



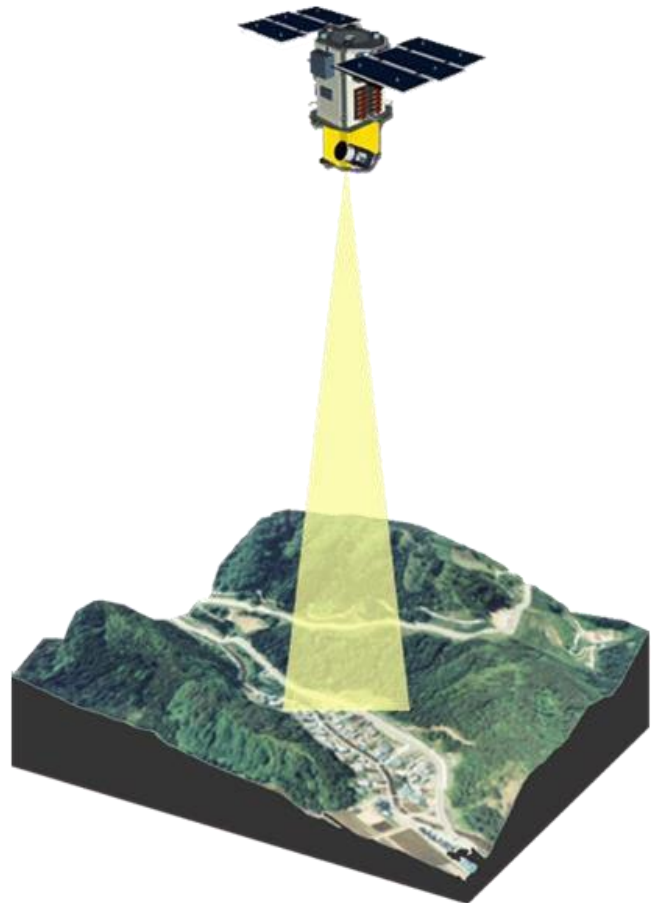
Introduction to Remote sensing



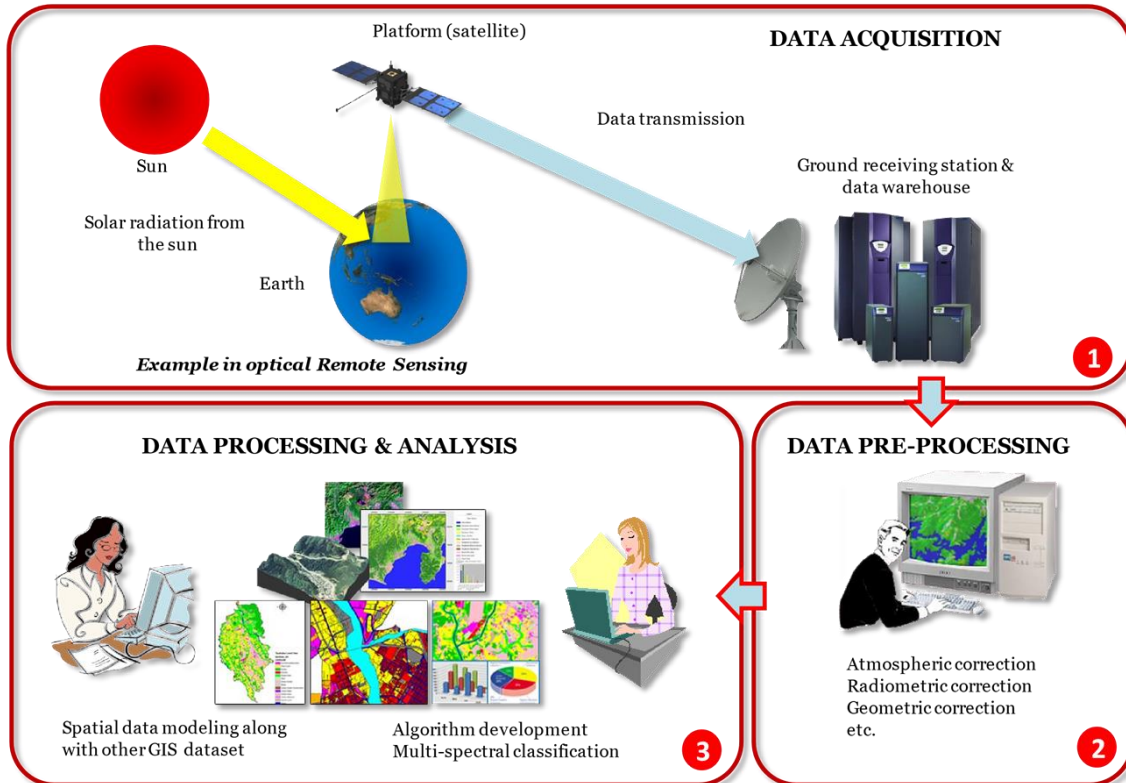
1.1 Definition

What is Remote Sensing?

If you are reading this sentence, now you are doing Remote Sensing. In fact, any information acquired from the object without touching is Remote Sensing. Following is a scientific definition of Remote Sensing. The science of acquiring information about the earth using instruments which are remote to the earth's surface, usually from aircraft or satellites. Instruments may use visible light, infrared or radar to obtain data. Remote sensing offers the ability to observe and collect data for large areas relatively quickly, and is an important source of data for GIS.



