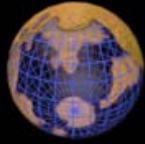


## Department of Geomatics



University of Alaska Anchorage

Geomaticians work with state of the art technology...

- Digital Cartography
- Analytic & Digital Photogrammetry
- Global Positioning Systems
- Spatial Analysis & Modeling



A Geo Multimedia Presentation  
by

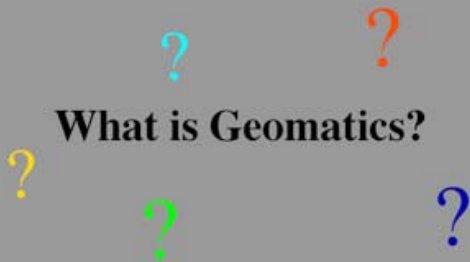
UAA Geomatics Faculty

and devices...

- Total Stations
- Stereo Plotters
- Global Positioning Satellite Receivers
- Data Collectors
- Computers
- Software
  - CAD
  - GIS
  - Database



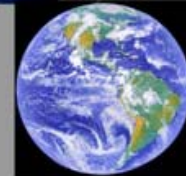
What is Geomatics?

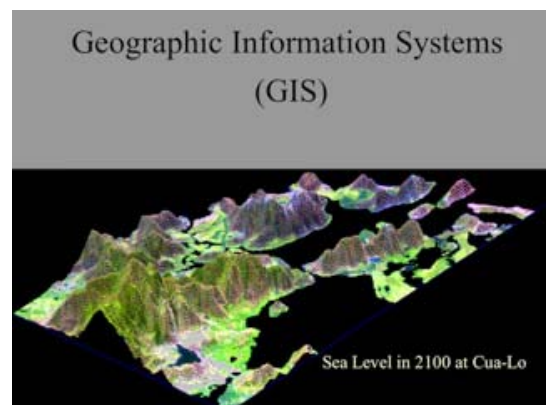
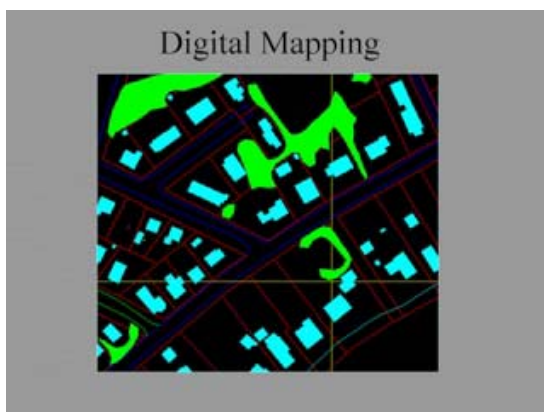
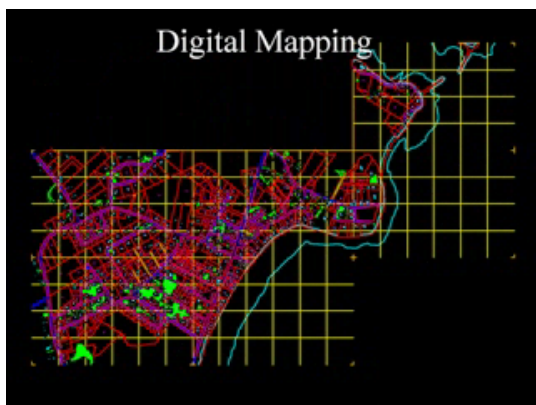
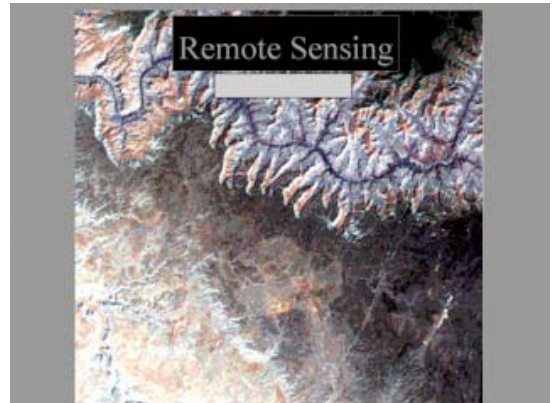
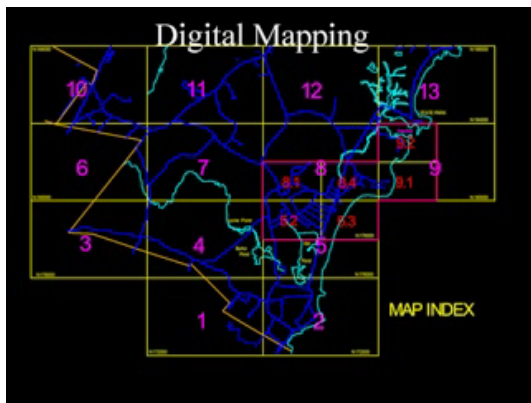


