

GEM 32023: Remote Sensing and GPS

Introduction to Remote Sensing and GPS

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Content:

Introduction to the Course

Introduction to Remote Sensing & GPS

Concepts of Space

Earth-SYSTEMS



ENVIRONMENT



LANDUSE



WATER



AGRICULTURE



SOILS



FORESTS



GEOSCIENCES



OCEANS

Application Areas.....

- Agriculture
- Environmental Management
- Water Resources
- Conservation
- Health
- Defense and Intelligence
- Forestry
- Emergency/Disaster Management
- Land Administration
- Civil Engineering
- Community Mapping and Analysis
- Marine and Coast
- Energy and Climate Change
- Homeland Security
- Law Enforcement
- Fire Protection
- Urban and Regional Planning
- Telecommunications
- Water/Wastewater
- Transportation
- Electric and Gas
- Surveying
- Mining
- Banking and Financial Services
- Insurance
- Media and Press
- Public Works
- Elections
- Real Estate Valuation
- Facilities Management

Job Market

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Globe

www.indeed.com/q-GIS-Field-Technician-jobs.html

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indeed one search. all jobs.

what: GIS Field Technician Find Jobs

GIS Field Technician jobs

Sort by: relevance - date

▼ Salary Estimate

- \$30,000+ (469)
- \$50,000+ (237)
- \$70,000+ (92)
- \$90,000+ (25)
- \$110,000+ (4)

► Title

► Company

► Location

► Job Type

► Employer/Recruiter

Geospatial Technician
Quantum Spatial ★★★★★ 2 reviews - Norcross, GA
Bachelor's Degree in GIS, Geography, Computer Science, Engineering or related technical field, or equivalent work experience...
14 hours ago - [save job](#) - [email](#) - [more...](#)

GIS Technician
AECOM ★★★★★ 1 review - Orlando, FL
AECOM is seeking opportunity GIS Technicians with Bachelor's degree in geography, planning, engineering, or computer science related field...
7 hours ago - [save job](#) - [email](#) - [more...](#)

GIS / ENVI Technician
n-Link - Bend, OR
Position reports to Field Operations Manager. Efficient management of GIS and imagery processing hardware and software...
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Drafter/GIS Technician
Duquesne Light ★★★★★ 7 reviews - Pittsburgh, PA
Using GIS software, check, revise or update drawings, maps, tables and other information. May make field trips, normally with others, to collect necessary...
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GIS Technician
Merced County, CA - Merced, CA
Assists customers with GIS related questions and in the use of online GIS applications. Monitors and tests various GIS on-line applications....
6 days ago - [save job](#) - [email](#) - [more...](#)

Engineering Technician I
City of Portland, OR - Oregon
Additional duties may include performing field asset management inventory, roadway distress ratings on city streets, database management and GIS mapping...
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geo COMMUNITY www.geocomm.com

Global Mapper

GeoCommunity

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Network with other Geospatial Industry professionals
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Geography Job - Job Listings and Resources in Geography. (Added March 27, 2009)

Getting A Way Tough Career Geographer - This resource from the NCGE is intended for... (Added Dec. 2009)

Now What? - How to Ensure Your Résumé Produces Top Results. Feature contributor [computerWorld H1-B Information](#) - If you hire H1B visa holders or if you're in the U resource for updates.

GIS Project Management Excellence - Project failure is endemic in the geo-spatial know why 85% of all projects fail to meet all of their critical measures of success? Re Hamil of MESA Solutions, Inc. (Jan. 21, 2002)

Career Announcement Writing Tips - Before you place your online Career Announcement, consider.

Geographers and the TN Visa - A guide for hiring Canadians to work in the US.

Illegal Interview Questions - Did you know that there are a number of interview questions employers can not require you to answer... check it out here!

Fact - Massachusetts has replaced Illinois as 4th Largest Cyberstate; The State Now is the 4th Largest Cyberstate.

H-1B Visas: An Update - This article from monster.com provides an update on the H-1B cap on H-1B visas from 115,000 to 195,000 per year, programmers, engineers an easier time finding jobs in the US."

Latest Industry Headlines

- NASA Hosts Media Day Featuring Airborne Storm Mission
- ISPRS Annals Included in Web of Science
- OGC Requests Comment on Extension that Integrates OGC Web Coverage Service Standard
- OGC to Present at Esri 3D Forum, San Diego
- Northern Alaska Coastal Erosion Threatens Habitat and

- Article** (Feb 2001) - Which qualities separate the best from the rest?
- August 2000 GIS Job Site Review** - Our perspective and ranking of popular GIS offer a number of valuable job links as well!
- Article** - How a Job Search Can Effect your Tax Return
- Article** - "Statement On the introduction of a new bill (H.R.4227) to increase the number of H-1B visas"
- Article** - GIS in the Real World: A Primer for Newcomers

Geo-Information Technologies

Geospatial technology is a multi-disciplinary activity which deals with

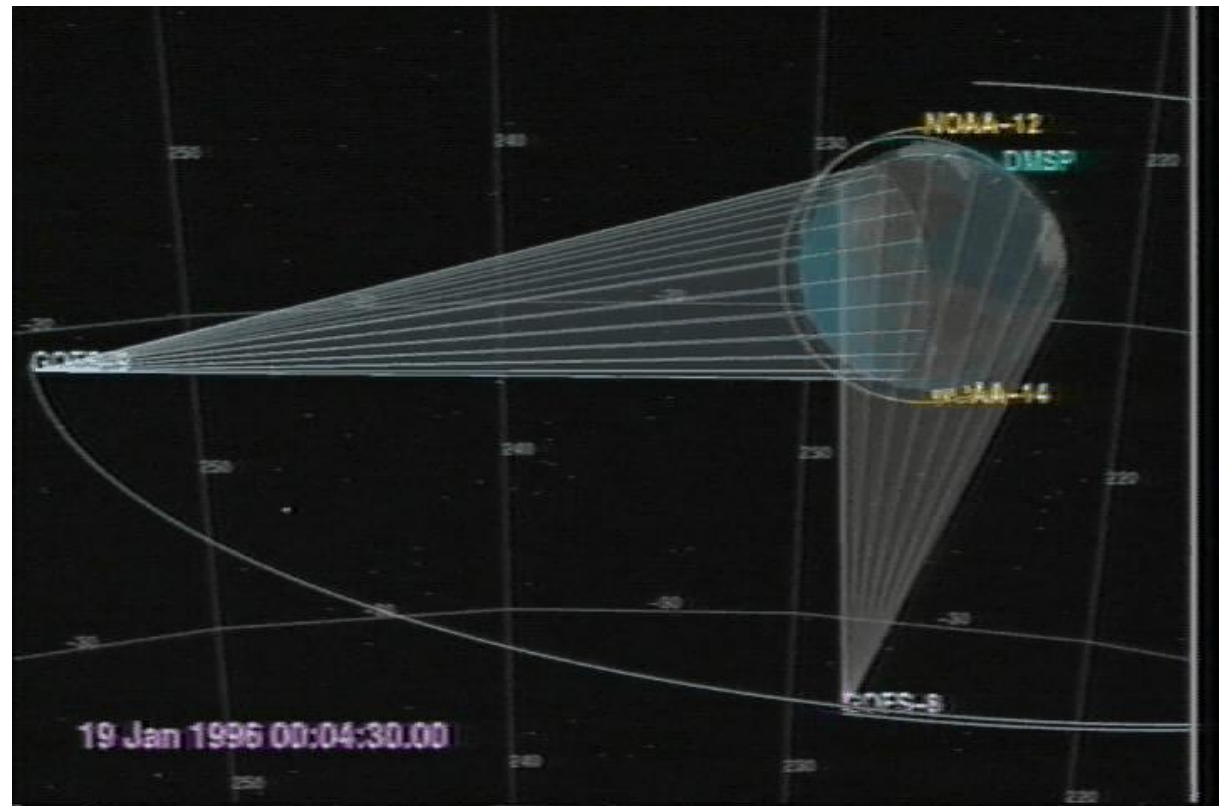
- 1. Remote Sensing (RS)**
- 2. Geographical Information Systems (GIS)**
- 3. Global Positioning Systems (GPS)**

