NYS GIS 2007

Conference a Success!

- View images from the 2007 Albany conference (PDF)Ñample evidence of a great year!

Thank you for your feedback! Here's one quote that echoed the sentiments of many:

ÒItÕs a great way to see what others are doing around the state.Ó

24th Annual New York State GIS Conference

October 6-7, 2008

Holiday Inn
Syracuse-Liverpool - Exit 37,
441 Electronics Parkway,
Liverpool, NY 13088

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The traditional State of the State presentation was especially appreciated this year to learn about activities around the state and get the latest on technology and applications used in a wide variety of projects.

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after year?

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- Monday evening poster session, map contest and reception followed by a banquet with banquet with presentation and Awards
- Tuesday Luncheon with a raffle of prizes

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FOUNTAINS SPATIAL
fountains spatial
Work Order Management and Visualization
fountains
Field/Mobile GIS
Needs Assessments
ESRI

The Role of Impervious Surfaces in Future Nutrient Loading in the New York City West of Hudson Watersheds

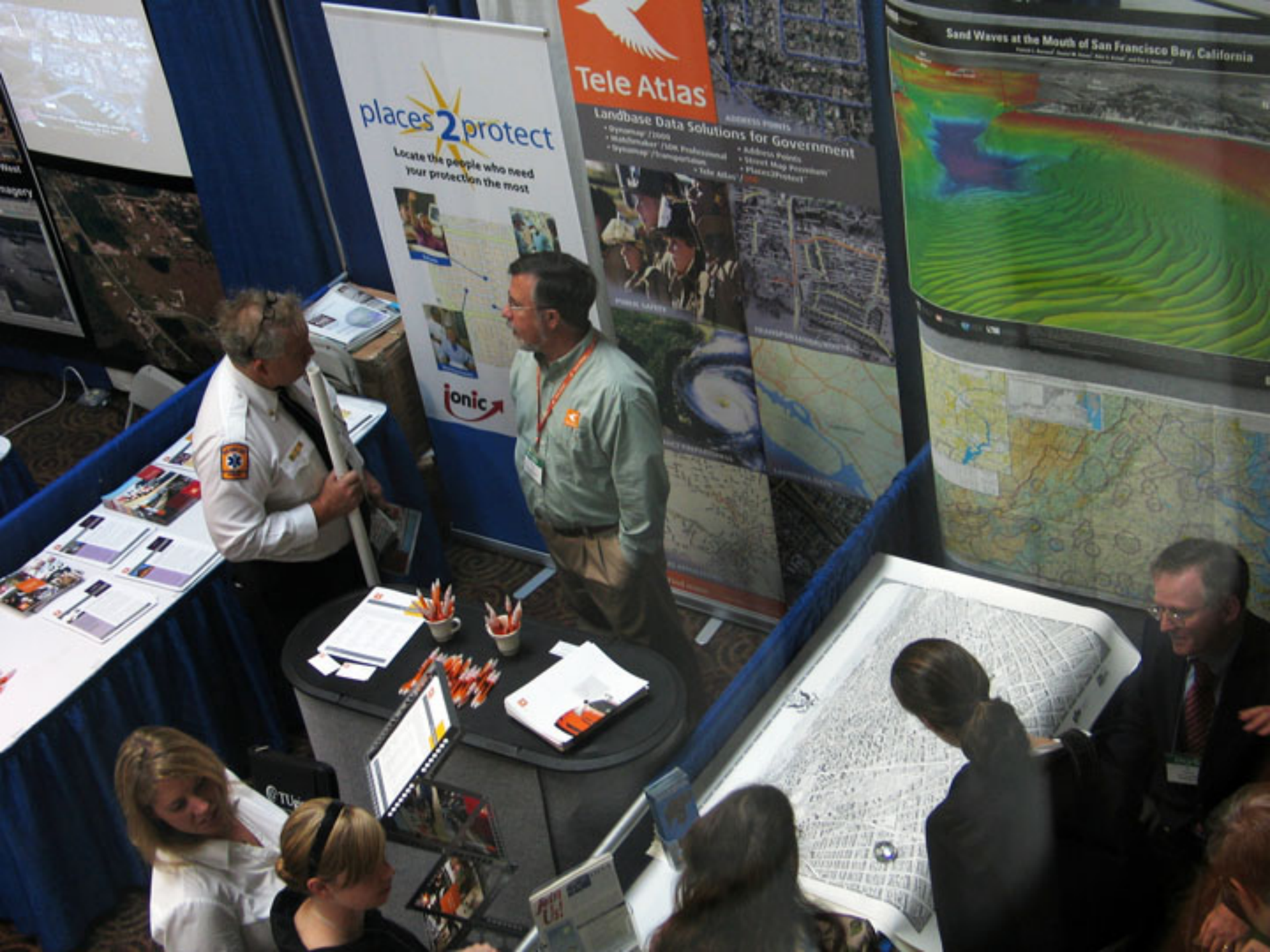


Myrna Hall [1], Prajjwal K. Panday [1], Mary Tyrrell [2], Charles A.S. Hall [1]

[1] SUNY College of Environmental Science and Forestry

[2] Yale School of Forestry and Environmental Studies, Global Institute for Sustainable Forestry


Trimble


places2protect
Locate the people who need your protection the most
ionic
Tele Atlas
Landbase Data Solutions for Government
Sand Waves at the Mouth of San Francisco Bay, California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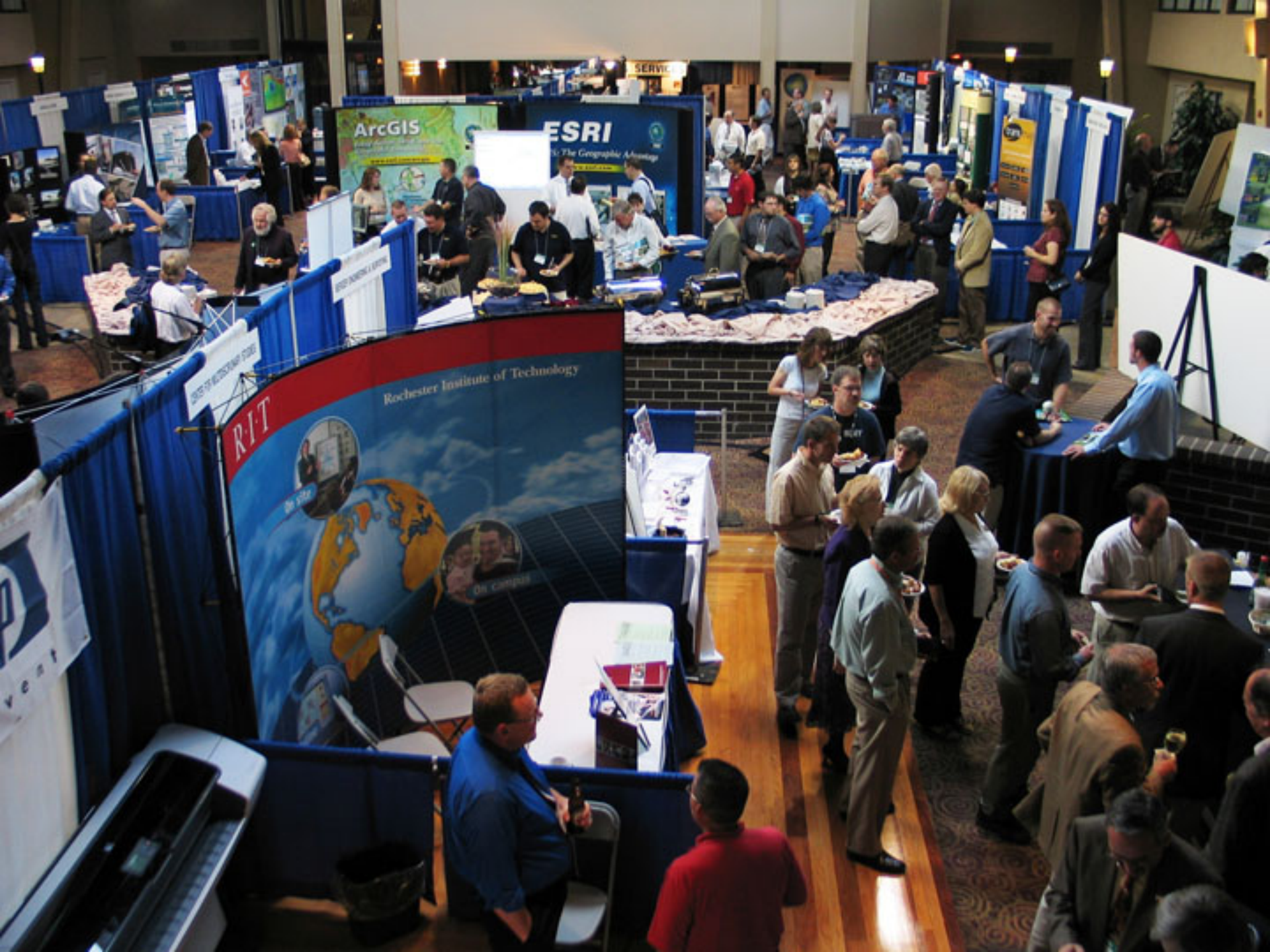
fountains


Rochester Institute of Technology


ArcGIS
ESRI
R·I·T
Rochester Institute of Technology


ESRI
ESRI
S: The Geographic Advantage
esri.com

The steepest downhill path identifies the route that the 'distance waves' took. Inset (a) shows a wave pattern similar to tossing a rock into a pond. The optinal path is straight down (perpendicular to the waves). In inset (b absolute barriers acts as a jetty forcing the waves around them. Inset (c) shows the effect of both absolute barriers and relative impedance

(c)

WEIGHTED PROXI
(ABS. and REL.

WE

←"...counter-intuitive move that responds to the realistic complexity of movement

DEVELOPING WIND FARMS

SCREENING FOR POTENTIAL SITES

STEP 1: PREPARE EXCLUSION LAYER

Identify undevelopable land using the following potential land use and land cover characteristics:

LAND USE

LAND COVER

STEP 4: DETERMINE DEVELOPABLE SITES

Contiguous sites are resolved from fragmented areas that are within a 1 km distance of each other. The total allowable land area of each site is then used to determine the maximum potential for wind build out.

EXAMPLE:

STEP 2: IDENTIFY WIND RESOURCE IN DEVELOPABLE LANDS

Determine Wind Power Classes within Mean Annual Wind Speeds of 6.5 m/s or greater

STEP 3: ASSESS PROXIMITY OF SITES TO RELEVANT INFRASTRUCTURE

Determine sites within a reasonable distance of roads and transmission lines.

AWS Truewind

Agenda

23rd Annual New York State GIS Conference

Presentations from the GIS Conferences

- Dr. Joseph K. Berry's Keynote Presentation (PDF)
- Dr. Joseph K. Berry's Workshop (PDF)
- Business Development Committee Report NYSGISA (PPT)
- Bill Johnson's State of the State Address

Ideas for activities to do on your own

- On Your Own (PDF)

Sunday, September 30, 2007	
TIMES: 1:00 - 4:00 pm 2:00 - 4:00 pm	Pre-Conference Workshops • Introduction to raster GIS in ArcGIS, instructor: Dr. Lee Herrington, in room Stonehenge C • GPS for GIS Workshop, instructor: Jonathan Cobb, in room Stonehenge B (and outdoors)
5:00 - 7:30 pm	Welcoming Reception at the New York State Museum • Reception Itinerary and Map
Monday, October 1, 2007 • Final Agenda (PDF)	
8:00 - 9:00 am	Registration sign in and Breakfast
9:00 - 10:00 am	Concurrent Sessions
10:00 - 10:30 am	Visit our exhibitors and Coffee Break

	Workshop: Grid-based Map Analysis Techniques and Modeling by Joseph Berry, approved for 2 Professional Development Hours (PDHs)
12:00 - 1:00 pm	Lunch
1:00 - 3:00 pm	Welcome followed by the annual State of the State Address by Bill Johnson and Keynote presentation by Joseph K. Berry
3:00 - 3:30 pm	Visit our exhibitors during a Coffee Break
3:30 - 5:00 pm	Concurrent Sessions
5:00 - 6:30 pm	Poster Session and Reception
6:30 pm	Banquet dinner with special presentation by Ross S. Whaley followed by a Partnership award ceremony
Tuesday, October 2, 2007	
7:30 - 8:30 am	Registration sign in and Breakfast (an earlier start)
8:30 - 10:00 am	Concurrent Sessions and Workshop: Grid-based Map Analysis Techniques and Modeling by Joseph Berry, approved for 2 PDHs
10:00 - 10:30 am	Visit our exhibitors and Coffee Break
10:30 - 12:00 pm	Concurrent Sessions
12:00 - 1:00 pm	Lunch followed by a raffle of prizes
1:00 - 3:00 pm	Concurrent Sessions
3:00 pm	Conference concludes

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Invited Speakers for 2007

23rd Annual New York State GIS Conference

Monday's Keynote Speaker: Joseph K. Berry

Dr. Joseph K. Berry is the Principal of Berry & Associates // Spatial Information Systems (*BASIS*), consultants and software developers in Geographic Information Systems (GIS) technology. He is a contributing editor and author of the *Beyond Mapping* column for GeoWorld magazine and has written over two hundred papers on the analytic capabilities of GIS technology. He is the author of the popular books *Beyond Mapping*, *Spatial Reasoning*, *Analyzing Precision Ag Data*, *Analyzing Geo-Business Data*, *Analyzing Geo-Spatial Resource Data, The Precision Farming Primer* (online) and *Map Analysis: Procedures and Applications in GIS Modeling* (online). He serves as the Keck Scholar in Geosciences at the University of Denver and Special Faculty at Colorado State University.

Read more about Joseph K. Berry

Monday's State of the State Address: Bill Johnson

Bill Johnson is Assistant Deputy Director & CIO for the New York State Office of Cyber Security and Critical Infrastructure Coordination. He functions as Operations Manager for the agency, overseeing both GIS and Cyber Security. He also Chairs the 18-member NYS GIS Coordinating Body which oversees the Statewide GIS Coordination Program. Previously, Bill was CSCIC's Manager of Geographic Information and Critical Infrastructure Coordination.

Monday evening Banquet Speaker: Ross S. Whaley

Ross S. Whaley has over 30 years experience as a university teacher, researcher and administrator. He also served as Director of Economics Research for the United States Forest Service for 6 years. He holds a bachelorÕs degree in forestry and a Ph.D. in natural resource economics from the University of Michigan.

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- Academic Calendar
- Catalog (degree requirements)
- Departments
- Graduate Programs
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23rd Annual New York State GIS Conference

ESF Outreach
221 Marshall Hall, SUNY-ESF
1 Forestry Drive, Syracuse, NY 13210
phone: 315-470-6817, fax: 315-470-6890
Registration Questions? email: tsakowsk@esf.edu

- Advisory Committee

Important Dates and Deadlines:

- June 11, 2007- Abstracts and poster abstracts Due
- September 6, 2007 -Hotel room rate cut off
- September 6, 2007 -Discount registration rate ends

Interested in becoming a sponsor for this year's conference?

- Sponsor Information (PDF)

GIS and Technical Oz

A Discussion of the History, Driving Forces, and Future Directions Guiding the Evolution/Revolution of Geotechnology

New York State Geographic Information Systems
23rd Annual Conference — October 1 and 2, 2007 — Albany, New York

Presentation by

Joseph K. Berry

W.M. Keck Scholar in Geosciences, University of Denver

Principal, Berry & Associates // Spatial Information Systems
2000 S. College Ave, Suite 300, Fort Collins, CO 80525
Phone: (970) 215-0825 Email: jberry@innovativegis.com

Website at ***www.innovativegis.com/basis***

Historical Setting and GIS Evolution

The US Department of Labor identifies Geotechnology as one of the "three most important emerging and evolving fields" of the 21st century

(along with Biotechnology and Nanotechnology)

Manual Mapping for 8,000 years

Computer Mapping *automates the cartographic process (70s)*

Spatial Database Management *links computer mapping with database capabilities (80s)*

Map Analysis *representation of relationships within and among mapped data (90s)*

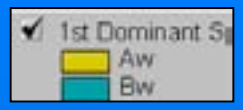
Multimedia Mapping *full integration of GIS, Internet and visualization technologies (00s)*

…focus of this presentation

(Berry)

Desktop Mapping Framework (Vector, Discrete)

Click on…



Select Theme

Zoom Pan

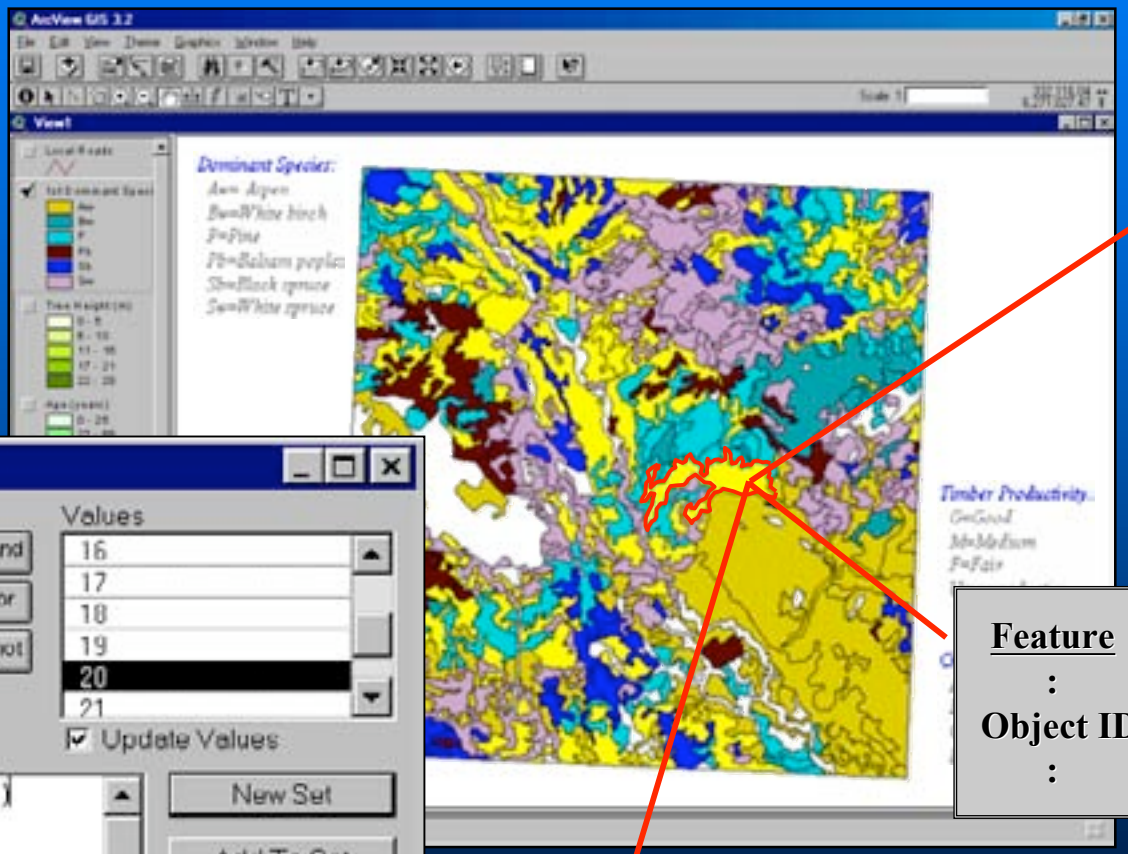
Info Tool

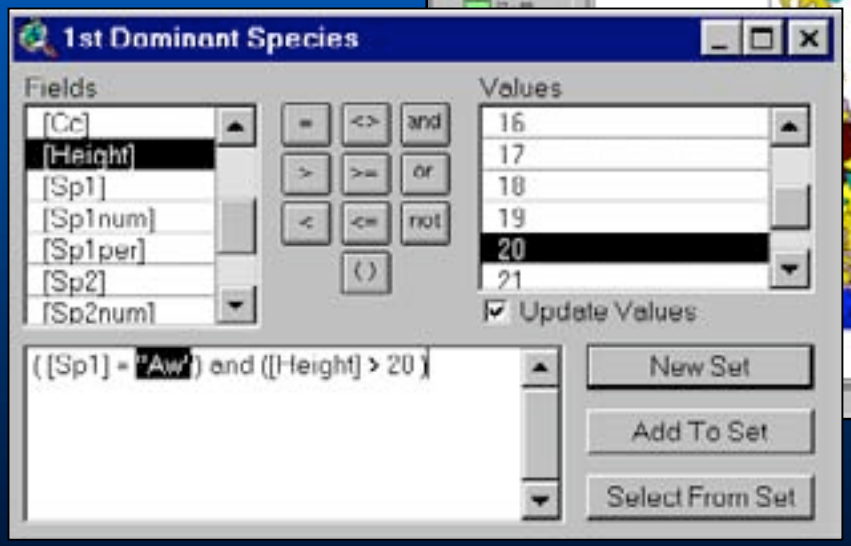
Theme Table

Distance

Query Builder

…identify tall aspen stands





Spatial Table

:
Object ID
X,Y
X,Y
X,Y
:

Attribute Table

Feature	Species	etc.
:	:	
Object ID	Aw	
:	:	

Discrete, irregular map features (objects)

Points, Lines and Polygons

(Berry)

MAP Analysis Framework (Raster, Continuous)

Click on…

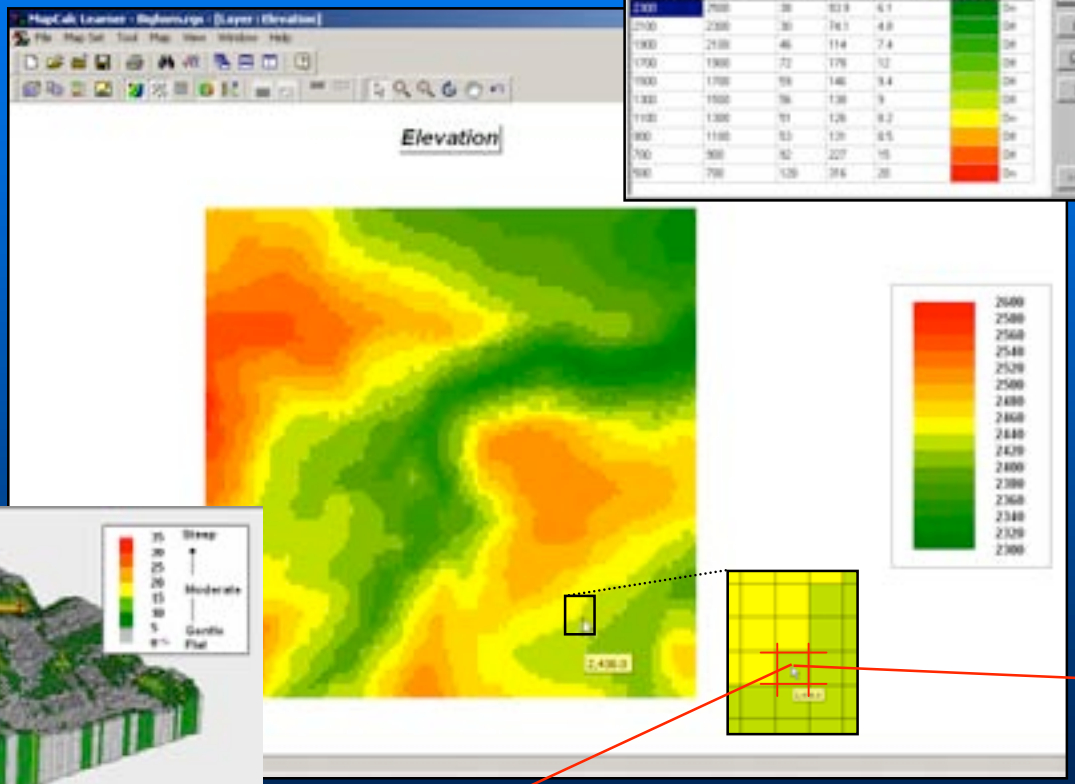
Zoom Pan Rotate

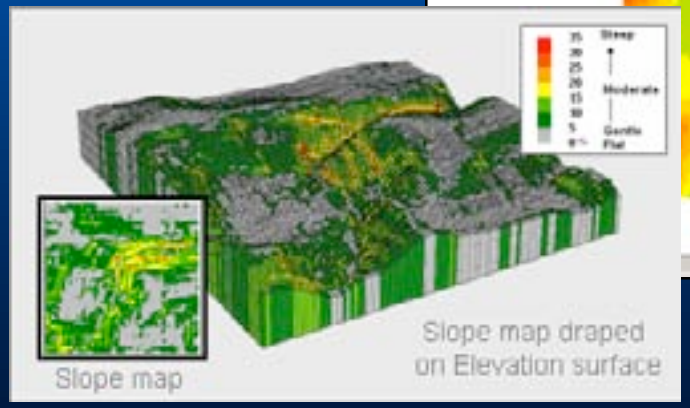
Display

Shading Manager

Grid Analysis

…calculate a slope map and drape on the elevation surface





Grid Table

```
:
--, --, --, --,
--, --, --, --,
--, --, --, --,
--, 2438, --,
--, --, --, --,
:
```

Continuous, regular grid cells (objects)

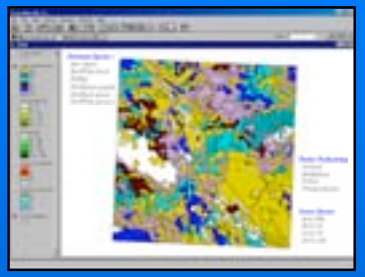
Points, Lines, Polygons and Surfaces

(click for MC_basocs.exe and MC_slope_drain.exe demos)

(Berry)

Map Analysis Evolution *(90s, Revolution)*

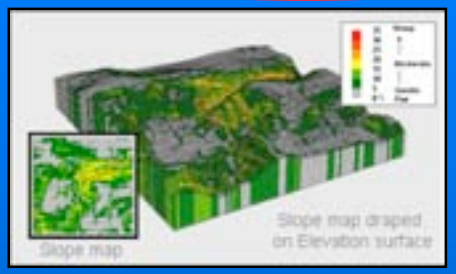
Traditional GIS



Forest Inventory Map

- Points, Lines, Polygons
- Discrete Objects
- Mapping and Geo-query

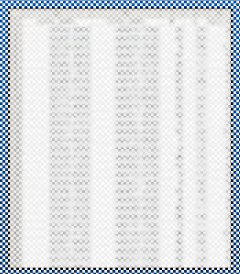
Spatial Analysis

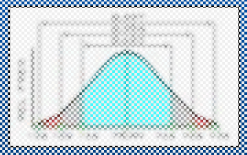


Slope Map Surface

- Cells, Surfaces
- Continuous Geographic Space
- Contextual Spatial Relationships

Traditional Statistics

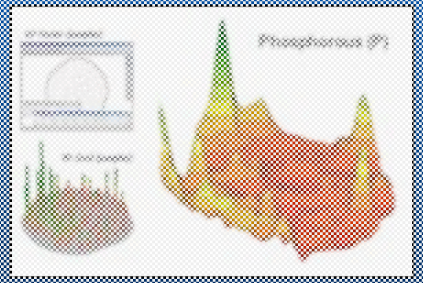




Minimum= 5.4 ppm
Maximum= 103.0 ppm
Mean= 22.4 ppm
StDEV= 15.5

- Mean, StDev (Normal Curve)
- Central Tendency
- Typical Response (scalar)

Spatial Statistics

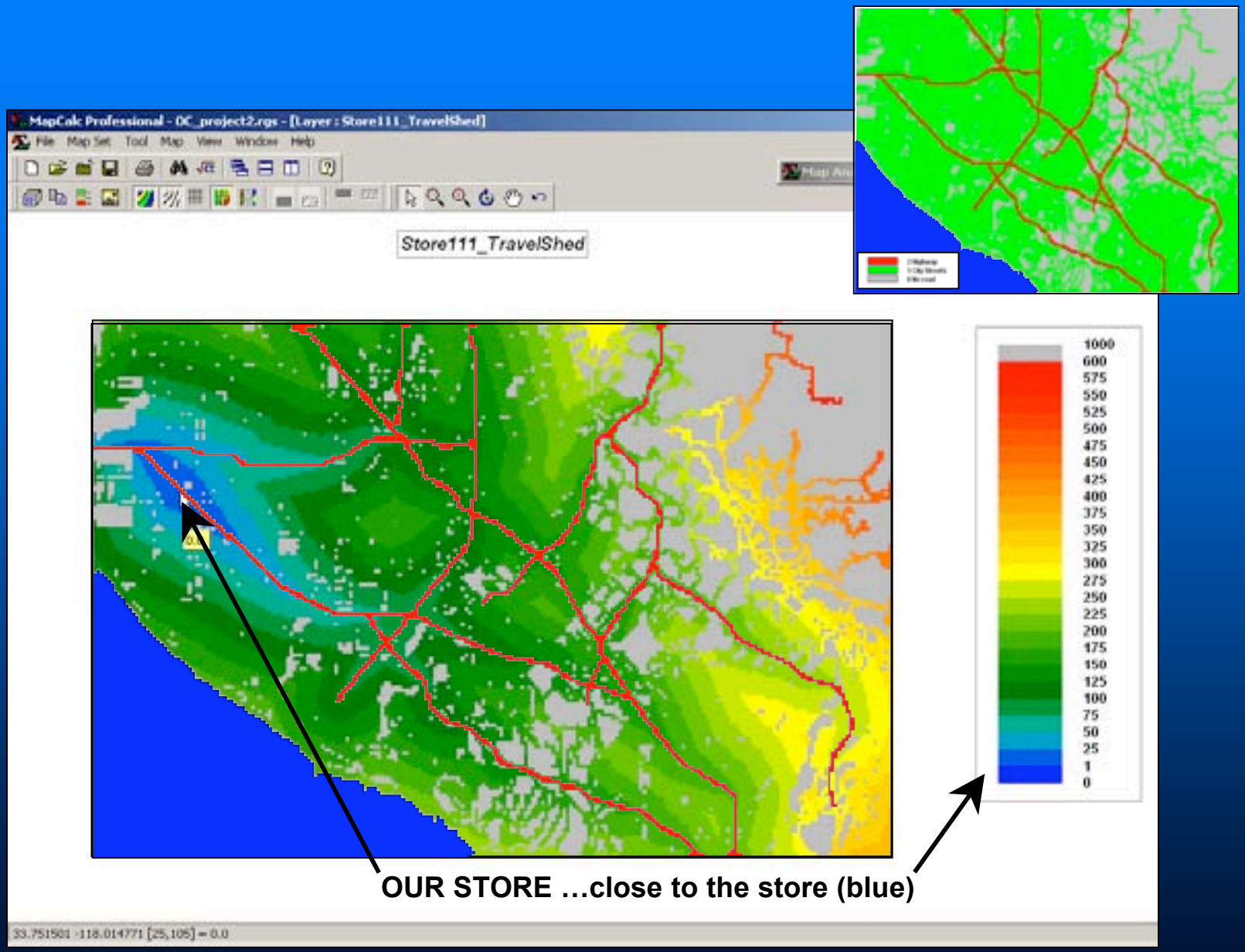


Spatial Distribution (Surface)

- Map of Variance (gradient)
- Spatial Distribution
- Numerical Spatial Relationships

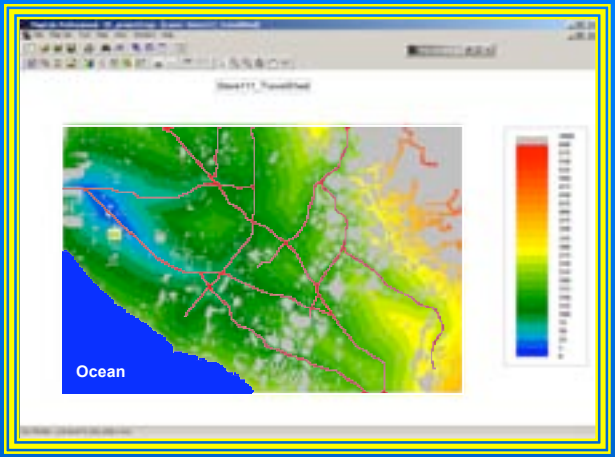
(Berry)

