

UNIVERSITY OF TWENTE.



Training Course

Remote Sensing – Basic Theory & Image Processing Methods

19 – 23 September 2011

Introduction to Remote Sensing

Michiel Damen (September 2011)

damen@itc.nl



FACULTY OF GEO-INFORMATION SCIENCE AND EARTH OBSERVATION





Course: Remote Sensing – Basic Theory & Image Processing Methods - 19 - 23 September 2011
Caucasus Environmental NGO Network



Overview

- **Some definitions**
- **Remote sensing history**
- **Examples of remote sensing images**
- **Remote sensing sensors – passive & active**
- **Electro magnetic spectrum**
- **Remote sensing platforms**
- **Spatial data acquisition**
- **Questions**



UNIVERSITY OF TWENTE. Michiel Damen, ITC



Remote Sensing

Remote Sensing is the art, science and technology of observing an object scene, or phenomenon by instrument-based techniques.

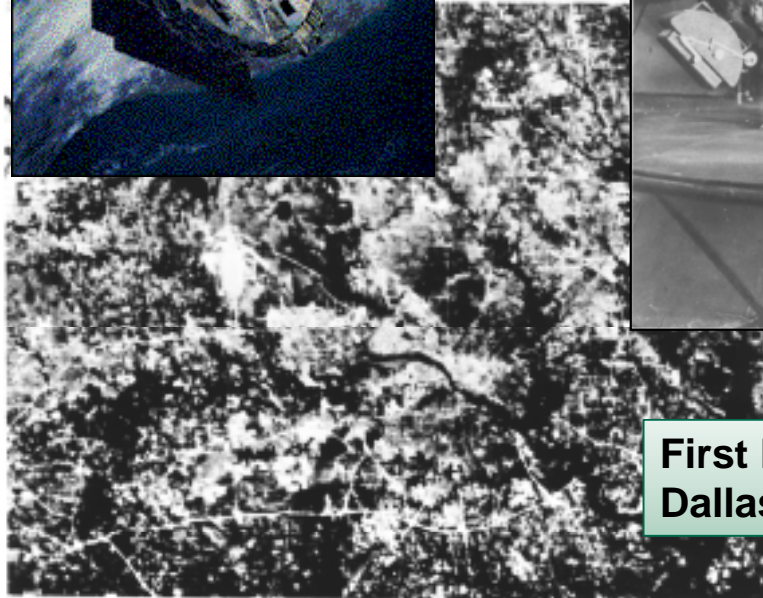
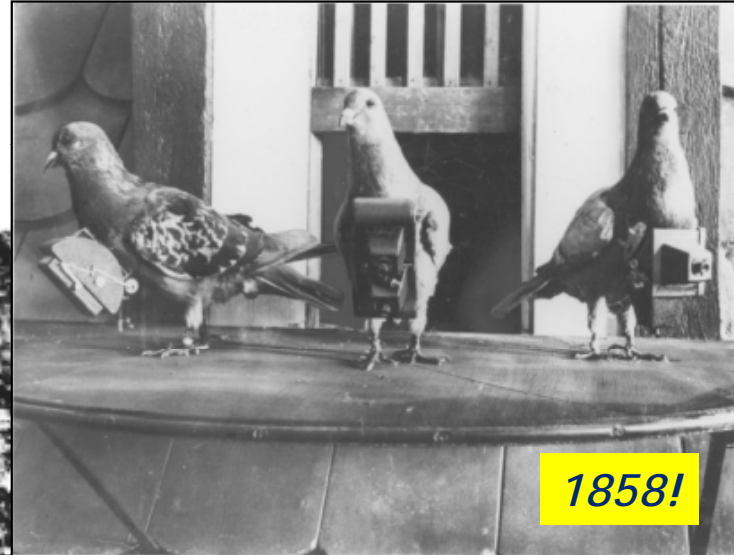
Remote: because observation is done at a distance without physical contact with the object of interest

Sensing: Detection of energy, such as light or another form of electromagnetic energy





Remote sensing history





Remote sensing data

Geospatial data acquisition (GDA):

Collection, processing and analysis of data for various purposes:

- Water management
- Land management
- Resource management, etc.

