

# **Remote sensing and Image Processing**

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# Lecture-1

## Introduction to Remote Sensing

(Definition ,history and development of Remote sensing)

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# Introduction to Remote sensing

## What is “Remote sensing”?

- Using artificial devices, rather than our eyes, to observe or measure things from a distance without disturbing the intervening medium
- Remote sensing is defined as the science which deals with obtaining information about objects on earth surface by analysis of data, received from a remote platform.

# Introduction to Remote sensing

- "reconnaissance from a distance," "teledetection," or a form of the common adage "look but don't touch"
- Remote sensing is the technique of deriving information about objects on the surface of the earth without physically coming into contact with them(NRSA-1995)
- Sensing of an object without having any physical touch.

# Types of Remote sensing

- 1.Spectral Remote sensing
- 2.NonSpectral Remote sensing

## 1.Spectral Remote sensing

- a. Photographic Remote sensing
- b. Non photographic Remote sensing

## 2.NonSpectral Remote sensing

- a. Audio Sensing(Sound)
- b. Action Sensing
- c. Geophysical Sensing

# Continue.....

Depending on the scope, remote sensing may be broken down into:

- ❖ *Satellite Remote sensing*—when satellite platforms are used
- ❖ **Photography and photogrammetry**—when photographs are used to capture visible light
- ❖ **Thermal Remote sensing**—when the thermal infrared portion of the spectrum is used
- ❖ **RADAR remote sensing**—when microwave wavelengths are used
- ❖ **LIDAR Remote sensing**—when laser pulses are transmitted toward the ground and the distance between the sensor and the ground is measured based on the return time of each pulse

# Historical prospective in Remote sensing

**1.Ludwing Raharman** of Germany –First man to take Birds eye photographic view in 1881

➤ He has used rocket-Propelled camera system from parachute

## **2.AlFord Maul(1907)**

Added the concept of Gyrostabilisation to rocket camera

➤ In 1912 he has sent a 41 kg pay load containing 200\*250 mm format camera to a height of 790m.

## **3.1946-1950**

Number of camera of different dimensions were put in V-2 rockets lunched from sand proving ground

# Continue.....

## **4.In succeeding years:**

Photographs were taken from

- ❖ Rockets
- ❖ Ballistic Missiles
- ❖ Satellites
- ❖ Manned spaced craft
  - Overall poor quality photographs
  - Mostly for the meteorological purposes



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## 5. TIROS-1 (Television Infrared Observation Satellite) ,(1960)

Meteorological satellite

provided coarser vision of about cloud pattern

6.1960's

### A. MERCURY MISSION

(i). **Alan B. shepard. (Jr.)** in 1961 has made a sub orbital mercury flight taken 150 photographs (using Automatic Camera)

➤ Sown only sky, cloud, ocean

(ii) **John Glenn Jr. (1962)** took three orbits around the earth and took 48 colour photographs in mercury mission

➤ Desert, cloud and water

➤ In mercury flights colour reversal photographs were also taken using Hasselblad Cameras (80mm lenses)

# Continue.....

## **B. Gemini Mission**

First Gemini mission took overlapping photographs for geology

- Lead to new and scintillating discoveries in Tectonics, Volcanoes and Geomorphology
- 1100 High quality colour photographs were taken

## **C.Appolo program:**

- Collected multispectral orbital photography
- Four camera array
- Eclectically driven
- 70mm Hasselblad camera
- Photographs were produced using pan chromatic films with Green,Red, Black and white ,IR film ,colour IR film.

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## **D.1973 SKY Lab :**

- American Astronauts collected 35,000 images called **EREP(Earth Resources Experiment Packages)**
- Included 6 camera multispectral array
- Long focal length (Earth terrain camera)
- 13 channel multispectral scanner
- Pointate Spectro Radiometer
- Two microwave systems