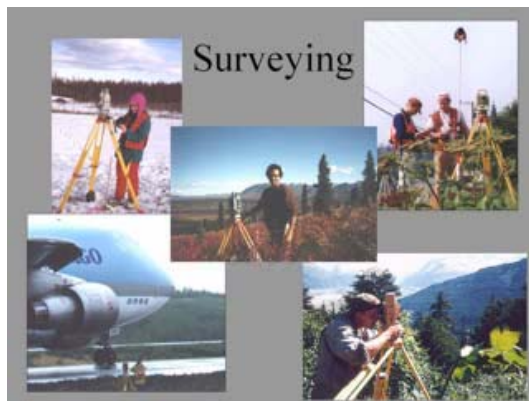
## Global Positioning Systems (GPS)



Your precise location  
on the surface of the Earth  
Latitude N 64° 25' 17.32"  
Longitude W 151° 12' 32.00"







## Surveying

As well as the comparatively new fields of:

- Remote Sensing
- Global Positioning Systems
- Geographic Information Systems (GIS)

**Geomatics** describes an integrated approach to:

- Acquisition
- Analysis
- Distribution
- Application of spatially referenced data

## Surveying is...

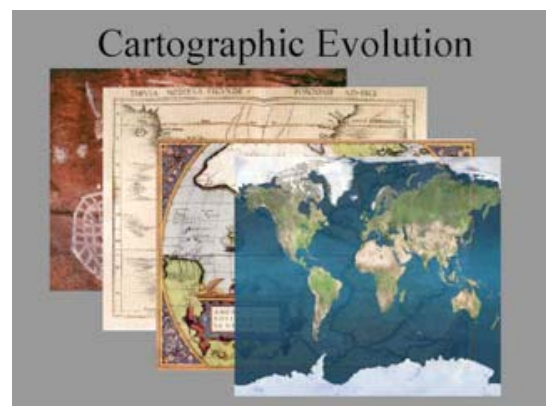
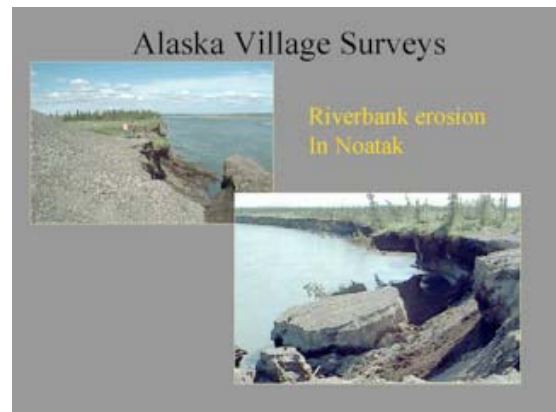
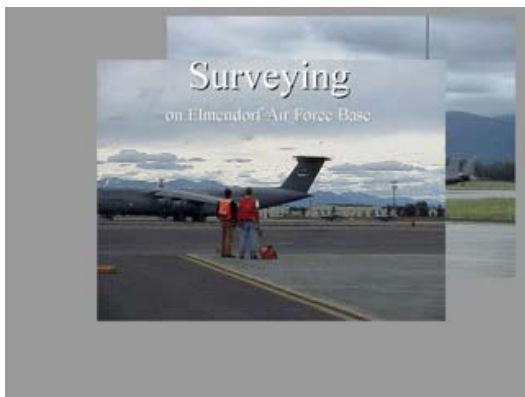
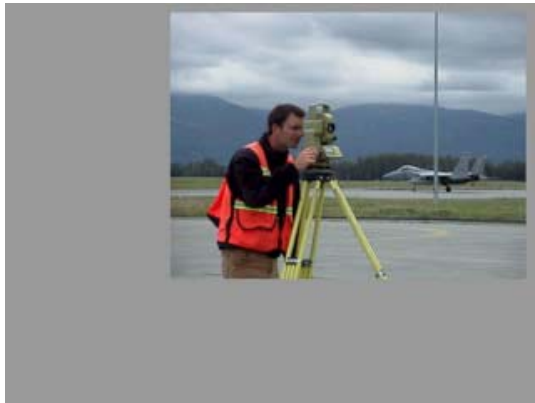
The science, art, and technology of determining the relative positions of points above, on, or beneath the earth's surface.

