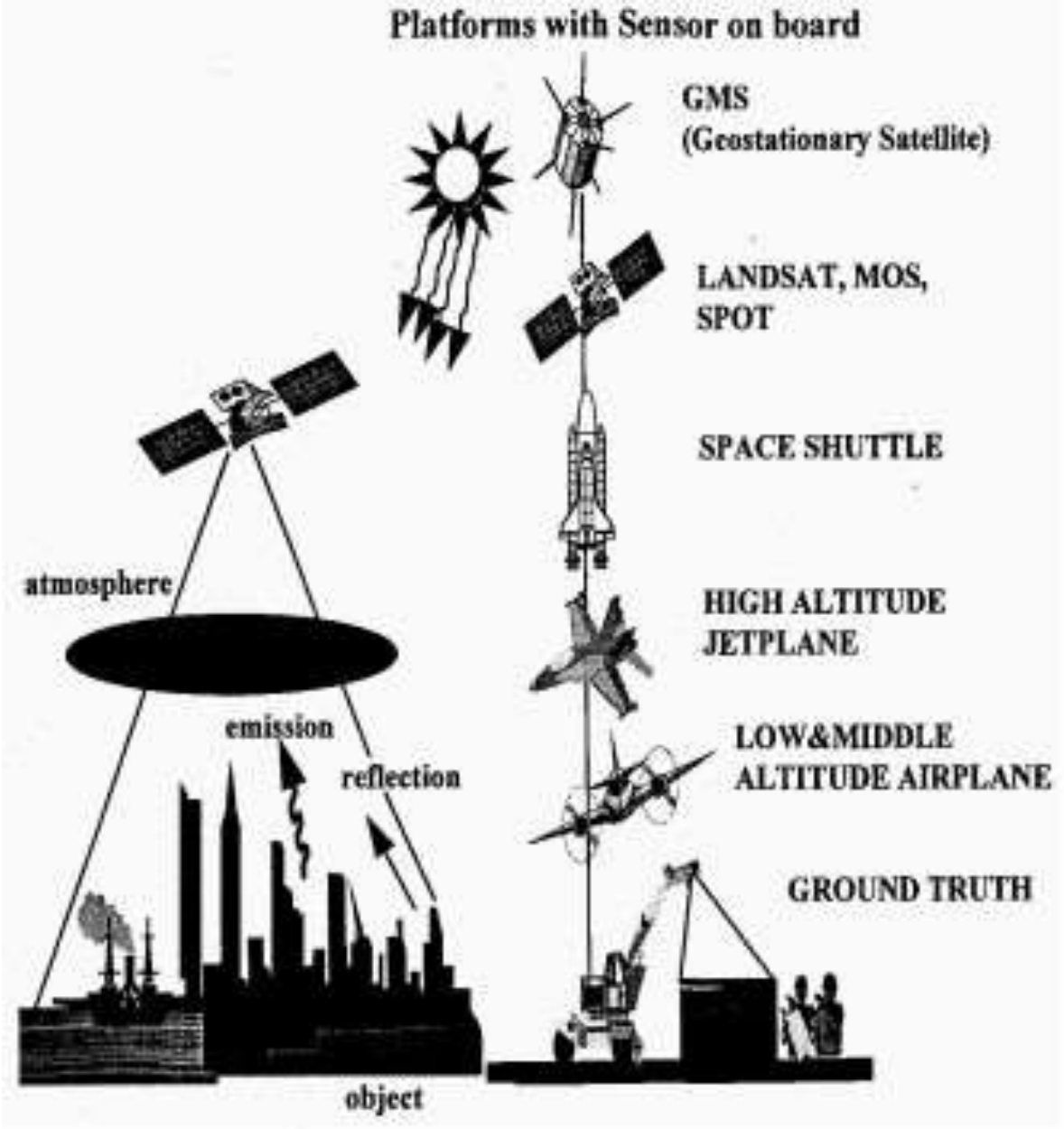
- Balloons offer reasonably stable platforms up to very considerable altitudes, 30 km, when propulsion is there.
- Aircraft flying at low and medium altitudes (1500-3000m) are appropriate for surveys of local or limited regional interest. High-altitudes photographs are obtained (by NASA) with aircrafts flying at 18 km above terrain.

Space borne platforms

- High-altitude rockets like Space Shuttles are used for experimental purpose. Synoptic imagery of some 40,000 to 90,000 km^2 per frame can be obtained from such platforms.
- The approximate altitude of these platforms range from 200 km to 400 km. Space shuttle orbit at 185 km.