1.2 Remote Sensing and GIS Work Flow



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Remote Sensing Advantages & Limitations

- Increased perspective
- Generally unobtrusive
- Broad electromagnetic sensitivity
- Systematic, unbiased observation
- Digital extensions
- External noise/interference
- Often relies on surrogate measures
- Technical/calibration issues
- Can be obtrusive

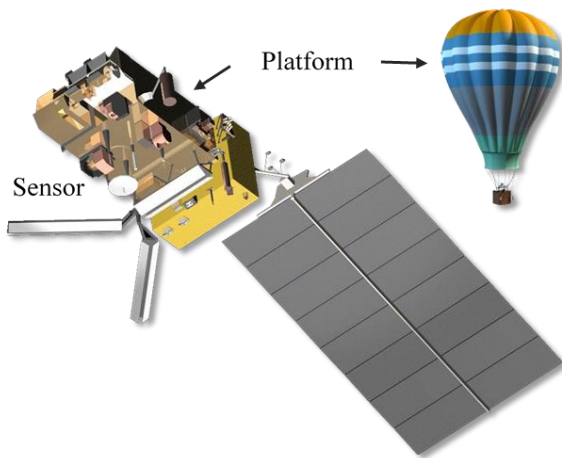
Components in Remote Sensing

Platform

The vehicle which carries a sensor. i.e. satellite, aircraft, balloon, etc...

Sensors

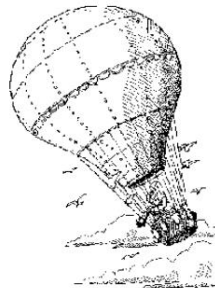
Device that receives electromagnetic radiation and converts it into a signal that can be recorded and displayed as either numerical data or an image.