**Geomatics** embraces the traditional areas of surveying & mapping, such as:

- Topographic Surveying
- Boundary Surveying
- Geodesy
- Cadastral Surveying
- Photogrammetry
- Hydrography

## *Surveying is...*

The discipline which encompasses all methods for  
Measuring,  
Processing and  
Disseminating  
information about the  
physical earth and our  
environment.

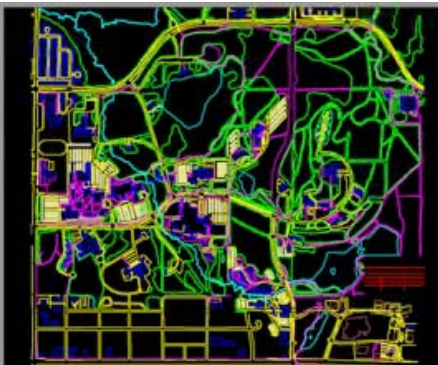
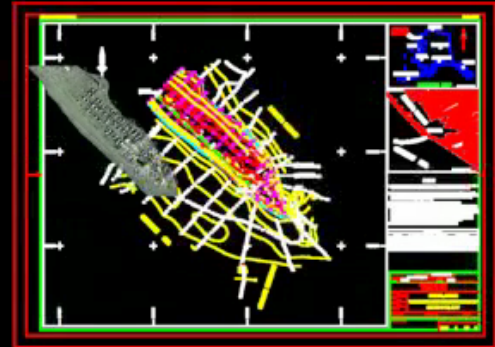




## Cartography = Maps



## Drawing with Orthophoto Overlay



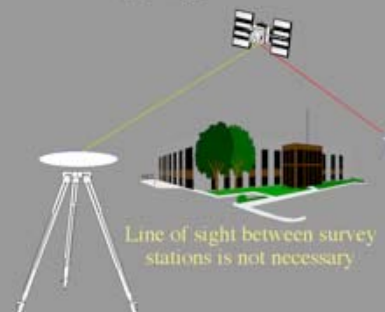
## What is GPS?

- Global Positioning Systems
- A navigation system developed and maintained by the U.S. Dept. of Defense
- Satellite based system
- 24 hour coverage
- Consists of 3 segments
  - Space
  - Control
  - User

## Orthophoto with elevation contours



## Why We Use Satellites for Mapping

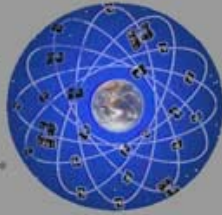


Line of sight between survey stations is not necessary

## Space Segment

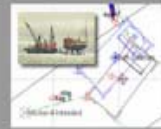
### GPS Constellation

- Designed for 21 satellites + 3 spares
- 26 satellites currently operational
- 6 orbital planes
- Orbital planes inclined  $55^\circ$  to equator\*
- 12 hour orbits
- Orbit height 12,600 miles (20,200 km)
- Minimum 5 satellites
- Design life of 7.5 years