Remote Sensing



EYE IN THE SKY

Remote Sensing means acquiring information about an object, surface or phenomenon while at a distant from the object, surface or phenomenon.



Introduction

- A new revolution in data collection
- Remote sensing was evolved as the ability of man to observe in regions of electromagnetic spectrum, beyond the range of human vision.
- Remote Sensing is attributed to recent technology in which satellites and spacecraft are used for collecting information about the earth's surface.
- The Remote Sensing is basically a multi-disciplinary science
 - optics
 - spectroscopy
 - photography
 - computer
 - electronics and telecommunication
 - satellite launching, etc.
- All these technologies are integrated to act as one complete system in itself, known as Remote Sensing System.

Remote Sensing.....

Spatial Data collection methods

- ❖ Field Survey (Ground based method)
- ❖ Remote Data Acquisition

Remote Data Acquisition

- ❖ Measuring at a distance without physical contact with the object.

Remote Sensing.....

❖ Five senses of human

❖ **Sight**

❖ **Hearing**

❖ **Taste**

❖ **Smell**

❖ **Touch**



Three (sight, hearing, & smell) may be considered forms of “remote sensing”, where the source of information is at some distance. Other two rely on direct contact with the source information.

Eyesight is a form of Remote sensing. When the eye sees an object, electromagnetic radiation , which is the reflected light, from the surface of the object, gets registered in the eye and information is sent to the brain.

DEFINITION OF RS

Defined by the American Society for Photogrammetry and Remote Sensing (ASPRS)

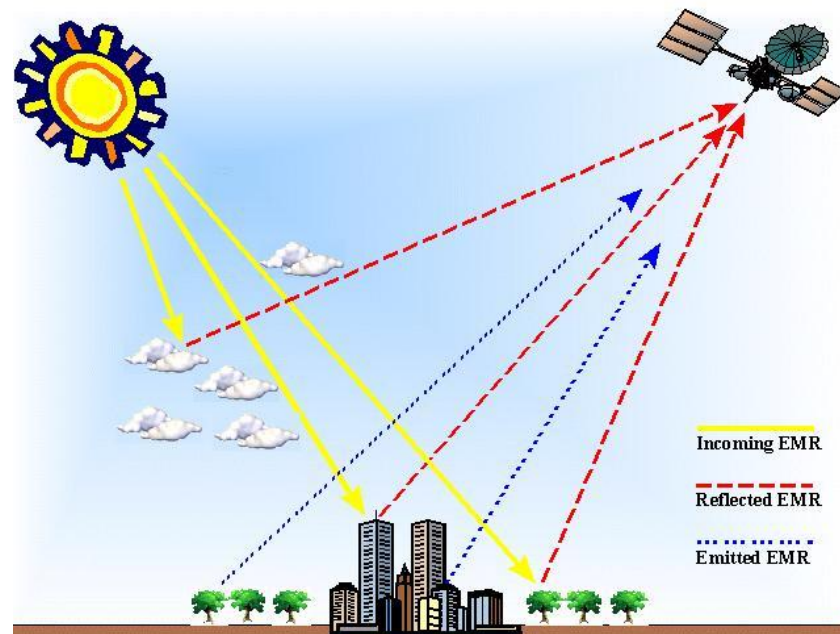
The measurement or acquisition of information of some property of an object or phenomenon, by a recording device that is not in physical or intimate contact with the object or phenomenon under study

(Coldwell, 1983)