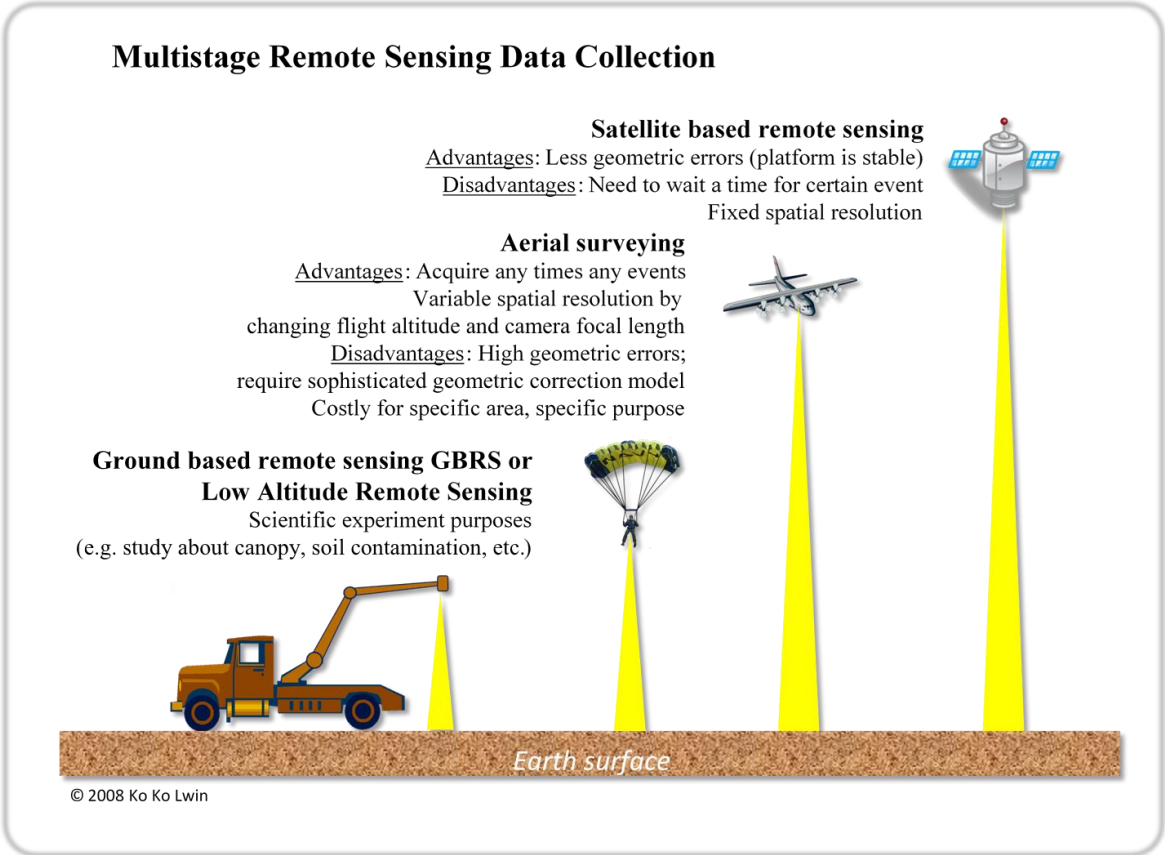


One platform can carry more than one sensor. For example:

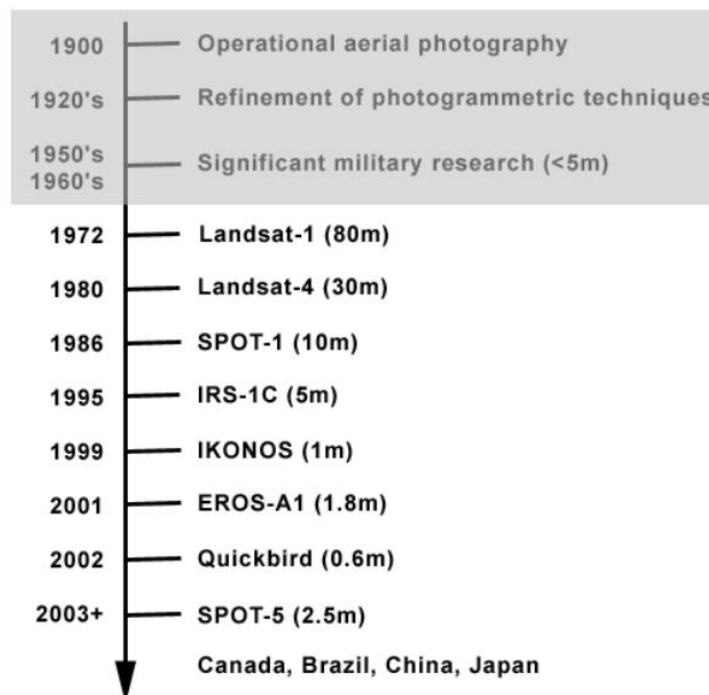
Platform Name	Sensor Name
Landsat TM	Thematic Mapper (Passive: Optical sensor)
Landsat ETM	Enhanced Thematic Mapper (Passive: Optical sensor)
ALOS	PRISM (Passive: Optical sensor) AVNIR-2 (Passive: Optical sensor) PALSAR (Active: Microwave sensor)