## **E.USSR Apollo- Soyu Z test project(ASTP)**

- Hand held 35 and 70mm Camera

## **F.LANDSAT PROGRAM**

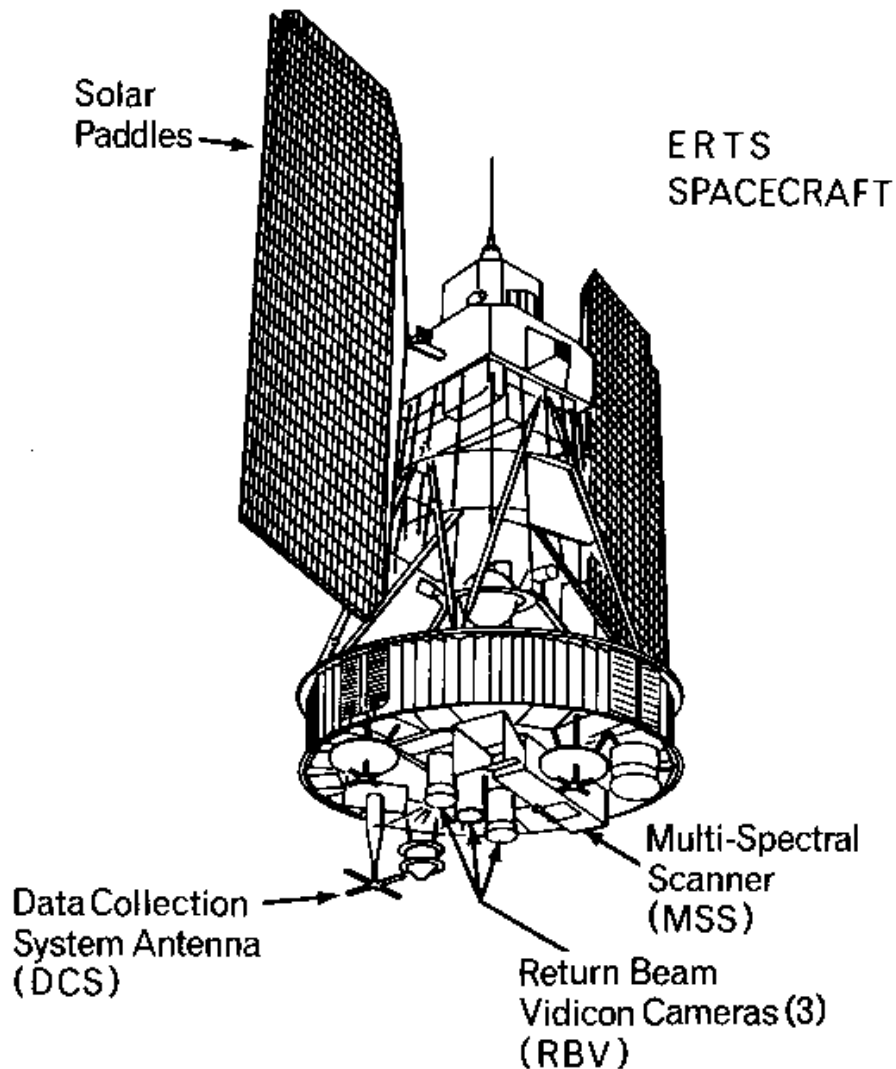
Started in 1967

(I)ERTS(Earth Resources Technology Satellites)-  
Satellites A,B,C,D,E,F

Latter called 1,2,3,4,5

(ii)ERTS 1/LANDSAT:

- Launched July 23 ,1972
- Thor –Delta rocket
- Platform NIMBUS Weather satellite
- Four band 4,5,6,7



Landsat: America's most successful Unmanned Satellites

### iii.LANDSAT-2

➤Jan 1975

➤4bands of MSS AND RBV

### IV.LANDSAT-3 MARCH 1978

Same as LAND SAT 2

### V.LANDSAT 4 AND 5

➤JULY 1982 and MARCH 1984

➤MSS and TM Band

# Continue.....

- **Indian remote sensing programmes**

- i.ARYABHAT MISSION

- Launch 19th April 1975

- II.PSLV LAUNCHING

- III.SLV3 & ROHINI

- IV.ASLV&SROSS

- AUGUMENTED SATELLITE LAUNCHING  
VECHICLE&STRECTHED ROHINI SERIES OF  
SATELLITE

- V.BHASKRA SATELLITE-launched in 1979

- VI.APPLE(ARIANE PASENGER PAYLOAD EXPERIMENT)

- VII.IRS MISSION

- IRS1A-17MARCH 1988

- IRS1 B

# Continue.....

## Other missions

### (a) Heat Capacity Mapping Mission (H.C.M.M)

- Heat capacity mapping radiometer (H.C.M.R)
- Two bands
  - 0.5-1.1 micrometers
  - 10.5-12.5 micrometers

### (b) SEASAT

- 26 June 1978
- Failed on 10.10.1978
- Radar Altimeter
- Synthetic Aperture Radar (SAR)
- Wind Scatterometer
- Scanning multichannel microwave radiometer (SMMR)

**C.** Nimbus 1 1964-08-28

Nimbus 2 1966-05-15

Nimbus 3 1969-04-14

Nimbus 4 1970-04-08

Nimbus 5 1972-12-11

Nimbus 6 1975-06-12

### **NIBUS -7**

➤ 24 October 1978

➤ 6 Bands

➤ Coastal

➤ Ocean studies

➤ Atmospheric studies

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**SPOT**(Système Pour  
l'Observation de la Terre )  
**MISSION**

a.SPOT-1

- Feb'1987
- HRV Camera
- 10m-PAN
- 30m multispectral
- 3 spectral bands

NOAA

- By National Oceanic  
Atmospheric Administration
- Has four instruments
  - ❖ AVHR(5Channels)
  - ❖ TIROS (Television Infrared  
Observation Satellite )
  - ❖ Operational Vertical  
Sounder(TOVS)
  - ❖ Data Collecting system  
(DCS)
  - ❖ Space Environment  
Monitor(SEM)