Travel-Time for Our Store to Everywhere

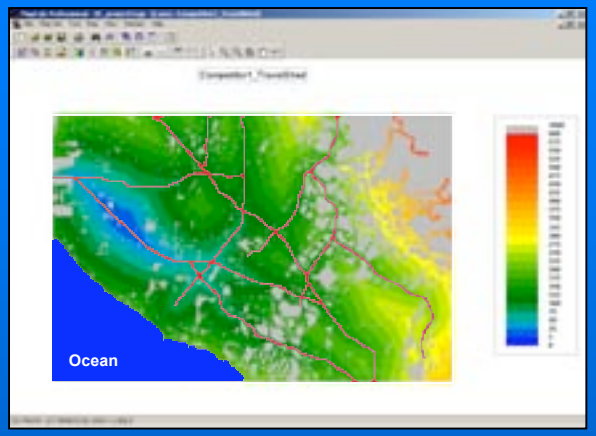


(Berry)

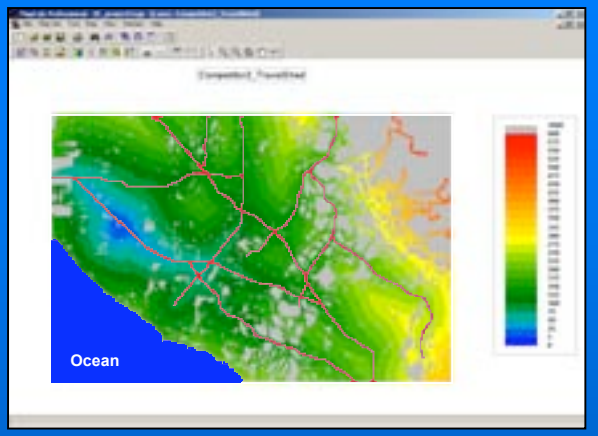
Travel-Time for Competitor Stores



Our Store (#111)

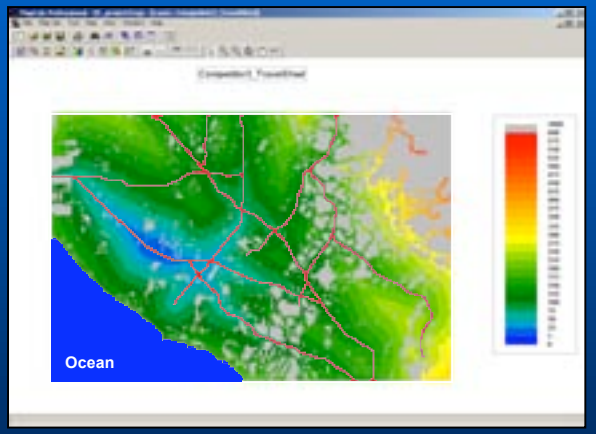


Competitor 1

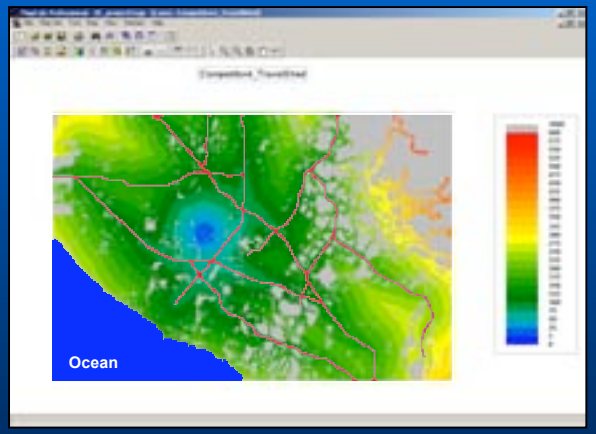


Competitor 2

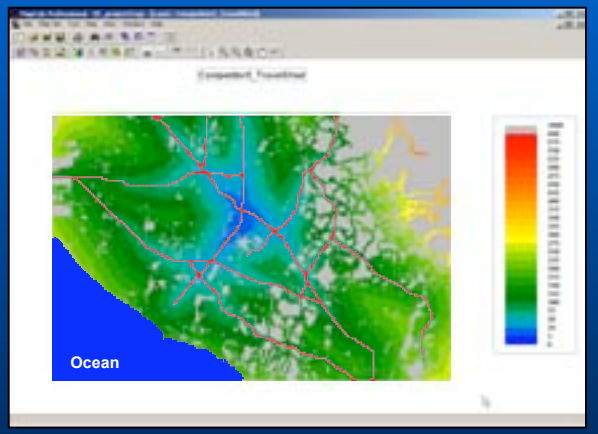
Competitor 3



Competitor 4



Competitor 5



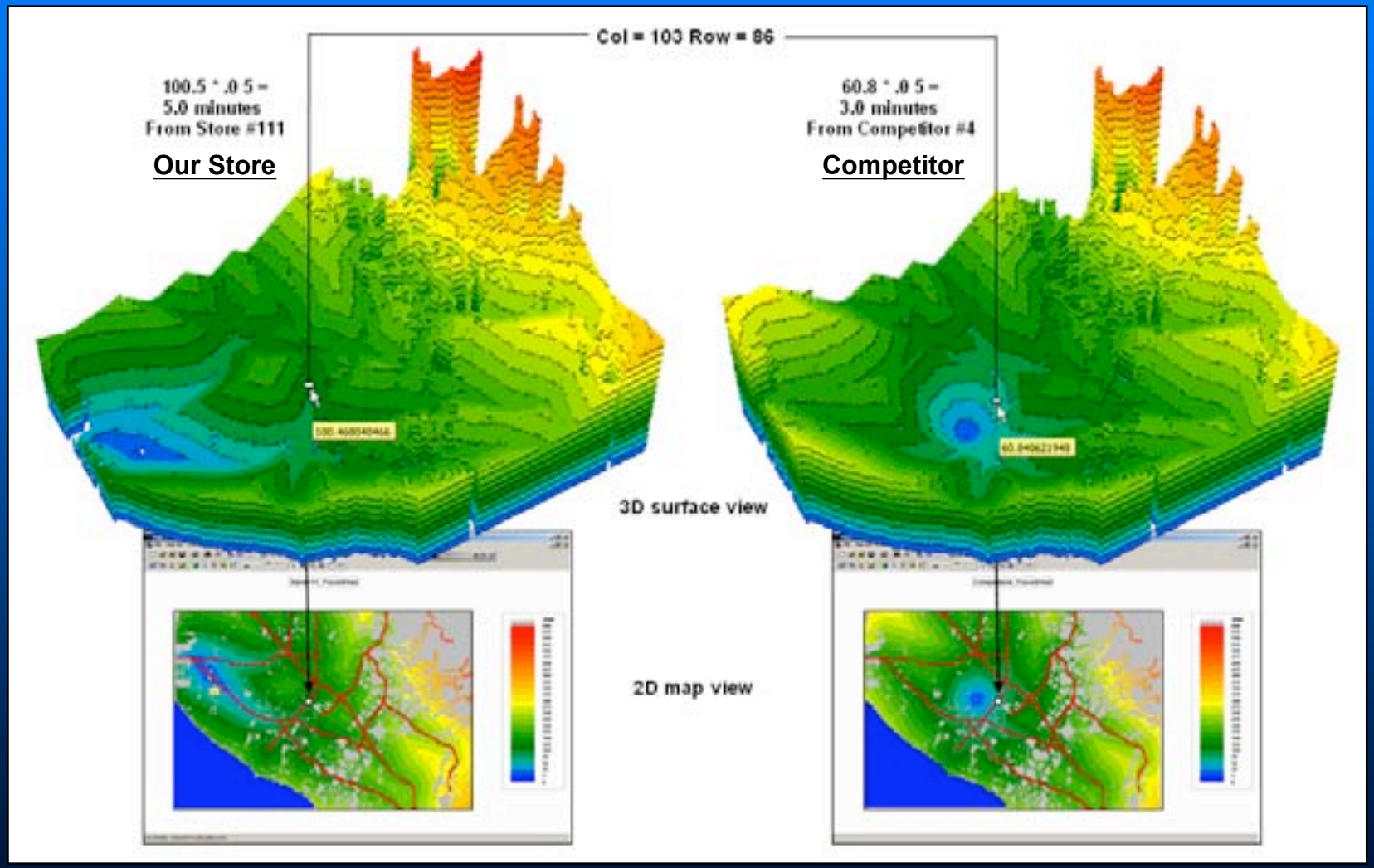
Travel-Time maps from several stores
treating highway travel as four times faster than city streets.

Blue tones indicate locations that are close to a store (estimated twelve minute drive or less). Customer data can be appended with travel-time distances and analyzed for spatial relationships in sales and demographic factors.

(Berry)

Travel-Time Surfaces (Our Store & Competitor #4)

Blue tones indicate locations that are close to a store (estimated twelve minute drive or less). The green through red tones form a bowl-like surface with larger travel-time values identifying locations that are farther away.

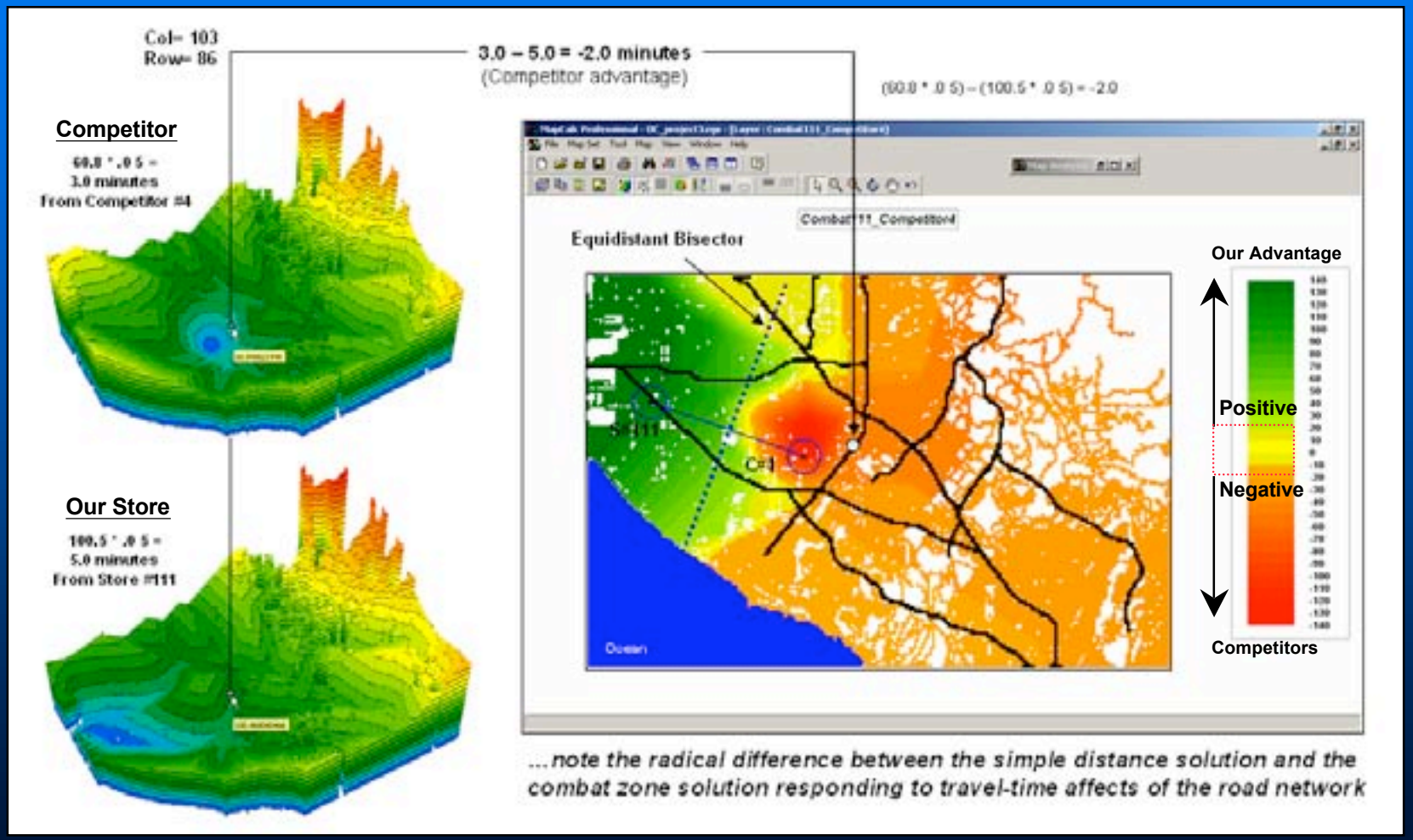


(Berry)

Competition Map *(Store #111 & Competitor #4)*

The travel-time surfaces for two stores can be compared (subtracted) to identify the relative access advantages throughout the project area.

Zero values indicate the same travel-time to both stores (equidistant travel-time)
…yellow tones identifying the Combat Zone ; green Store #111 advantage; red Competitor #4 advantage

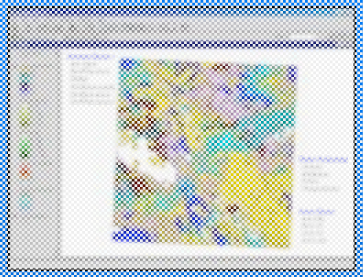


…note the radical difference between the simple distance solution and the combat zone solution responding to travel-time affects of the road network

(Berry)

Map Analysis Evolution (Revolution)

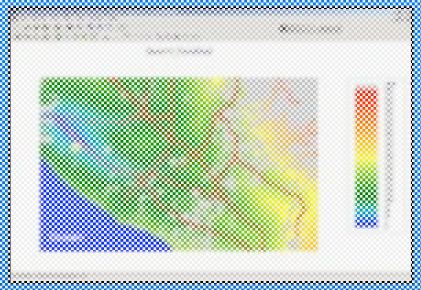
Traditional GIS



Forest Inventory Map

- Points, Lines, Polygons
- Discrete Objects
- Mapping and Geo-query

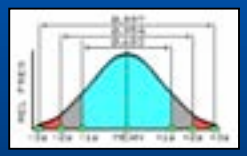
Spatial Analysis



Store Travel-Time (Surface)

- Cells, Surfaces
- Continuous Geographic Space
- Contextual Spatial Relationships

Traditional Statistics



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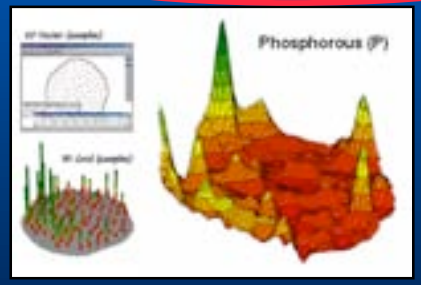
Spatial Statistics



Spatial Distribution (Surface)

- Map of Variance (gradient)
- Spatial Distribution
- Numerical Spatial Relationships

(Berry)

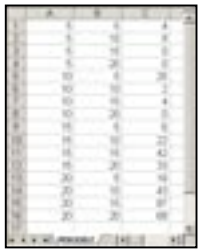
GeoExploration vs. GeoScience

Desktop Mapping *graphically links generalized statistics to discrete spatial objects (Points, Lines, Polygons)— non-spatial analysis (GeoExploration)*

Desktop Mapping

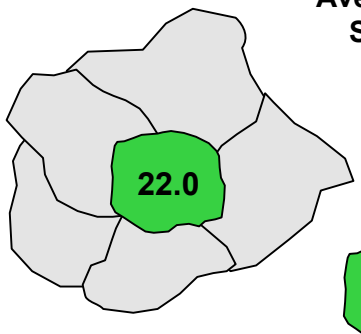
Data Space

Standard Normal Curve



Field Data

Average = 22.0
StDev = 18.7

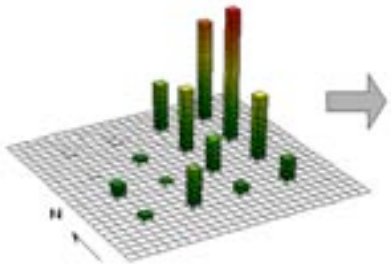


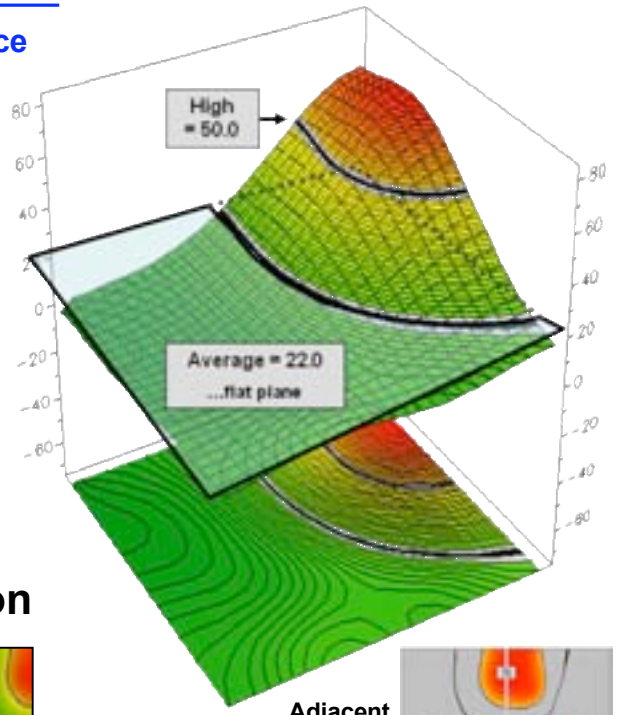
Discrete Spatial Object

Spatially Generalized

Map Analysis

Geographic Space





Continuous Spatial Distribution

Spatially Detailed

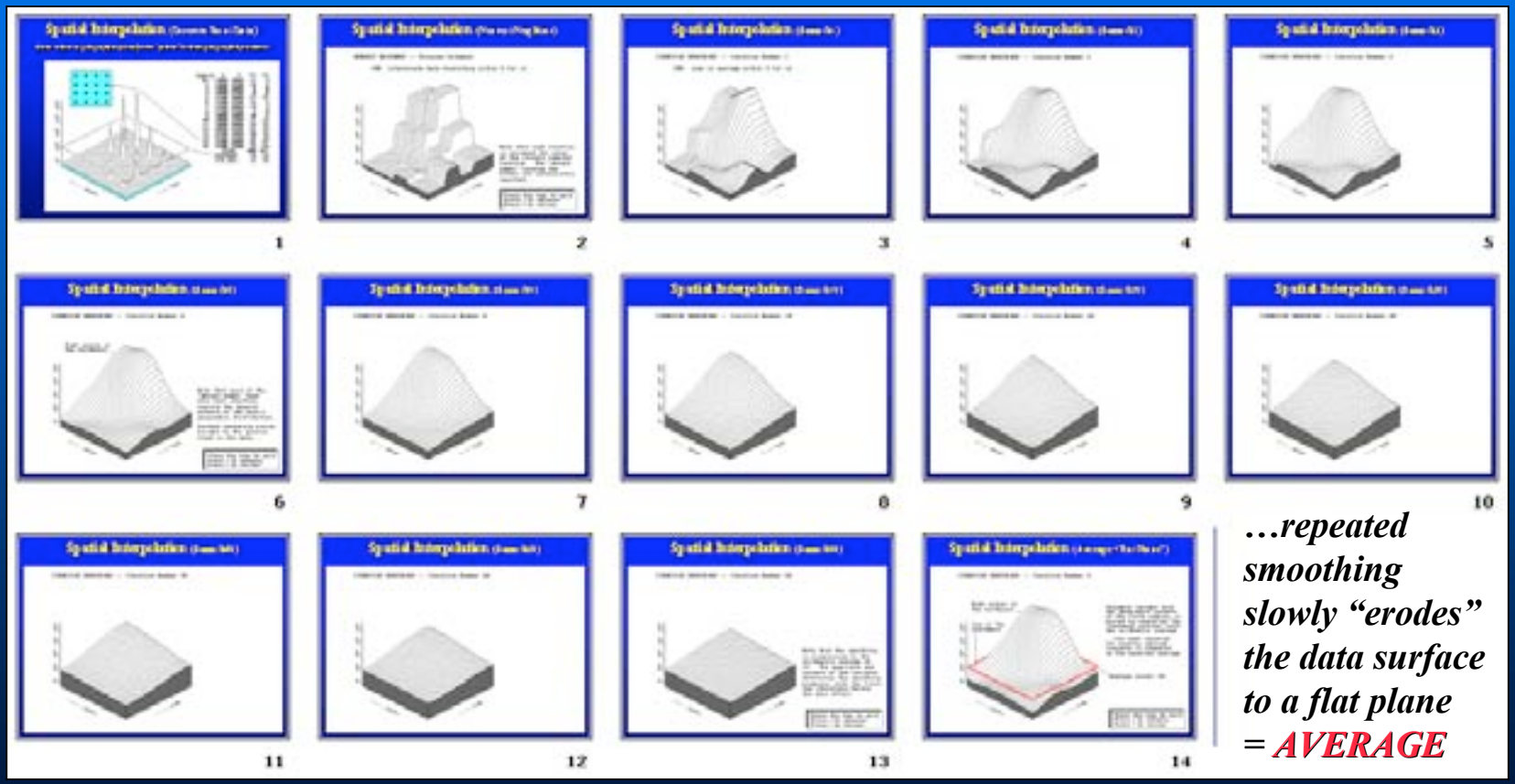
Adjacent Parcels

Map Analysis *map-ematically relates patterns within and among continuous spatial distributions (Map Surfaces)— spatial analysis and statistics (GeoScience)*

(Berry)

Spatial Interpolation *(Spatial Distribution)*

The "iterative smoothing" process is similar to slapping a big chunk of modeler's clay over the "data spikes," then taking a knife and cutting away the excess to leave a continuous surface that encapsulates the peaks and valleys implied in the original field samples …mapping the Variance

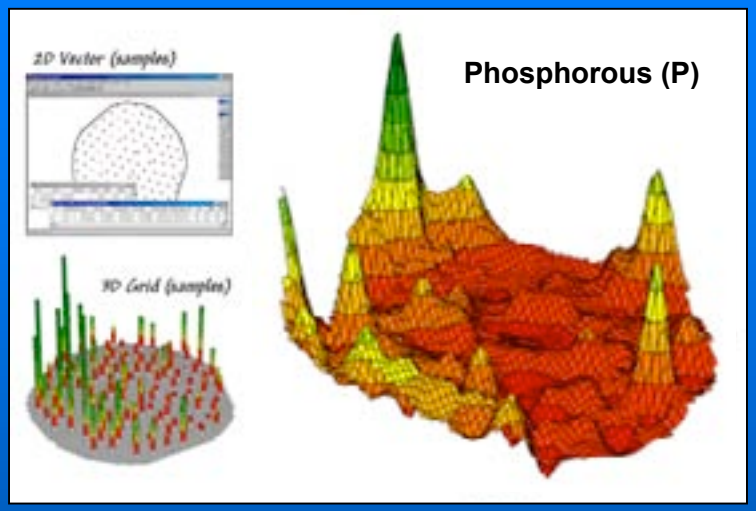


…repeated smoothing slowly "erodes" the data surface to a flat plane = AVERAGE

(digital slide show SSTAT)

(Berry)

Visualizing Spatial Relationships



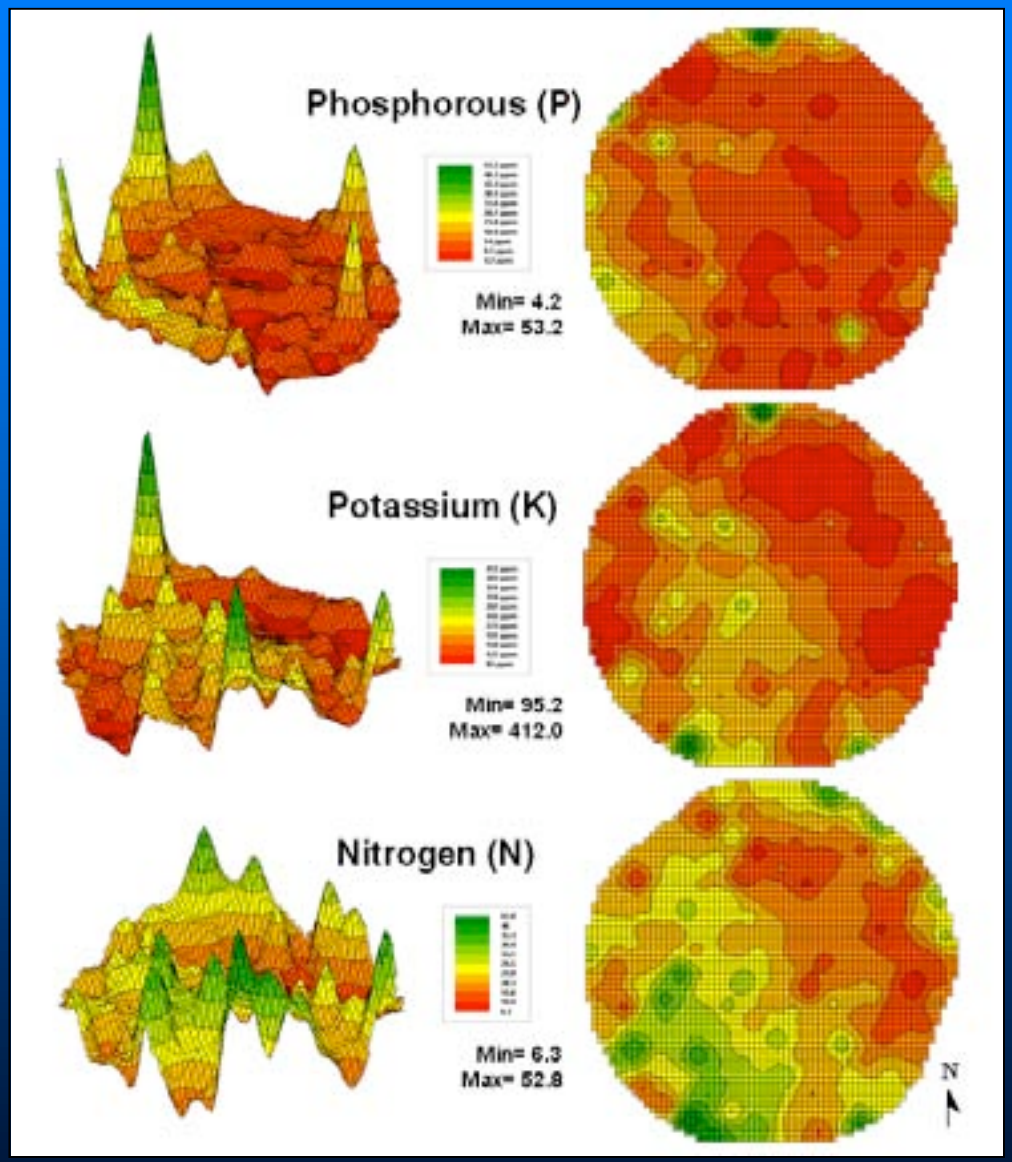
What spatial relationships do you <u>SEE</u>?

…do relatively high levels of P often occur with high levels of K and N?

…how often?

…where?

<u>Multivariate Analysis</u>

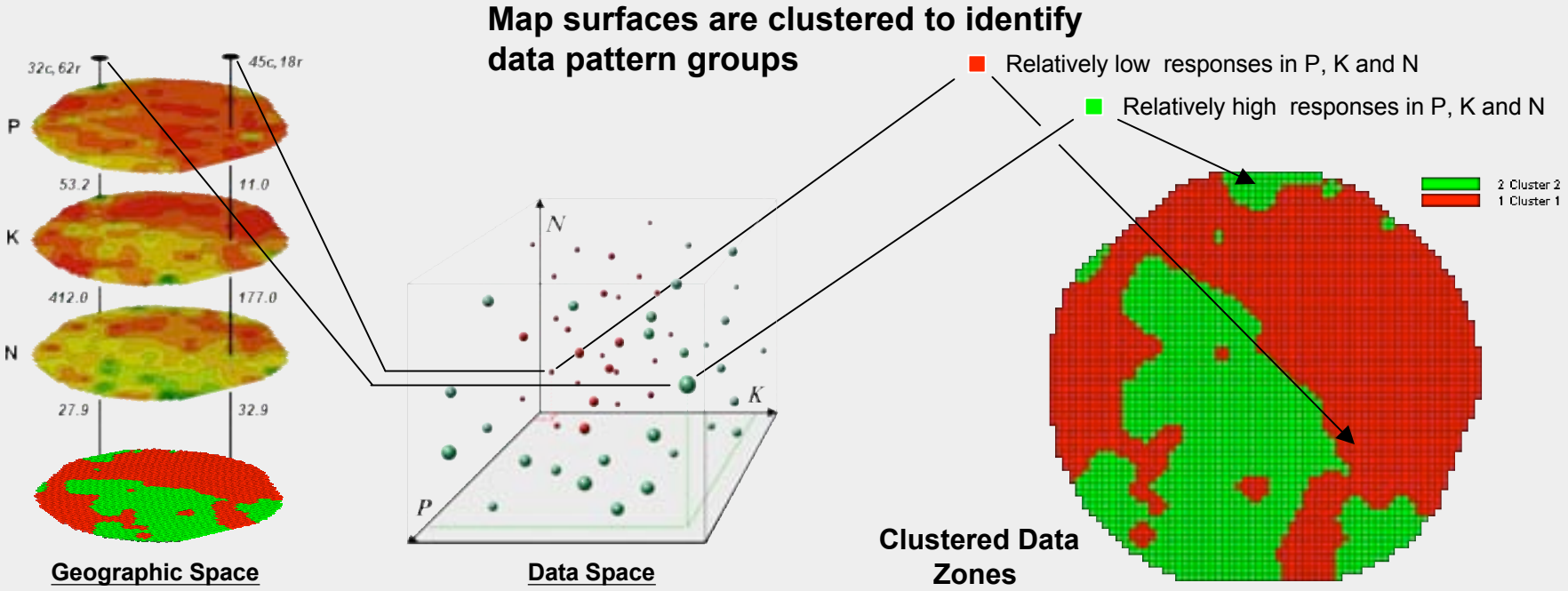


(Berry)

Clustering Maps

…groups of "floating balls" in data space identify locations in the field with similar data patterns– data zones

Spatial Data Mining



…other techniques, such as Level Slicing, Similarity and Map Regression, can be used to discover relationships among map layers …map-ematics/statistics

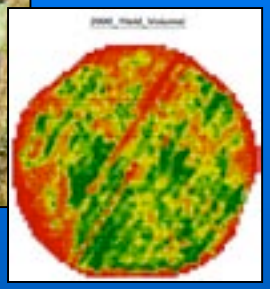
(Berry)

The Precision Ag Process *(Fertility example)*

As a combine moves through a field it 1) uses GPS to check its location then 2) checks the yield at that location to 3) create a continuous map of the yield variation every few feet. This map is 4) combined with soil, terrain and other maps to derive 5) a "Prescription Map" that is used to 6) adjust fertilization levels every few feet in the field (variable rate application).

