Remote sensing platforms

Remote sensing platforms can be defined as the structures or vehicles on which remote sensing instruments (sensors) are mounted.

For remote sensing applications, sensors should be mounted on suitable stable platforms. These platforms can be ground based air borne or space borne based. As the platform height increases the spatial resolution and observational area increases. Thus, higher the sensor is mounted; larger the spatial resolution and synoptic view is obtained. The types or characteristics of platform depend on the type of sensor to be attached and its application. Platforms for remote sensors may be situated on the ground, on an aircraft or balloon (or some other platform within the Earth's atmosphere), or on a spacecraft or satellite outside of the Earth's atmosphere.

Typical platforms are satellites and aircraft, but they can also include radio-controlled aeroplanes, balloons kits for low altitude remote sensing, as well as ladder trucks or 'cherry pickers' for ground investigations.

Types of platforms

1. **Ground-borne platforms:** Ground borne platforms are used to record detailed information about the surface which is compared with information collected from aircraft or satellite sensors i.e. for ground observation. Ground observation includes both the laboratory and field study, used for both in designing sensors and identification and characterization of land features

   Ground observation platforms include – handheld platform, cherry picker, towers, portable masts and vehicles etc. Portable handheld photographic cameras and spectroradiometers are largely used in laboratory and field experiments as a reference data and ground truth verification.

2. **Air-borne platforms:** Airborne platforms are used to collect very detailed images and facilitate the collection of data over virtually any portion of the Earth's surface at any time. Airborne platforms were the sole non-ground-based platforms for early remote sensing work.
**Balloon**

Balloons are used for remote sensing observation (aerial photography) and nature conservation studies. The first aerial images were acquired with a camera carried aloft by a balloon in 1859. Balloon floats at a constant height of about 30 km. The balloon is governed by the wind at the floating altitude. Balloons are rarely used today because they are not very stable and the course of flight is not always predictable, although small balloons carrying expendable probes are still used for some meteorological research.

**Drone**

Drone is a miniature remotely piloted aircraft. It is designed to fulfill requirements for a low cost platform, with long endurance, moderate payload capacity and capability to operate without a runway or small runway. Drone includes equipment of photography, infrared detection, radar observation and TV surveillance. It uses satellite communication link. An onboard computer controls the payload and stores data from different sensors and instruments.

Drone was developed in Britain during World War-II, is the short sky spy which was originally conceived as a military reconnaissance. Now it plays important role in remote sensing. The unique advantage is that it could be accurately located above the area for which data was required and capable to provide both night and day data.

**Aircraft**

Special aircraft with cameras and sensors on vibration less platforms are traditionally used to acquire aerial photographs and images of land surface features. While low altitude aerial photography results in large scale images providing detailed information on the terrain, the high altitude smaller scale images offer advantage to cover a larger study area with low spatial resolution.

Beside aerial photography multi spectral, hyperspectral and microwave imaging is also carried out by aircraft.

Aircraft platforms offer an economical method of remote sensing data collection for small to large study areas with cameras, electronic imagers, across-track and along-track scanners, and radar and microwave scanners. AVIRIS hyperspectral imaging is famous aircraft aerial photographic operation of USGS.
High Altitude Sounding Rockets

High altitude sounding rocket platforms are useful in assessing the reliability of the remote sensing techniques as regards their dependence on the distance from the target is concerned. Balloons have a maximum altitude of approximately 37 km, while satellites cannot orbit below 120 km. High altitude sounding rockets can be used to a moderate altitude above terrain. Imageries with moderate synoptic view can be obtained from such rockets for areas of some 500,000 square kilometers per frame. The high altitude sounding rocket is fired from a mobile launcher. During the flight its scanning work is done from a stable altitude, the payload and the spent motor are returned to the ground gently by parachute enabling the recovery of the data. One most important limitations of this system is to ensure that the descending rocket not going to cause damage.

3. **Space-borne platforms:** In space-borne remote sensing, sensors are mounted on-board a spacecraft (space shuttle or satellite) orbiting the earth. Space-borne or satellite platform are onetime cost effected but relatively lower cost per unit area of coverage, can acquire imagery of entire earth without taking permission. Space borne imaging ranges from altitude 250 km to 36000 km.

Spaceborne remote sensing provides the following advantages:

- Large area coverage;
- Frequent and repetitive coverage of an area of interest;
- Quantitative measurement of ground features using radiometrically calibrated sensors;
- Semi-automated computerized processing and analysis;
- Relatively lower cost per unit area of coverage.

There are two types of well recognized satellite platforms- manned satellite platform and unmanned satellite platform.

**Manned Satellite Platforms:** Manned satellite platforms are used as the last step, for rigorous testing of the remote sensors on board so that they can be finally incorporated in the unmanned satellites. This multi-level remote sensing concept is already presented. Crew in the manned satellites operates the sensors as per the program schedule.

**Unmanned Satellite Platforms**
Landsat series, SPOT series and IRS series of remote sensing satellite, NOAA series of meteorological satellites, the entire constellation of the GPS satellites and the GOES and INSAT series of geostationary environmental, communication, television broadcast, weather and earth observation satellites etc are examples of unmanned satellite category.