Data :

representations that can be manipulated by a computer

Information :

interpreted data

“GEO” : geodetically defined coordinate system

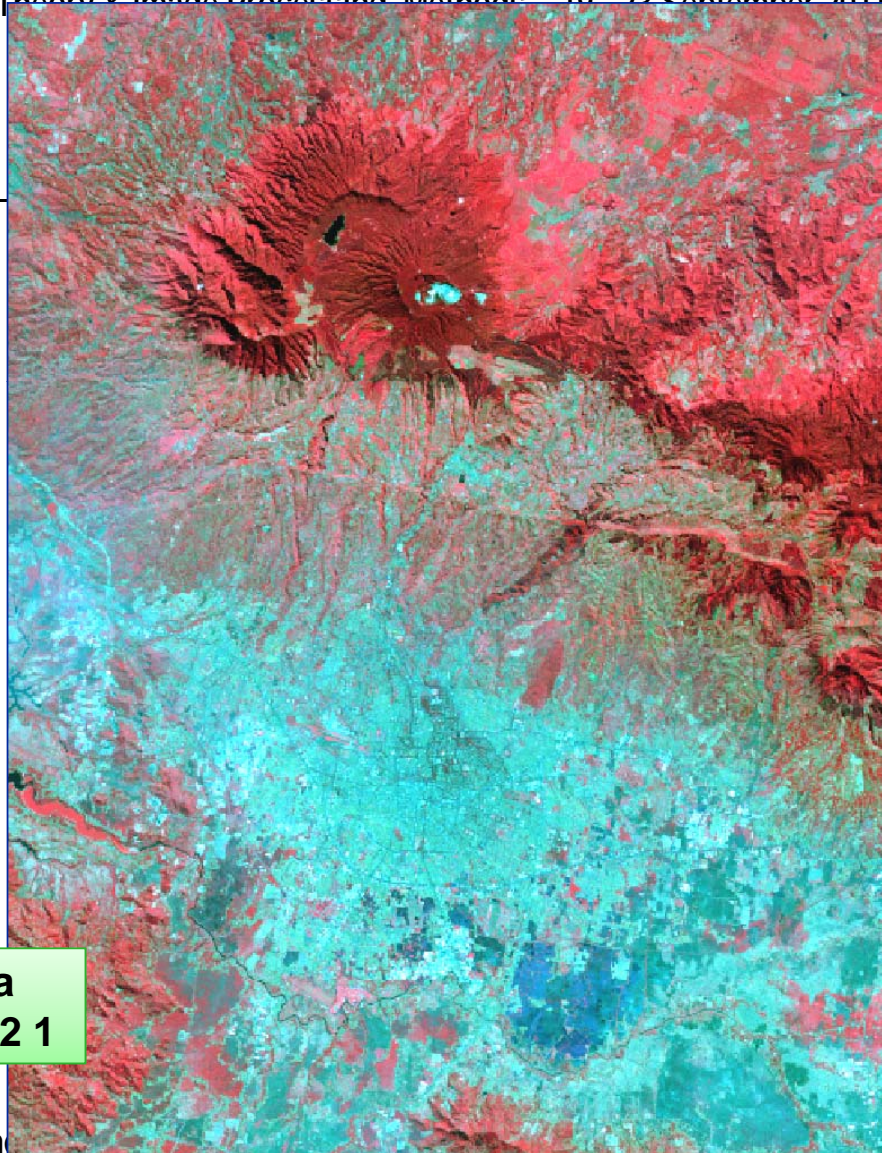




Course: Remote Sensing – Basic Theory & Image Processing Methods – 19 – 22 September 2011