On-the-Fly Yield Map

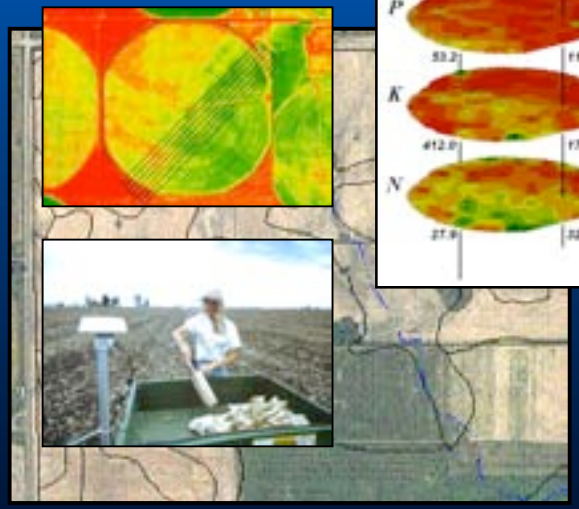
Steps 1) – 3)

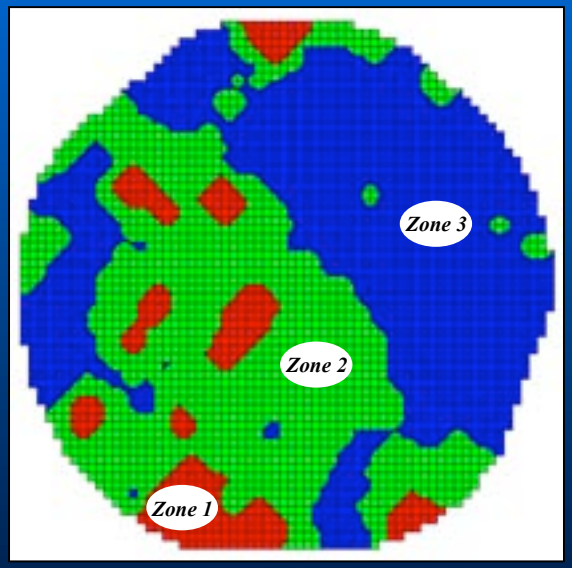


Map Analysis

Step 4)

Farm dB





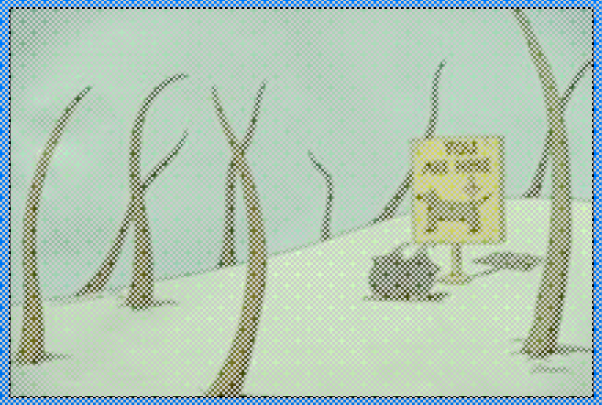
Prescription Map

Step 5)

Variable Rate Application

Step 6)

(Berry)



Mapping and Geo-query

Recall that in the beginning we had…

Computer Mapping *automates the cartographic process (70s)*

Spatial Database Management *links computer mapping with database capabilities (80s)*

Map-ematics

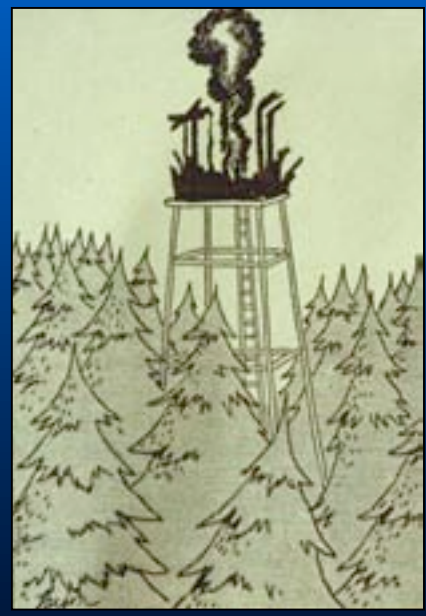
Map Analysis *representation of relationships within and among mapped data (90s)*

- *Spatial Analysis (Contextual)*
- *Spatial Statistics (Numerical)*

Multimedia Mapping *full integration of GIS, Internet and visualization technologies (00s)*

- *Map Delivery/Devices*
- *Map Display*
- *Visualization*
- *Geospatial Multimedia*

Knock-your-socks-off



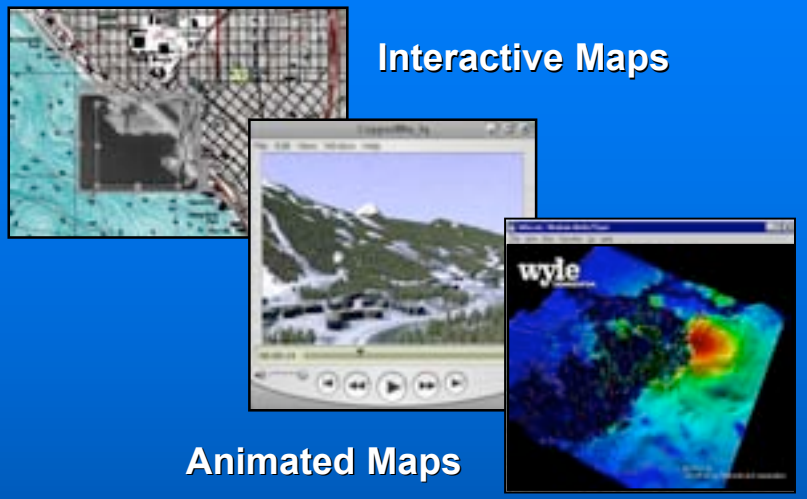
(Berry)

Part 2 Multimedia Mapping *(00s,)*

1) Map Delivery/Devices

GPS/GIS Enabled Devices and Internet Mapping

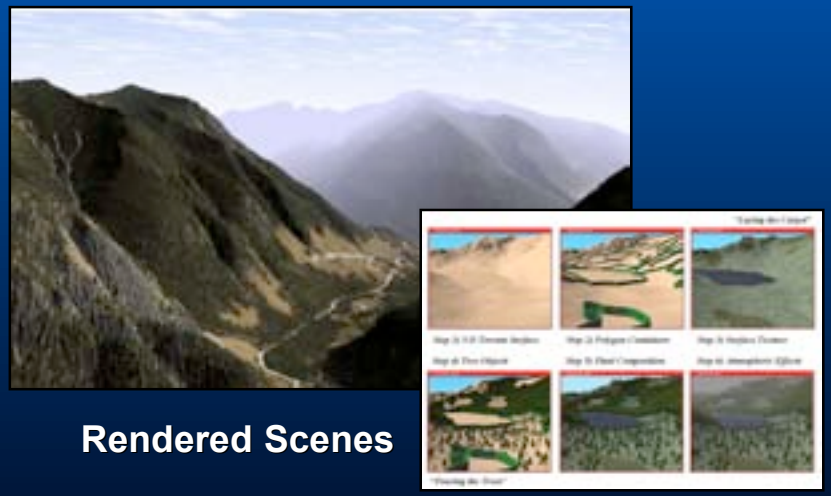
2) Map Display



Interactive Maps

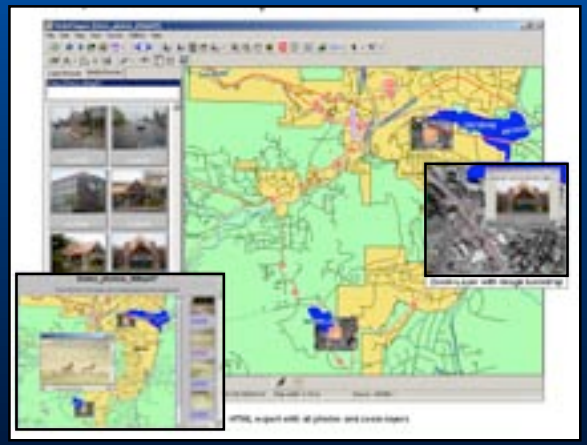
Animated Maps

3) Visualization



Rendered Scenes

4) Geospatial Multimedia



Maps with Integrated

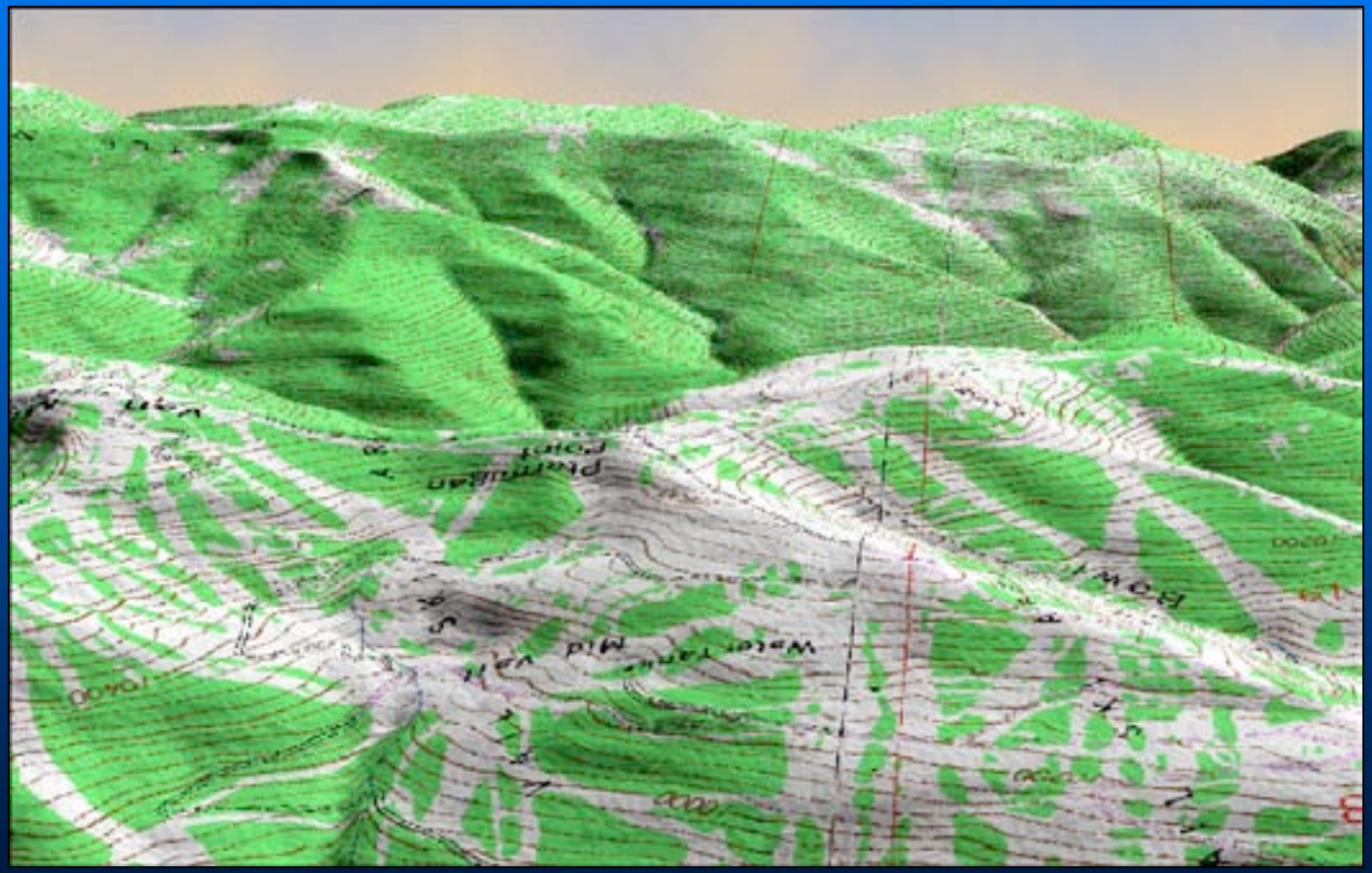
Photos
Video
Audio
Text
Data

(Berry)

3-D Visualization Approaches *(Mega-Trend #2)*

Image Draping *-- is an established technique in GIS. Draping a topographic or thematic map onto a 3-D terrain surface is effective but relies on abstract colors, shading and symbols.*

"Map Abstraction"



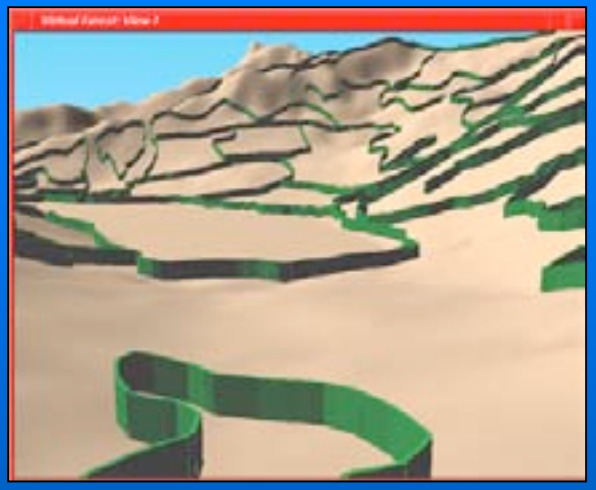
SportsTracker (MapTrek, 9/98)

(Berry)

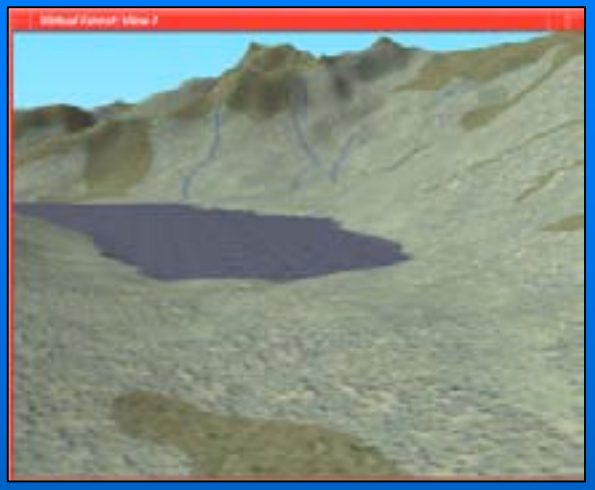
Landscape Visualization (Rendering Technique)

"Laying the Carpet"

Step 1) 3-D Terrain Surface



Step 2) Polygon Containers



Step 3) Surface Texture

Step 4) Tree Objects

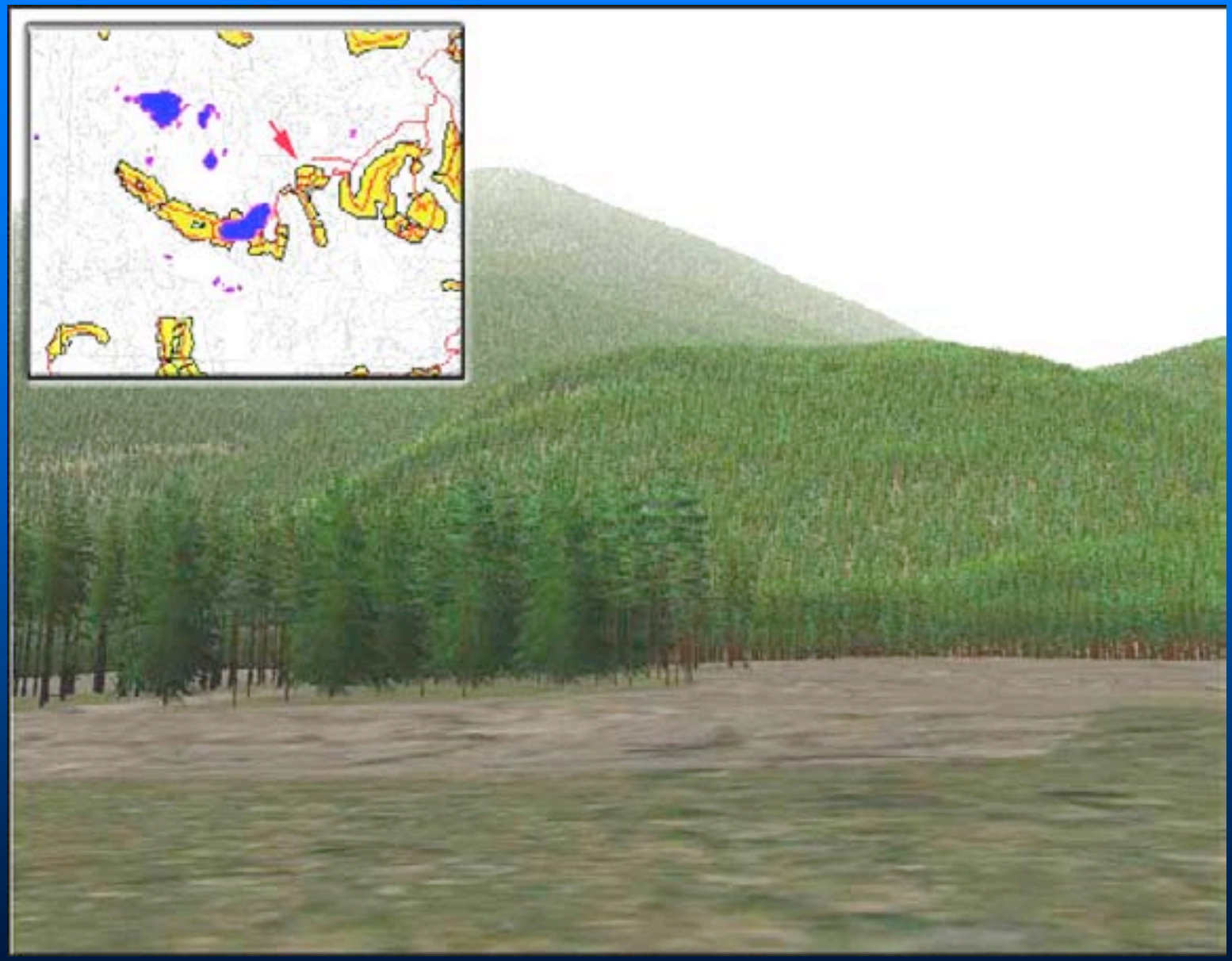
Step 5) Final Composition

Step 6) Atmospheric Effects

"Pouring the Trees"

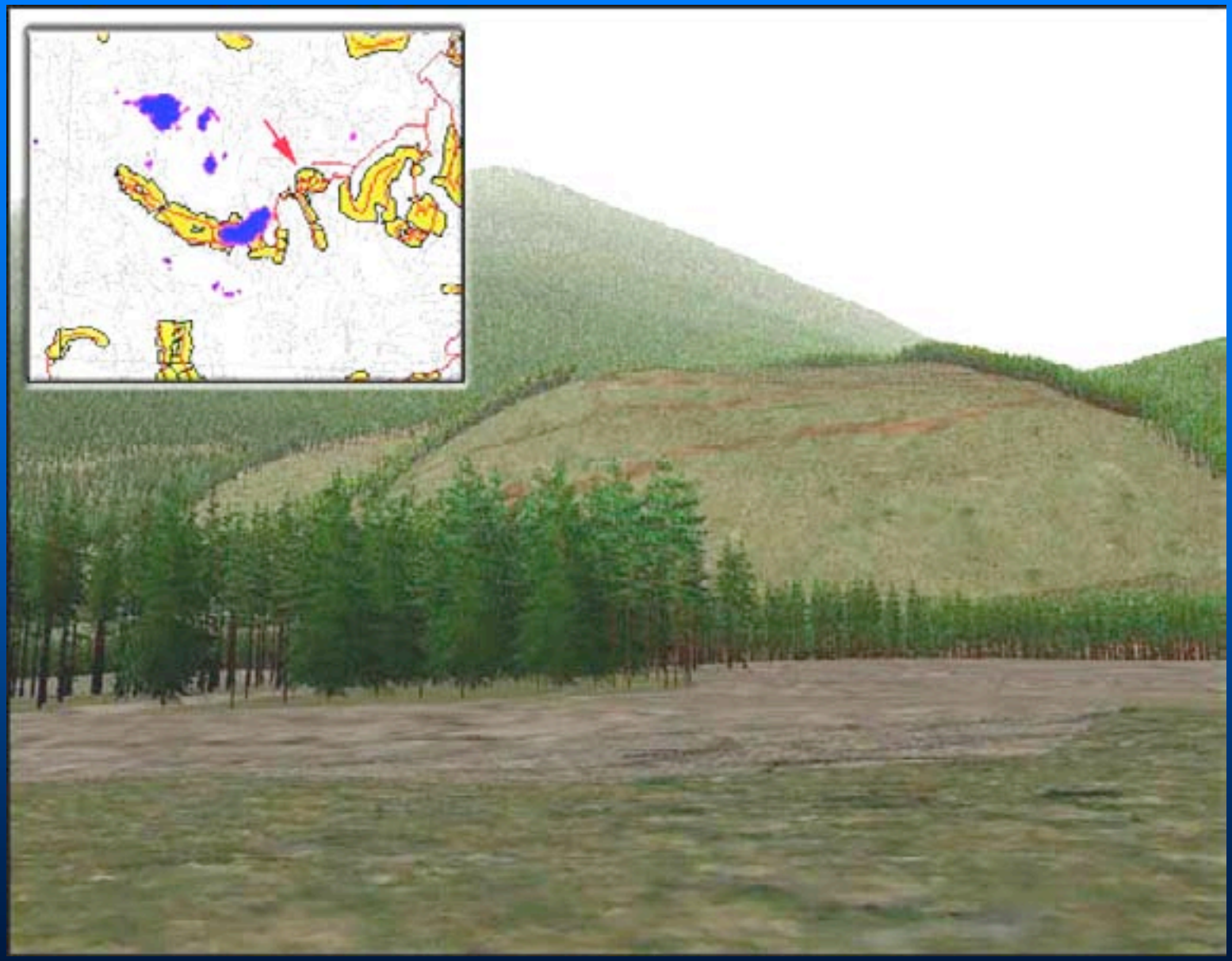
(Berry)

Visualizing Landscape Impacts (GIS Rendering)



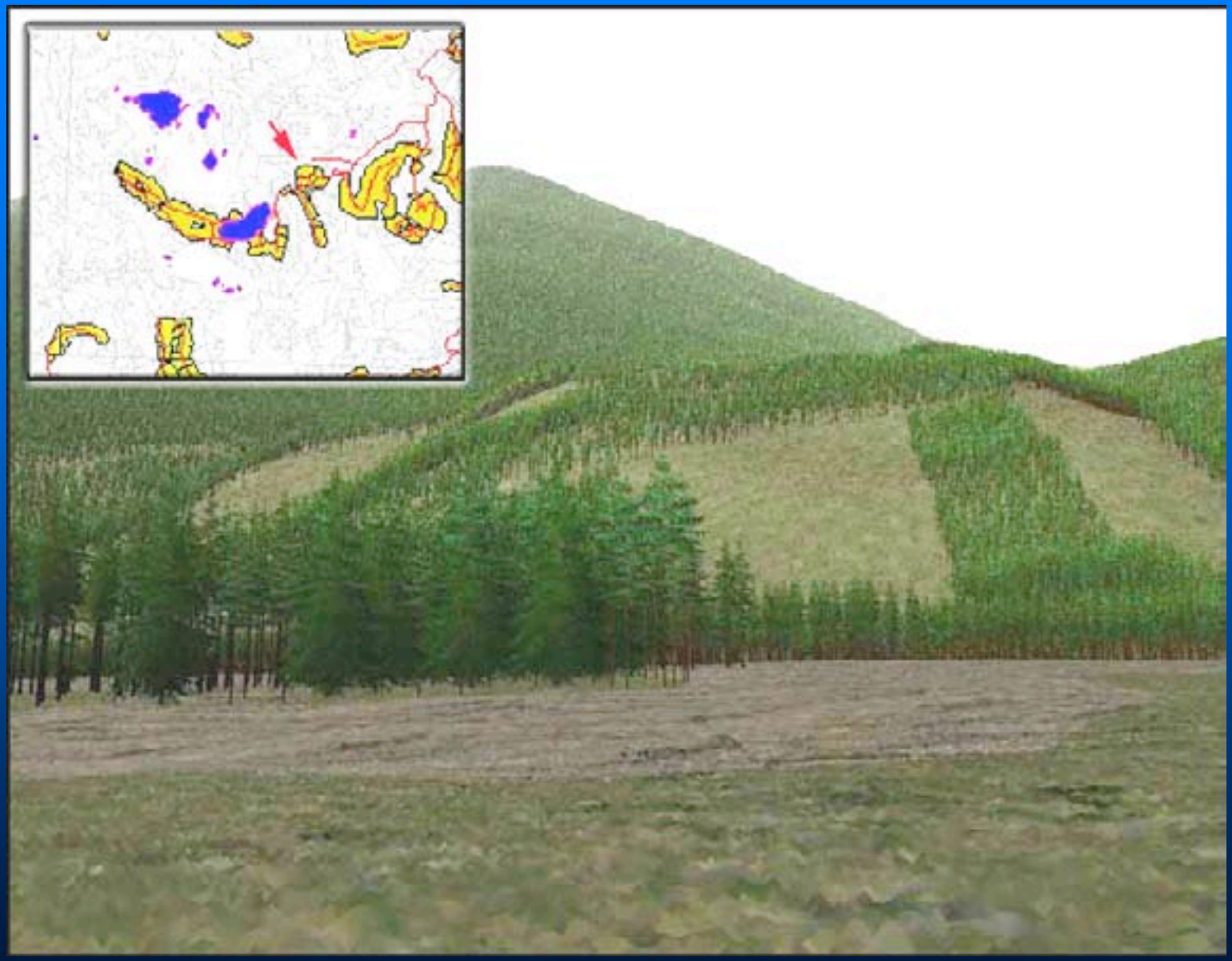
(Berry)

Visualizing Landscape Impacts (Clear cut)



(Berry)

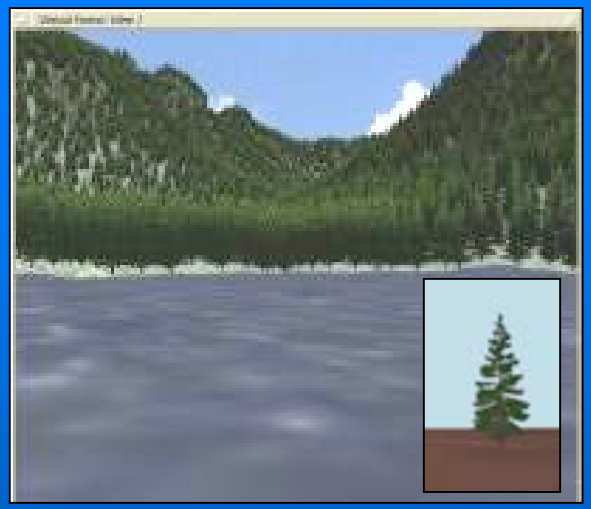
Visualizing Landscape Impacts (Water retention cut)



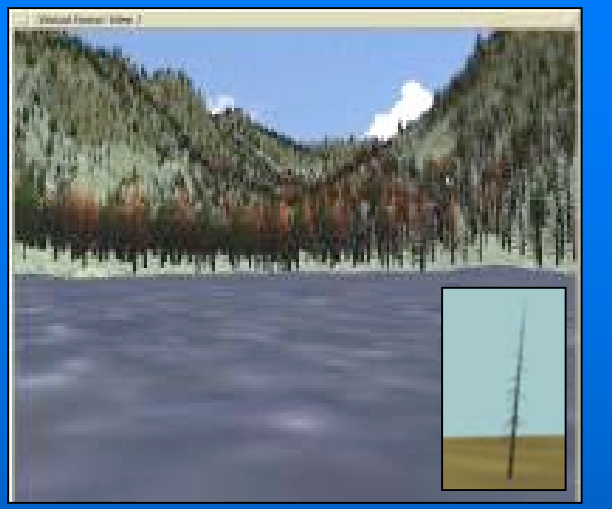
(Berry)

Visualizing Landscape Conditions

…changing the landscape's carpet and objects to simulate different conditions

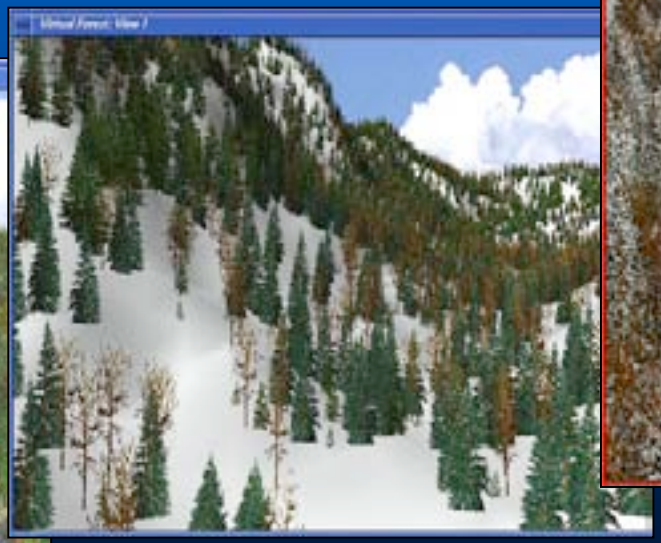


Before Fire



After Fire

Summer (diseased)



Winter

After Snowfall (ski run)

(Berry)

Geospatial Multimedia *(Mega-Trend #4)*

…take pictures with a digital camera or video recorder while carrying a GPS with 'track logging' then link the Lat/Lon with each picture.