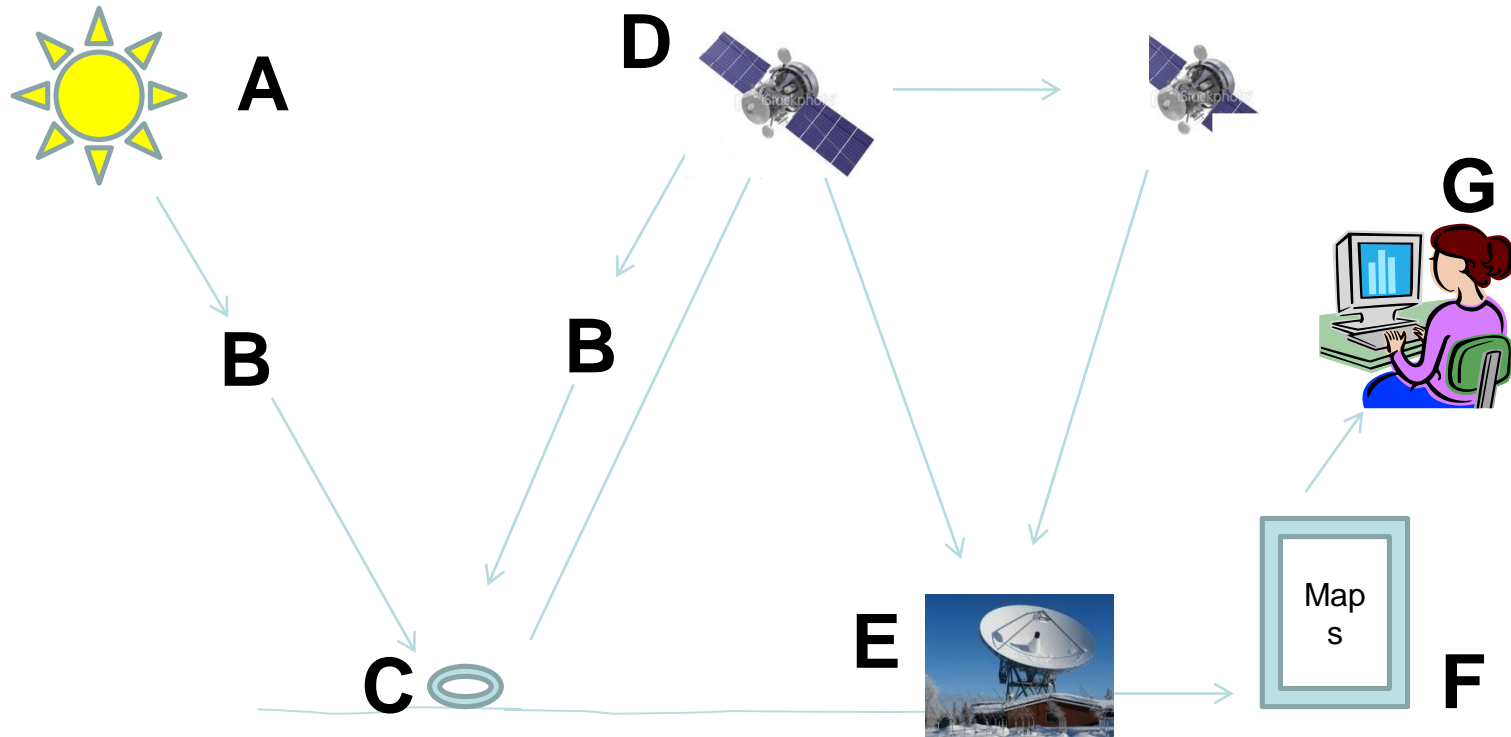
Satellite Remote Sensing

"Remote sensing is the science of acquiring information about the Earth's surface without actually being in contact with it.

This is done by sensing and recording reflected or emitted energy and processing, analyzing and applying that information"



Remote sensing Process



A – Energy Source or Illumination

B – Radiation & the Atmosphere

C – Interaction with the Target

D- Recording of Energy by the Sensor

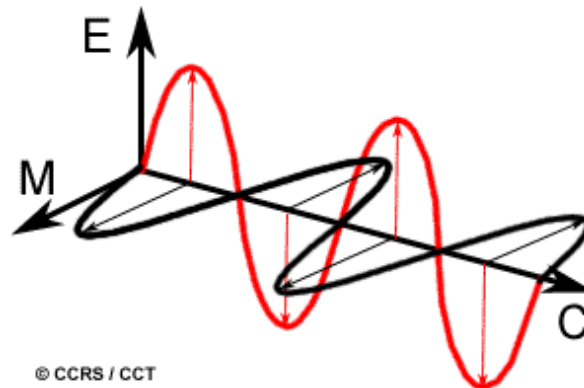
E – Transmission, Reception & Processing

F – Interpretation and Analysis

G - Applications

Electromagnetic Radiation

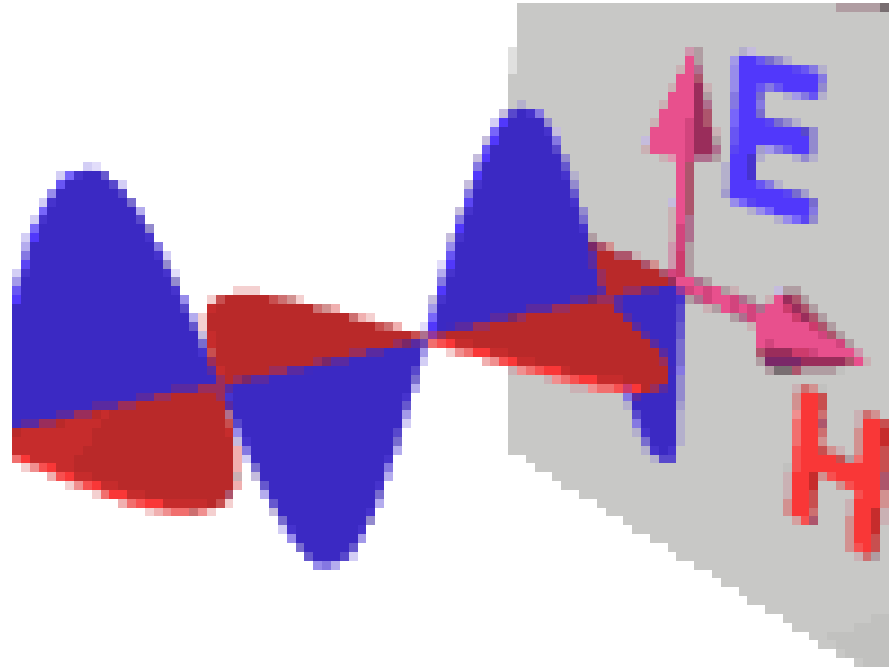
- ❖ First requirement of RS is to have an energy source to illuminate the target.
- ❖ This energy is in the form of electromagnetic radiation
- ❖ ER Transverse waves without a medium. (They can travel through space)
- ❖ Speed of electromagnetic waves = 300,000,000 meters/second (Takes light 8 minutes to move from the sun to earth {150 million miles} at this speed.)