Caucasus Environmental NGO Network

Remote sensing image



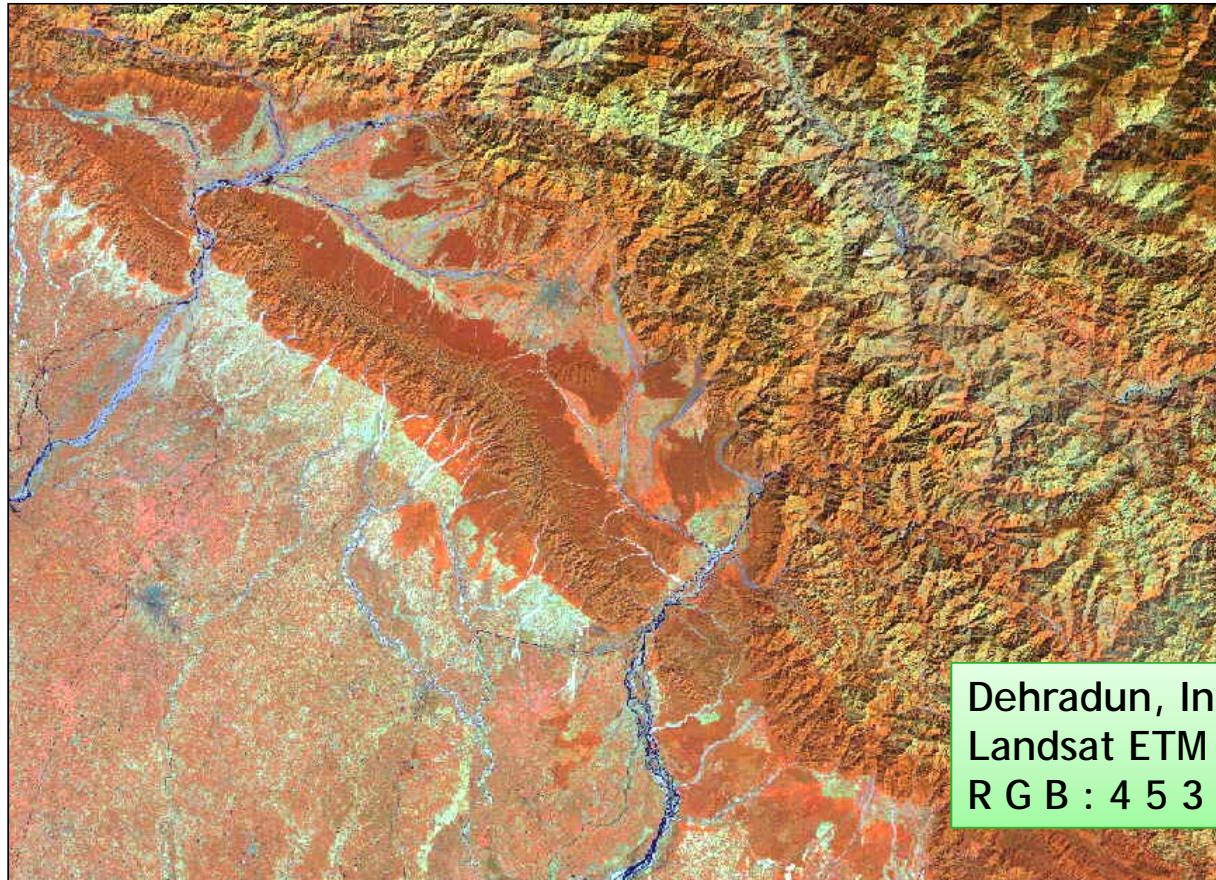
Bandung, Indonesia
ASTER R G B : 3N 2 1



UNIVERSITY OF TWENTE. Michiel Dam



Remote sensing image

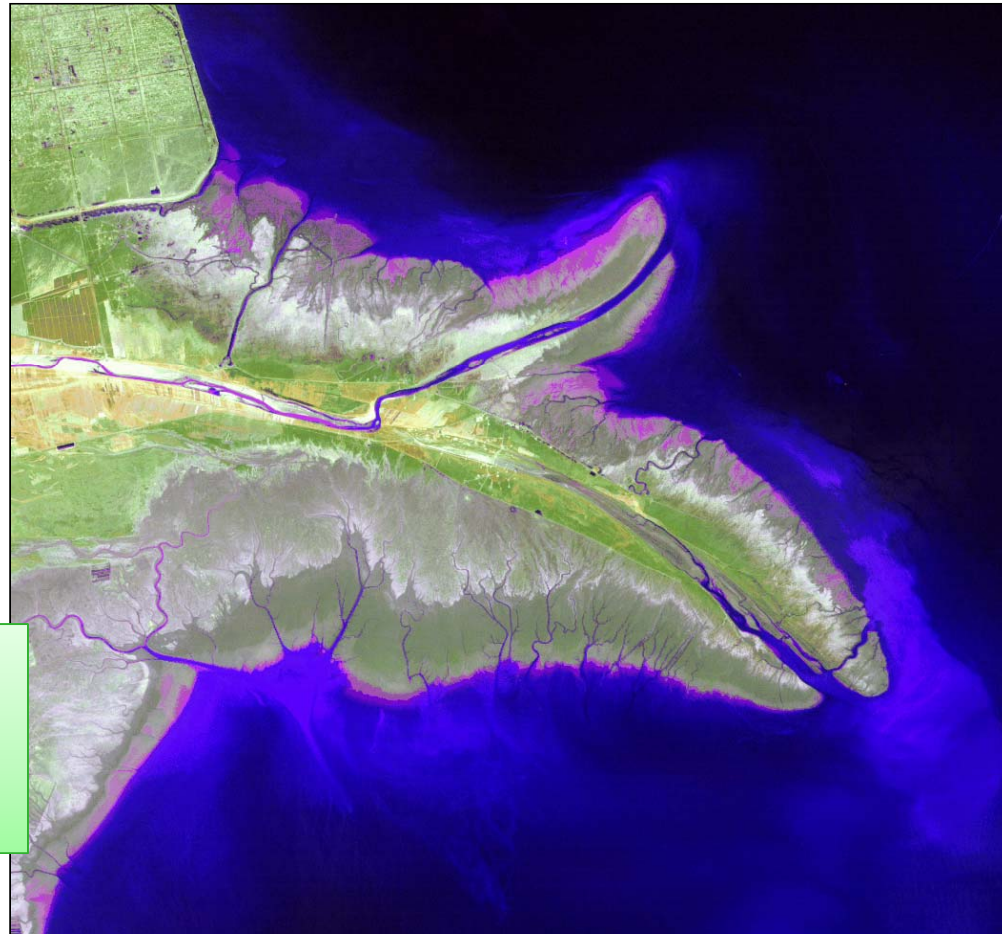


Dehradun, India
Landsat ETM
R G B : 4 5 3





Remote sensing image



**Yellow River
delta, China
Landsat ETM
R G B : 4 5 3**

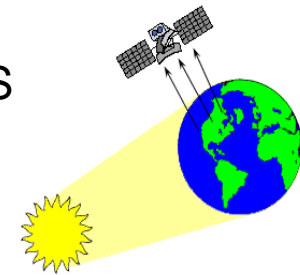