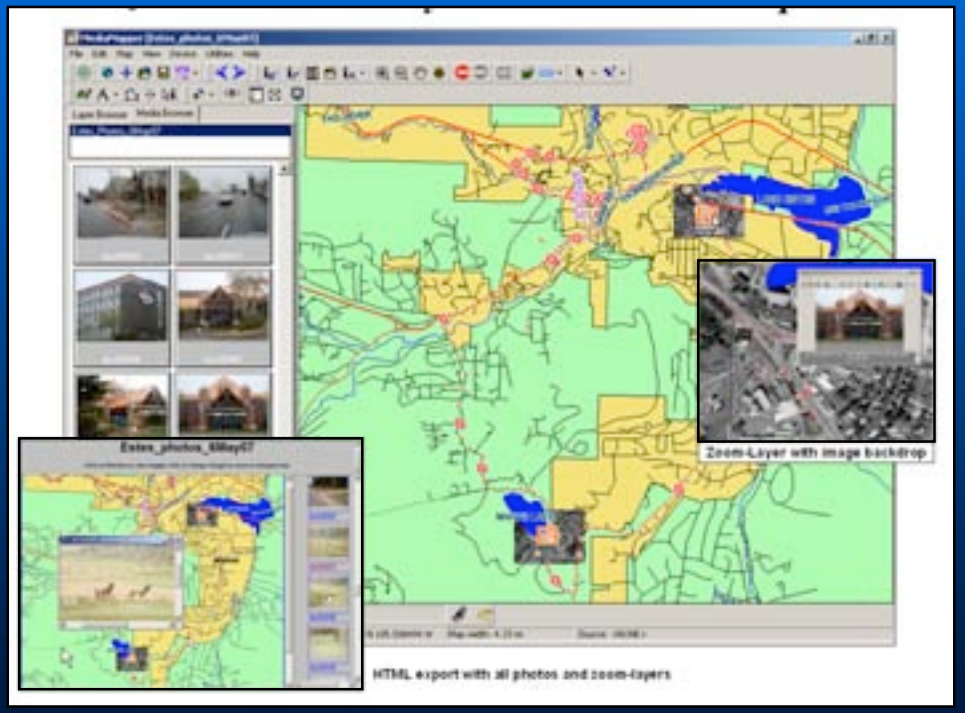
Digital Camera

- ✓ ***What** (picture)*
- ✓ ***When** (time)*

- ✓ ***When** (time)*
- ✓ ***Where** (X,Y)*

GPS Unit

Pictures are "posted and linked" to a map

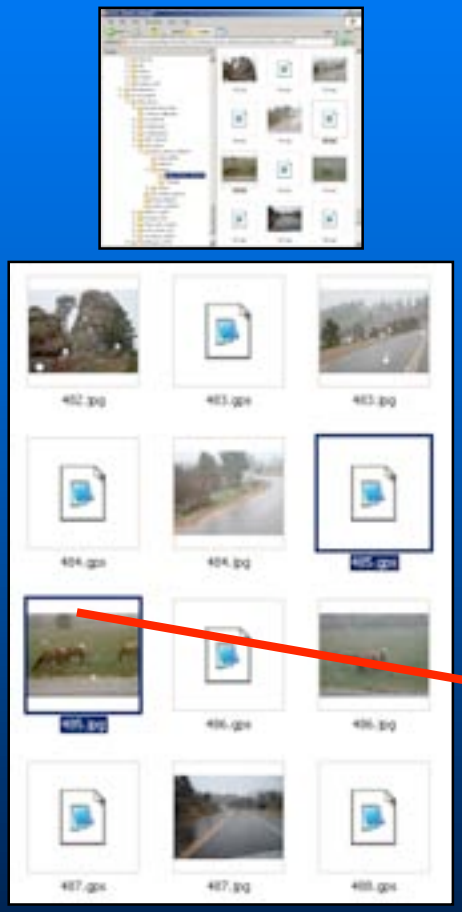


Export to HTML and post to Internet

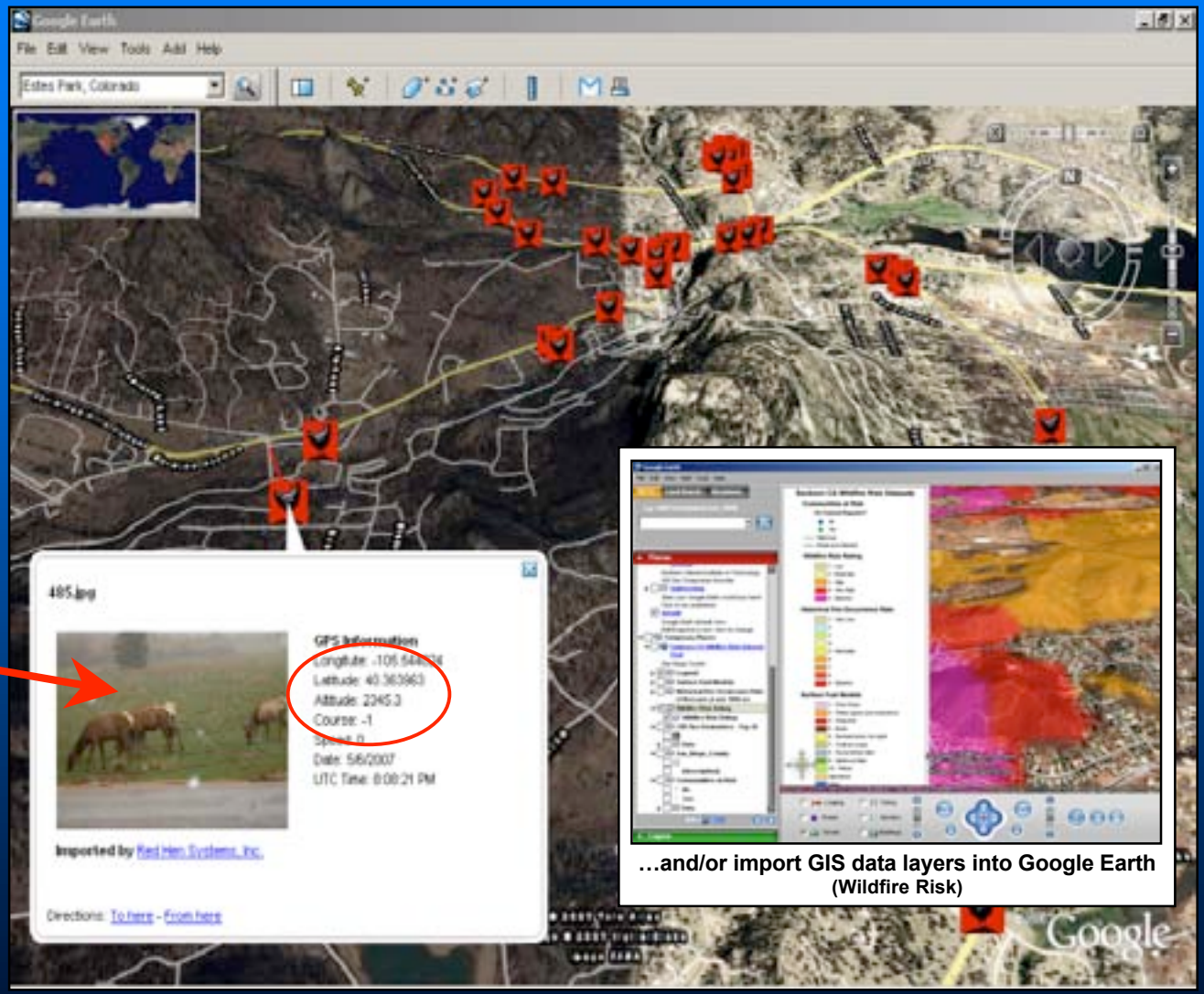
(Berry)

Google Earth *(Killer App of 2005)*

***Vessel for Mapped Data*— has brought Geotechnology to the masses; not a GIS but digests map data for 3D display with satellite imagery of the globe as backdrop**



Geo-tagged Photos



…and/or import GIS data layers into Google Earth
(Wildfire Risk)

(click for GE_EstesPark_Photos.avi demo)

(Berry)

GIS Utility and Understanding

Philosopher's Progression of Understanding—

- ✓ **Data** (all facts)
- ✓ **Information** (facts within a context)

  …**GeoExploration** *emphasizes tools for data access and visualization (general user)*

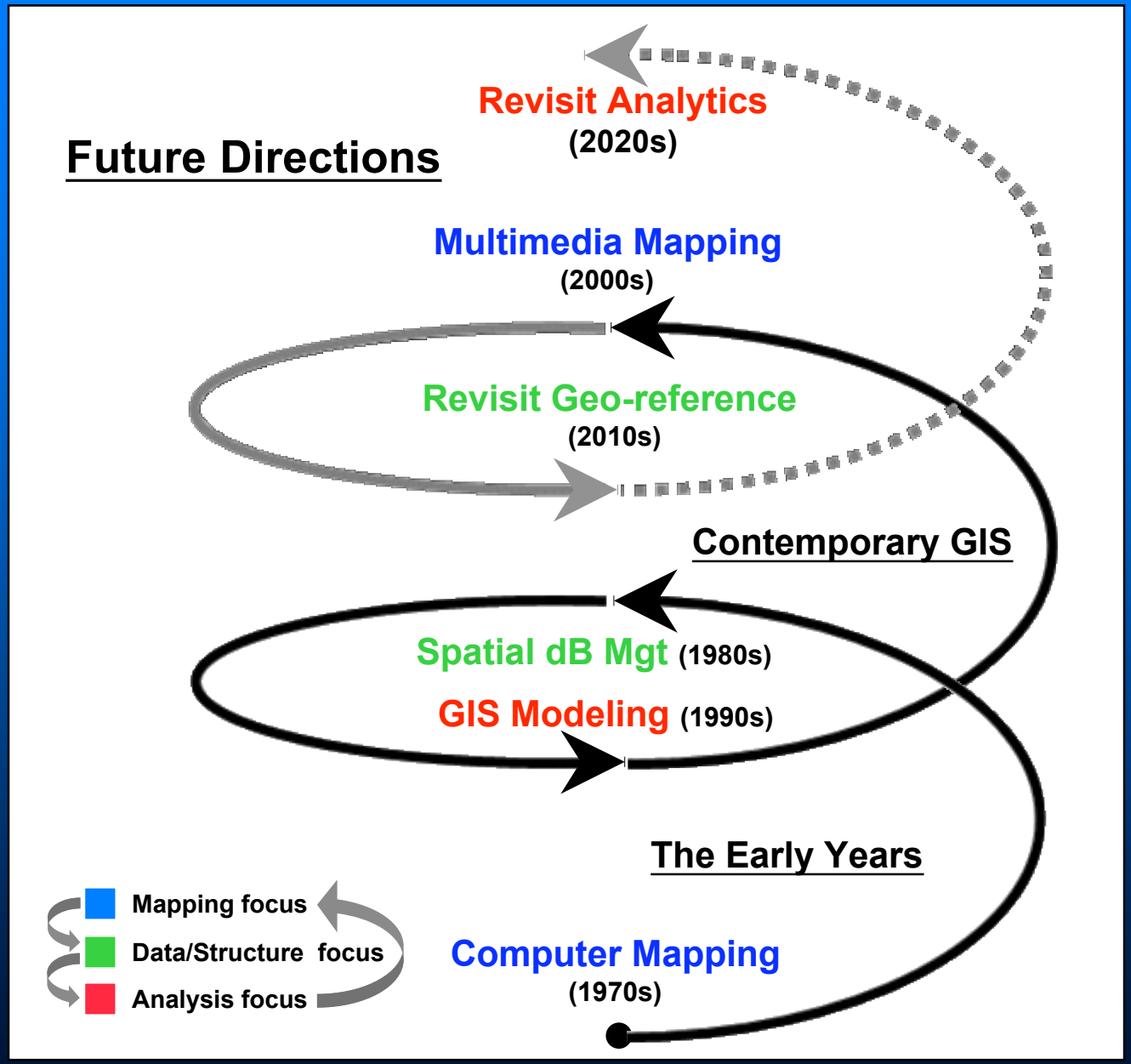
  Mapping focus

  Data/Structure and Analysis focus

- ✓ **Knowledge** (interrelationships among relevant facts)
- ✓ **Wisdom** (actionable knowledge)

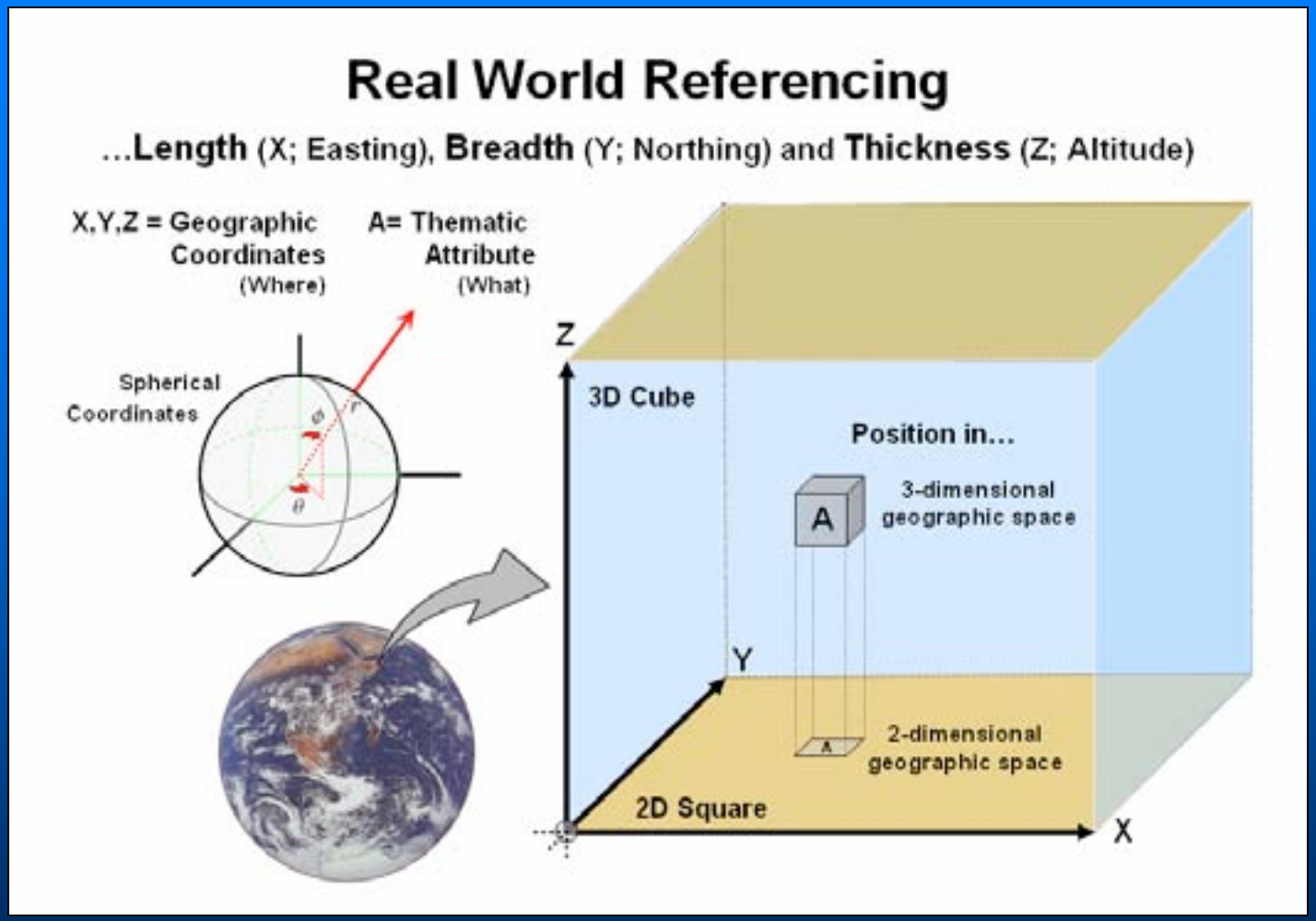
  …**GeoScience** *emphasizes tools for spatial reasoning and understanding of geographic patterns and relationships (application specialist)*

A Peek at the Bleeding Edge (2010 and beyond)



(Berry)

Traditional Geographic Referencing (Cartesian)

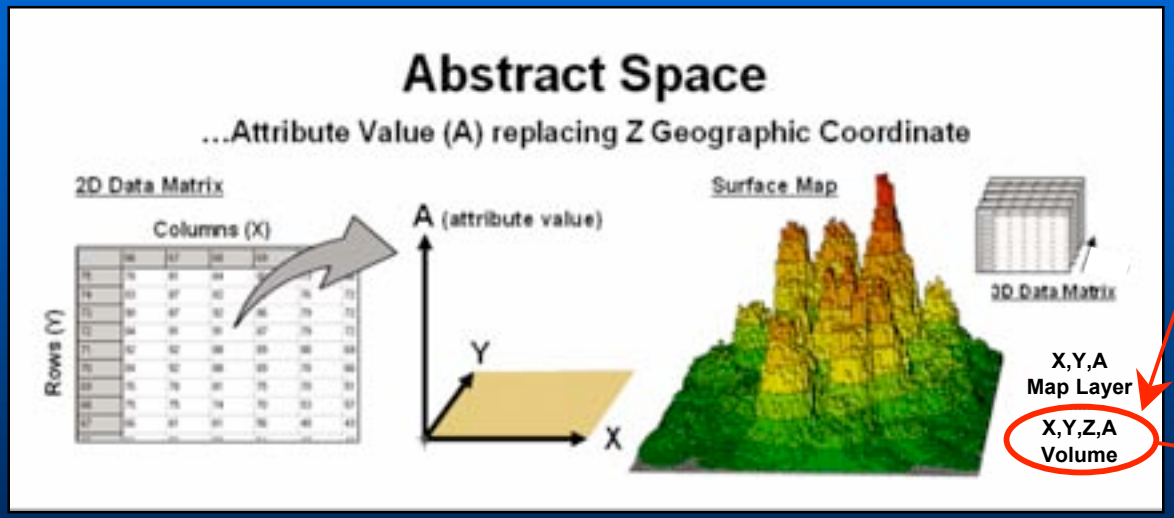


Cartesian Coordinate System (X, Y, and Z)

- **Discrete Spatial Objects** (vector) — *Point (X,Y) as fundamental unit*
- **Continuous Surfaces** (grid) — *Cell (Col,Row) as fundamental unit*

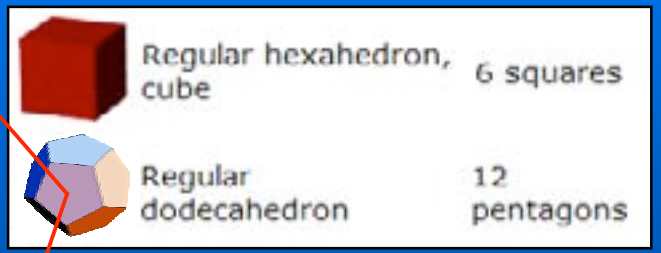
(Berry)

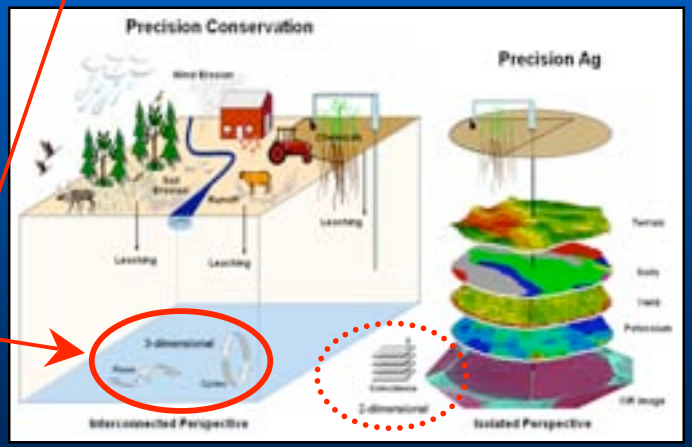
Alternative Geographic Referencing (Polyhedral)



Geo-referencing (2010)

- *Nested Hexagons*
  (2D hexagon grid)
- *Solid Volumes*
  (3D polyhedral grid)



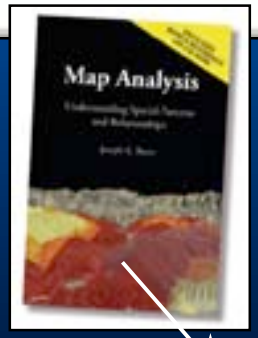


Re-tooling Analytics (...and beyond)

...new geo-referencing and data structures (X,Y,Z geography plus Attribute values) will spawn a host of new analytic algorithms (e.g., 3D flows and cycles)

(Berry)

Where Have We Been…



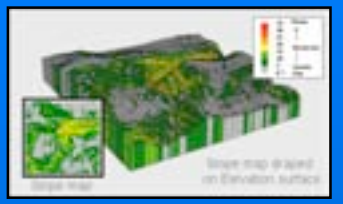
Computer Mapping (70s) — Spatial Database Management (80s)

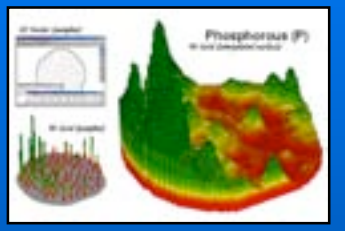
Map Analysis *representation of relationships within and among mapped data (1990s)*

- ***Spatial Analysis*** *— "contextual" relationships*
- ***Spatial Statistics*** *— "numerical" relationships*

Multimedia Mapping *full integration of GIS, Internet and visualization technologies (2000s)*

- ***Map Delivery/Devices*** *— Internet & Devices*
- ***3D Visualization*** *— Draping & Virtual Reality*
- ***Map Display*** *— Interactive & Animated Maps*
- ***Multimedia Mapping*** *— GPS/Photos & Video*
- ***Google Earth*** *— New Vessel for Mapped Data*





Geo-referencing (2010s) — Re-tooling Analytics (2020s)

www.innovativegis.com/basis ... online papers, materials, books and software

Introductory Workshop on

Grid-based Map Analysis Techniques and Modeling

New York State Geographic Information Systems
23rd Annual Conference — October 1 and 2, 2007 — Albany, New York

Presentation by

Joseph K. Berry

W.M. Keck Scholar in Geosciences, University of Denver

Principal, Berry & Associates // Spatial Information Systems
2000 S. College Ave, Suite 300, Fort Collins, CO 80525
Phone: (970) 215-0825 Email: jberry@innovativegis.com

Website at ***www.innovativegis.com/basis***

Historical Setting and GIS Evolution

Manual map drafting …8,000 years

Computer Mapping

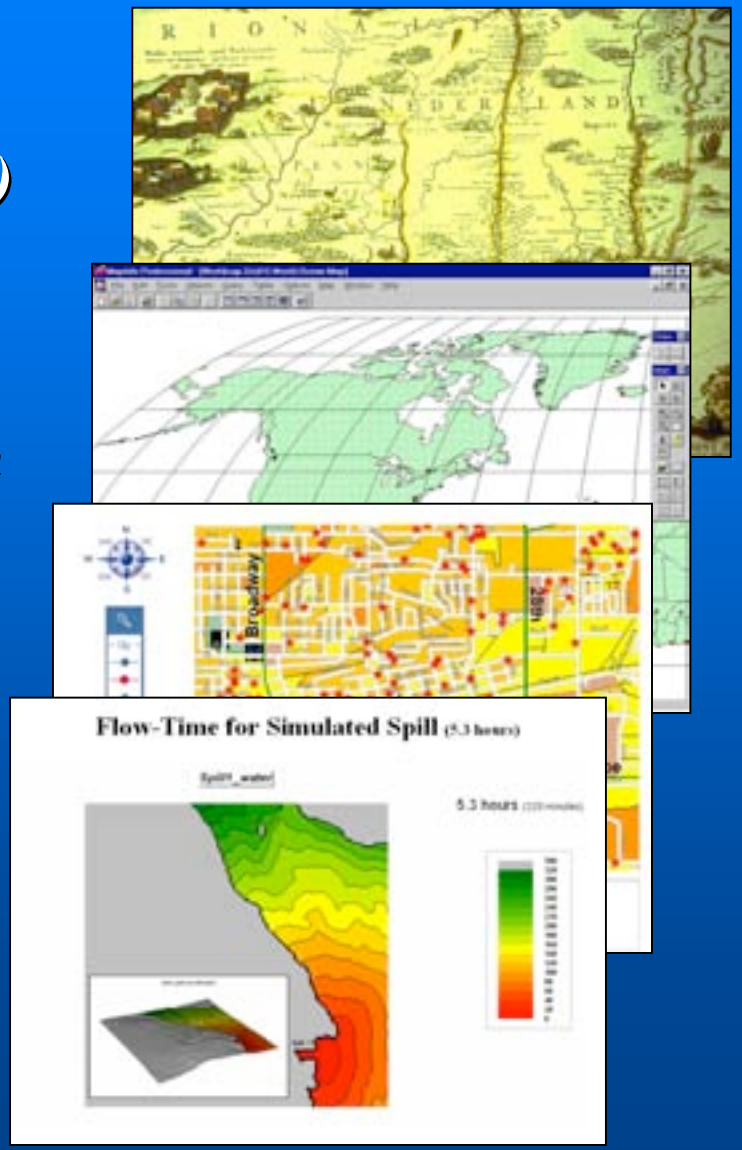
automates the cartographic process (70s)

Spatial Database Management

links computer mapping techniques with traditional database capabilities (80s)

GIS Analysis and Modeling

representation of relationships within and among mapped data (90s)



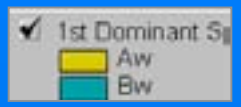
What do you think is the current (00s) frontier?
…but that's another story

(See Beyond Mapping III, "Topic 27", www.innovativegis.com/basis)

(Berry)

Desktop Mapping Framework

Click on…



Select Theme

Zoom Pan

Info Tool

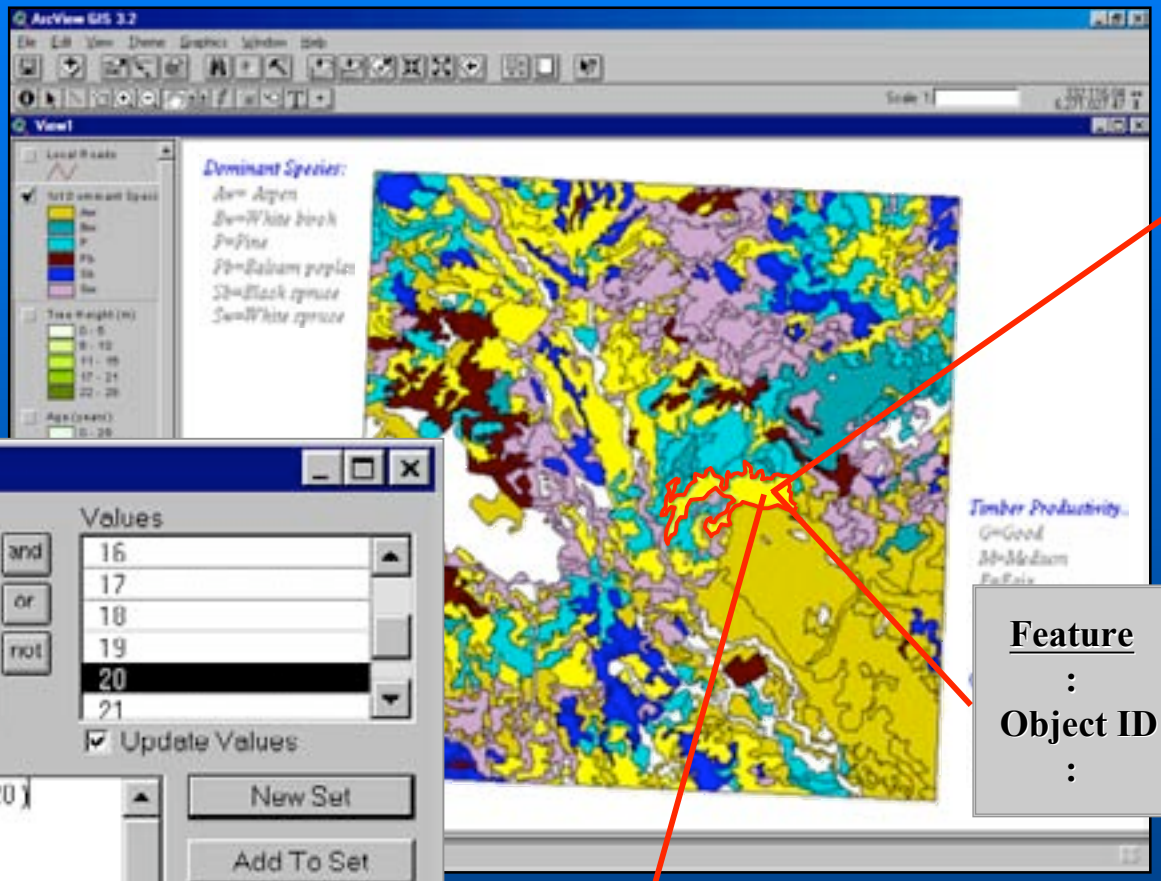
Theme Table

Distance

Now for a Geo-Query…

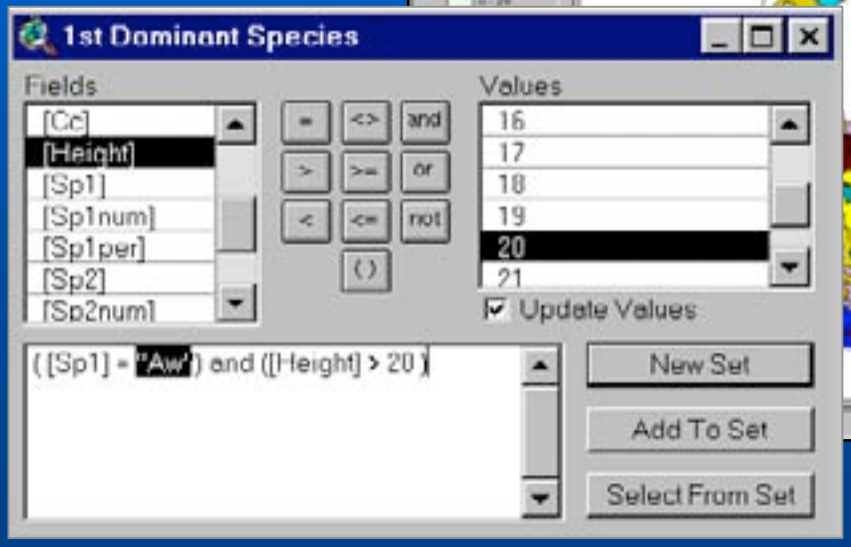
Query Builder

…identify tall aspen stands



Spatial Table

:
Object ID
X,Y
X,Y
X,Y
:



Attribute Table

Feature	Species	etc.
:	:	
Object ID	Aw	
:	:	

Discrete, irregular map features (objects)

(Berry)

MAP Analysis Framework (Raster/Grid)

Click on…

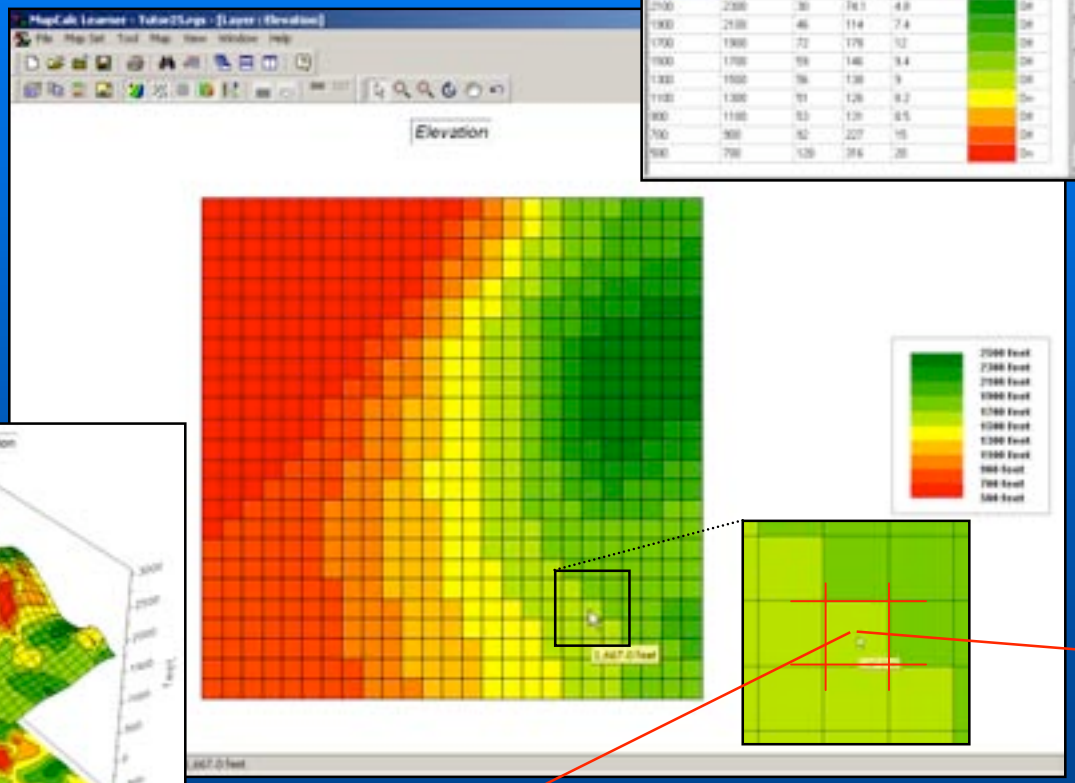
Zoom Pan Rotate

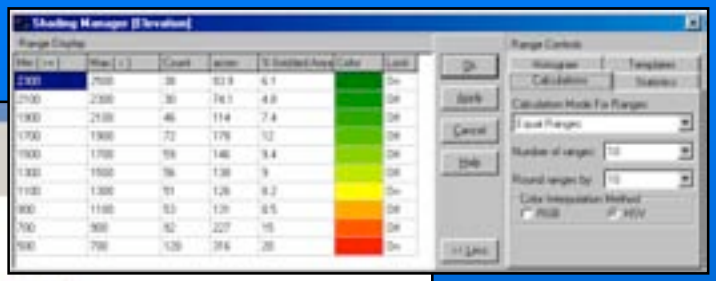
Display

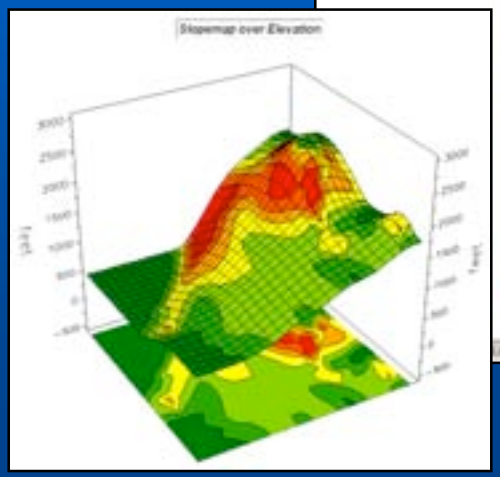
Shading Manager

Grid Analysis

…calculate a slope map and drape on the elevation surface







Grid Table

:				
--,	--,	--,	--,	
--,	--,	--,	--,	
--,	--,	--,	--,	
--,	1667.0,	--,		
--,	--,	--,	--,	
:				

Continuous, regular set of grid cells (objects)

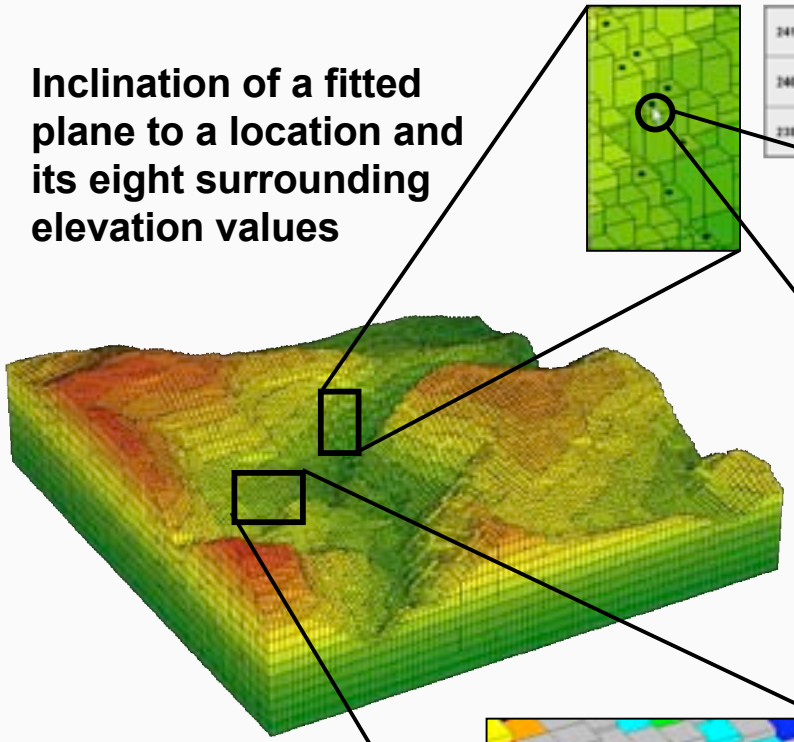
Points, Lines, Polygons and Surfaces

(See Beyond Mapping III, "Topic 18", www.innovativegis.com/basis)

