

{07} G.I.S.

Map Interpretation & GPS
Spring 2010
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G.I.S.

Geographic Information Systems

“A database designed to work with map data”
- Price, 2008

“A collection of computer hardware, software, and geographic data for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically referenced information” -
ESRI's Dictionary of GIS Terminology

The System Concept

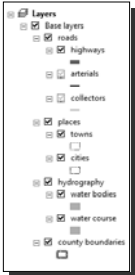
‡ GIS isn't one 'thing'

- More than computers, more than GPS, more than databases
- A way of storing, analyzing, and visualizing spatial data

Layers

Data are treated as layers

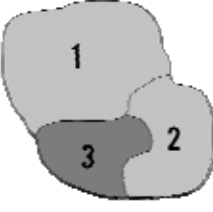
- Allows you to manipulate individual features



Attribute Tables

‡ What distinguishes GIS from graphic design

- Allows each layer to be symbolized, queried, etc.



1	woods	prime
2	meadows	prime
3	willow grove	near prime

Software

‡ Desktop GIS

- Load software on your computer

‡ Web based mapping

- Send requests to centralized server

Data acquisition

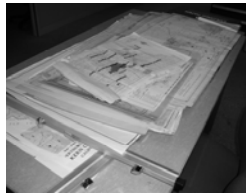
- ‡ Can get GIS data through:
 - Fieldwork (like our GPS work)
 - Digitizing
 - Available data sources

Digitizing

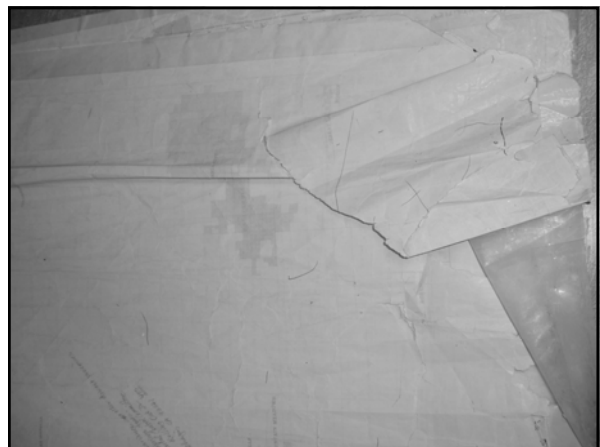
- ‡ The process of converting “analog” data, like a paper map, into digital information.
- ‡ Important to know the source of digital data
 - GPS data is accurate, tracing an old map might not be...