Electromagnetic Radiation

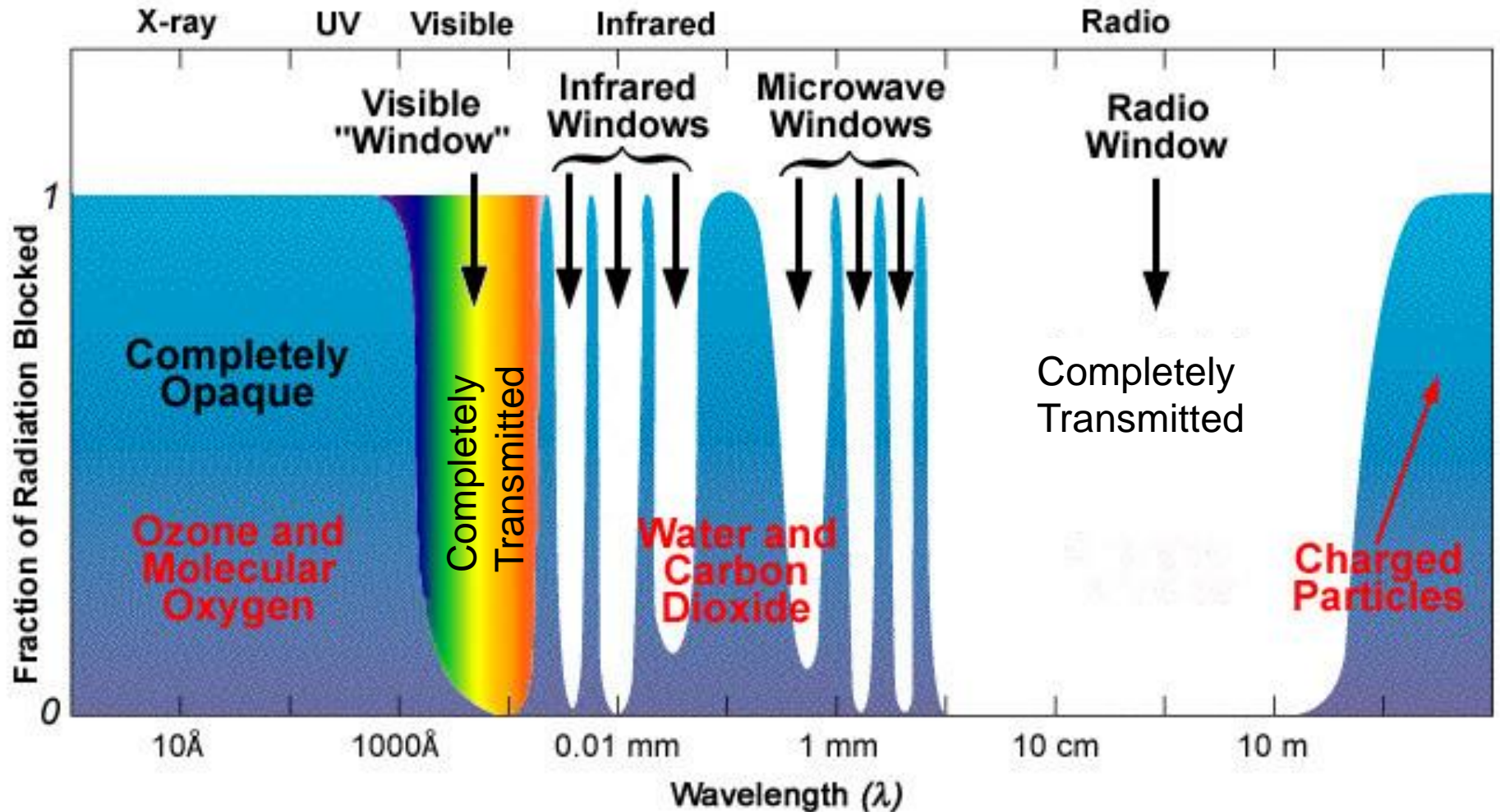
Electro Magnetic Radiation consists of....

- ❖ Electrical Field (E) which varies in magnitude in a direction perpendicular to the direction in which the radiation is traveling.
- ❖ Magnetic Field (M) oriented at right angles to the electrical field.
- ❖ Both these fields travel at the speed of light (c).

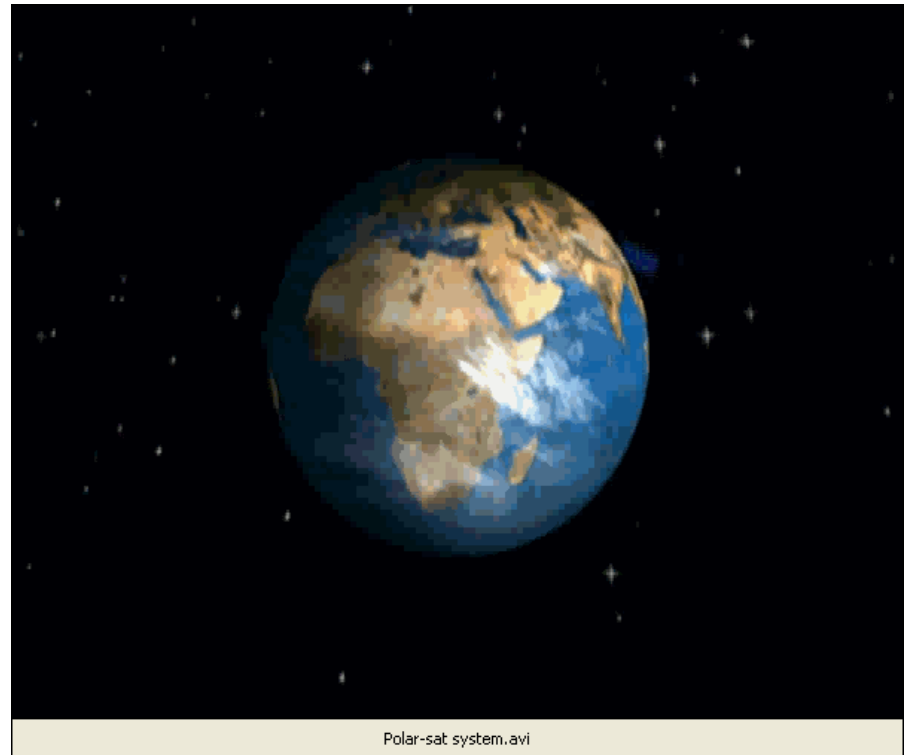
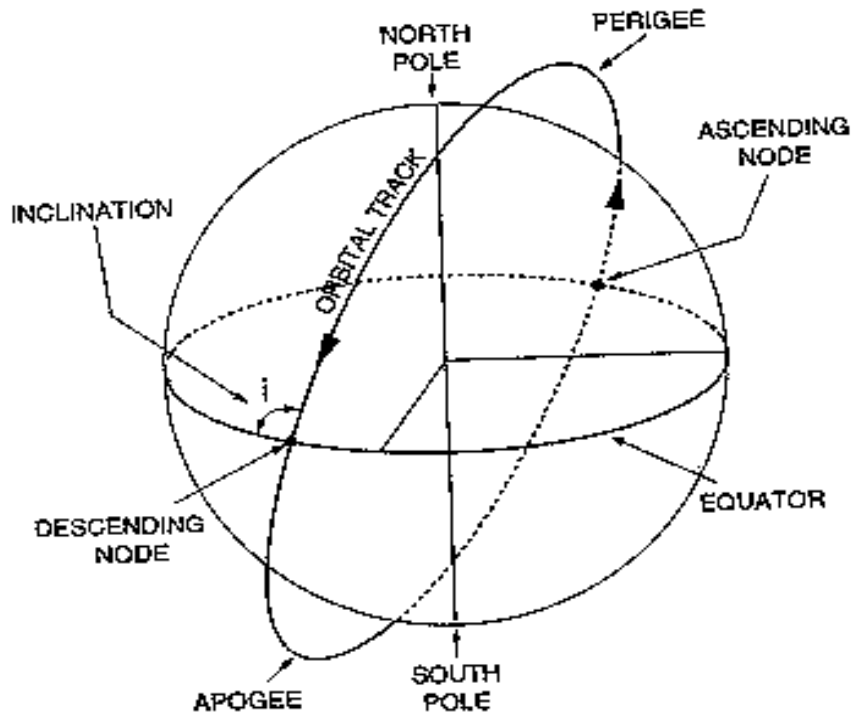