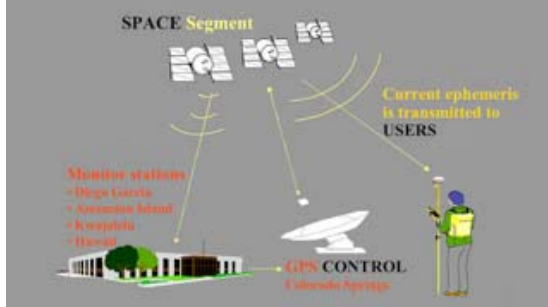


\* No satellite travels beyond  $55^\circ$  north or south of the equator.

## GPS is used in Hydrographic surveys



## Knowing where the satellites are - *Ephemeris*



## GPS is...

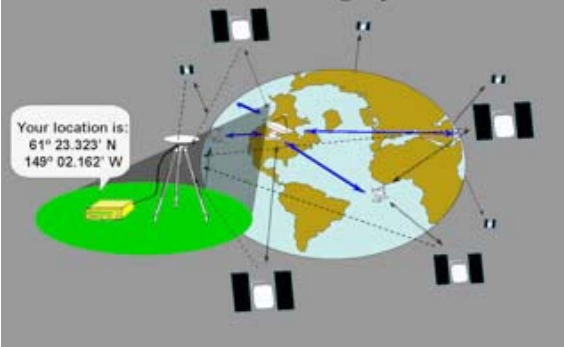
### Measuring



Mt. McKinley



## Global Positioning System

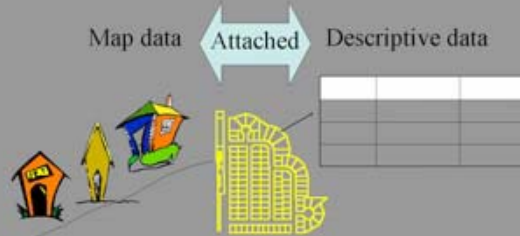


## GPS is used for precise positioning in Agriculture



## Geographical Information Systems (GIS)

- A digital model of the real world



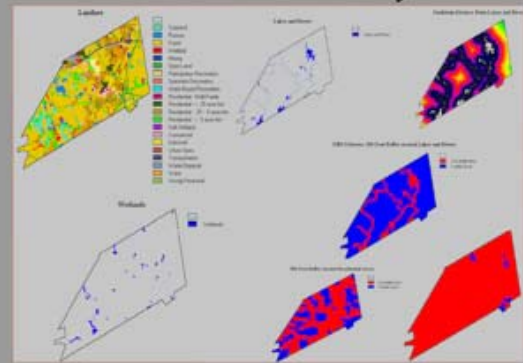
## GIS Application Examples

- Land Suitability
- Prediction Modeling
- Time Series Analysis
- Change Detection
- Digital Landscape Animation

## Municipal Utilities



## GIS- Land Suitability



GIS is a powerful tool  
to aid in managing resources



## Prediction Modeling

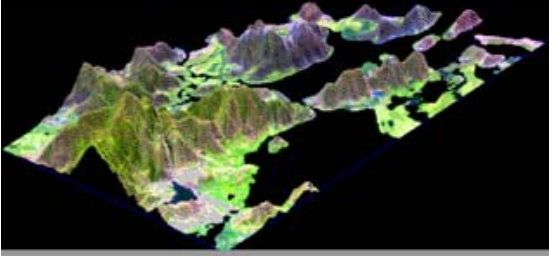
### Cua-Lo Estuary in Northcentral Vietnam