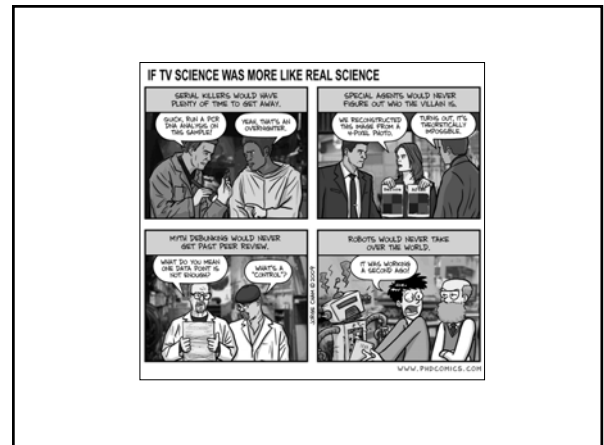
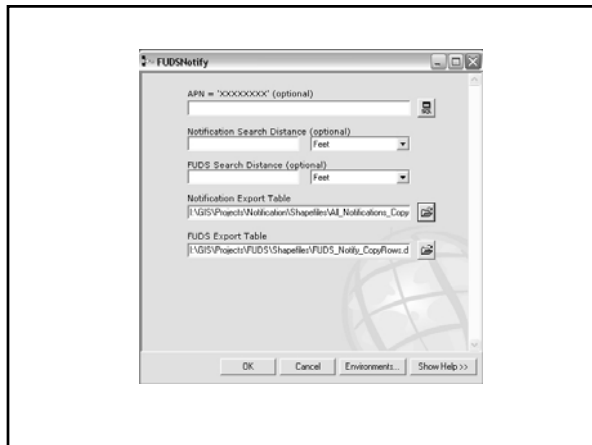
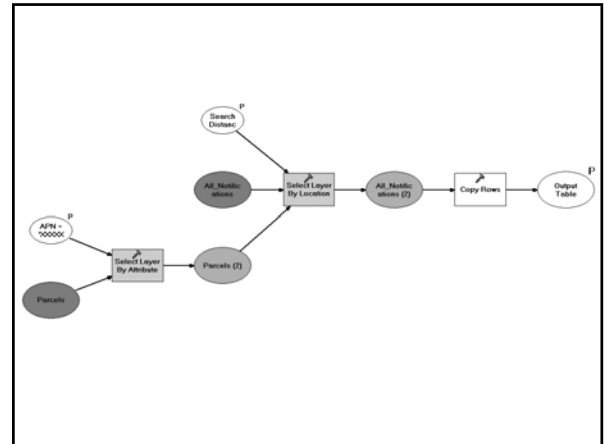
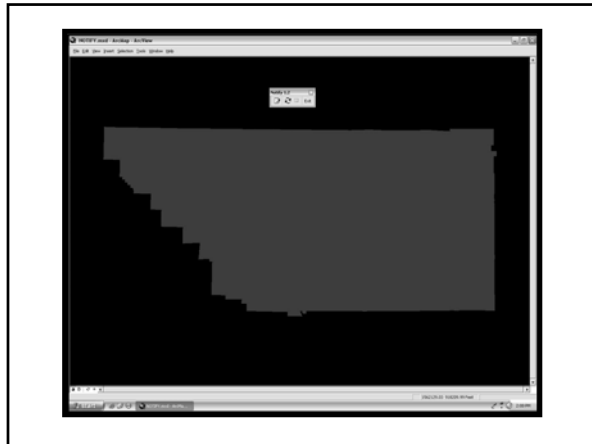
Notification Maps

- ‡ Planners used a stack of maps to see who wanted to know about certain projects



Original Data





Available data

‡ More and more data are available online

- USGS
- National Map
- State and local government websites

Metadata

‡ Data about data

‡ Not simply a GIS thing, but VERY IMPORTANT!

‡ Contains the details about the data you are using

- Date, source, what codes mean, etc.

Applications

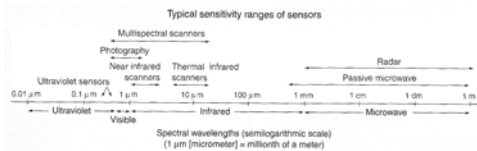
- ‡ Geocoding
- ‡ Thematic mapping
- ‡ Classification
- ‡ Statistical analysis
- ‡ Predictive modeling

Remote Sensing

‡ “Gathering information by means of a sensor that is not in contact with the object being detected.”

The electromagnetic spectrum

- ‡ We can only see a small portion
- ‡ Other “signatures” are useful to analysis



Spectral range

- ‡ The range of wavelengths used by the remote sensing device
- ‡ Broad-band – aerial photos
- ‡ Narrow-band – radar
- ‡ Multispectral – Landsat images

Signal – active v. passive

Active signal

- Sends signals at the required wavelength
- ‡ Radar

Passive signal

- detects radiated energy from objects
- ‡ photography

Remote sensing from space

- ‡ Landsat, SPOT, ASTER
- ‡ Benefits of aerial imagery, but able to easily cover the globe