Remote sensing sensors

Passive sensors

collect electromagnetic radiation in the visible and infra-red part of the spectrum:

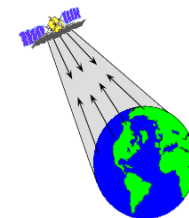
- Aerial Photographs
- Low resolution: Landsat, ASTER, SPOT, IRS
- High Resolution: Quickbird, IKONOS



Active sensors :

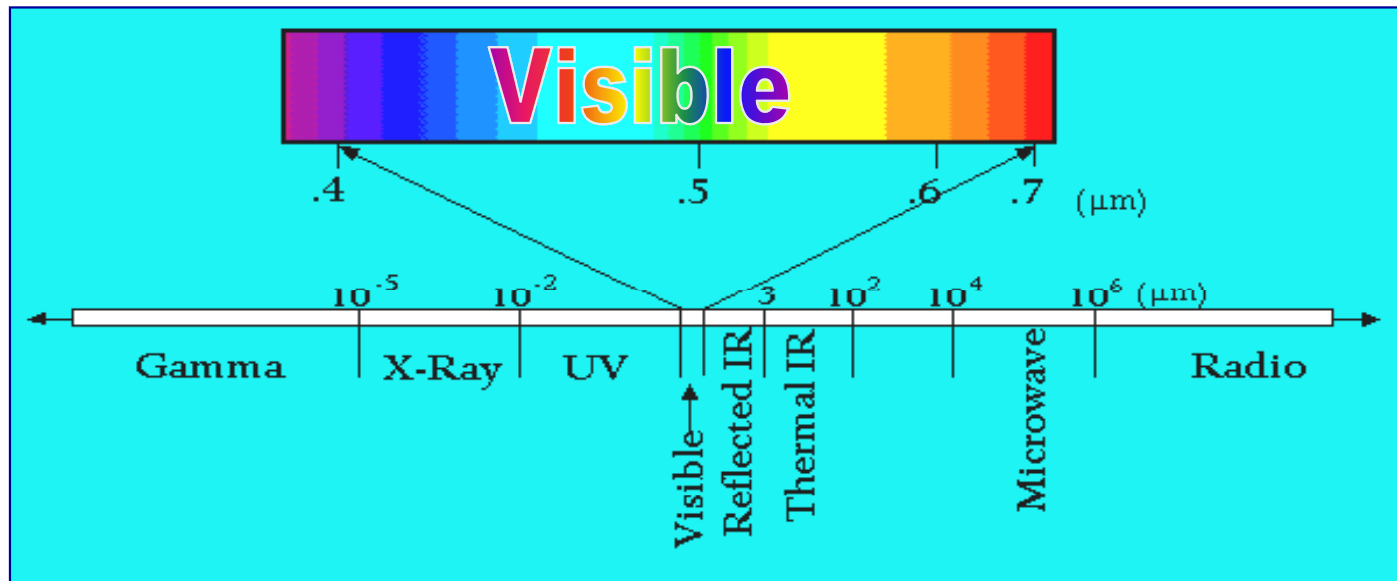
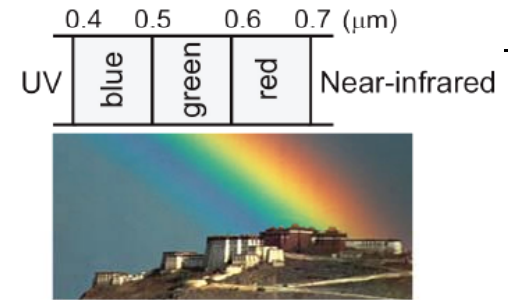
generate their own radiation:

- Air-borne radar
- Space borne radar: ERS 1 / 2, Radarsat
- Lidar (laser scanner)
- Shuttle Radar Topography Mission Data (SRTM)



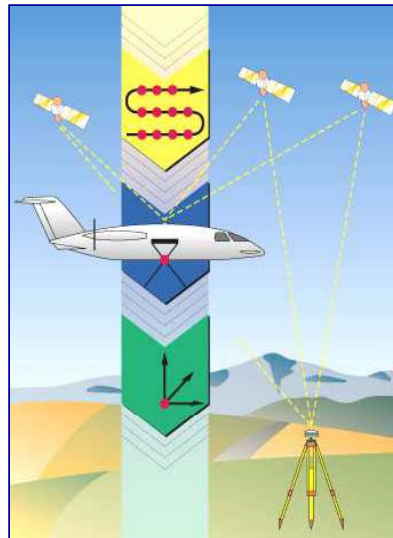
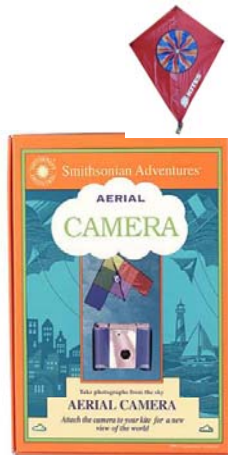