(Berry)

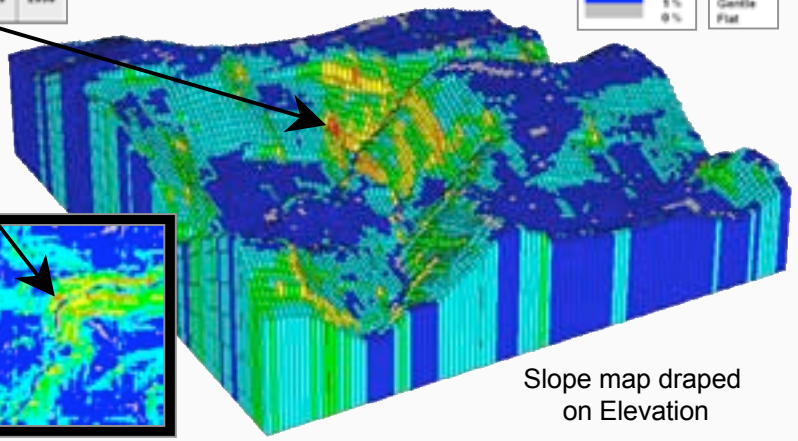
Calculating Slope and Flow (Map Analysis)

Inclination of a fitted plane to a location and its eight surrounding elevation values



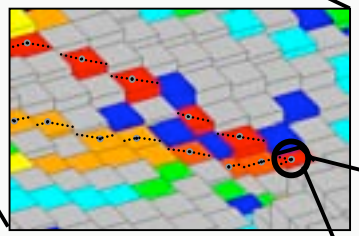
Elevation Surface

Slope $_{(47,64)}$ = 33.23%

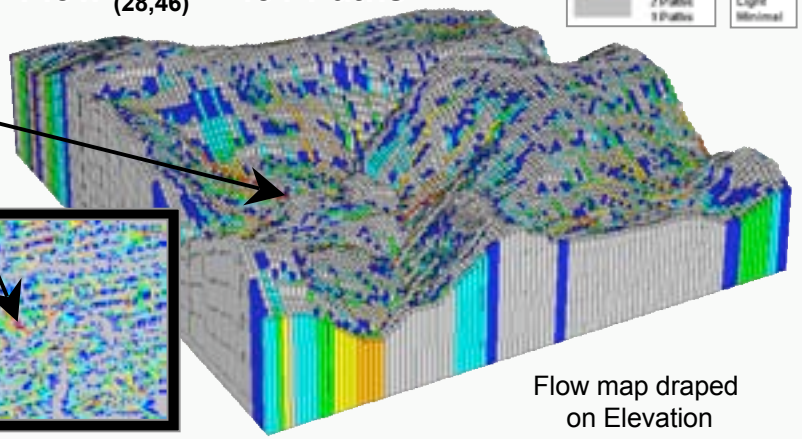


Slope map draped on Elevation

Slope map



Flow $_{(28,46)}$ = 451 Paths



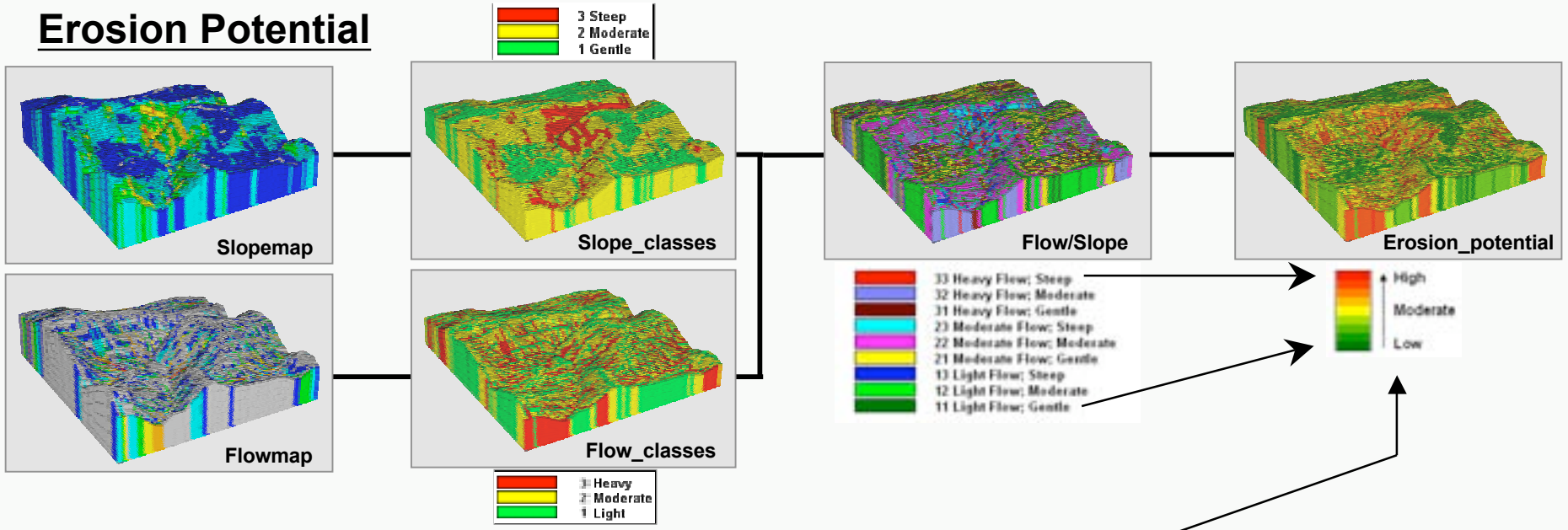
Flow map draped on Elevation

Flow map

Total number of the steepest downhill paths flowing into each location

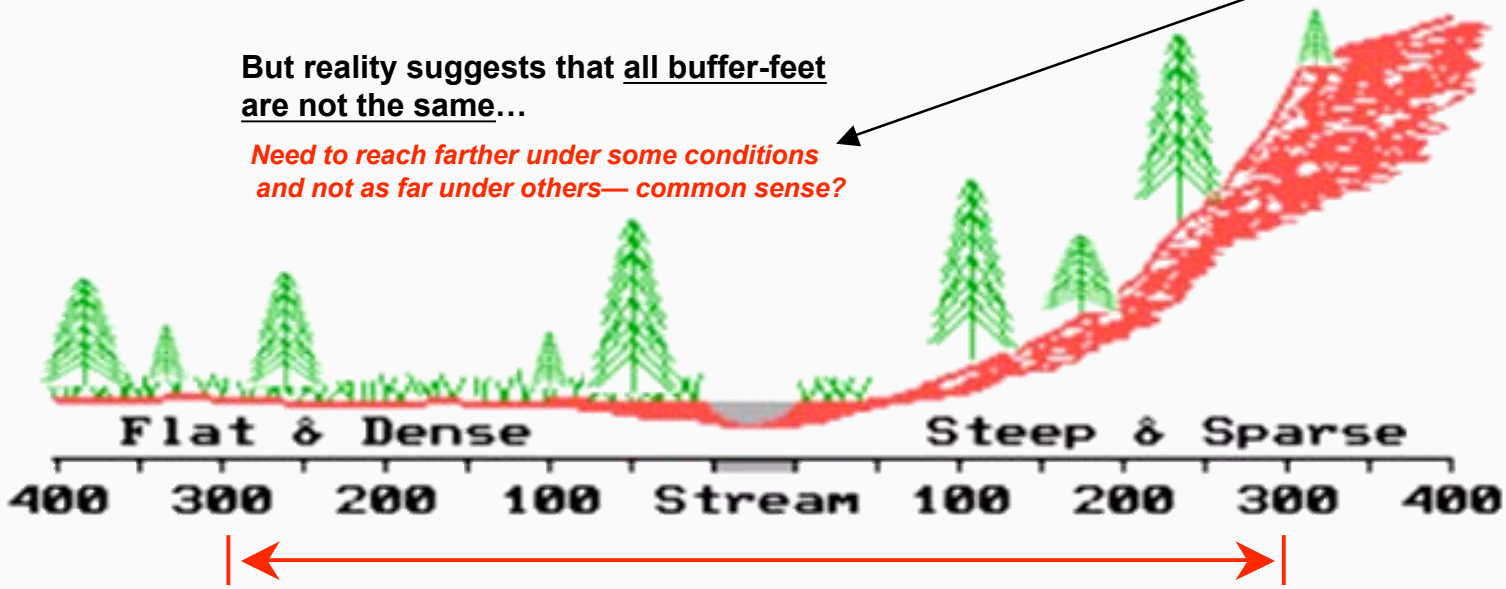
(Berry)

Deriving Erosion Potential



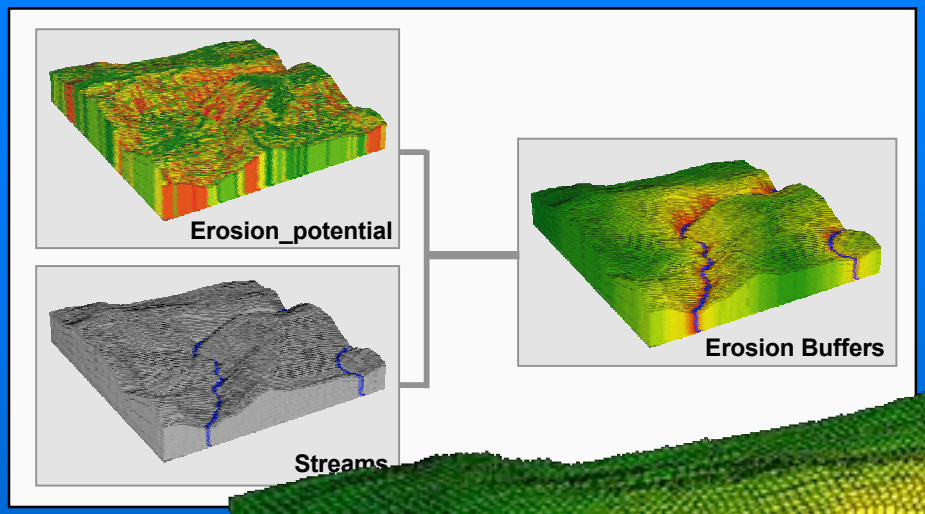
But reality suggests that <u>all buffer-feet are not the same</u>…

Need to reach farther under some conditions and not as far under others— common sense?



(Berry)

Calculating Effective Distance *(variable-width buffer)*

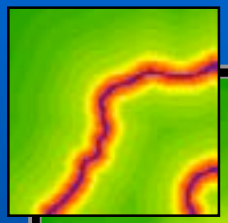


Distance away from the streams is a function of the erosion potential (Flow/Slope Class) with intervening heavy flow and steep slopes computed as effectively closer than simple geographic distance—

Effective Erosion Distance

Close → Far

Simple Buffer



Effective Buffer

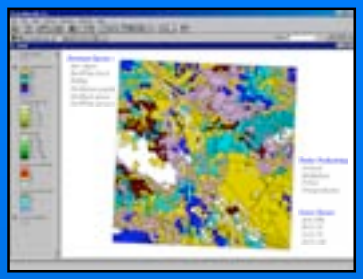
(click for digital slide show VBuff)

(See Beyond Mapping III, "Topics 11 & 13", www.innovativegis.com/basis)

(Berry)

Mapped Data Analysis (SA and SS)

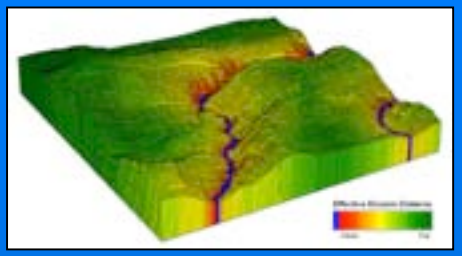
Traditional GIS



Forest Inventory Map

- Points, Lines, Polygons
- Discrete Objects
- Mapping and Geo-query

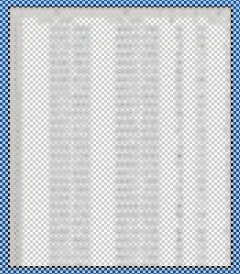
Spatial Analysis

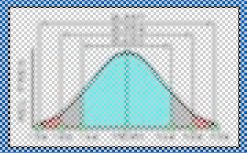


Erosion Potential (Surface)

- Cells, Surfaces
- Continuous Geographic Space
- Contextual Spatial Relationships

Traditional Statistics

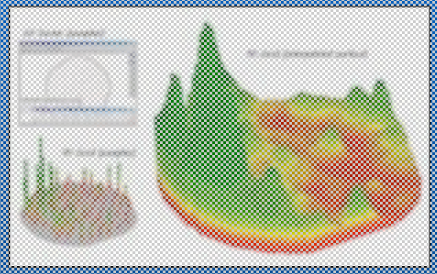




Minimum= 5.4 ppm
Maximum= 103.0 ppm
Mean= 22.4 ppm
StDEV= 15.5

- Mean, StDev (Normal Curve)
- Central Tendency
- Typical Response (scalar)

Spatial Statistics



Spatial Distribution (Surface)

- Map of Variance (gradient)
- Spatial Distribution
- Numerical Spatial Relationships

(See Beyond Mapping III, "Topic 24", www.innovativegis.com/basis)

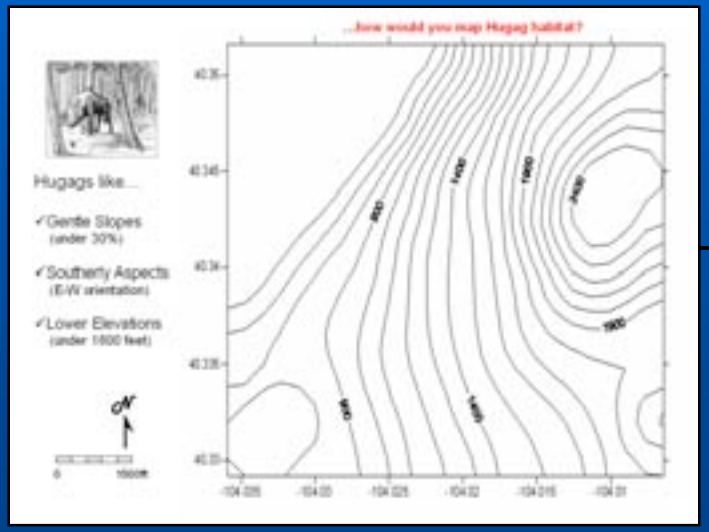
(Berry)

Evaluating Habitat Suitability

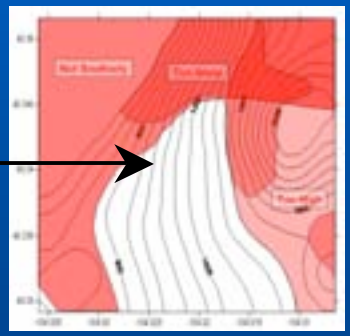
***Assumptions** – Hugags like…*

- *gentle slopes*
- *southerly aspects*
- *low elevations*

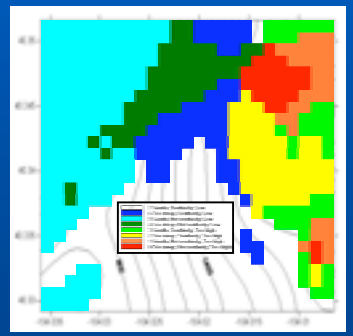
Generating maps of animal habitat…



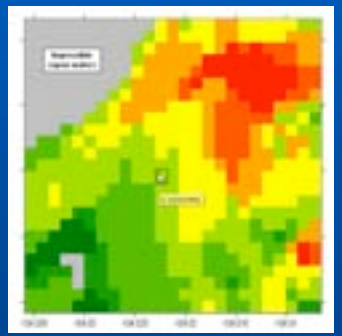
(click for digital slide show Hugag)



Manual Map Overlay (Binary)



Ranking Overlay (Binary Sum)



Rating Overlay (Rating Average)

(Berry)

Conveying Suitability Model Logic

gentle slopes

Elevation → Slope → Reclassify → Slope Preference (Bad 1 to 9 Good) → (Times 1)

southerly aspects

Elevation → Aspect → Reclassify → Aspect Preference (Bad 1 to 9 Good) → Overlay → Habitat Rating (Bad 1 to 9 Good)

lower elevations

Elevation → Reclassify → Elevation Preference (Bad 1 to 9 Good) → (1)

Overlay → Habitat Rating (0= No, 1 to 9 Good)

Algorithm **Calibrate** **Weight**

Base Maps **Derived Maps** **Interpreted Maps** **Solution Map**

Fact → *Judgment*

Covertype → Reclassify → Water Mask (0= No, 1= Yes)

Constraint Map

…while Reclassify and Overlay operations aren't very exciting, they are frequently used

(See Beyond Mapping III, "Topics 22 & 23", www.innovativegis.com/basis)

(Berry)

Extending Model Criteria

Elevation	Slope	gentle slopes Slope Preference Bad 1 to 9 Good	(Times 10)	
Elevation	Aspect	southerly aspects Aspect Preference Bad 1 to 9 Good	(1)	Habitat Rating Bad 1 to 9 Good
Elevation		lower elevations Elevation Preference Bad 1 to 9 Good	(1)	
Forests	Forest Proximity	forests Forest Preference Bad 1 to 9 Good	(10)	
Water	Water Proximity	water Water Preference Bad 1 to 9 Good	(10)	

Additional criteria can be added…

—Hugags would prefer to be in/near forested areas

—Hugags would prefer to be near water

—Hugags are 10 times more concerned with slope, forest and water criteria than aspect and elevation

(Berry)

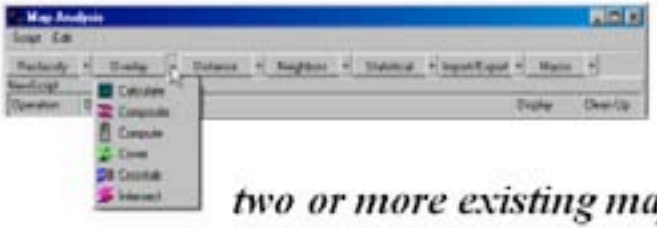
Classes of Spatial Analysis Operators

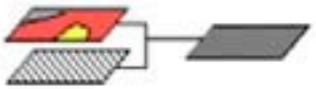
(contextual)

…all Spatial Analysis involves generating new map values (numbers) as a mathematical or statistical function of the values on another map layer(s)

Reclassifying Maps

New map values are a function of the values on a single existing map; no new spatial information is created





Overlaying Maps

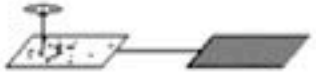
New map values are a function of the values on two or more existing maps; new spatial information is created

Basic

Advanced

Measuring Distance

New map values are a function of the simple or weighted distance or connectivity among map features



Summarizing Neighbors

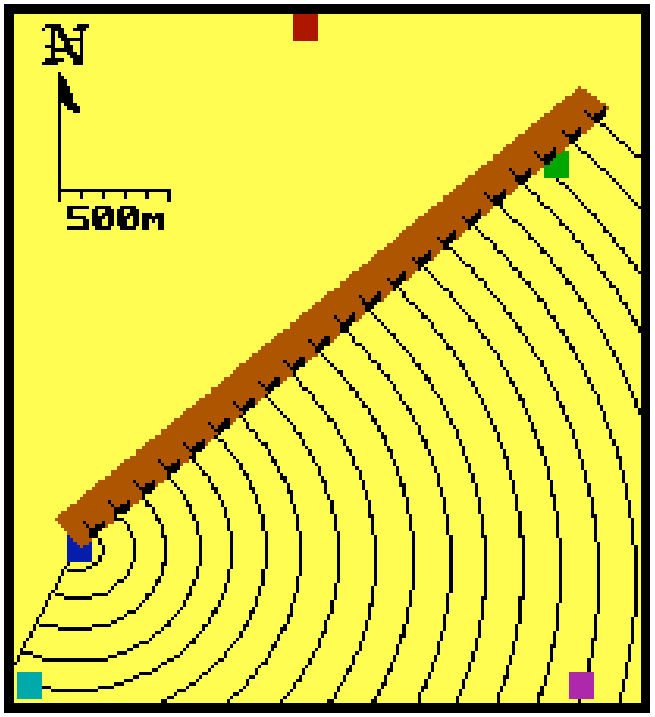
New map values are a function of the values within the vicinity of a location on an existing map

(Berry)

Establishing Distance and Connectivity

(digital slide show DIST2)

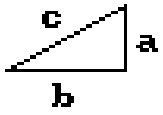
LOCATIONS



1 RANCH
2 CABIN
3 THISPLACE
4 THATPLACE
5 ANOTHERPLACE

Three measurement Methods:

- Analog-- align ruler and count the implied grid spaces.
- Mathematical-- count grid spaces along the sides of an implied right triangle and solve



$$c^2 = a^2 + b^2$$

and a new GIS-based method...

- Algorithmic-- "SPLASH"

A series of waves (ripples) form concentric halos of one grid space increment. This procedure extends the concept of distance to that of PROXIMITY.

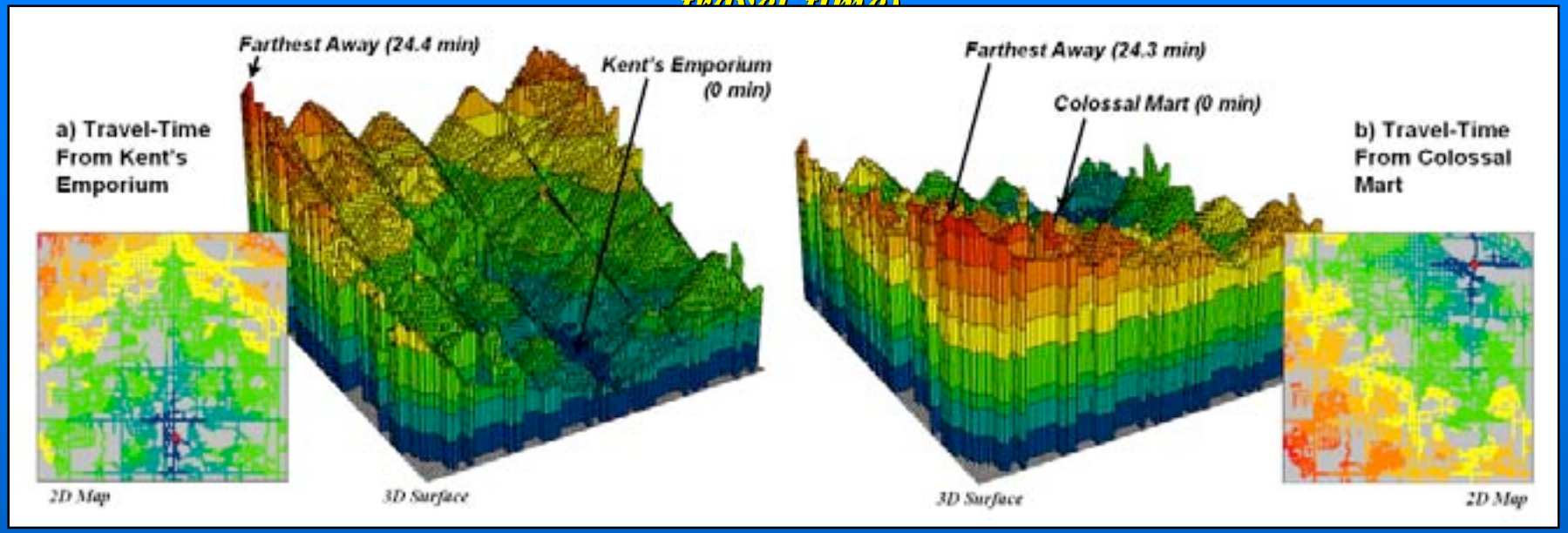
Distance-- S, SL, 2P
Proximity-- S, SL

(See Beyond Mapping III, "Topic 25", www.innovativegis.com/basis)

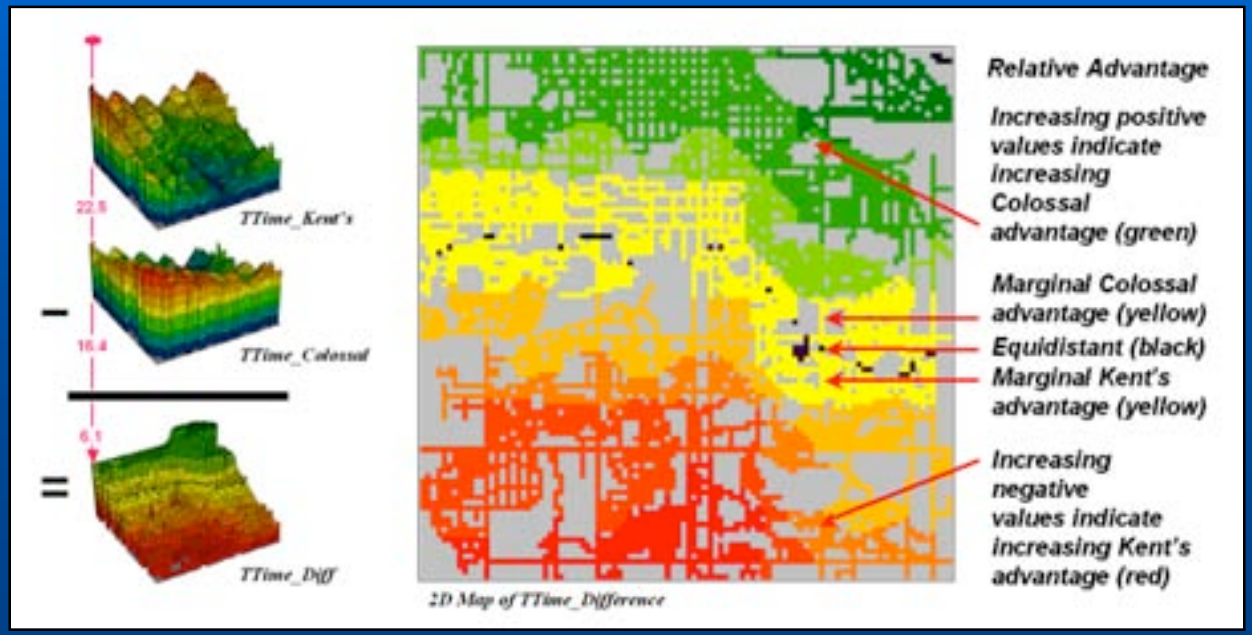
(See Beyond Mapping III, "Topic 15", www.innovativegis.com/basis for related material on Visual Exposure Analysis)

(Berry)

Accumulation Surface Analysis *(customer travel time)*



(digital slide show TTime)



…subtracting two proximity surfaces identifies relative advantage

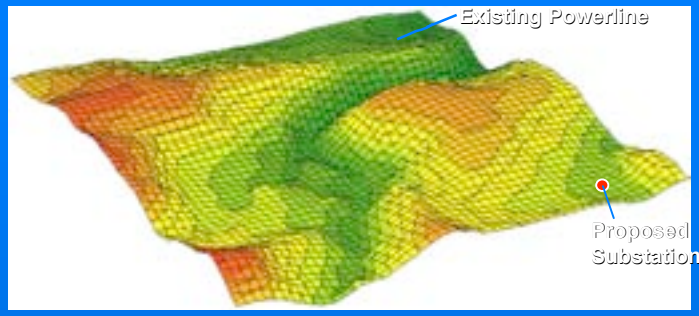
***Zero** – equidistant*
***Sign** – which has the advantage*
***Magnitude** – advantage strength*

See Beyond Mapping III, "Topics 5, 14 and 17", www.innovativegis.com/basis for more information

(Berry)

Transmission Line Siting Model

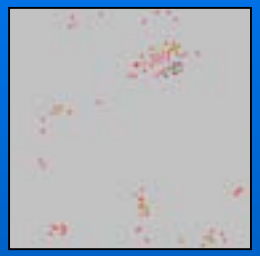
Goal – identify the **best route for an electric transmission line** that considers various criteria for minimizing adverse impacts.