Remote Sensing Platforms





Historical Development of Remote Sensing

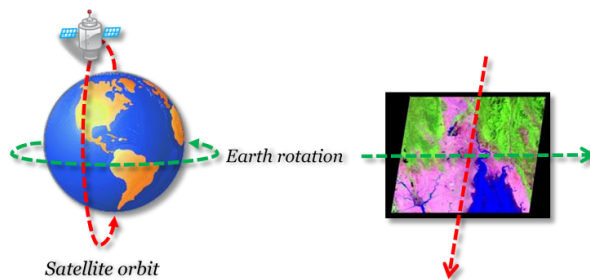


1.7 Types and Uses of Satellites

Types of satellites can be classified by their orbit characteristics.

Type 1: Low Earth Orbits/Satellites: Normally used in spy satellite (Military purposes)

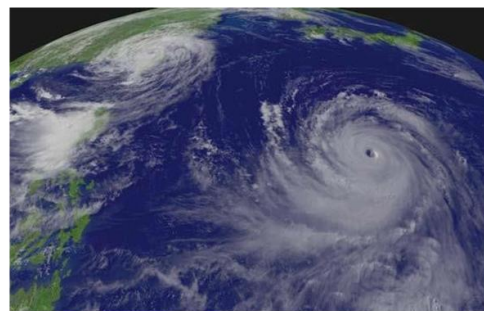
Type 2: Sun-synchronous Orbits/Satellites: a polar orbit where the satellite always crosses the Equator at the same local solar time. Most of the earth resources satellites are sun-synchronous orbit.



Examples

- Landsat TM/ETM
- SPOT
- ALOS
- IKONOS
- QuickBird

Type 3: Geostationary Orbits/Satellites: Satellites at very high altitudes, which view the same portion of the Earth's surface at all times. Especially used in metrological applications.



- Fixed position on specific location
- Same speed as earth rotation speed
- Wide area coverage
- Especially designed for weather monitoring

Aerial Photograph

1858 – “Gasper Felix Tournachon Nadar” took the first aerial photograph from a captive balloon from an altitude of 1,200 feet over Paris.



1889 – “Arthur Batut” took the first aerial photograph from using a kite of Labruguiere France.



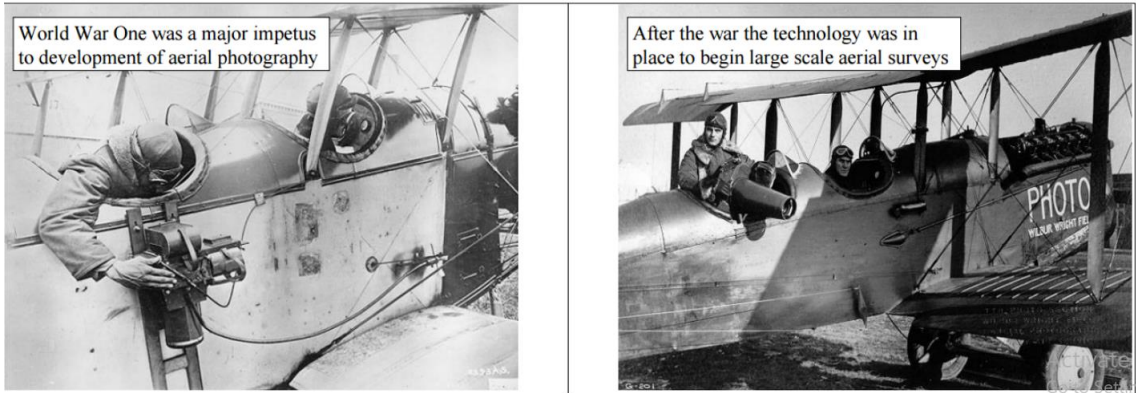
Photographs documenting Arthur Batut's kite, style sense, and imagery of Labruguiere.