Remote sensing spectrum

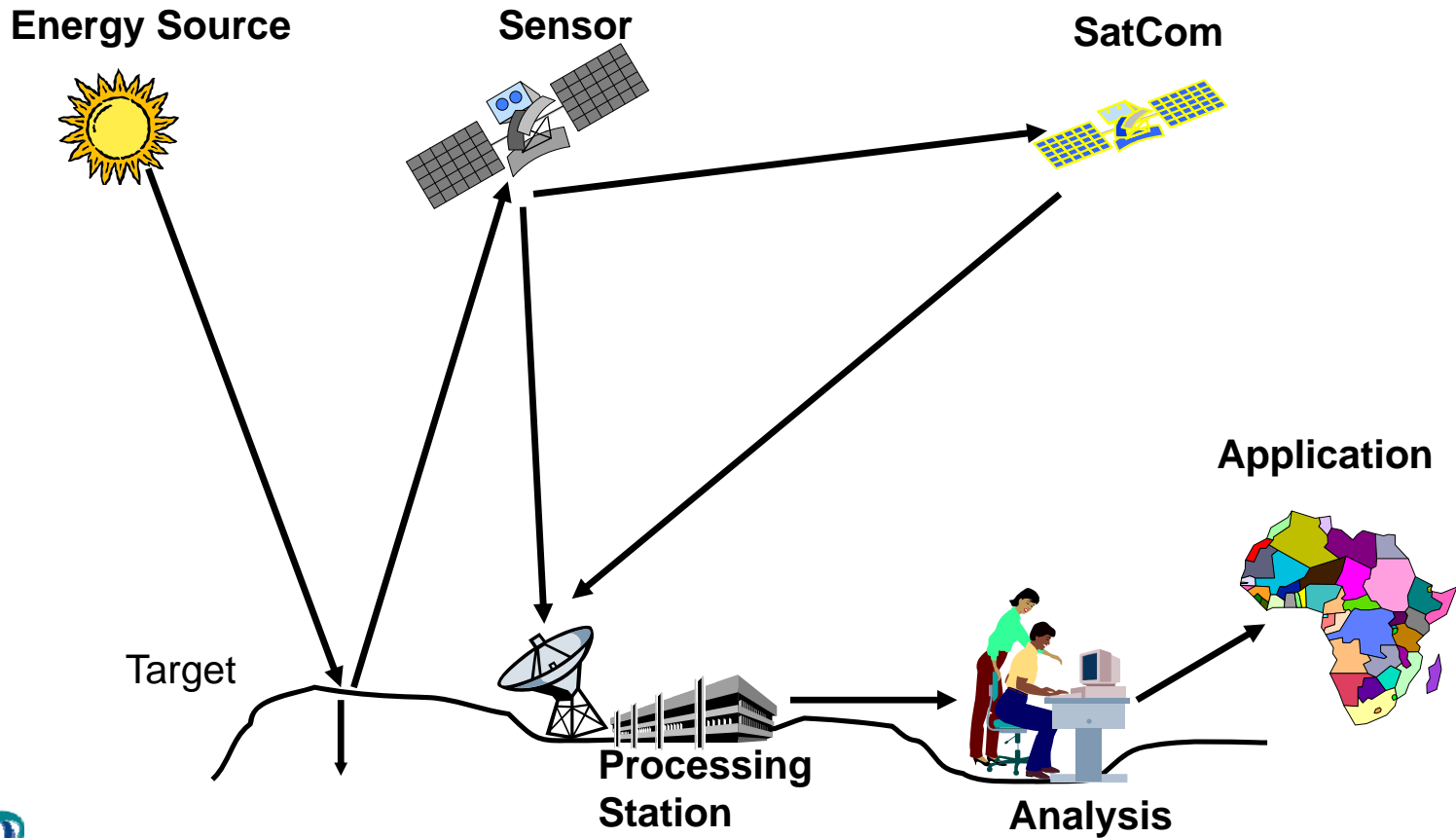


Remote sensing platforms

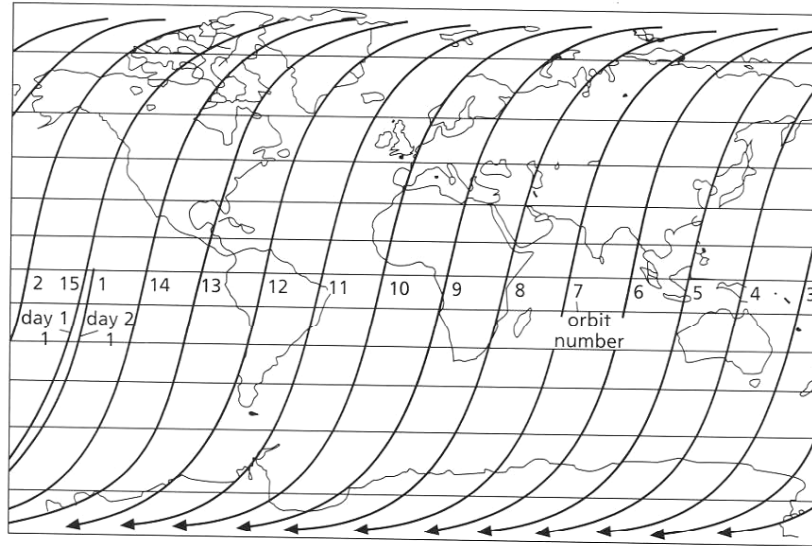
- **Satellite platform : 700 - 800 km above the earth surface**
- **Aeroplane**
- **Helicopter**
- **Microlight**
- **Kite**



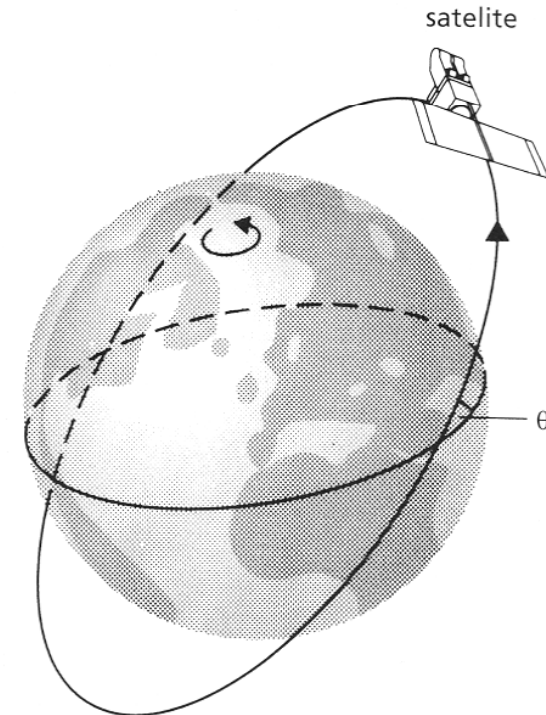
Remote sensing data steams



Remote sensing satellite orbit



**Ground tracks
Sun synchronous Landsat satellite**



Figures: Drury, Image Interpretation in Geology



Spatial data acquisition

Ground based methods

Making field observations, taking in-situ measurements.

Remote sensing

Methods are based on the use of image data acquired by a sensor, such as aerial camera's scanners or radar.