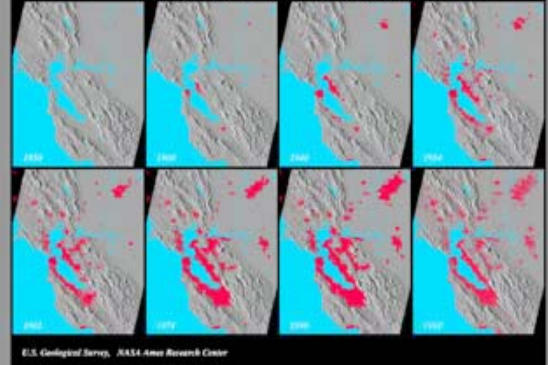


## Prediction Modeling

### Sea Level in 2100 at Cua-Lo

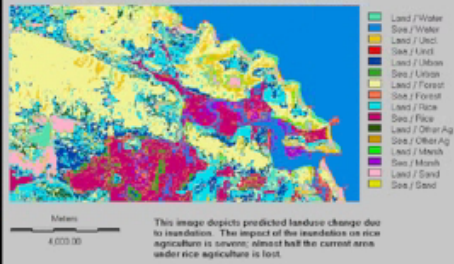


## Historical Perspective of Urban Land Use Change in the San Francisco Bay Region



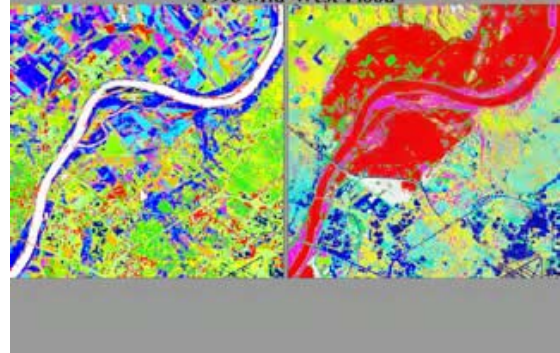
## Prediction Modeling

### Cross-Classification : Sea Level 2100 | landuse



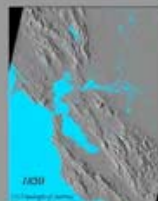
## Change Detection

### 1993 Mid-West Flood



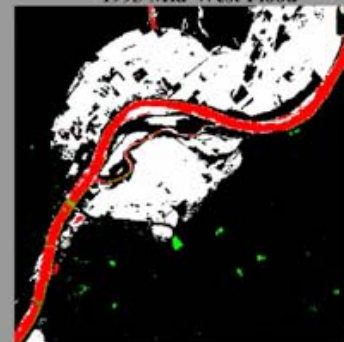
## Time Series Animation using GIS

Urban development in the San Francisco Bay 1880- 1992



## Change Detection

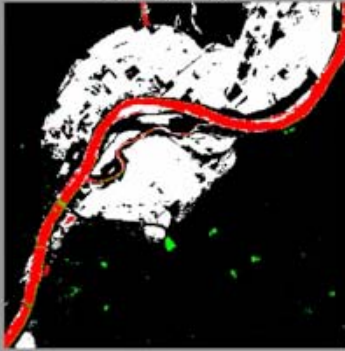
### 1993 Mid-West Flood





## Change Detection

1993 Mid-West Flood



## Remote Sensing

Collection of data  
without being in  
physical contact



Human Eye



## Digital Landscape Animation



- Electro-magnetic energy is emitted from the sun  
travels through atmosphere  
interacts with features on earth  
travels back through atmosphere  
and is recorded by the sensor

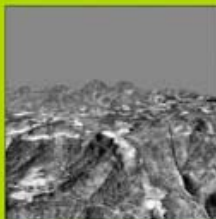
## Remote Sensing

- Electromagnetic spectrum  
divisions of different wavelengths  
visible - limits of human vision

- Premise of remote sensing  
different land cover types reflect  
different amounts of radiation  
thus the recorded data allows users to  
study phenomena on earth