Oblique aerial photos



Orthographic aerial photos



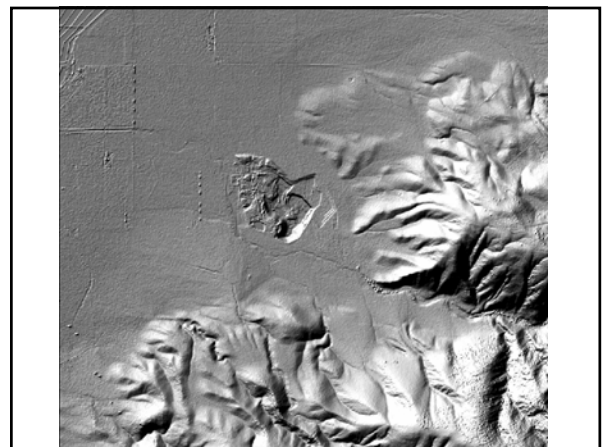
Infrared photography

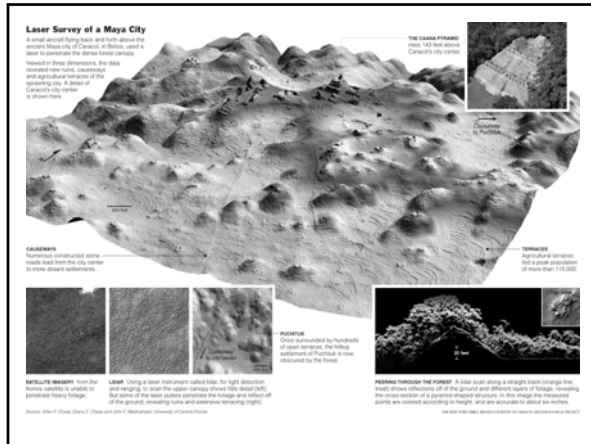
- ‡ More than just seeing where things are from above
 - Picks up on specific signatures
 - Healthy deciduous plants are bright red, water is dark,
- ‡ *Can see patterns not normally visible with regular photography*



Lidar

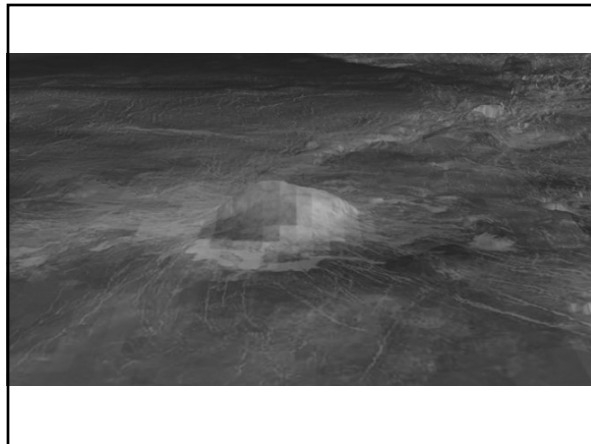
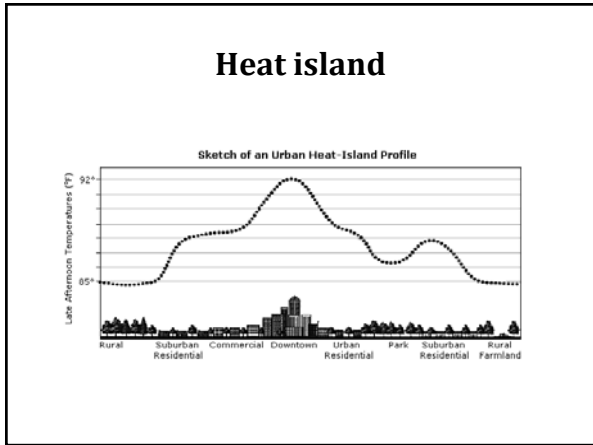
- ‡ An active method
- ‡ Sends laser signals to an object then record how they are reflected
- ‡ Good for elevation data





Scanners

- ‡ Passive readings of energy
- ‡ Temperature can be detected with infrared
- ‡ Useful for measuring fire, heat islands, etc.



Maps made from the data

- ‡ Classification
 - What is located where?
- ‡ Change
 - How has the fire spread?
 - Where has the forest been cut down?
 - Where has the city sprawled?