• [Click here → Animation:](#)

Atmospheric Window

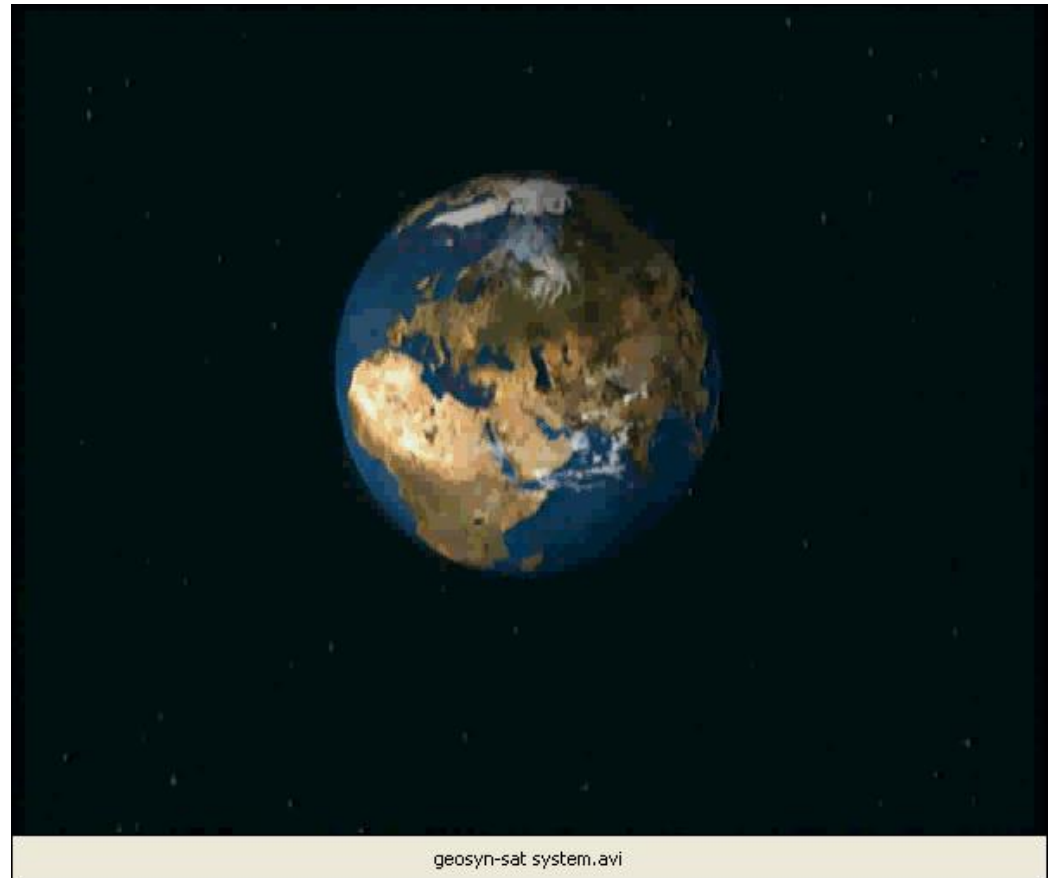


1. Sun synchronous orbit or Polar Orbiting



2. Geostationary orbit

A satellite's period increases with altitude, at an altitude of 36000 Km a satellite has the same period as that of the earth, hence it remains stationary with respect to the earth's surface – geostationary orbit. Geostationary orbits are ideal for meteorological or communication satellites.