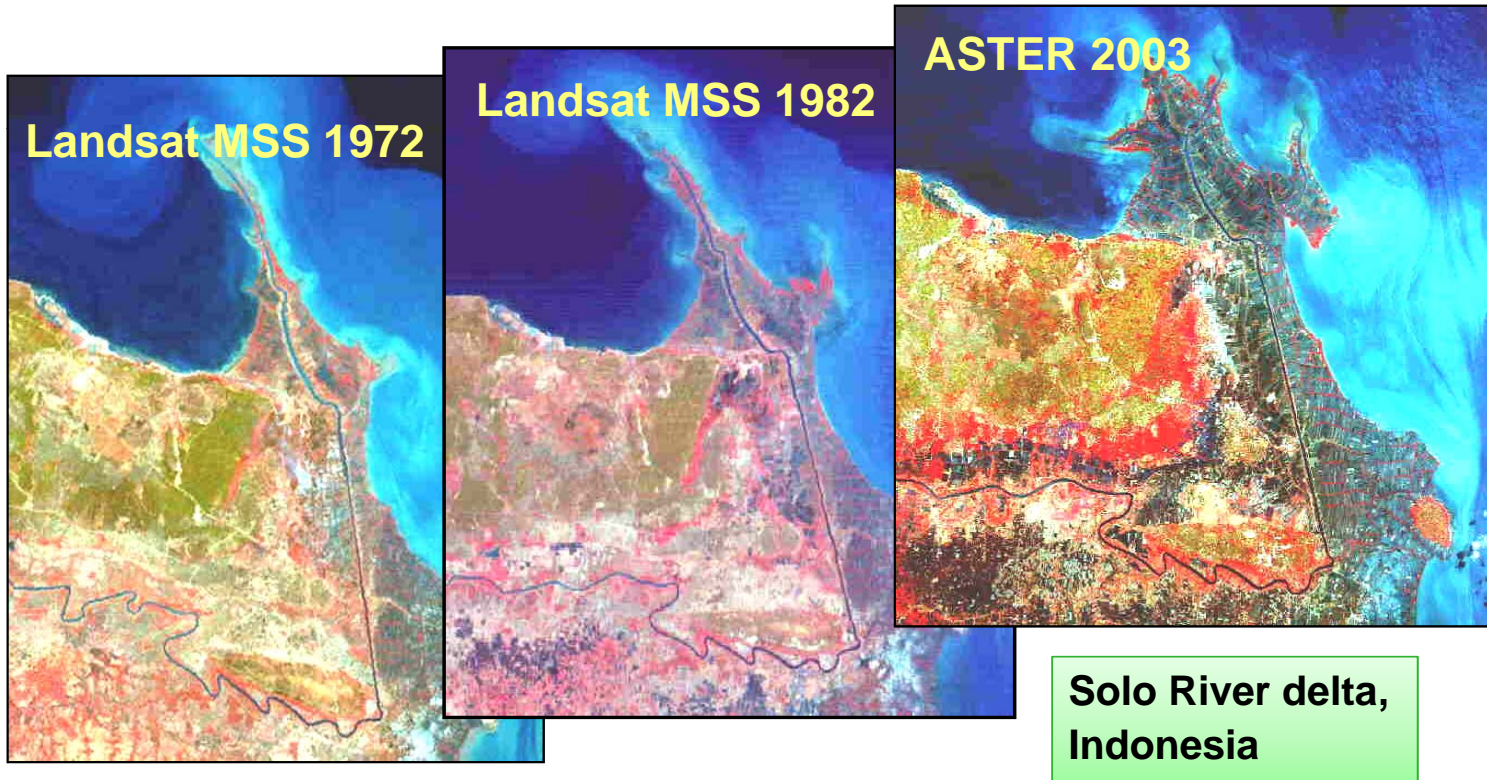
Spatial data acquisition

Ground based methods

Making field observations, taking in-situ measurements.



Spatial and temporal aspects



Spatial data acquisition

Ground based methods

Making field observations, taking in-situ measurements.