Criteria – the transmission line route should…

- ✓ Avoid areas of **high housing density**
- ✓ Avoid areas that are **far from roads**
- ✓ Avoid areas **within or near sensitive areas**
- ✓ Avoid areas of high **visual exposure to houses**

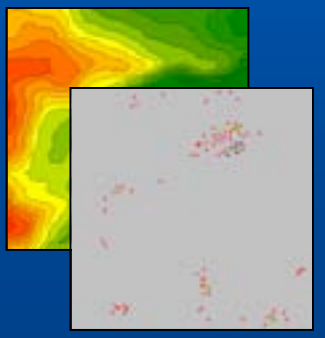
Houses



Roads

Sensitive Areas

Elevation



Houses

(Berry)

Siting Model Flowchart (Model Logic)

Model logic is captured in a flowchart where the boxes represent maps and lines identify processing steps leading to a spatial solution

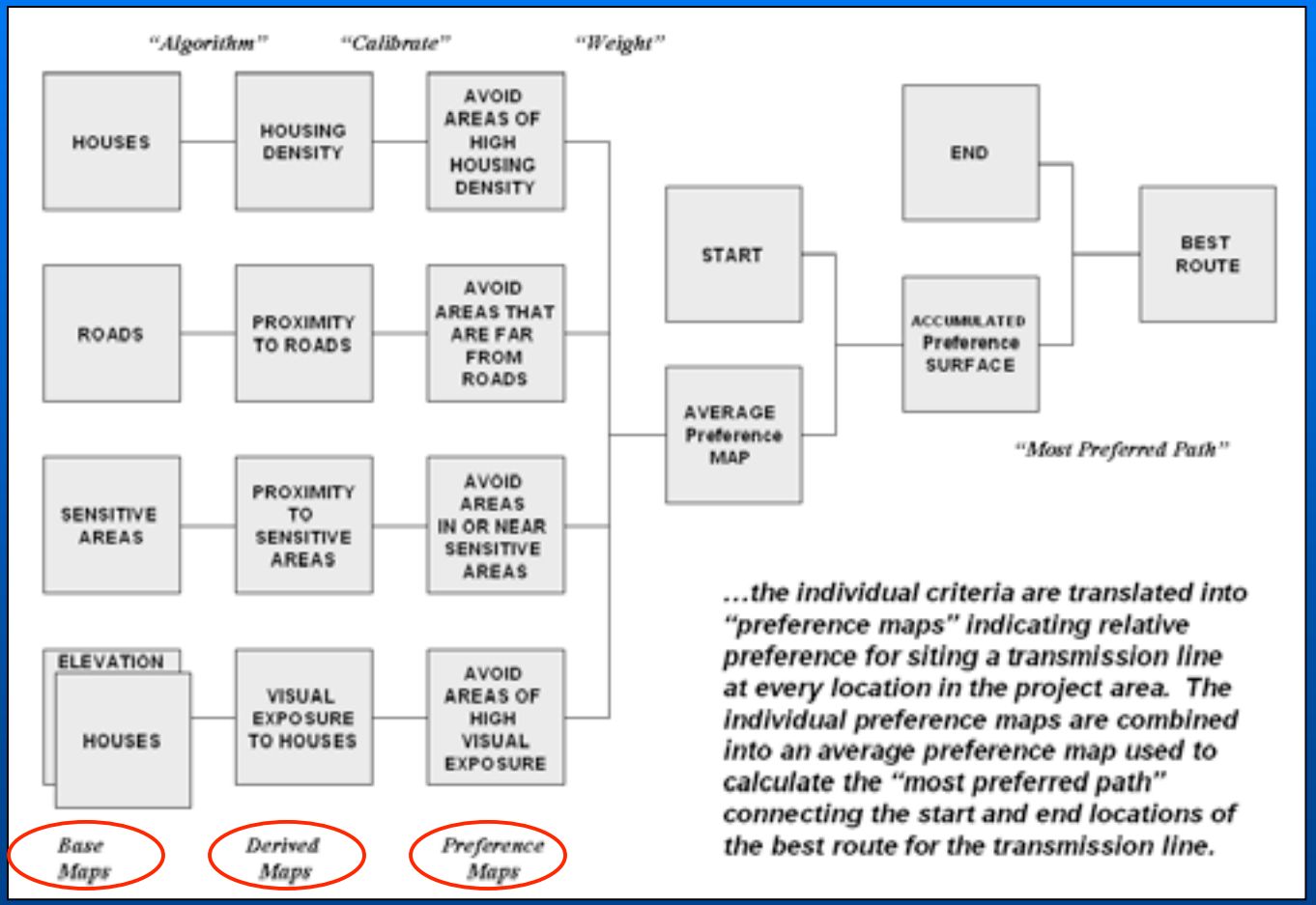
Avoid areas of…

High Housing Density

Far from Roads

In or Near Sensitive Areas

High Visual Exposure
…build on this single factor



(Berry)

Siting Model Flowchart *(Model Logic)*

Model logic is captured in a flowchart where the boxes represent maps and lines identify processing steps leading to a spatial solution

Step 1

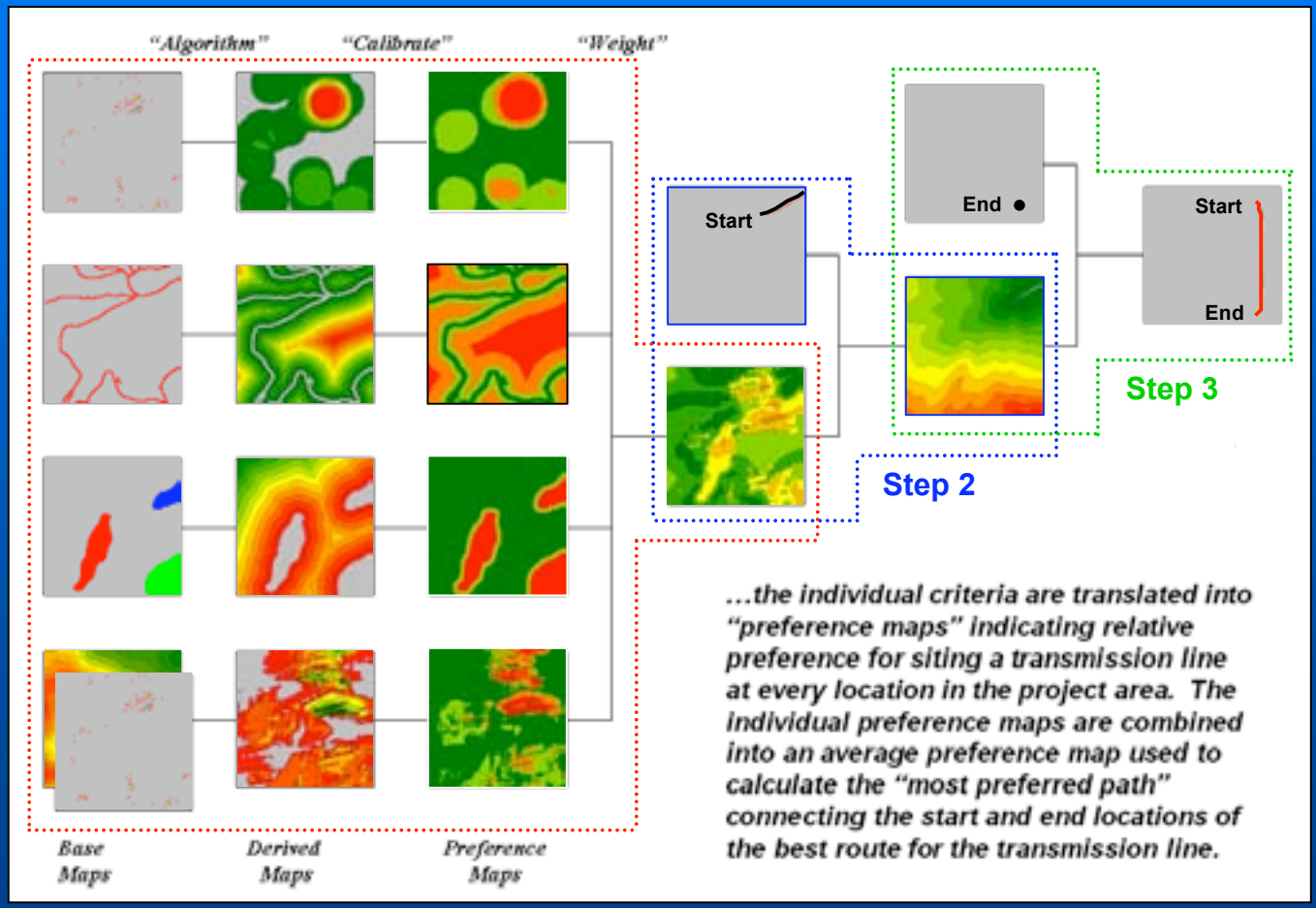
Identify overall ***Discrete Preference*** *(1 good to 9 bad rating)*

Step 2

Generate an ***Accumulated Preference*** *surface from the starting location to everywhere*

Step 3

Identify the ***Most Preferred Route*** *from the end location*

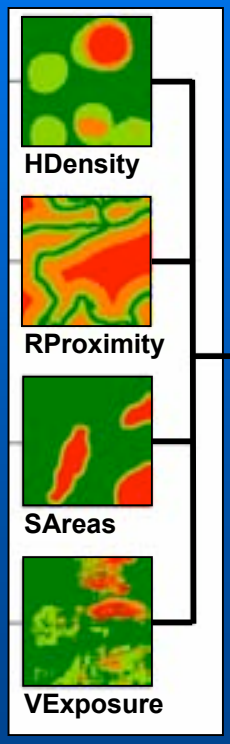


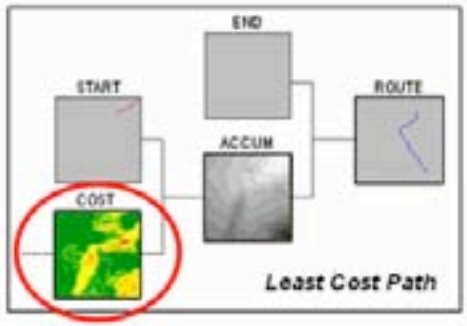
(See Beyond Mapping III, "Topic 19", www.innovativegis.com/basis *)*

(Berry)

Step 1 Discrete Preference Map

Calibration Weighting

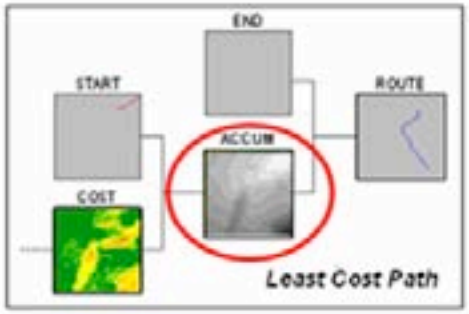




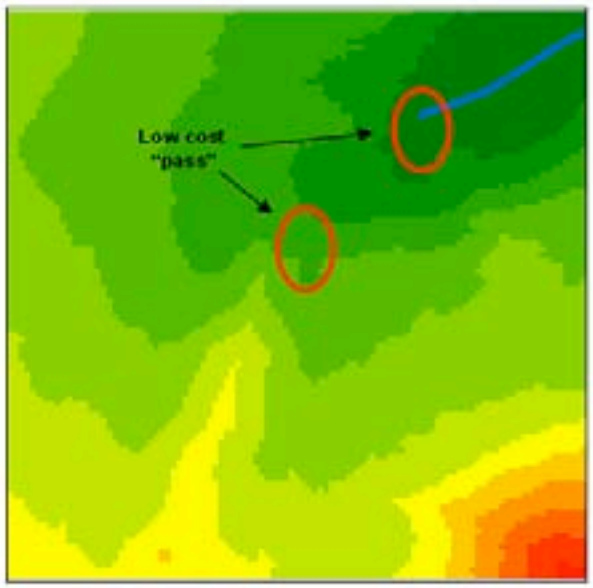
…identifies the "relative preference" of locating a route at any location throughout a project area considering multiple criteria (avoid areas of High Housing Density, Far from Roads, In or Near Sensitive Areas and High Visual Exposure)

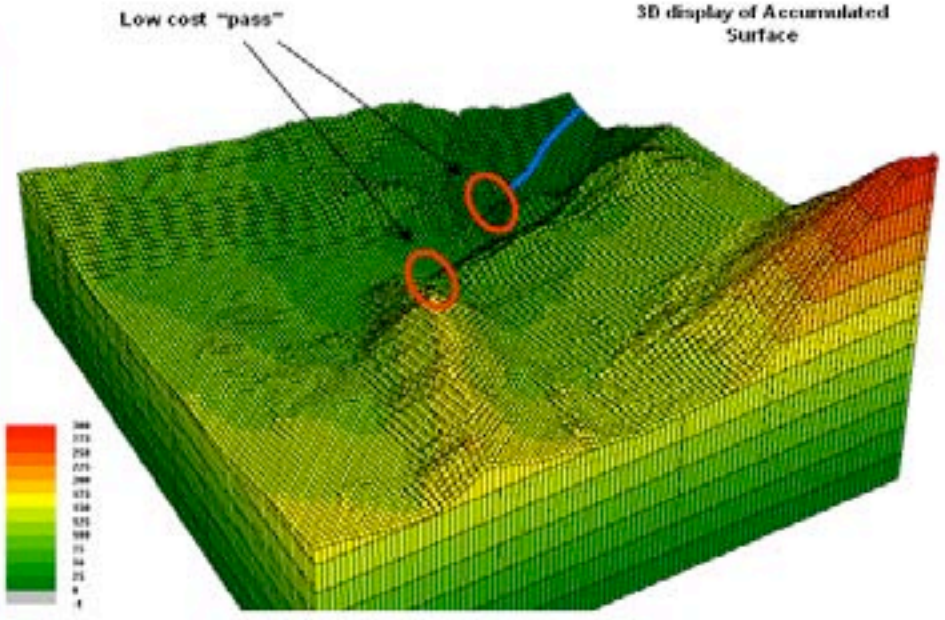
(Berry)

Step 2 Accumulated Preference Map



…identifies the "total cost" (minimal avoidance) to locate the preferred route from a Starting location to everywhere in the project area

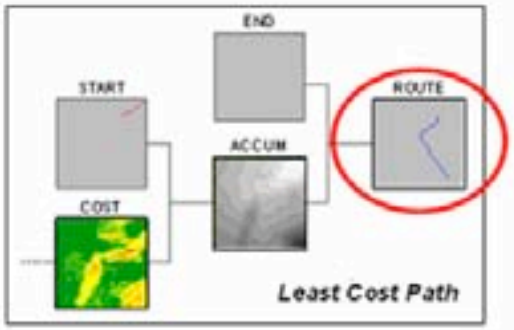




Splash Algorithm – like tossing a stick into a pond with waves emanating out and accumulating costs as the wave front moves

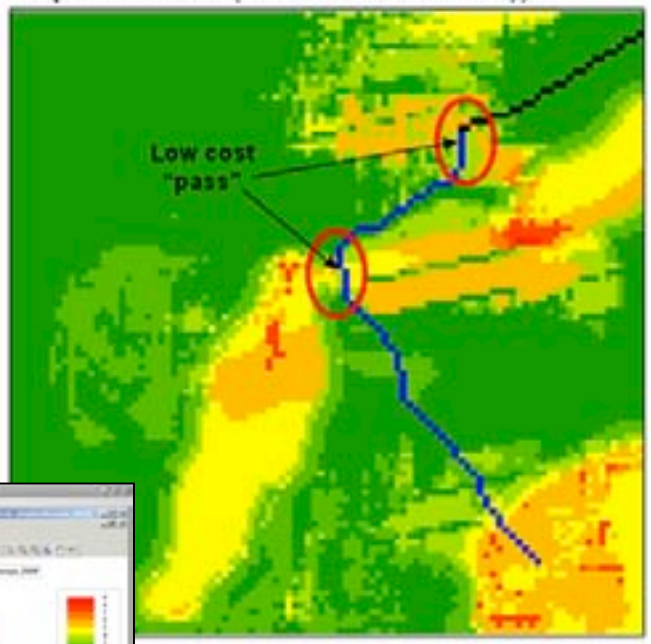
(Berry)

Step 3 Most Preferred Route

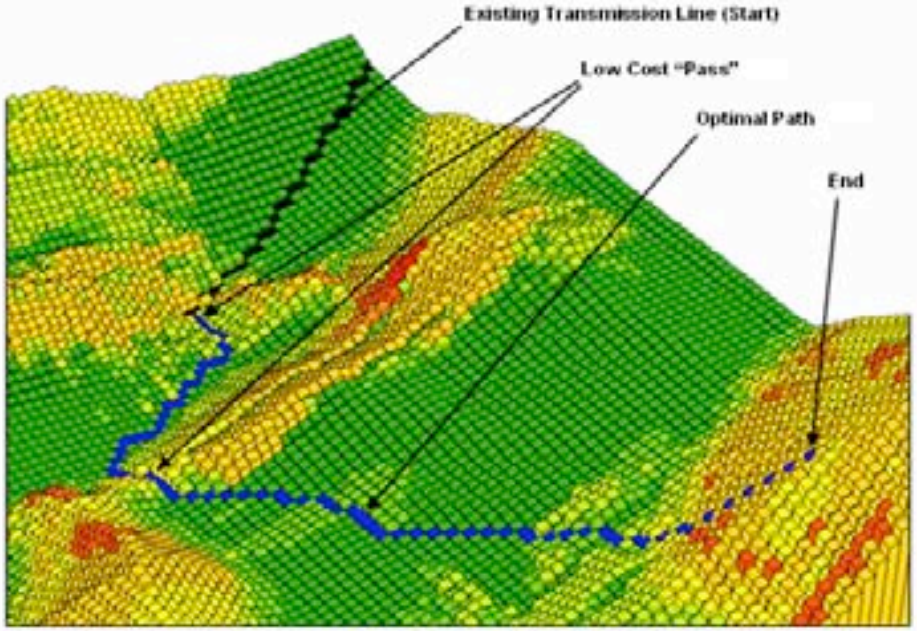


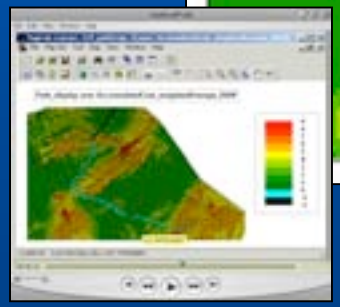
…the steepest downhill path over the accumulated preference surface identifies the optimal route that minimizes areas to avoid

Optimal Route (overlaid on discrete cost map)



Optimal Route (overlaid on 3D accumulation surface with draped discrete cost map)

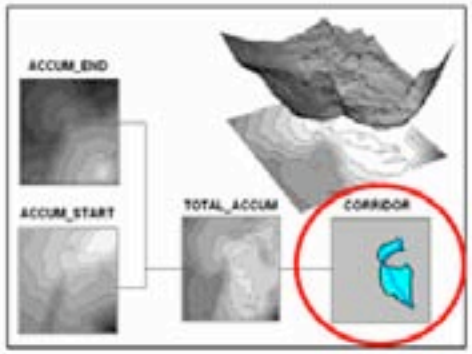




…steepest downhill path "re-traces" the accumulated cost wave front that got there first

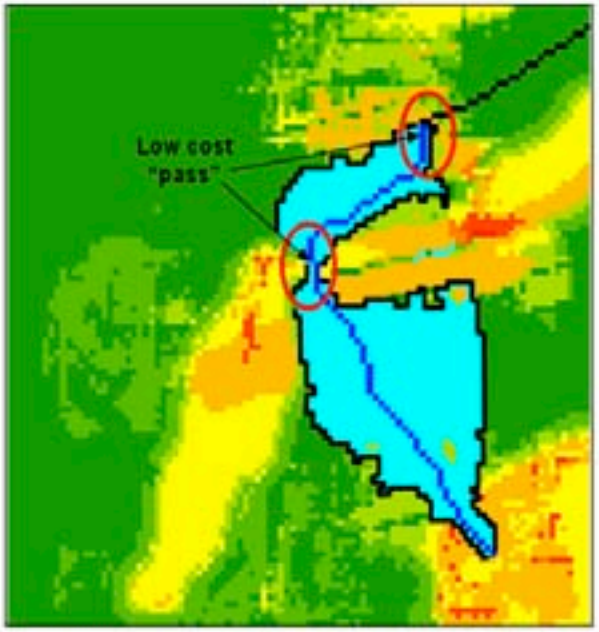
(Berry)

Generating Optimal Path Corridors

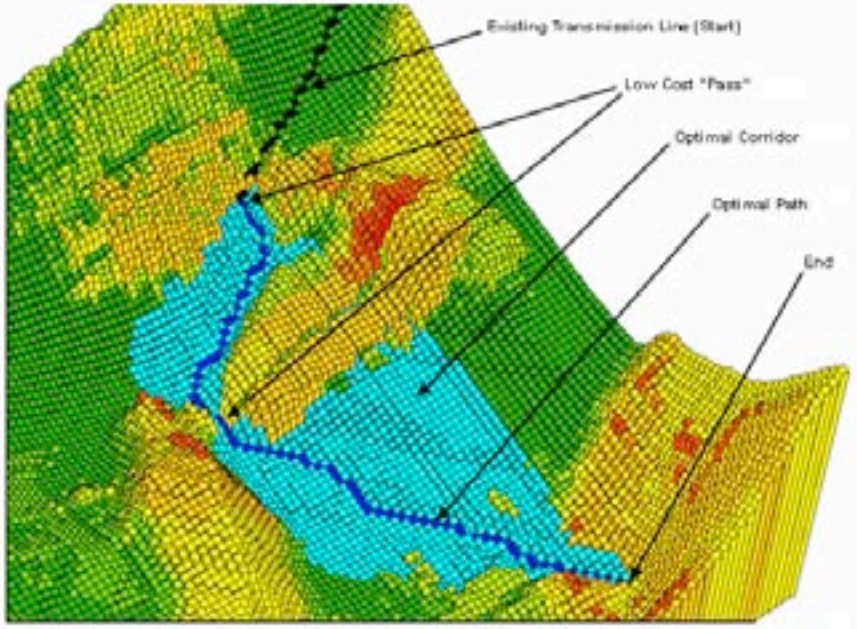


…the accumulation surfaces from the Start and End locations are added together to create a total accumulation surface—the "valley" is flooded to identify the set of nearly optimal routes

Optimal Corridor (overlaid on discrete cost map)



Optimal Corridor (overlaid on 3D total accumulation surface with draped discrete cost map)



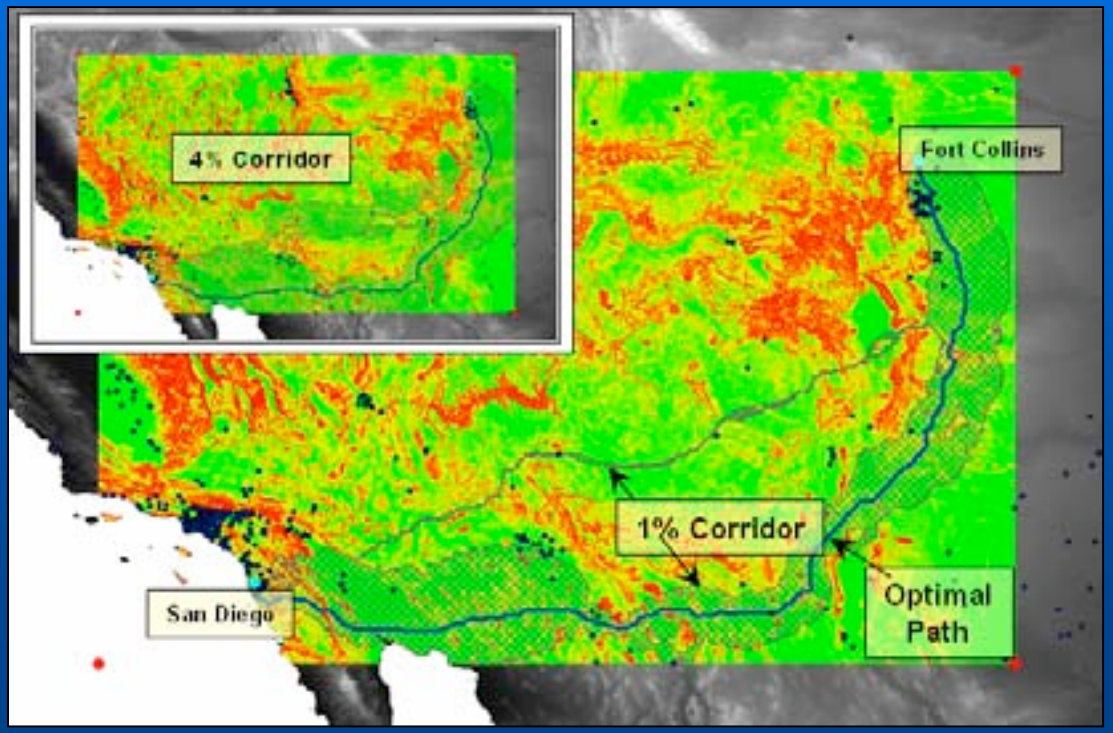
(Berry)

Power and Pipeline Routing *(Advanced GIS Models)*

…see Application Paper \GW04_routing on the Workshop CD

Infusing stakeholder perspectives into Calibration and Weighting

…of Engineering considerations, Natural Environment consequences and Built Environment impacts

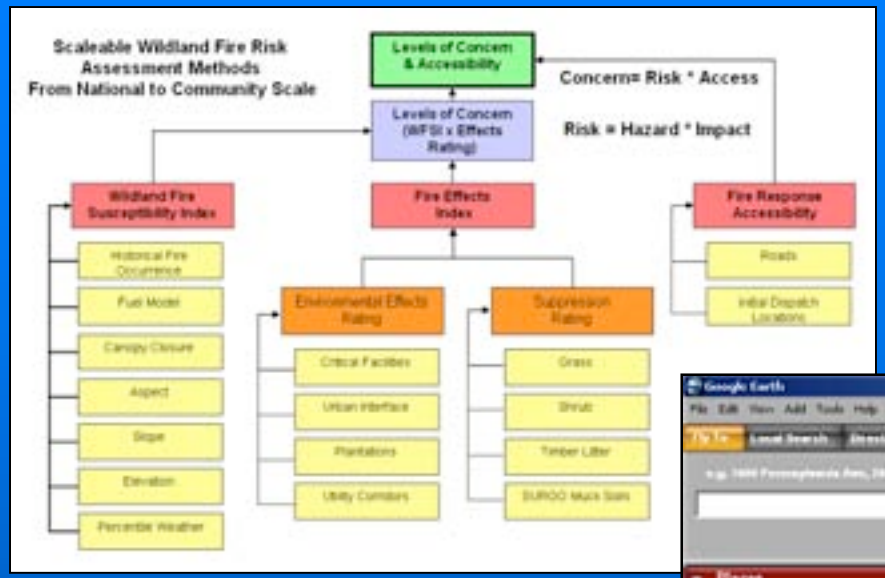


Global routing solution identifies the Optimal Route (blue line) and Optimal Corridor (cross-hatched)

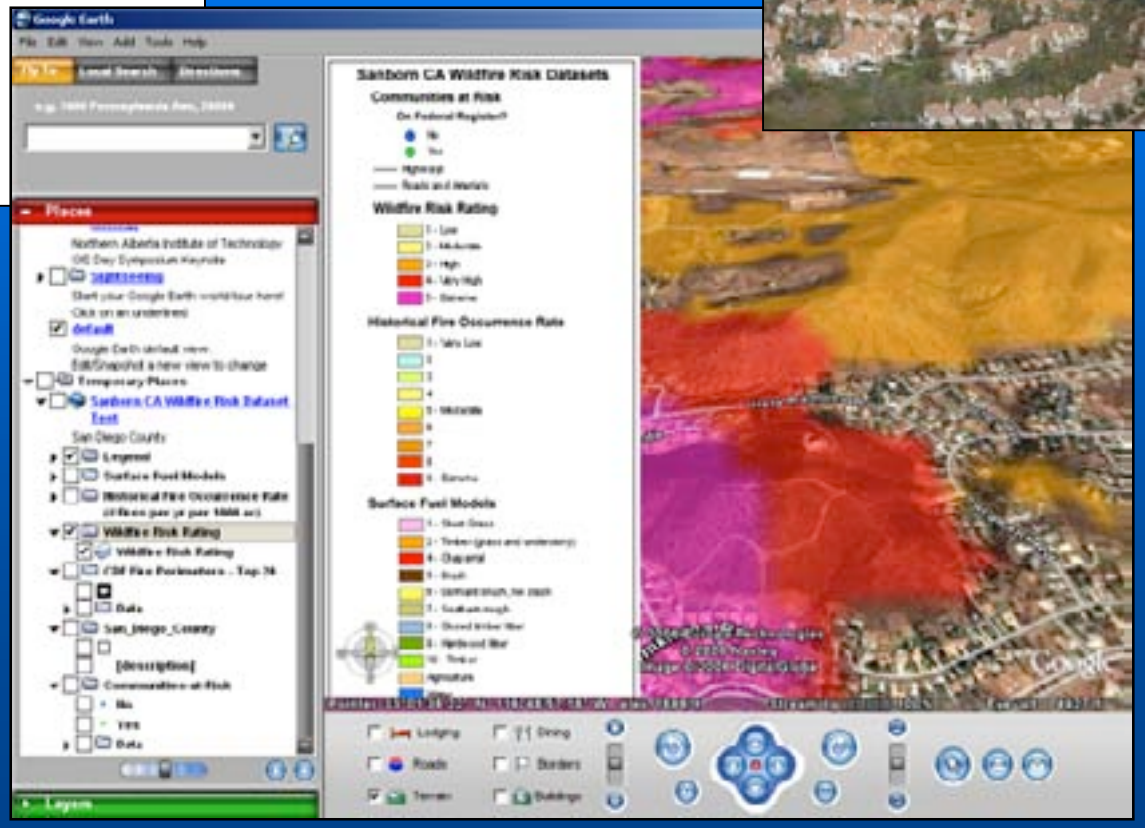
…see Application Paper \GITA_Oil&Gas_04 on the Workshop CD

(Berry)

Modeling Wildfire Risk



Increased population growth into the wildland/urban interface raises the threat of disaster…



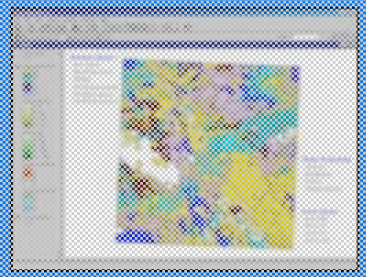
*…an extensive GIS model was developed to **identify areas most likely to be impacted by wildfire** so effective pre-treatment, suppression and recovery plans can be developed*

(…see Application Paper \GW05_Wildfire on the Workshop CD)

(Berry)

Mapped Data Analysis (SA and SS)

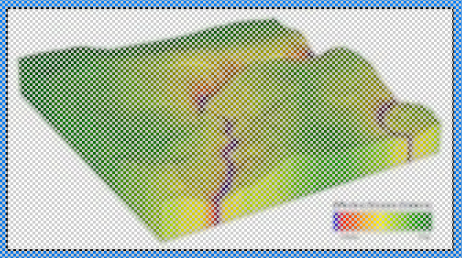
Traditional GIS



Forest Inventory Map

- Points, Lines, Polygons
- Discrete Objects
- Mapping and Geo-query

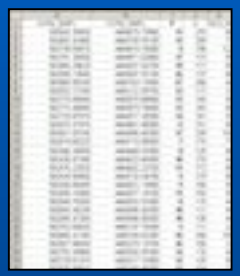
Spatial Analysis

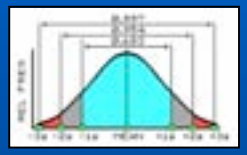


Erosion Potential (Surface)

- Cells, Surfaces
- Continuous Geographic Space
- Contextual Spatial Relationships

Traditional Statistics

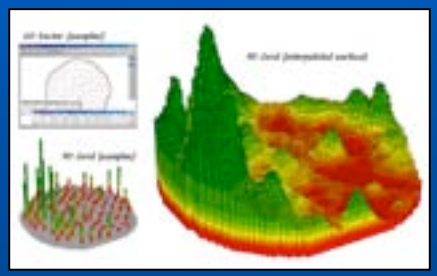




Minimum= 5.4 ppm
Maximum= 103.0 ppm
Mean= 22.4 ppm
StDEV= 15.5

- **Mean, StDev (Normal Curve)**
- **Central Tendency**
- **Typical Response (scalar)**

Spatial Statistics



Spatial Distribution (Surface)

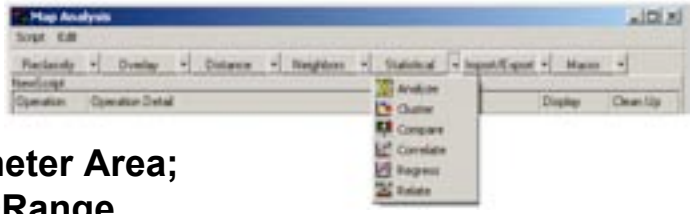
- **Map of Variance (gradient)**
- **Spatial Distribution**
- **Numerical Spatial Relationships**

Classes of Spatial Statistics Operators

(numerical)

…just like there are fundamental Spatial Analysis classes of operations, there are

Fundamental Spatial Statistics classes of operations—



Descriptive Statistics

- **Within a Map – Min, Max, Mode; Count, Perimeter Area; Mean, StdDeviation; Median, QRange, …**
- **Among Maps – Coincidence, Overlap, Correlation, …**

Surface Modeling *(discrete point samples to continuous map surface)*

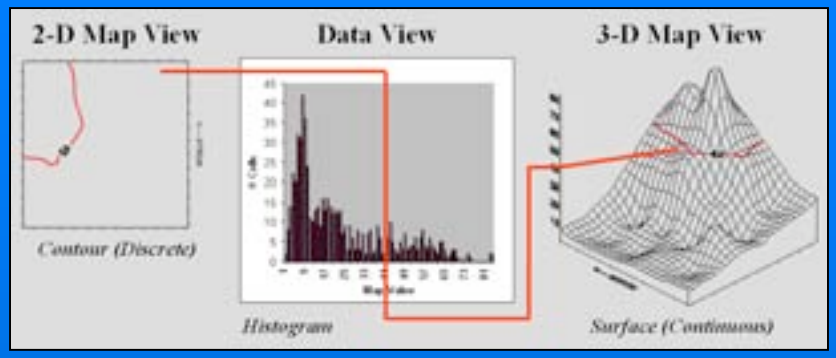
- **Density Analysis – count of number of points within a roving window**
- **Spatial Interpolation – weighted average of values within window (e.g. IDW and Krig)**
- **Map Generalization – fit of an equation to all values (e.g. plane and polynomial)**

Spatial Data Mining *(numerical relationships within and among maps)*

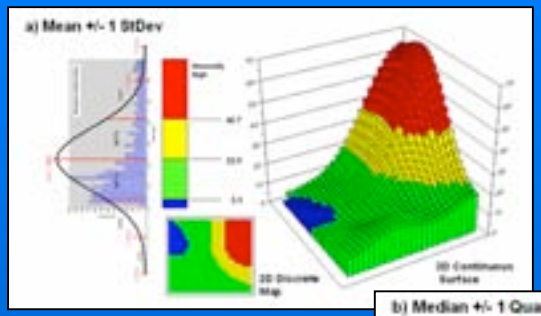
- **Map Similarity and Clustering – uses multivariate "data distance" for similarity**
- **Prediction Models – uses Regression and Knowledge Engines to relate dependent and independent map variables**

(Berry)

Statistical Nature of Mapped Data *(descriptive)*

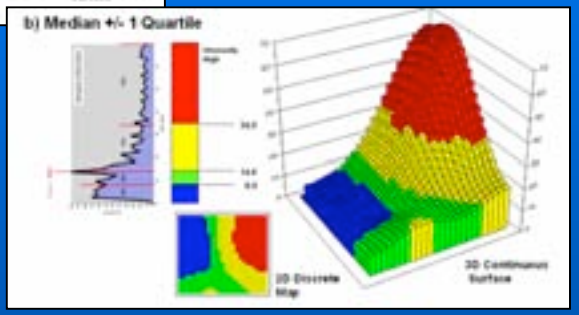


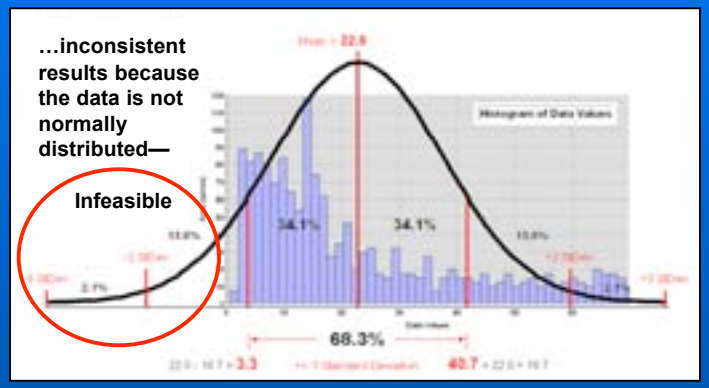
Digital maps are linked to descriptive data by attribute tables (vector) or directly to data matrices (grid)