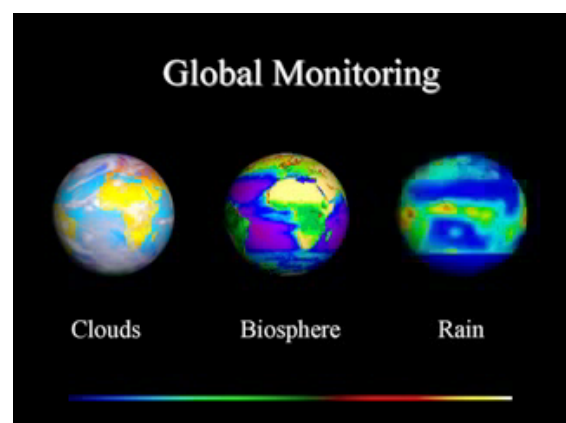
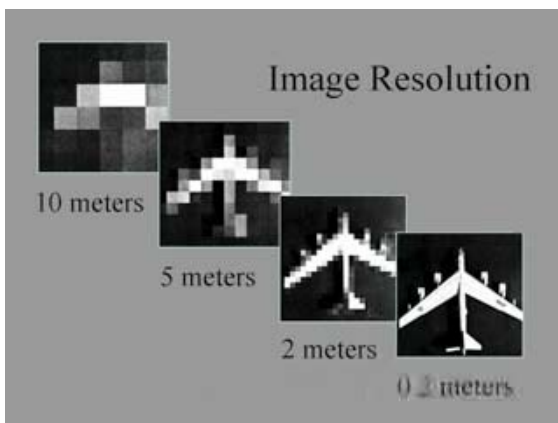
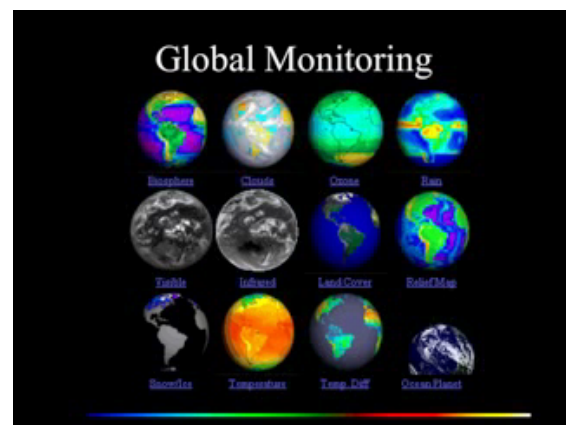


## Digital Landscape Animation



## Remote Sensing Platforms





# Remote Sensing Applications

- Global Analysis
- Weather and Climate Analysis
- Wildlife Refuge Management
- Deforestation
- Digital Terrain Modeling

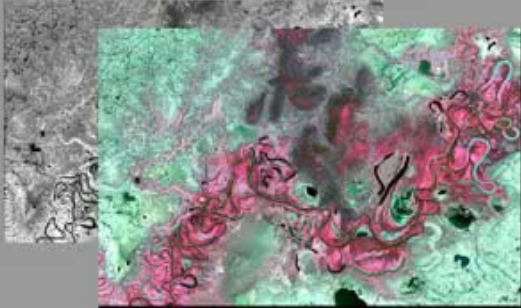
# Weather and Climate Analysis

- GEOS\*
- Oct 9, 1998

\* Geostationary Environmental Operational Satellite

### Wildlife Refuge Management

- Innoko Wildlife Refuge, AK
- Landsat Satellite-30 m res.

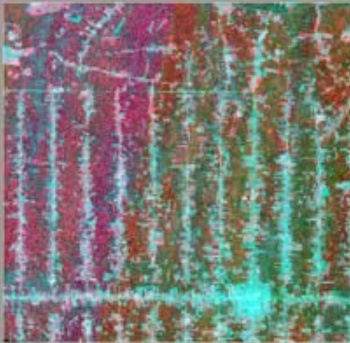


Geomatics is the  
integration of the following  
technologies

GPS  
Surveying  
GIS  
Cartography  
Remote Sensing

### Deforestation

- Brazil
- SPOT, 30 m



### Digital Terrain Modeling