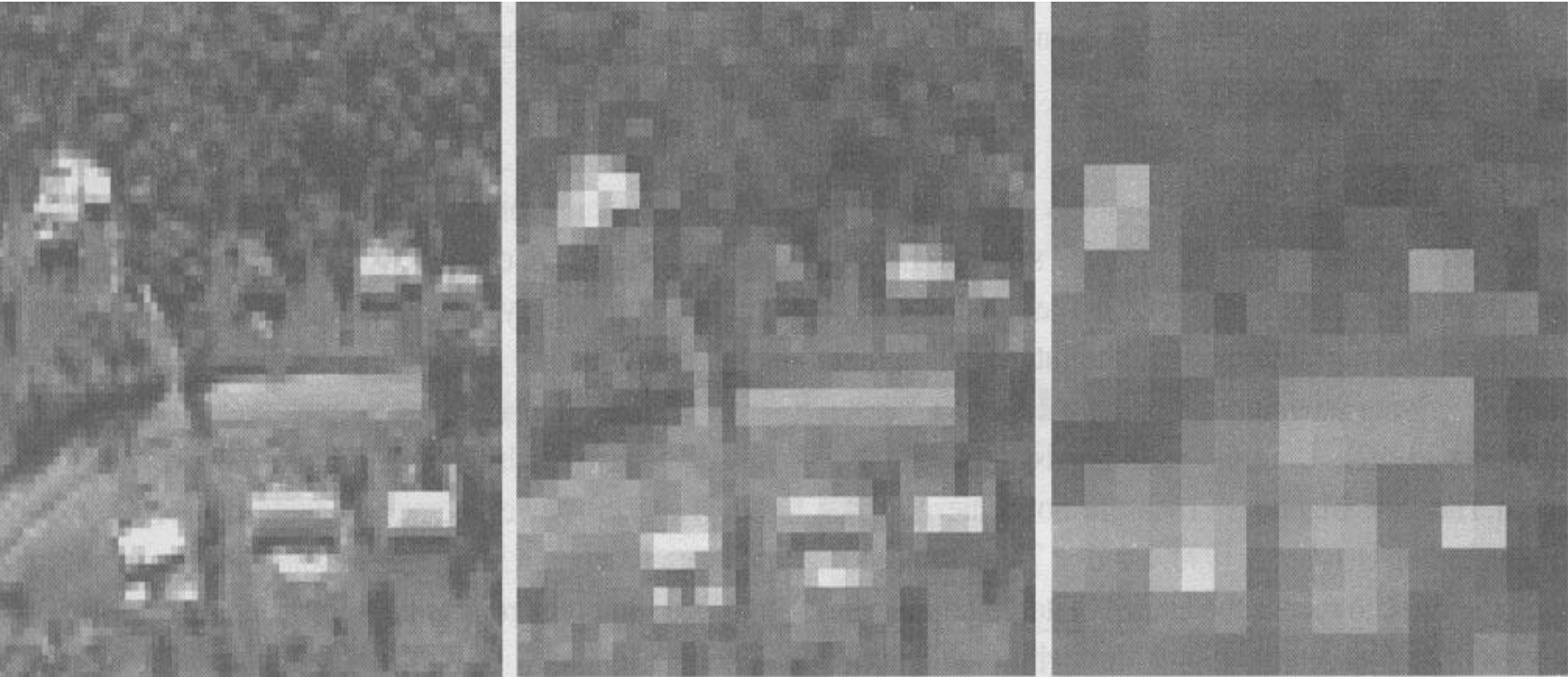


Remote Sensing Outputs

Photographic Remote Sensing



Non – Photographic



Panchromatic Photograph



PANCHROMATIC(B/W) & B/W INFRARED



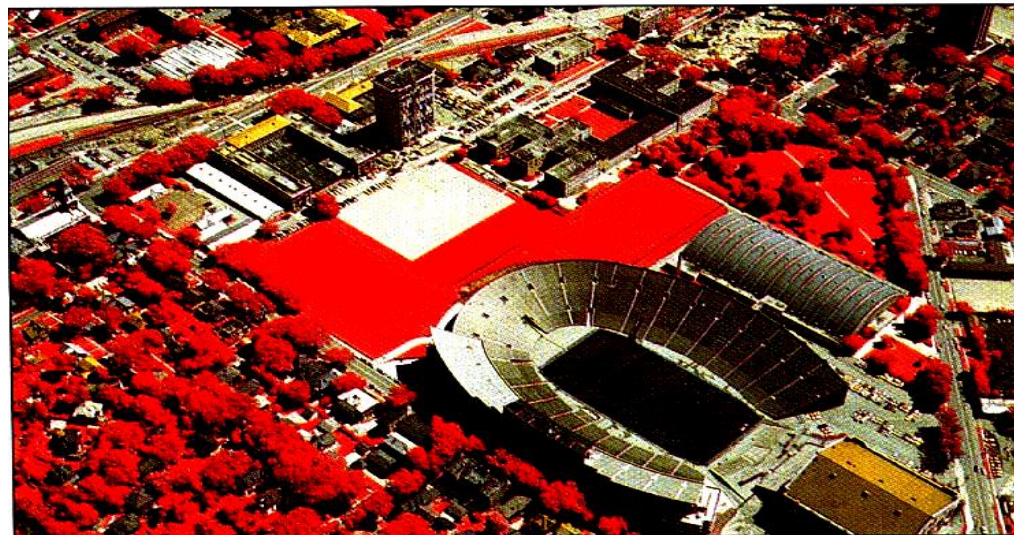
Natural Photograph



Infrared Photograph



COLOURED AND COLOURED INFRARED



Applications of Remote Sensing

- **Environmental Management**
- **Natural Resource Management**
- **Disaster Mitigation**
- **Telecommunication**
- **Mapping**
- **Geo-Science**
- **Urban Development**
- **Military Application**
- **Meteorology**
- **Navigation**
- **Agriculture**

Agriculture

- **Crop type mapping**
- **Crop Monitoring**

Forestry

- **Burn Mapping**
- **Clear cut mapping**
- **Species identifications**

Geology

- **Structural Mapping**
- **Geological Units Identifications**

Hydrology

- **Flood monitoring**
- **Soil content/ soil moisture**

Land Cover

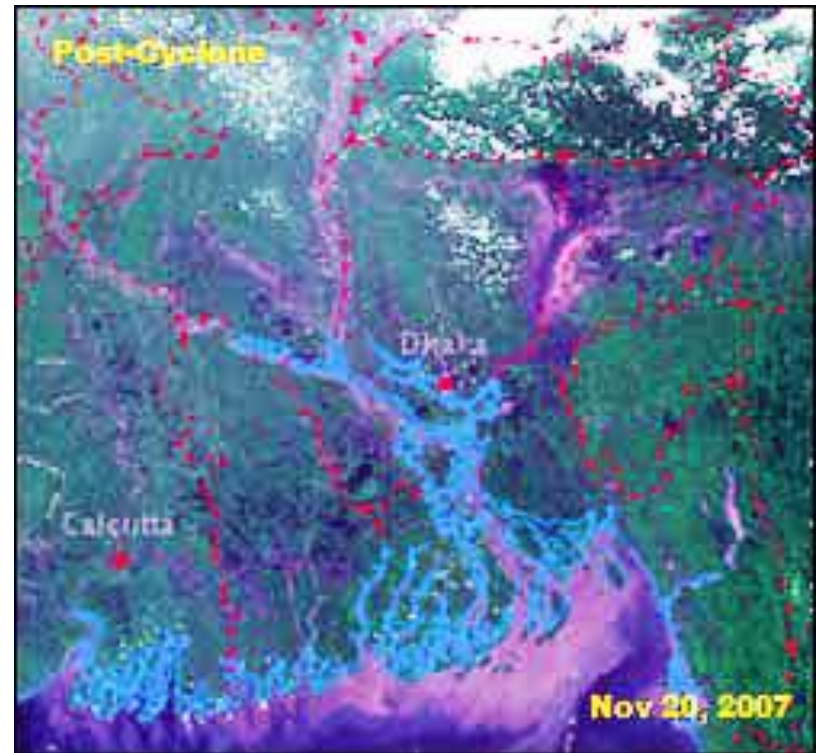
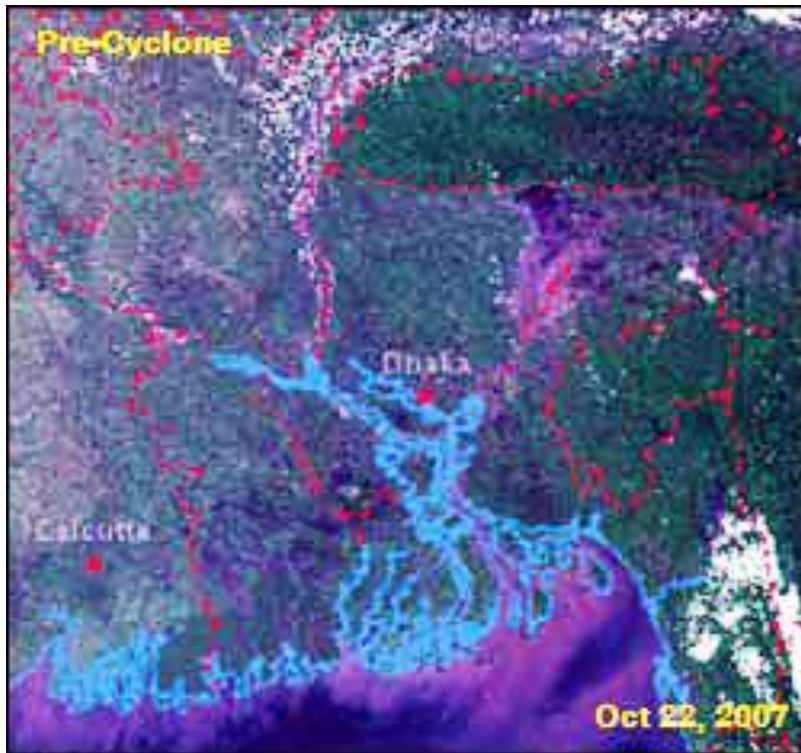
- **Rural urban change**
- **Biomass mapping**
- **Urban Planning**