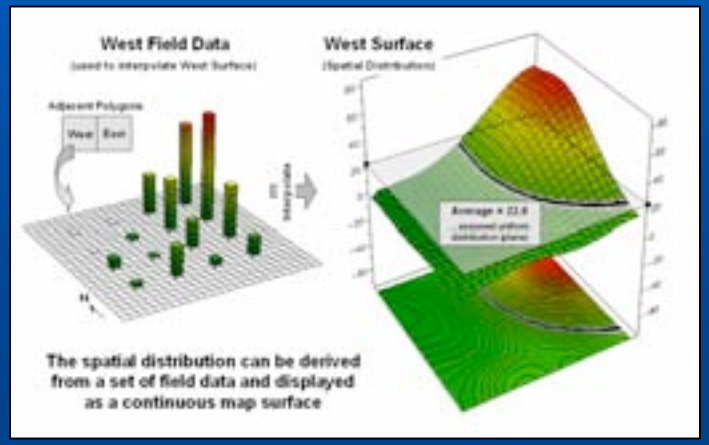
Red is unusually high (Mean + 1 StDev)

Red is unusually high (Median + 1 QRange)

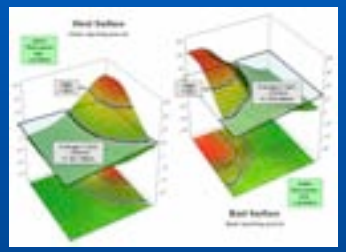




Map data can be generalized into a single statistic (e.g. Mean or Median)



...throwing the baby (spatial distribution) out with the bath water (data)



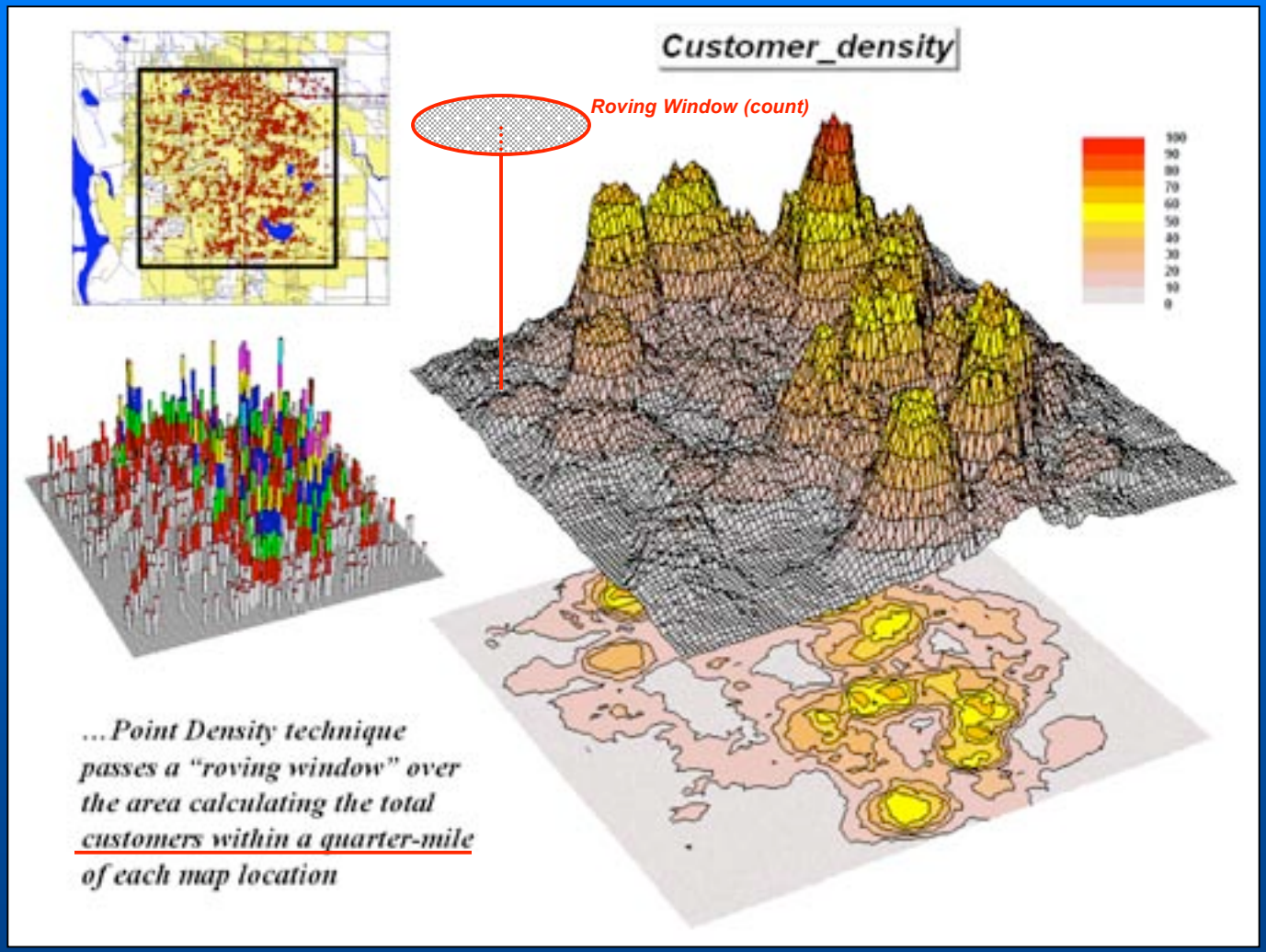
...most desktop mapping applications simply "paint" a color corresponding to the average regardless of numerical or spatial patterns of the field collected data within a parcel

(See Beyond Mapping III, "Topic 7", www.innovativegis.com/basis)

(Berry)

Point Density Analysis

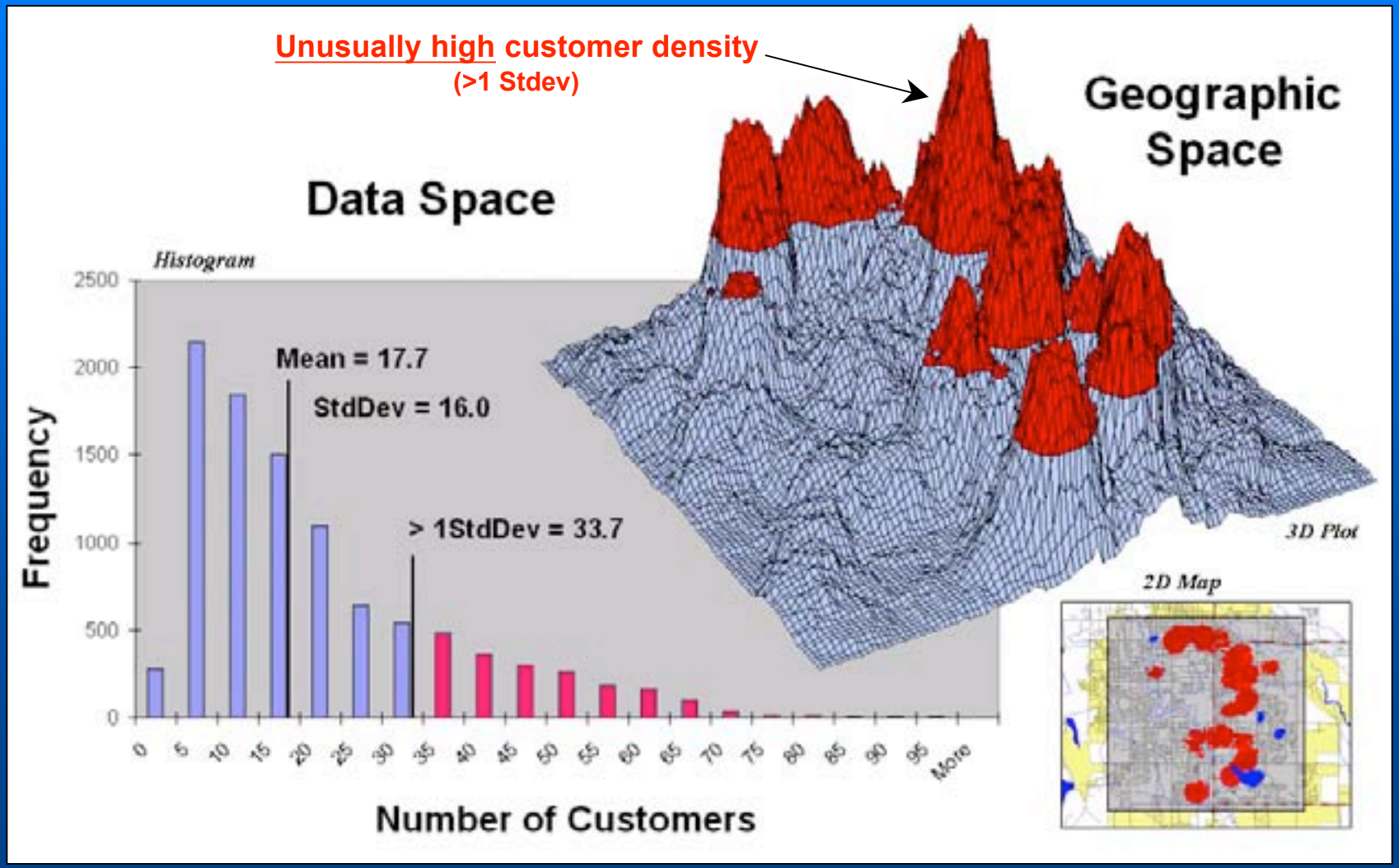
Point Density analysis identifies the number of customers within a specified distance of each grid location



(Berry)

Identifying Unusually High Density

Pockets of unusually high customer density are identified as more than one standard deviation above the mean

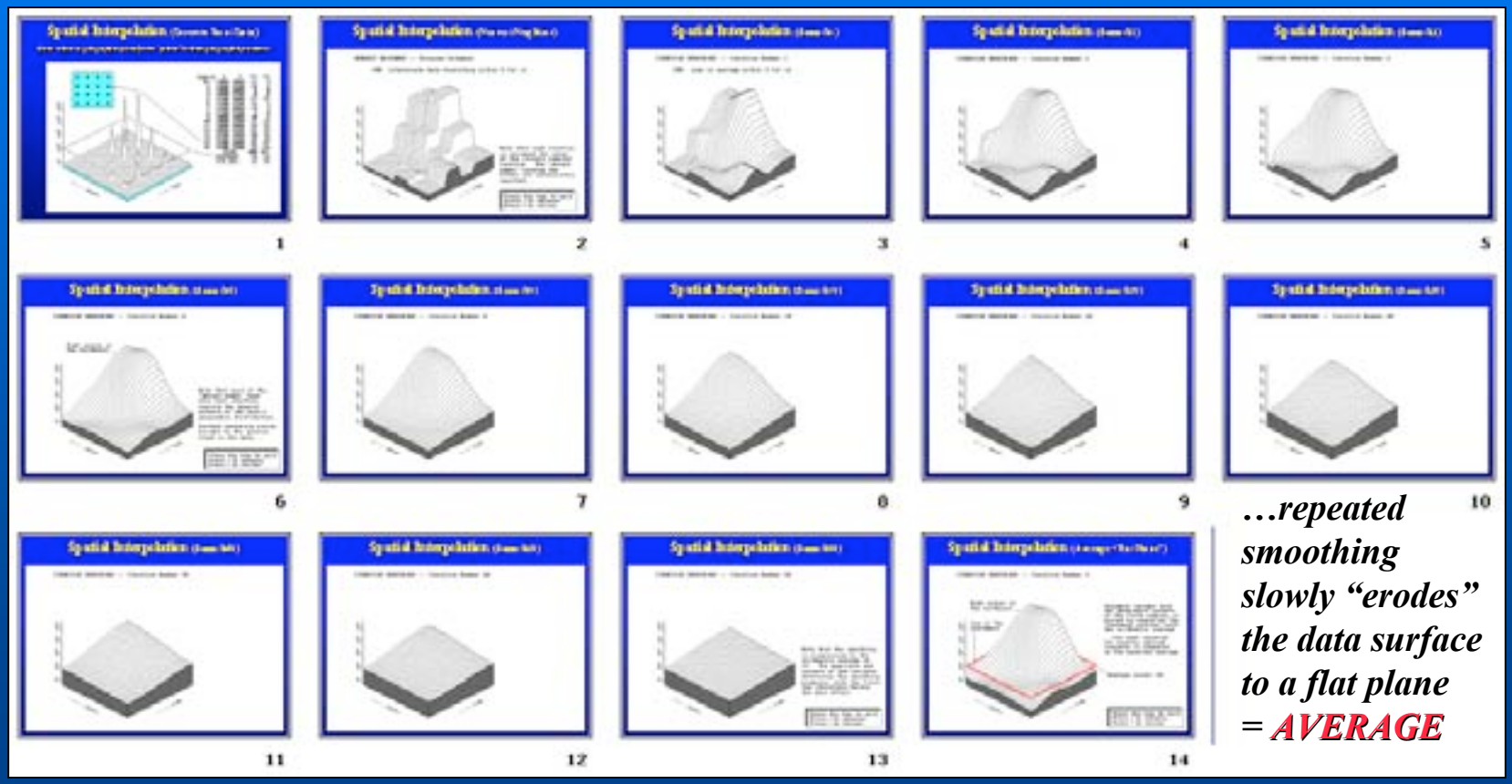


(Berry)

Spatial Interpolation *(Smoothing the Variability)*

The "iterative smoothing" process is similar to slapping a big chunk of modeler's clay over the "data spikes," then taking a knife and cutting away the excess to leave a continuous surface that encapsulates the peaks and valleys implied in the original field samples

(click for digital slide show SStat2)

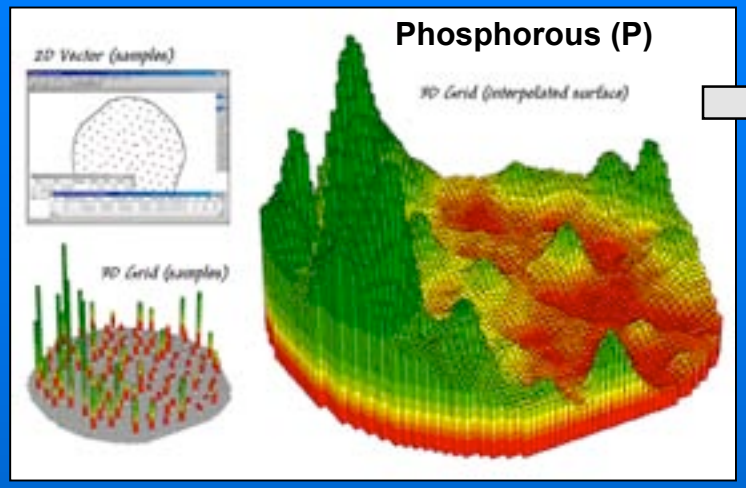


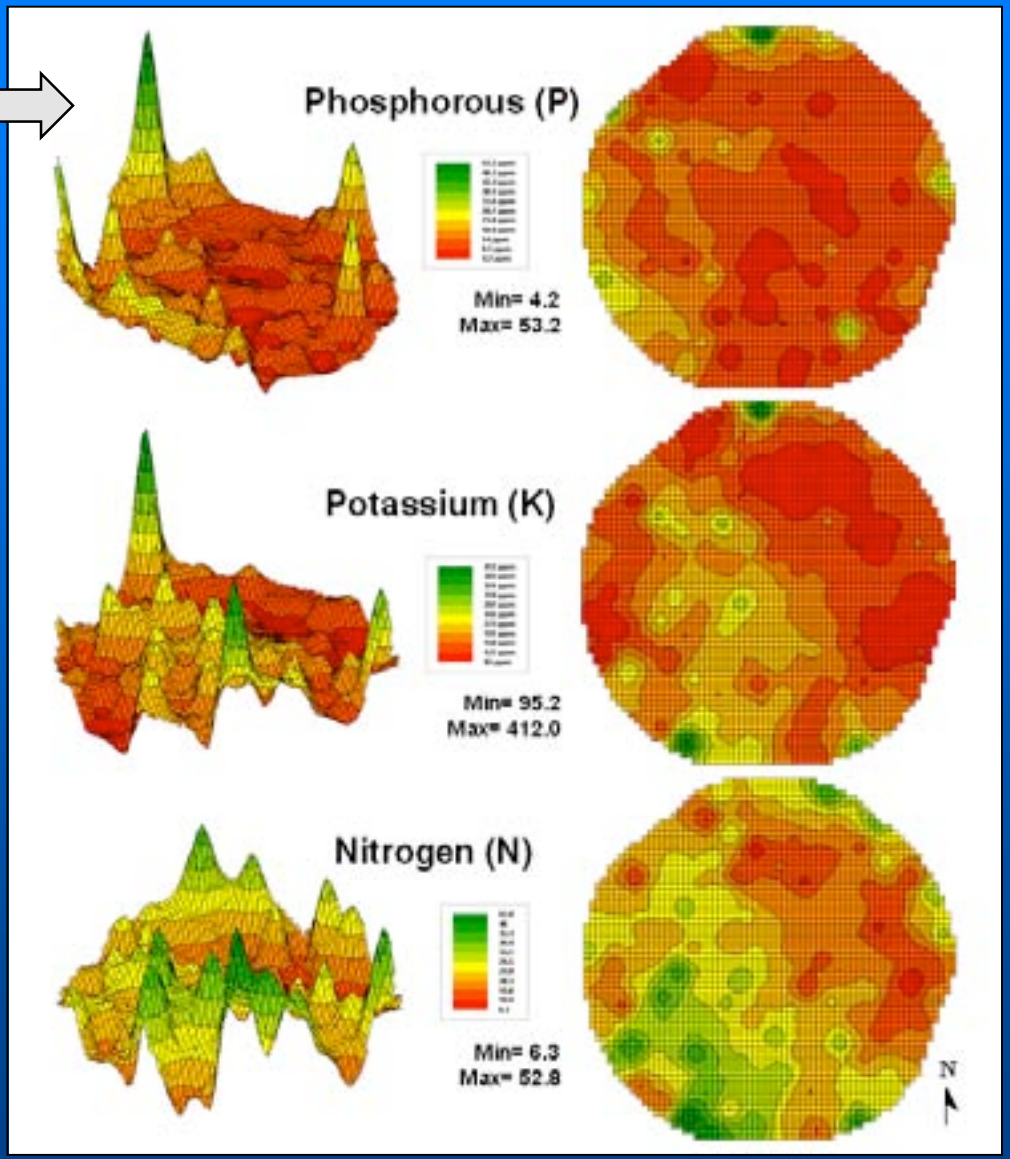
(See Beyond Mapping III, "Topic 2" and "Topic 8", www.innovativegis.com/basis)

(Berry)

Visualizing Spatial Relationships

Interpolated Spatial Distribution





What spatial relationships do you see?

…do relatively high levels of P often occur with high levels of K and N?

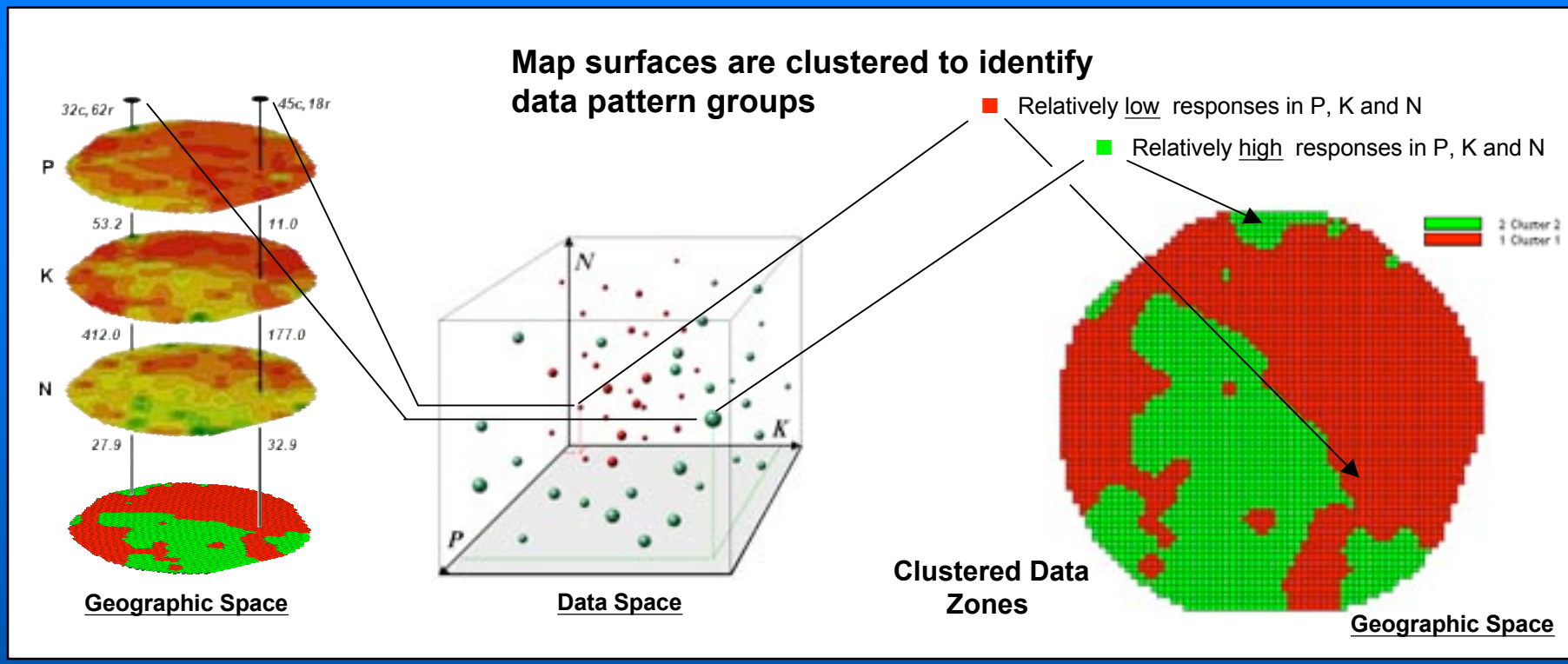
…how often?

…where?

(See Beyond Mapping III, "Topic 16", www.innovativegis.com/basis)

(Berry)

Clustering Maps for Data Zones



…groups of "floating balls" in data space of locations in the field identify similar data patterns– data zones

…apply different management actions for different "data zones"

Variable Rate Application

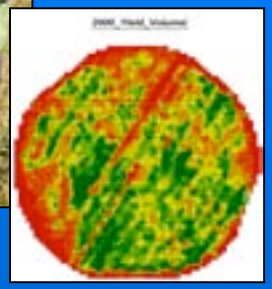
(See Beyond Mapping III, "Topic 10", www.innovativegis.com/basis)

(Berry)

The Precision Ag Process (Fertility example)

As a combine moves through a field it 1) uses GPS to check its location then 2) checks the yield at that location to 3) create a continuous map of the yield variation every few feet. This map is 4) combined with soil, terrain and other maps to derive 5) a "Prescription Map" that is used to 6) adjust fertilization levels every few feet in the field (variable rate application).

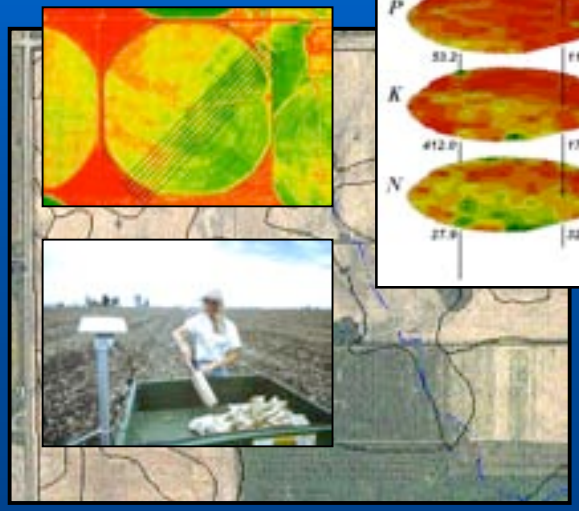
Steps 1) – 3)



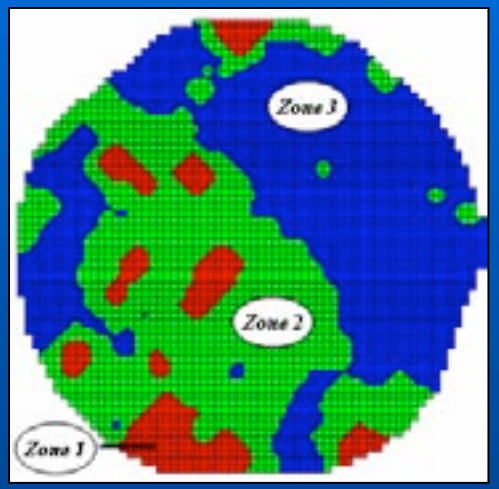
On-the-Fly Yield Map

Step 4)

Farm dB



Map Analysis



Prescription Map

Step 5)

Variable Rate Application

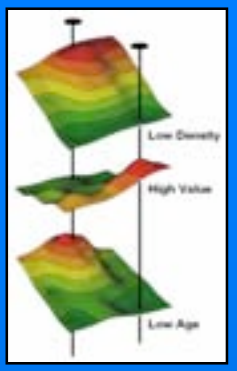
Step 6)

(Berry)

…see Application Paper \GW98_PrecisionAg on the Workshop CD

Spatial Data Mining

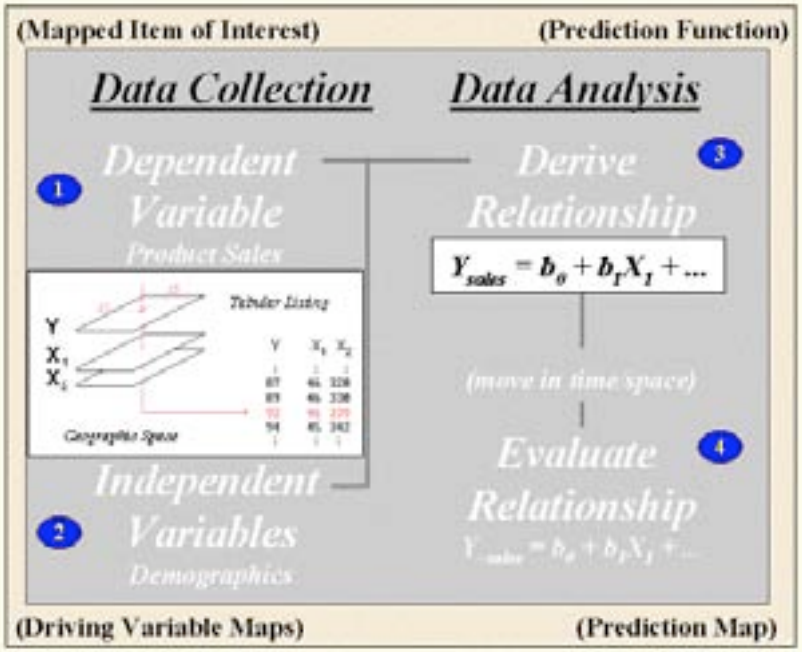
Precision Farming is just one example of applying spatial statistics and data mining techniques



Analyzing Spatial Relationships

The Spatial Data Mining Process

Geo-Registered Maps are Used to Uncover and Apply Spatial Relationships



Maps of the item of interest (1) and related variables (2) are encoded then analyzed to derive a "map-ematical" relationship (3) that can be used to predict the item at another place or time (4).

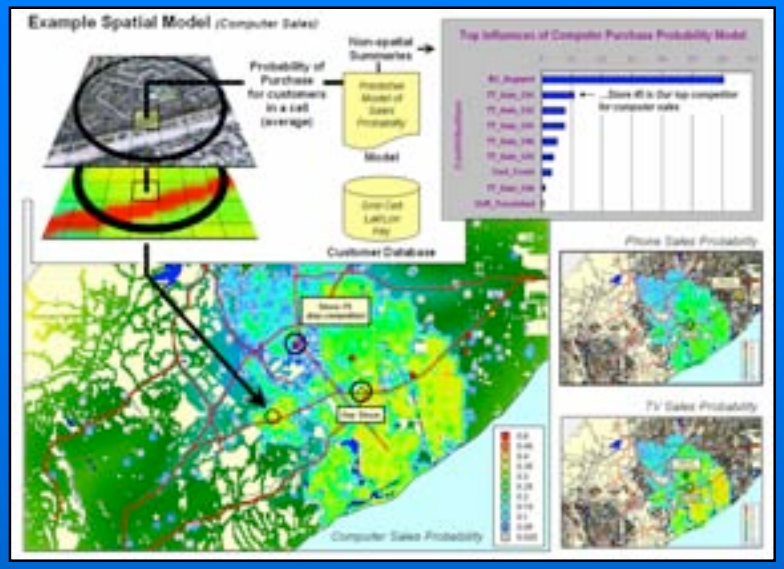
For example, test market sales of a product (1) can be related to demographic characteristics (2) then the derived relationship (3) moved to another city to generate a map of predicted sales (4).

Mapped data that exhibits high spatial dependency create strong prediction functions. As in traditional statistical analysis, spatial relationships can be used to predict outcomes

…the difference is that spatial statistics predicts where responses will be high or low

(Berry)

Retail Competition Analysis



…Geo-Business applications are might be the biggest potential arena for Geotechnology that is one of the three mega-trends for the 21st century

(Biotechnology, Nanotechnology)

GeoExploration vs. GeoScience

Competitive Analysis – Spatial Modeling Steps

Step 1

Build travel time maps for entire market area

- Compute travel time from every location to our store
- This requires grid-based map analysis software
- Update customer record with travel time to our store
- Add this to every non-customer record in trading area

Step 2

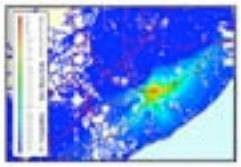
Repeat for every competitor

- Update every customer record with travel time to competitor store
- Add to every non-customer record in trading area

Step 3

Compute Travel Time Gain for travel to main store

- Every customer and non-customer record is updated
- The greater gain indicates lower travel effort to visit our store

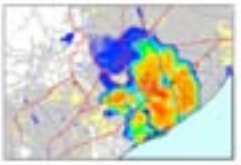


Competitive Analysis – Predictive Modeling Steps

Step 4

Build analytic dataset from customer data

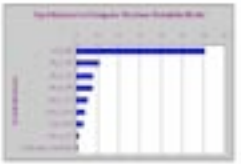
- Geocoding information
- Transactions, sales, product category purchases
- Visitation frequency, recency, spend
- Customer Segment, travel times, demographics



Step 5

Build predictive models

- Probability of Visitation (not possible for this demo)
- Probability of Purchase by Product Category
- Expected Sales and Transactions
- Use store travel time and all competitive differences



Step 6

Map the scores

- The distribution of the scores provide visual evidence of the effects of travel time and competitive pressure
- Spatial hypotheses can be tested and evaluated

…see Application Paper \GW06_retail on the Workshop CD

(Berry)

Where Have We Been?

- ✓ **Mapping** (70s), **Modeling** (80s) **and Modeling** (90s)
- ✓ **Vector** (discrete objects) **vs. Raster/Grid** (continuous surfaces)
- ✓ **Spatial Analysis — analytical tools for investigating CONTEXTUAL relationships within and among map layers**
  - ✓ Reclassifying Maps, Overlaying Maps, Measuring Distance and Connectivity, Summarizing Neighbors
  - ✓ GIS Modeling involves sequencing map analysis operations to solve spatial problems (map-ematics)
- ✓ **Spatial Statistics — analytical tools for investigating NUMERICAL relationships within and among map layers**
  - ✓ Descriptive Statistics (aggregate summaries)
  - ✓Surface Modeling (discrete point data to a continuous spatial distribution)
  - ✓ Spatial Data Mining (identifying relationships within and among map layers)

Grid-based Map Analysis is more different than it is similar to Traditional Mapping—

Counter-intuitive?

A bit deep?