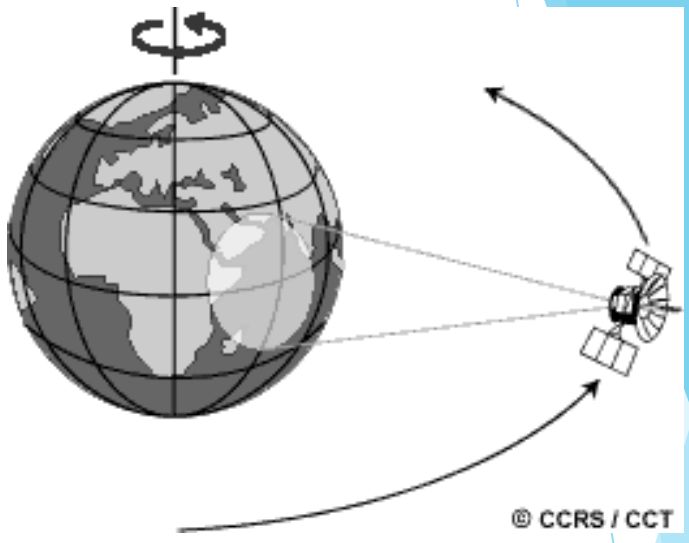
Satellite platforms

- Satellite platforms offer a good coverage and all weather capability.
- The platform can be utilized for earth observation, weather monitoring and telecommunication and positioning system.
- The altitude above 300 km and can be upto 36000 km.



Satellite platforms: Orbits and Swaths

- Remote sensing instruments can be placed on a variety of platforms to view and image targets.
- Although ground-based and aircraft platforms may be used, satellites provide a great deal of the remote sensing imagery commonly used today.
- Satellites have several unique characteristics which make them particularly useful for remote sensing of the Earth's surface.
- The path followed by a satellite in the space is referred to as its **orbit**.
- Satellite orbits are matched to the capability and objective of the sensor(s) they carry.
- Orbit selection can vary in terms of altitude (their height above the Earth's surface) and their orientation and rotation relative to the Earth.



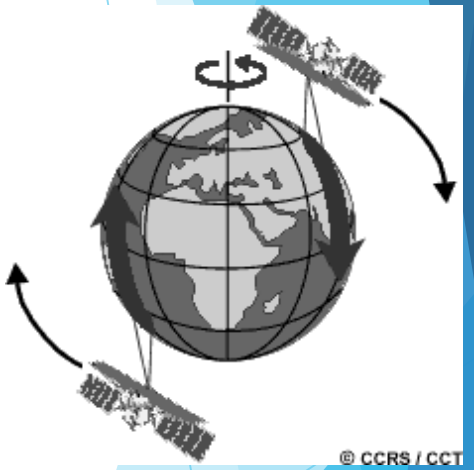
Geostationary or Geosynchronous orbits

- **Geostationary or Geosynchronous orbits:** Satellites at very high altitudes, which view the same portion of the Earth's surface at all times
- These geostationary satellites, at altitudes of approximately 36,000 kilometres, revolve at speeds which match the rotation of the Earth so they seem stationary, relative to the Earth's surface.
- This allows the satellites to observe and collect information continuously over specific areas.
- Weather and communications satellites commonly have these types of orbits (eg. INSAT series of satellites).

Sun-synchronous orbits

- **Sun-synchronous orbits:** Many remote sensing platforms are designed to follow an orbit (basically north-south) which, in conjunction with the Earth's rotation (west-east), allows them to cover most of the Earth's surface over a certain period of time.
- They cover each area of the world at a constant local time of day called **local sun time**.
- These are **near-polar orbits**, so named for the inclination of the orbit relative to a line running between the North and South poles.
- At any given latitude, the position of the sun in the sky as the satellite passes overhead will be the same within the same season.
- This ensures consistent illumination conditions when acquiring images in a specific season over successive years, or over a particular area over a series of days. This is an important factor for monitoring changes between images or for mosaicking adjacent images together, as they do not have to be corrected for different illumination conditions.

- Most of the remote sensing satellite platforms today are in near-polar orbits, which means that the satellite travels northwards on one side of the Earth and then toward the southern pole on the second half of its orbit. These are called ascending and descending passes
- If the orbit is also sun-synchronous, the ascending pass is most likely on the shadowed side of the Earth while the descending pass is on the sunlight side.
- Sensors recording reflected solar energy only image the surface on a descending pass, when solar illumination is available. Active sensors which provide their own illumination or passive sensors that record emitted (e.g. thermal) radiation can also image the surface on ascending passes.



THANK YOU