Use of Mobile GIS

iPAQ from HP / Compaq



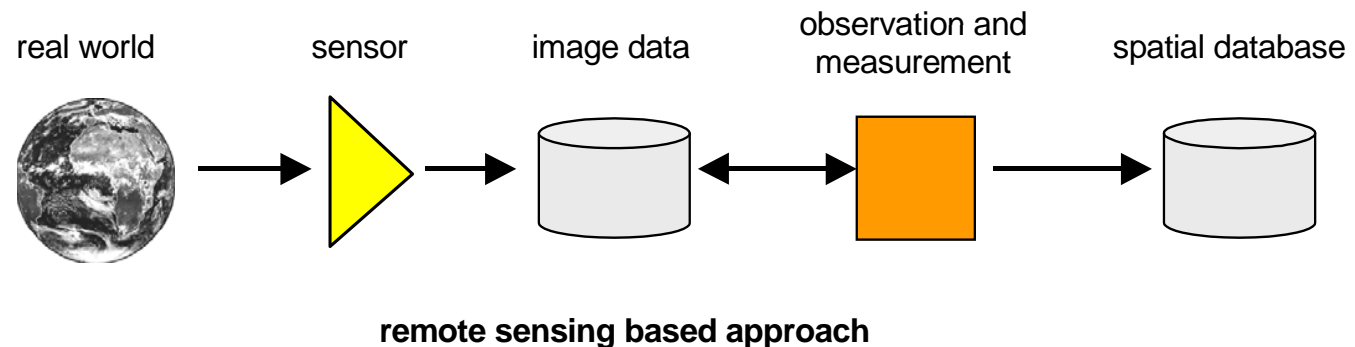
GPS



Connection through Bluetooth

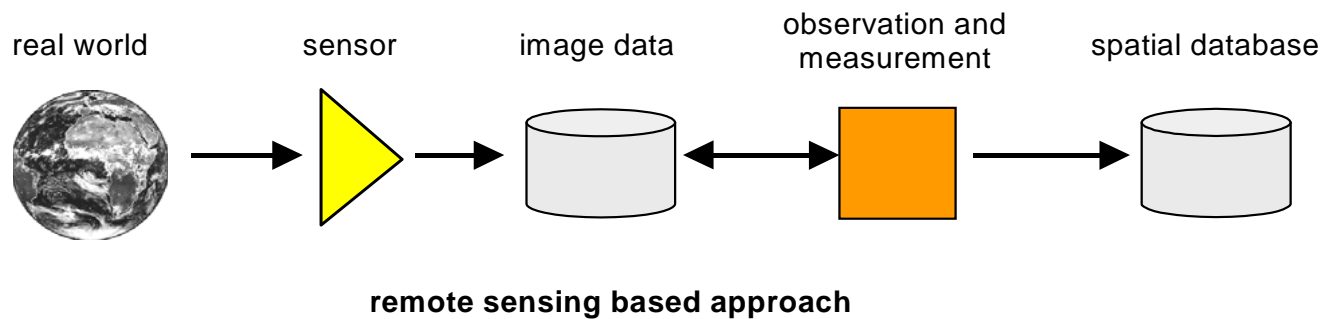
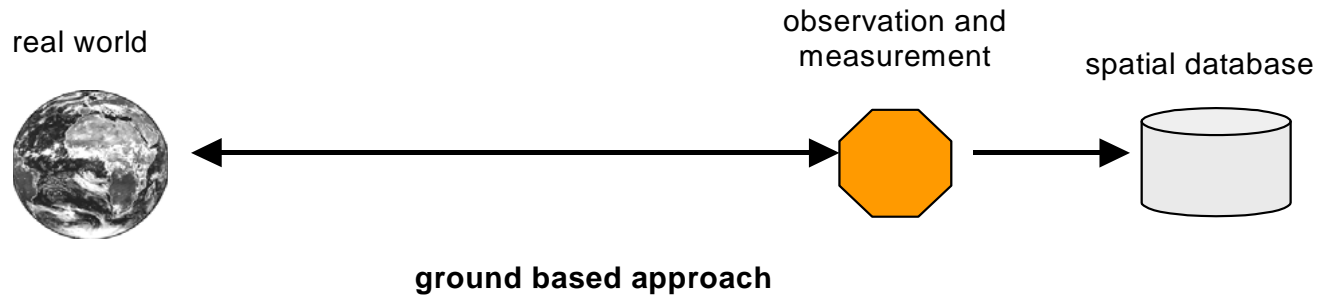
Spatial data acquisition

Remote Sensing methods are based on the use of image data acquired by a sensor, such as aerial cameras, scanners or a radar.



Spatial data acquisition

Ground based vs. Remote Sensing based





Spatial data acquisition

- RS sensors can be divided into **passive** and **active** sensors
- **Passive sensors** detect EM radiation in the visible and IR part of the spectrum
- **Active sensors** (radar) generate their **own radiation**
- There exist different RS platforms: space-borne, air-borne (plane, helicopter, micro-light)
- For analysis of the RS images is also ground checking needed





Applications of remote sensing

Question :

How is remote sensing used in your organization?

- ❖ **Kind of RS data (sensors etc.)**
- ❖ **Software used**
- ❖ **Created output**
- ❖ **G I S**