Aerial Photograph contd.

1903 – The Bavarian Pigeon Corps uses pigeons to take aerial photos.



1914 - WWI provided a boost in the use of aerial photography.



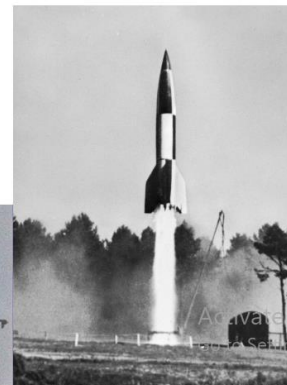
1934 - The American Society of Photogrammetry and Remote Sensing.

1938 - A German General Werner von Fritsch, stated: "**The nation with the best photo reconnaissance will win the next war!!**"

1940 - World War II brought about more sophisticated techniques.

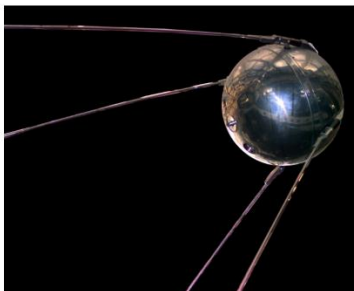
1946 - First space photographs from **V-2 rockets**.

1954 - **U-2** takes first flight.



Satellite Era

1957 - Russia launches Sputnik-1



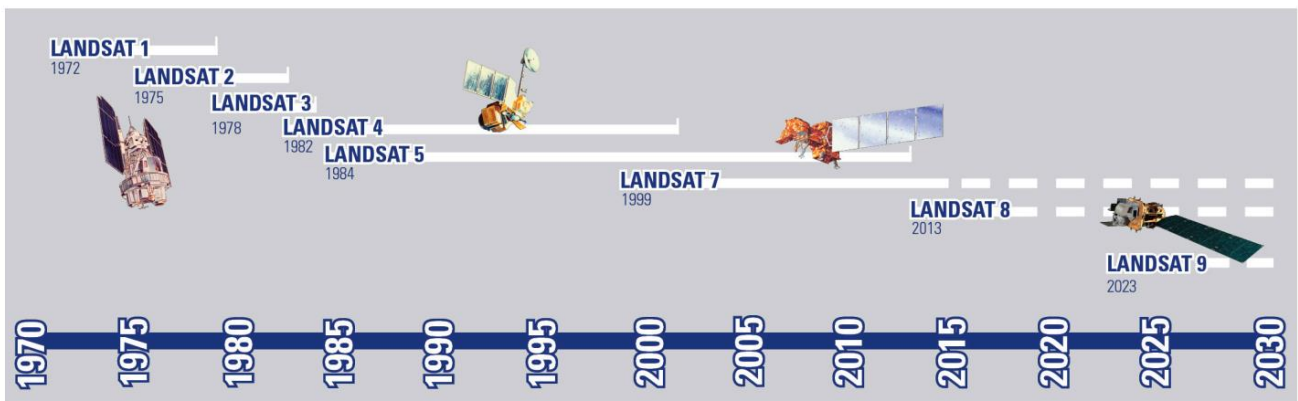
Late 1960's - US's Gemini and Apollo Space photography



Landsat Program : Mission Earth

Launched on July 23, 1972, **Landsat 1**, initially named ERTS (Earth Resources Technology Satellite), was the first satellite designed to study and to monitor the Earth’s surface, more specifically its landmasses.

The sensors on **Landsat 1** revolutionized remote sensing. They provided imagery in digital format and in multi-spectral form. It was the beginning of traditional aerial photography taken from planes for decades being replaced by digital imagery recorded from satellites.



Fundamental difference

Photographs are analogue(printed), however, images are digitally recorded.

“All images are photographs, but all photographs are not images.”