Mapping

- **Create DEM**
- **Topo Mapping**

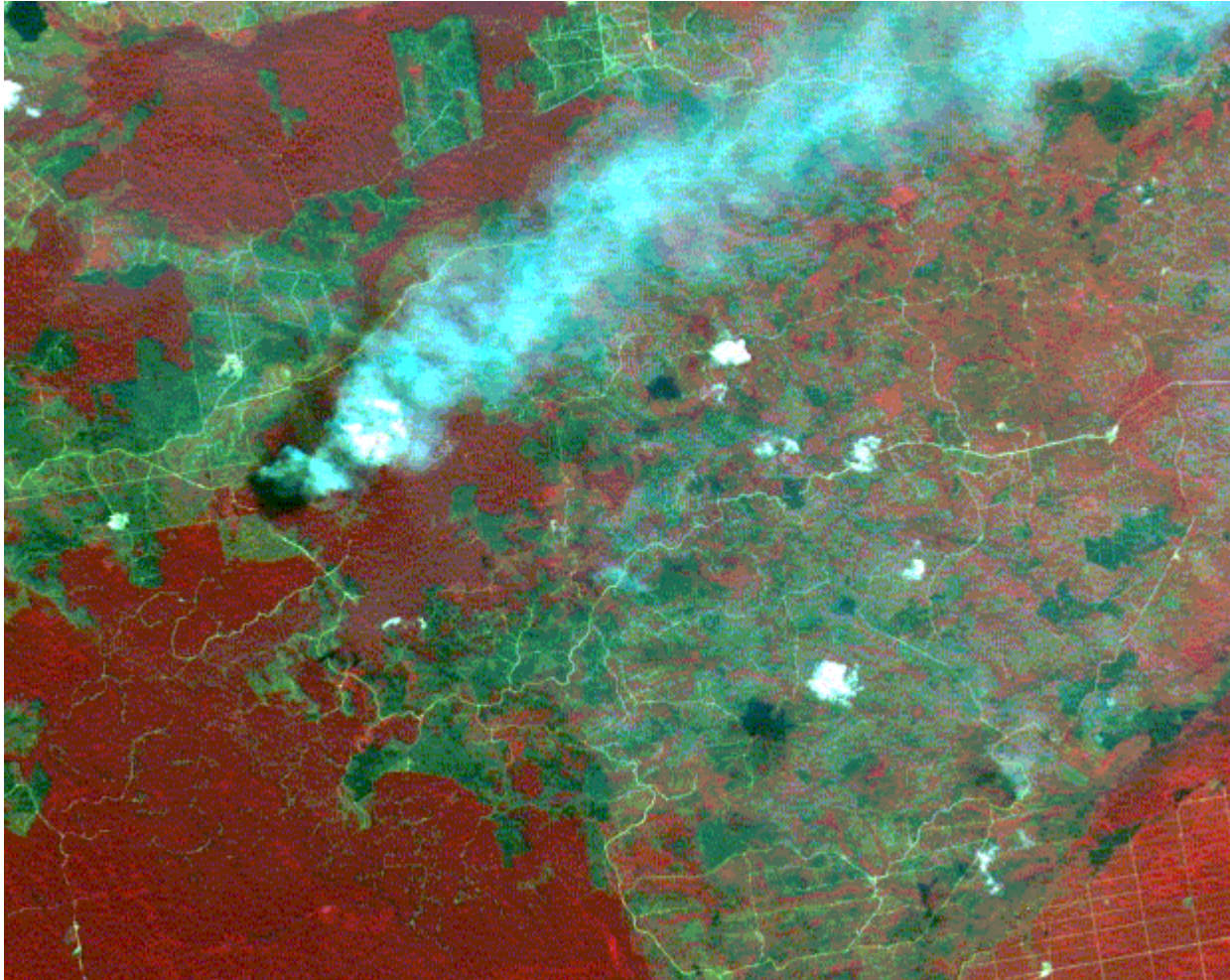
Applications

Post Disaster Detections



Applications

Burn Mapping

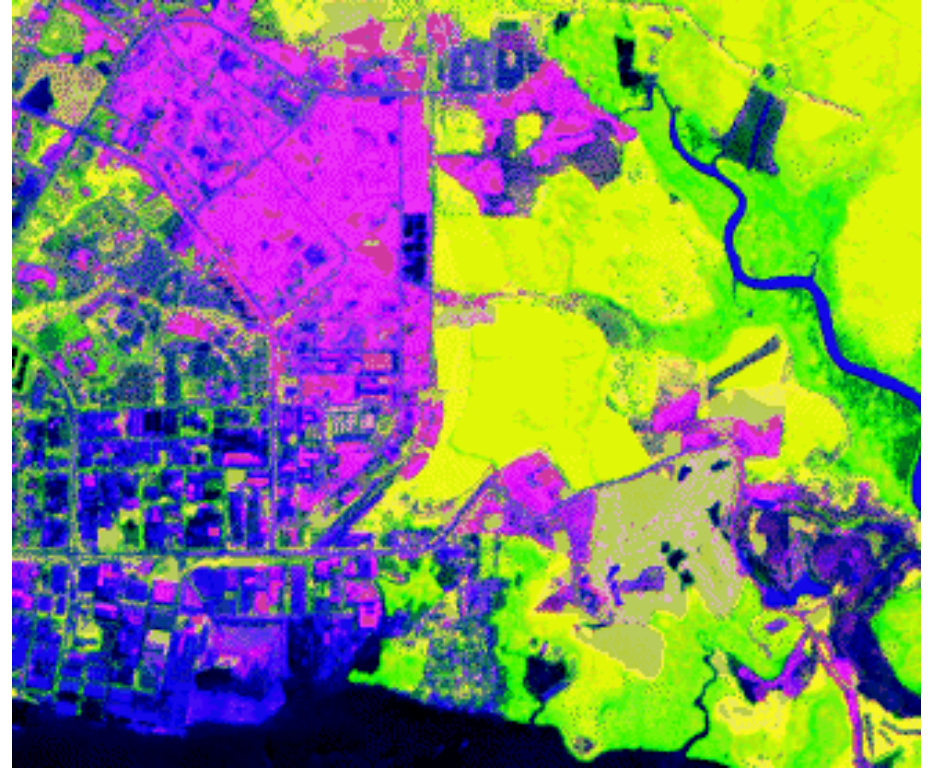


Applications

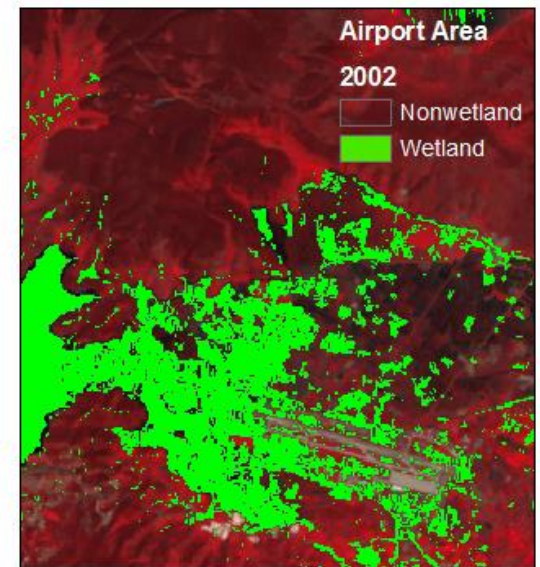
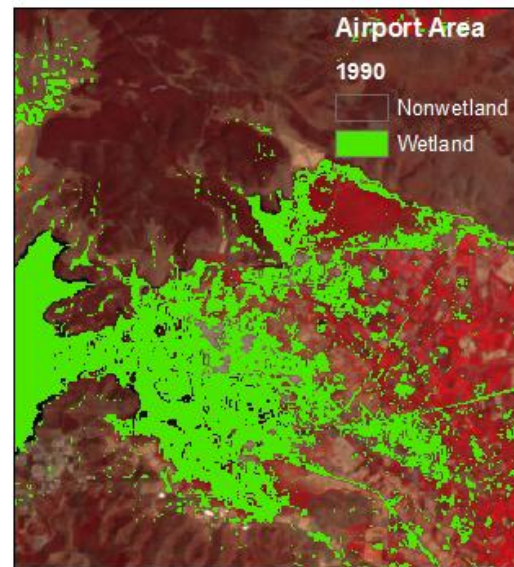
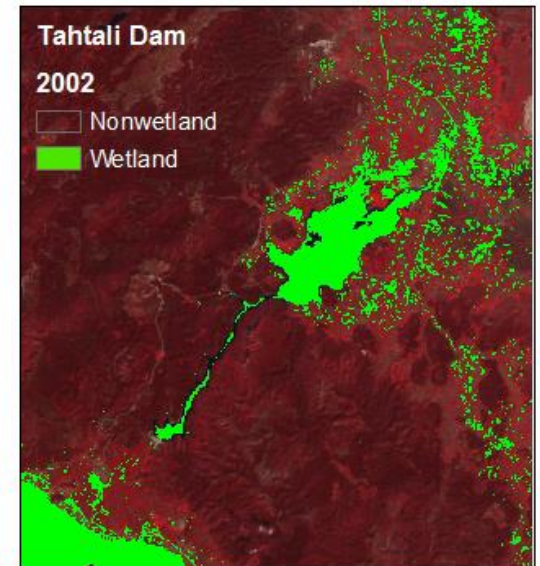
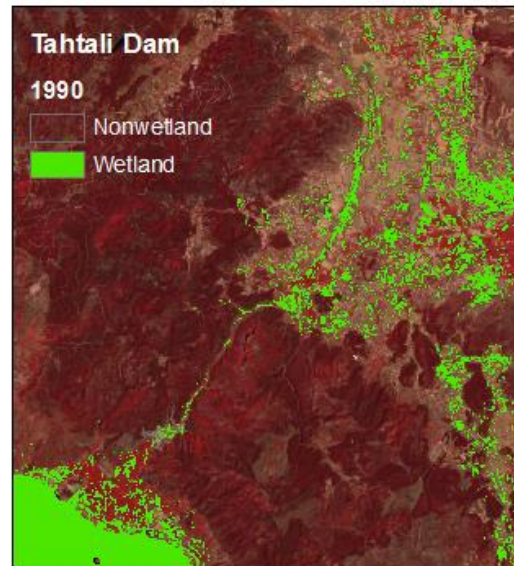
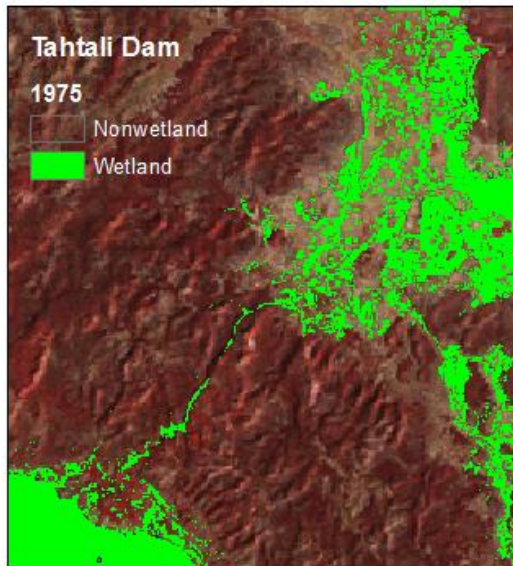
Urban Planning



Vegetation type identifications



Applications



Why Remote Sensing ?

- Remote sensing provides a regional view
- Remote sensing provides repetitive looks at the same area
- Remote sensors can "see" a broad portion of the spectrum
- Sensors can focus in on a very specific wavelength range and distinguish subtle differences
- They can also look at a number of wavelengths simultaneously
- Remote sensors often record signals electronically or photographically
- Some remote sensors operate in all seasons, at night, and in bad weather

Thank You