What's Next? *(References and Homework)*

ONLINE REFERENCE — see the online book **Beyond Mapping III** (Berry, BASIS Press) that is posted at… **www.innovativegis.com/basis**

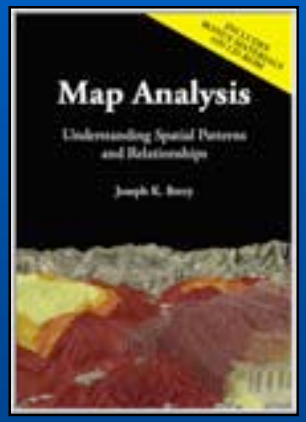
... application papers referenced in this presentation are included on the Workshop CD

WORKSHOP CD — contains the PowerPoint slide set, notes, background reading, hands-on tutorial using MapCalc Learner software (14-day evaluation)

NEW BOOK — see the description of the **Map Analysis** book (Berry, 2007; GeoTec Media) at…
www.innovativegis.com/basis

…develops a structured view of the important concepts, considerations and procedures involved in grid-based map analysis.

…the companion CD contains further readings and software for hands-on experience with the material presented.



Joseph K. Berry, jberry@innovativegis.com

NYS GIS 2007 23rd Annual New York State GIS Conference

Ideas for On-Your-Own Activities in the Albany Area

Capital	
NYS Capitol Building	73°45'28.426"W 42°39'8.42"N
Corning Tower	73°45'34.816"W 42°38'56.742"N
NYS Museum	73°45'41.372"W 42°38'55.148"N
Legislature Building	73°45'33.723"W 42°39'8.837"N
Executive Mansion	73°45'39.133"W 42°38'48.147"N
Hudson River Way Bridge/Corning Preserve	73°44'56.713"W 42°38'59.703"N
Cultural	
Albany Institute of Art	73°45'38.028"W 42°39'19.695"N
The Egg	73°45'30.752"W 42°39'1.829"N
Event at Times Union Center	73°45'14.387"W 42°38'53.955"N
Empire State Aerosciences Museum	73°55'58.412"W 42°51'36.477"N
Cathedral of the Immaculate Conception	73°45'34.449"W 42°38'50.707"N
Boating	
Albany Aqua Ducks tour	73°44'55.133"W 42°39'14.743"N
Dutch Apple Cruises	73°45'1.382"W 42°38'30.219"N
Cruise on the Captain JP	73°41'26.624"W 42°43'56.677"N
Tour the USS Slater	73°44'59.652"W 42°38'33.014"N
Replica of Henry Hudson's Halfmoon	73°45'0.468"W 42°38'31.185"N
Historic	
Erie and Champlain Canals and locks	73°40'39.584"W 42°47'8.368"N
Shaker Village	73°48'39.419"W 42°44'28.656"N
Uncle Sam's Grave	73°40'5.657"W 42°45'45.013"N
President Chester A. Arthur's Grave	73°44'1.179"W 42°42'26.919"N
President Martin VanBuren's home/grave	73°42'14.046"W 42°22'11.342"N
Cherry Hill Mansion	73°45'48.083"W 42°38'5.214"N
Schuyler Mansion	73°45'32.99"W 42°38'29.022"N
Crailo	73°44'57.637"W 42°38'6.019"N
Pruyn House	73°46'41.706"W 42°43'55.162"N
Saratoga Battlefield	73°38'56.805"W 43°0'43.699"N
Natural	
John Boyd Thatcher State Park	74°0'23.41"W 42°39'1.527"N
Visit Cohoes Falls	73°42'25.476"W 42°47'4.069"N
Five Rivers Environmental Education Center	73°53'24.818"W 42°36'31.874"N
Saratoga Spring Spa Park	73°47'18.91"W 43°3'47.207"N
Educational	
Schenectady Museum and Planetarium	73°56'1.196"W 42°48'42.656"N
Henry Hudson Planetarium	73°44'53.181"W 42°39'14.636"N

Sunday, September 30, 2007

2:00 - 4:00 **Pre-Conference Workshop,** Capitol Room and 45 minutes outdoors

GPS for GIS workshop, instructor: **Jonathan Cobb**

Description: A hands-on session intended for novice to intermediate-level GPS users.

This workshop will cover the primary elements of a GPS data collection project and is suitable for GIS professionals that may participate in field data collection and/or project design and data processing/management functions. Class size is limited to 16 people and will include a field data collection component. GPS receivers and software will be provided. Please dress appropriately for a 45-minute outdoor session.

Resume for Jonathan A. Cobb

Partner/GPS Consultant

BS Education: University of Rochester **1987, Geo-mechanics**

Mr. Cobb has over seventeen years of varied professional experience in GPS/GIS applications, public relations, and environmental engineering with particular emphasis on government relations activities, regulatory compliance, public speaking, and communications.

As one of the co-founders of Waypoint Technology Group, he has extensive experience in GPS mapping applications using Global Positioning System and Geographic Information System technologies; he is a Trimble-certified trainer with extensive experience on Trimble's full line of mapping-grade GPS hardware and software.

Mr. Cobb has served as a consultant to a wide range of public and private organizations and is a regular speaker at regional conferences and symposia relating to GPS and GIS applications, and innovative uses of these two complementary technologies.

Technical Skills:

- Experienced user and technical trainer on wide range of Trimble based GPS data collection software including Aspen, Asset Surveyor, TerraSync, Media Mapper, and Survey Controller
- Experienced user and technical trainer on GPS data management software systems including Trimble Pathfinder Office, Trimble Reference Station, and Geomatics Office
- Experienced user of ESRI's ArcView Desktop GIS software, ArcPad field data collection software and related applications

Credentials:

- Certified Trainer – Trimble Mapping Systems, Trimble Pathfinder ProXR/XRS GPS Mapping Systems, and Certified Training – Trimble Real Time Surveying
- Registered Engineer in Training (EIT) in New York State;
- Graduate - The Dale Carnegie Course (Human Relations Award)
- 40 Hour OSHA HAZMAT Certification (1989); Supervisors Course (1990)
- NICET Level II Certification (Geotechnical)

Welcoming Reception at the New York State Museum

23rd Annual New York State GIS Conference

Sunday, September 30, 2007, 5:00 - 7:30pm

Once again, we are kicking off the NYS GIS Conference with a chance to meet old friends and make new ones, away from the pressure of having to attend meetings, workshops, and plenary sessions. This year, we will meet on Sunday evening, at the NYS Museum on Madison Avenue, Albany, NY.

- New York State Museum website
- Map/Directions (PDF)

Reception Itinerary

Throughout the reception, beverages and hot and cold appetizers will be served in the Adirondack Room, on the 1st floor.

- 5 pm - 6 pm: Explore the entire museum, but especially enjoy the 4th floor's exhibits, spectacular view of the Capitol, and see the 90-year old carousel (the carousel will not be in operation, sorry). The 4th floor closes at 6:00 pm.
- 6 pm - 7 pm: Enjoy the extensive 1st floor exhibits, and participate in the NYS GIS scavenger hunt with the chance to win a great prize.
- 7:30 pm: Event ends. Dine on your own at one of the many fine establishments in Albany (maps to be provided at the Museum).

Folks had a great time at last year's event, which was limited to the first 100 people who signed up. This year, there are no restrictions on attendance, so for the low, low price of $10/person (includes 2 drink tickets), we hope to see everyone there!

State University of New York College of Environmental Science and Forestry
SUNY-ESF | 1 Forestry Drive | Syracuse, NY 13210 | 315-470-6500

2007 NYS GIS Conference
Program at a Glance

Holiday Inn Albany
205 Wolf Road
Albany NY 12205
Phone: 518-458-7250, Fax: 518-458-7377

Sunday, Sept. 30, 2007

	Times	Activity and Location
Registration Desk Hours	**12:00 - 7:00 pm**	
Exhibitor set up	**3:00 - 9:00 pm**	
		Pre-conference workshops
	1: 00 - 4:00 pm	**Spatial Analyst – *Lee Herrington, SUNY-ESF* – limit to 20 seats in Capital Room**
	2:00 - 4:00 pm	**GPS in GIS – *Jonathan Cobb, Waypoint Technology* – limit to 20 in Stonehenge A, 2 Professional Development Hours (2 PDHs)**
		Welcoming Reception
Pre-conference Social Event	**5:00 – 7:30 pm**	**Reception at the NYS Museum, Empire State Plaza, Madison Avenue, Albany, NY**

Monday, Oct. 1, 2007

Exhibitor set up	**8:00 - 10:00 am**	**Concurrent Sessions**				
Continental Breakfast	**8:00 - 9:00 am**					
Registration Desk Hours	**8:00 - 12:00 pm**					
Times		**Stonehenge A**	**Stonehenge B**	**Stonehenge C**	**Stonehenge D**	**Capital Room**
9:00 AM		**Session 1A** **Special Session**	**Session 1B** **Moderator: Paul** **Imagery**	**Session 1C** **Workshop**	**Session 1D** **Moderator: Ann** **Infrastructure**	**Available for meetings**
	9:00 - 9:30	Report of the NYSGISA Business Development Commitee on the State of Private Sector GIT Businesses in NY State, *Scott Sherwood (60 min.)*	Production of High Resolution Digital Elevation Models (DEM) applying New York State Original Aerial Photographs, *Tao Tang and Xiao Wang*	SARA grant workshop: Grant Writing for GIS Projects, *Ann Marie Przybyla (60 min)*	The Victorian Rail Infrastructure Survey Project, *David Petterson*	
Exhibits open 10 am - 6:30 pm	9:30 - 10:00		Historical Orthoimagery, *Matthew Steigman and Tim Ruhren*		Using GIS to Manage Airport Facilities and Utilities, *Sean Myers*	
10:00AM - 10:30 AM	***AM break in Front Courtyard /Exhibitor Area***					
10:30 AM		**Session 2A** **Moderator: Clark** **Modeling**	**Session 2B** **Moderator: Bill** **Panel Discussion**	**Session 2C** **Workshop**	**Session 2D** **Moderator: Abu** **Infrastructure-Mobile GIS**	**Session 2E** **Moderator: Lee** **Local Government**
	10:30 - 11:00	Understanding Land Use Change in the Connecticut Highlands as a Function of Ecological/Economic Forcing Functions: A comparison of 3 different models, *Seth Myers and Myrna H. Hall*	From Dust to Digital: Collaboration and Technology come together to resurrect and revive archived images, *Tim Ruhren (90 min.)*	Grid-based Map Analysis Techniques and Modeling, *Joe Berry (90 min.)*	City of Buffalo, New York Hydrant and Critical Valve Collection Program, *John Monell*	Nassau County's Municipal Data Sharing Portal - A NYS ORPS Technology Improvement Program Grant Project, *Joseph Jones and Richard P. Slutzah*
	11:00 - 11:30	An ArcHydro model for an artificial agricultural drainage system, *Peng Gao and Jay Puckett*			Color Demosaicking of Oblique Aerial color Imagery *Stephen L. Schultz and Nancy Brelos*	Unified GIS Services for Westchester County, *Sam Wear*
	11:30 - 12:00	Mapping Labor Migration in the Philippines and Vietnam: Spatial application of the Harris-Todaro Model, *Scott R. Sanders and Joe Francis*			GIS and GPS Applications In Mapping For Department Of Public Works, *Jonathan Novak*	Ithaca is Gorges: City of Ithaca Gorge Rescue Mapping Project, *Sohyun Park and Guy Van Benschoten*

Monday, Oct. 1, 2007 cont.

Registration Desk Hours	1:00 - 5:00 pm	Concurrent Sessions				
Times		**Stonehenge A**	**Stonehenge B**	**Stonehenge C**	**Stonehenge D**	**Capital Room**
Noon	12:00 - 1:00 pm	**Lunch - Rear Courtyard Area and Patio**				
1:00 PM	1:00 - 3:00	• **Welcome from Dr. Lee Herrington, SUNY ESF** • **State of the State Address delivered by Bill Johnson, CSCIC** • **Keynote speaker, Joseph K. Berry in Stonehenge BC**				
3:00 - 3:30 PM	**PM Break in Front Courtyard /Exhibitor Area**					
3:30 PM		**Session 3A Moderator: Jeff H. Socioeconomics**	**Session 3B Moderator: Ann Visualization**	**Session 3C Moderator: Jeff V. Special Session**	**Session 3D Moderator: Brian Emergency Response**	**Session 3E Workshop**
	3:30 - 4:00	Class Profiling of American Consumers, *Ashraf Ghaly and Janet Grigsby*	3D Visualization, *Christine Kinn*	Use of GIS/geospatial technologies in Criminal Justice, *Jim Gilmer*	Blazing the Trail: The Transportation Component of Emergency Management, *Jo Jordon*	Introduction to Remote Sensing for the GIS Practitioner, *Ben Houston (90 min.)*
	4:00 - 4:30	Preparing for 2010 Census: Verification of NY State Group Quarters locations though Google Maps, *Jan Vink*	Use Of Landscape Visualization Software (Lvs) To Aid In Viewshed Management At The Home Of Franklin D. Roosevelt National Historic Site, *Rebecca McGuire ,C. A. Nowak, D. Hayes, R. D. Briggs, R. E. Hoffman, G. W. Curry, and J. Auwaerter*		The Integration of GIS and Computer Aided Dispatch (CAD), *Richard Annitto and Edmond Horace*	
	4:30 - 5:00	Employing the Unemployment Rate to Examine Some of its Socioeconomic Correlates, *Ashraf Ghaly and Eshragh Motahar*	SERVIR Viz: A 3D Visualization Tool for Mesoamerica, *Jessica Coughlin*		The Harvesting and Distribution of Local GIS Data for Public Safety and Homeland Security, *Steve Leatherman, Eric Lowry, Steve Leatherman, Rex Jones*	
5:00 PM		**Reception / Poster Session in Front Courtyard /Exhibitor Area**				
6:30 PM		**Banquet with speaker, Ross S. Whaley in Stonehenge BC**				

Tuesday, Oct. 2, 2007

Continental Breakfast	**7:30 - 8:30 am**	**Concurrent Sessions**				
Registration	**8:30 - 12:00 pm**					
Times		**Stonehenge A**	**Stonehenge B**	**Stonehenge C**	**Stonehenge D**	**Capital Room**
8:30 AM *Exhibits open* *8:30 am - 1:30 pm*		**Session 4A** **Special Meeting**	**Session 4B** **Moderator: Cathy** **Web services**	**Session 4C** **Workshop**	**Session 4D** **Moderator: Bill** **Workshop**	**Session 4E** **Moderator: Eddie** **Natural Resources**
	8:30 - 9:00	NYS GIS Association Meeting (60 min)	Geographic Web Services – Open Solutions for Local Government, *Jim Hall*	Grid-based Map Analysis Techniques and Modeling, *Joe Berry (90 min.)*	Map Design workshop, NYS CSCIC (90 min.)	Mapping Potential Wetlands in a GIS: Model Development and Validation, *Ariel Diggory*
	9:00 - 9:30		Interactive County Bathing Beach Advisory Website, *Scott Mastellon*			Using GIS to Manage the Upper Susquehanna Watershed, *Bruce Oswald and Chris Yearick*
	9:30 - 10:00		The NY Ocean and Great Lakes Atlas, *Jeff Herter*			The Utility of the 2001 NLCD Impervious Surface Map for Predicting Water Chemistry in the New York City West of Hudson Watersheds, *Myrna Hall and Prajjwal Panda*
10:00:00 AM - 10:30 AM	***AM break in Front Courtyard /Exhibitor Area***					
		Session 5A **Panel Discussion**	**Session 5B** **Moderator: Cathy** **Web services**	**Session 5C** **Moderator: Dennis** **Panel on Education**	**Session 5D** **Moderator: Lee** **Software**	**Session 5E** **Moderator: Myrna** **Natural Resources**
	10:30 - 11:00	GIS Certification Process and Benefits, *Eric Herman Eileen Allen and Lindi Quackenbush (90 min.)*	Building the National Spatial Data Infrastructure (NSDI) with New York State Local Government Web Mapping Services, *Sam Wear and Paul Rooney*	Education and Training: Toward Creating a Geospatially Literate Society and a Geospatially Enabled Workforce, Moderated by Dr. Dennis Golladay, Panel: Ann Johnson, Amy Work (*(90 min.)*	Open Source GIS Software, *Jason Baum*	Using GIS to inform a shift toward a park-wide approach to Adirondack Preserve planning, *Steve Signell*
	11:00 - 11:30		Making the NYS GIS Streets & Addressing Data Sets better, *Rodger Coryell*		Serving Each Other, *Paul Rooney and Sam Berg*	Quantifying sawmill competition across the Northern Forest based on a geospatial analysis of individual sawmill woodsheds, *Eddie Bevilacqua*
	11:30 - 12:00		The Geographic Data Mashup - One Local Government's Perspective, *Joseph Jones*		ESRI: What's New at 9.2 and Beyond?, *Paul Rooney and Mark Scott*	Viewshed Protection Area Mapping Results in a Town Land Use Law - A Case Study, *John Barge*

Tuesday, Oct. 2, 2007 cont.

Times		Stonehenge A	Stonehenge B	Stonehenge C	Stonehenge D	Capital Room
Noon	12:00 - 1:30 PM	**Lunch with Raffle and Award Presentations - Partnership Award in Rear Courtyard and Patio**				
1:30 PM *Exhibitor Tear Down* *1:30 – 3:00 PM*	1:30 - 2:00	**Session 6A** **Moderator: Bob** **Collaboration** Collaborative Approach and Benefits to GIS Implementation - City of Buffalo, *Jeff Volpe and Eric Schmarder*	**Session 6B** **Moderator: Clark** **Natural Resources** Comparing and Contrasting Watershed based Assessment for Nonpoint Sources of Phosphorous,, *Matt Starr*	**Session 6C** **Workshop** Cartography Critique, *Lee Herrington* *(90 min.)*	**Session 6D** **Moderator: Lindi** **Software** The Importance of a Linear Reference System to track and maintain Assets, *Craig Schorling and Sumi Gauchan*	**Available for meetings**
	2:00 - 2:30	Ontario County Enterprise GIS Implementation – OnCOR, *Kevin J. Schultz*	Watershed Management with GIT and Advanced Visualization Techniques, *David Carr*		Demystifying ESRI Annotation: A Technical Seminar, *C. Craig Cleveland and Kate Buss* *(60 min.)*	
	2:30 - 3:00	GIS-based Spatial Modeling in Disaster Management, *Jo Jordon*	Common Themes in GIT Enabled Water Resource Management in Wisconsin, Indiana, and New York, *Ben Houston*			
3:00 PM	**Conference Concludes**					

Special Interactive Panel – Session 2B

Time and Location: Monday, 10:30 am – 12:00 pm in Room Stonehenge B

Title: From Dust to Digital: Collaboration and Technology come together to resurrect and revive archived images

Panel members:

Tim Ruhren, NY State Office of Cyber Security and Critical Infrastructure Coordination (CSCIC), **Jeff Barth**, New York State Department of Transportation (NYSDOT), Photogrammetry Section, **Eugenia Barnaba**, with Cornell University's Institute for Resource Information Sciences and **Doug English**, GIS Administrator for Broome County- all challenged by similar hurdles on surprisingly similar projects.

Description:

This interactive session is intended to develop a strategic plan for making better use of historical aerial photograph archives throughout New York State. Owners of historical imagery as well as current and potential users are encouraged to attend.

The challenges range from documenting and protecting imagery in scattered archives to ultimately integrating the imagery in GIS applications. Meeting these challenges will help make the imagery more widely available.

The panel will discuss a variety of hurdles and common goals gleaned from their experience with historical imagery. The bulk of the panel session is reserved for open discussions with audience members to begin the process of developing standards and a framework for avoiding redundant efforts.

New York State Geographic Information Systems
23rd Annual Conference — October 1 and 2, 2007 — Albany, New York

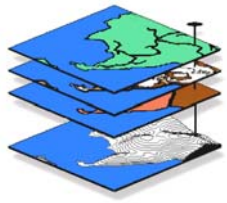
Workshop on Grid-based Map Analysis Techniques and Modeling

Points, Lines and Polygons to Continuous Geographic Decision Space: Applying Raster Analysis in a Vector World

Presented by

Joseph K. Berry

W. M. Keck Scholar in Geosciences, Geography Department, University of Denver
Principal, Berry & Associates // Spatial Information Systems
Email: jberry@innovativegis.com *Web:* www.innovativegis.com/basis/



Situation: Most desktop mapping and GIS applications have focused on mapping and spatial data management responding to inventory assessments of "***Where Is What***" involving digital maps and linked databases (computer mapping and geo-query). Map analysis provides new processing structures and analytical tools for investigating and incorporating spatial relationships of "***Why and So What***" in both research and decision-making contexts. While the new tools of Spatial Analysis, Surface Modeling and Spatial Data Mining, and GIS Modeling might at first seem daunting, their roots are in basic math/stat and are less challenging than balancing your checkbook. However, the extension of effective GIS applications from descriptive to prescriptive mapping involves new spatial reasoning concepts and skills that are not reflected in our paper map legacy, manual processing procedures or contemporary "spatial object" mindset.

Description: This 1.5 hour introductory workshop discusses and demonstrates numerous techniques for spatial analysis and data mining using application examples from *natural resources*, *infrastructure*, *geo-business* and *precision agriculture*. The discussion focuses on concepts, procedures and practical considerations in successfully applying grid-based map analysis within in a map-*ematical* context. The material presented encapsulates numerous "Beyond Mapping" columns published in GeoWorld and compiled into the new book Map Analysis: Understanding Spatial Patterns and Relationships (Berry, 2007).

Who Should Attend: GIS managers and specialists who are interested in or currently involved in the development of systems that analyze spatial data should attend. The material presented is designed to illustrate the common threads of map analysis used in a wide range of applications. Prior GIS exposure and a basic familiarity with statistics are recommended.

About the Instructor: Dr. Joseph K. Berry is the Principal of Berry and Associates // Spatial Information Systems, consultants and software developers in Geographic Information Systems (GIS) technology. He also serves as the W. M. Keck Scholar in Geosciences at the University of Denver and as a Special Faculty member at Colorado State University.

General Notes for the Introductory Workshop on

Grid-based Map Analysis Techniques and GIS Modeling

Joseph K. Berry, email ***jberry@innovativegis.com****, website* ***www.innovativegis.com/basis***

Beyond Mapping III *online book posted at…*
www.innovativegis.com/basis/*, select "Beyond Mapping III"*

Example Applications *posted at…*
www.innovativegis.com/basis/*, select "Example Applications"*

Cartography– manual map drafting (paper map legacy for thousands of years)
Computer Mapping– automates the cartographic process (70s)
Spatial Database Management– links computer mapping techniques with traditional database capabilities (80s)
GIS Modeling and Analysis– representation of relationships within and among mapped data (90s)…

- ✓ *Surface Modeling*– maps the spatial distribution of a set of point sampled data,
- ✓ *Spatial Data Mining*– characterizes the "numerical" relationships among mapped data and develops predictive models,
- ✓ *Spatial Analysis*– derives new information based on "contextual" relationships among mapped data, and
- ✓ *GIS Modeling*– logical processing of spatial information to characterize a system or solve a problem.

*(See Beyond Mapping III online book, "****Topic 4****" and "****Topic 27****" for more information)*

Raster refers to image display (map values represent the color assigned to each dot; e.g., scanned topographic maps–DRGs or aerial photos–DOQs) while **Grid** refers to map analysis (map values have all of the rights, privileges and responsibilities of a map-*ematics*).
Grid data structure the *Analysis Frame* provides consistent "parceling" needed for map analysis and extends points, lines and areas to *Map Surfaces.*
*(See Example Applications, "****Short Video Demos****" for more information)*

Surface Contouring options include *# of Ranges*, *Calculation Method* (e.g., Equal Ranges with same range for each interval and Equal Count with same number of cells for each interval) and *Color Pallet/Ramp* selection.
Grid Display Types are *Lattice* that forms a smooth "wireframe" by connecting cell centroids with lines whose lengths are a function of elevation differences and *Grid* that forms extruded grids whose heights are a function of elevation differences.
*(See Example Applications, "****Display Types****" for more information)*

Grid Data Types are characterized by their *Numeric Distribution* (independent integers versus range of values) and their *Geographic Distribution* (abrupt boundaries versus gradient). A *Discrete* map has values that simply represent categories (e.g., a Cover type map) that form sharp abrupt boundaries) whereas a *Continuous* map has values that represent a spatial gradient (e.g., a slope map).
*(See Example Applications, "****Data Types****" for more information)*

Spatial Analysis investigates the "contextual" relationships in mapped data…

- **Reclassifying Maps**– New map values are a function of the values on a single existing map… no new spatial information is created
- **Overlaying Maps**– New map values are a function of the values on two or more existing maps… new spatial information is created
- **Measuring Distance**– New map values are a function of the simple or weighted distance or connectivity among map features
- **Summarizing Neighbors**– New map values are a function of the values within the vicinity of a location on an existing map.

*(See Beyond Mapping III online book, "**Topic 24**" for more information)*

Reclassifying and Overlaying Maps– reclassifying operations involve the reassignment of the values of an existing map as a function of its initial value, position, size, shape or contiguity of the spatial configuration associated with each map category; overlay operations involve the creation of a new map where the value assigned to every location is computed as a function of the independent values associated with that location on two or more maps (point-by-point, region-wide and map-wide)

*(See Beyond Mapping III online book, "**Topic 22**" for more information)*

Measuring Distance and Connectivity– the concept of *Distance* as the "shortest straight line between two points" is expanded to *Proximity* by relaxing the assumption of only "two points" then expanded to *Movement* by relaxing the assumption of "straight-line" connectivity.

*(See Beyond Mapping III online book, "**Topic 13**," "**Topic 14**" and "**Topic 25**" for more information)*
*(See Example Applications, "**Determining Proximity**" and "**Creating an Up-Hill Road Buffer**")*

Calculating Visual Exposure– a *Viewshed* identifies all locations that can be seen from a view point(s) while *Visual Exposure* develops a relative scale indicating the number of times each location is seen from a set of viewer points (e.g., a road network).

*(See Beyond Mapping III online book, "**Topic 15**" for more information)*
*(See Example Applications, "**Determining Visual Exposure**" and "**Modeling Visual Exposure**)*

Summarizing Neighbors– a *Diversity Map* indicates how many different types, a *Roughness Map* identifies the variation in slope values, and a *Density Map* reports the total value within a specified distance of each grid location.

*(See Beyond Mapping III online book, "**Topic 11**"and "**Topic 26**" for more information)*
*(See Example Applications, "**Assessing Covertype Diversity**")*

Surface Modeling maps the spatial distribution and pattern of point data…

- ✓ **Map Generalization**– characterizes spatial trends (e.g., titled plane) by considering all of the samples at once as it fits a surface,
- ✓ **Spatial Interpolation**– derives spatial distributions (e.g., IDW, Krig) by considering small, localized set of samples throughout the map area (roving window), and
- ✓ **Other**– roving window and facets (e.g., density surface; tessellation)

*(See Beyond Mapping III online book, "**Topic 2**", "**Topic 3**" and "**Topic 8**" for more information)*

Spatial Data Mining investigates the "numerical" relationships in mapped data…

- ✓ **Descriptive**– calculates aggregate statistics (e.g., average/stdev, similarity, clustering) that summarize mapped data,
- ✓ **Predictive**– develops relationships among maps (e.g., regression) that can be used to forecast characteristics or conditions at other locations or times, and
- ✓ **Prescriptive**– uses descriptive and predictive information to optimize appropriate actions.

*(See Beyond Mapping III online book, "**Topic 7**", "**Topic 10**" and "**Topic 16**" for more information)*

GIS Models come in three basic types…

- ✓ **Suitability Models**– based on logically sequenced decision criteria similar to a recipe (e.g, animal, shopper and pipeline "habitat")…
  - o **Binary Model**– identifies areas that are acceptable based on combining binary maps (0 and 1),
  - o **Ranking Model**– develops a ranking of areas based on the number of criteria that are acceptable (0 to 3), and
  - o **Rating Model**– develops a "goodness" scale (0 to 9 best) and calculates the average rating for each grid cell.
- ✓ **Statistical Models**– based on numerical relationships (e.g., crop yield), and
- ✓ **Process Models**– based on physical (e.g., erosion potential)

*(See Beyond Mapping III online book, "**Topic 17**", "**Topic 19**", "**Topic 20**" and "**Topic 23**" for more information)*

Capturing and Communicating Model Logic– a flowchart is used where boxes represent maps and lines represent analytical operations to identify the processing steps linking command scripts to mapped data.

*(See Beyond Mapping III online book, "**Topic 21**" for more information)*

Data Conversion investigates vector to/from raster data exchange…

- ✓ **V to R–** burning the points, lines and areas into the grid (fat, thin and split),
- ✓ **R to V–** connecting grid centroids, sides and edges (line smoothing), and
- ✓ **Pseudo Grid–** each grid cell is stored as a polygon

*(See Beyond Mapping III online book, "**Topic 18**" for more information)*

Presentation of the Annual Partnership Award

24th Annual New York State GIS Conference

The New York State GIS Coordination Program's Standards and Data Coordination Work Group promotes formation of GIS partnerships in New York State. Through their efforts, a Partnership Summaries page is posted on the GIS Clearinghouse http://www.nysgis.state.ny.us/coordinationprogram/reports/partnerships/index.htm and an Annual GIS Partnership Award is presented at the NYS GIS Conference.

The Annual GIS Partnership Award recognizes a GIS partnership involving government agencies, academia, private business, and/or not-for-profit organizations. The Award is presented in hope that by recognizing these partnerships, existing GIS partnerships will grow, additional resource sharing will occur, duplication of efforts will decrease, and perhaps others will see the benefits provided and initiate similar unique partnerships.

Who is eligible?

Any partnership that does not have an existing summary on the GIS Partnership Summary page AND partnerships that are on the Summary page but have expanded or significantly modified their original partnership (you will need to update your summary by resubmitting a Partnership Summary Form). Previous winners of the last two partnership awards include: Jane Sokolow of OASIS, 2004, Pete Walsemann of RACOG, 2005, and Anne Wilbiralskie et al of the Old Forest Preservation Partnership, 2006.

- Partnerships considered for the award will be judged on the following criteria: "Entries will be judged on their originality, innovation, and the scope of the partnership, such as number and diversity of participants or dollar savings of the partnership."

Partnerships may be submitted using the Partnership Summary Form by going to http://www.nysgis.state.ny.us/coordinationprogram/reports/partnerships/index.htm which takes you to the GIS Partnership Summary page (scroll down and review some of the previously submitted partnership summaries). From this page click on Òdownloadable document in rich text format (rtf)Ó (http://www.nysgis.state.ny.us/coordinationprogram/reports/partnerships/partner.rtf) to take you to the actual form. It's a very easy one page form to fill out. Once filled out, just attach it to an e-mail and send to nysgis@cscic.state.ny.us

Deadline for new and updated award applications/summary pages is 27 September.

Questions? Contact Jeffrey L. Herter**,** jeff.herter@dos.state.ny.us

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Advisory Committee

24th Annual New York State GIS Conference

Advisory Council Meeting Schedule

Day and Date	Time	Location	Focus
Tuesday, Dec. 11, 2007	10 am - 2 pm	213 Marshall Hall, SUNY-ESF campus	Debrief
	10 am - 2 pm	SUNY-ESF	Program, Marketing, Sponsors
	9 am - 11 am	Subcommittee Conference calls (call in at your time)	9-9:30 Program support9:30 - 10 Sponsorship10-10:30 Activities10:30 - 11 Workshops
	10 am - 2 pm	SUNY-ESF	Workshops, social, keynote
	11 am - 1 pm	Subcommittee Conference calls (call in at your time)	Abstracts, posters, program and marketing
	10 am - 2 pm	SUNY-ESF	Define program - slots ABSTRACTS and Abstract List
	10 am - 2 pm	SUNY-ESF	Final - moderators, final marketing, etc.
	11 am - 2 pm	Holiday Inn - Liverpool (open to all)	Walkthough
	9 am- 10 am	Conference call	Final arrangements and logistical report from walkthrough

Important Dates and Deadlines

- June 4, 2008 - Abstracts and poster abstracts Due
- September 5, 2008 - Hotel room rate cut off
- September 10, 2008 - Discount registration rate ends

Advisory Council Members

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Sponsorship

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23rd Annual NYS Geographic Information Systems Conference

October 1-2, 2007

Holiday Inn Albany on Wolf Road
205 Wolf Road, Albany, NY 12205

Conference Sponsorship
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We invite you to get involved with the conference as a sponsor to help us educate, inform and understand the uses of GIS. Make your check payable to SUNY Research Foundation at these levels:

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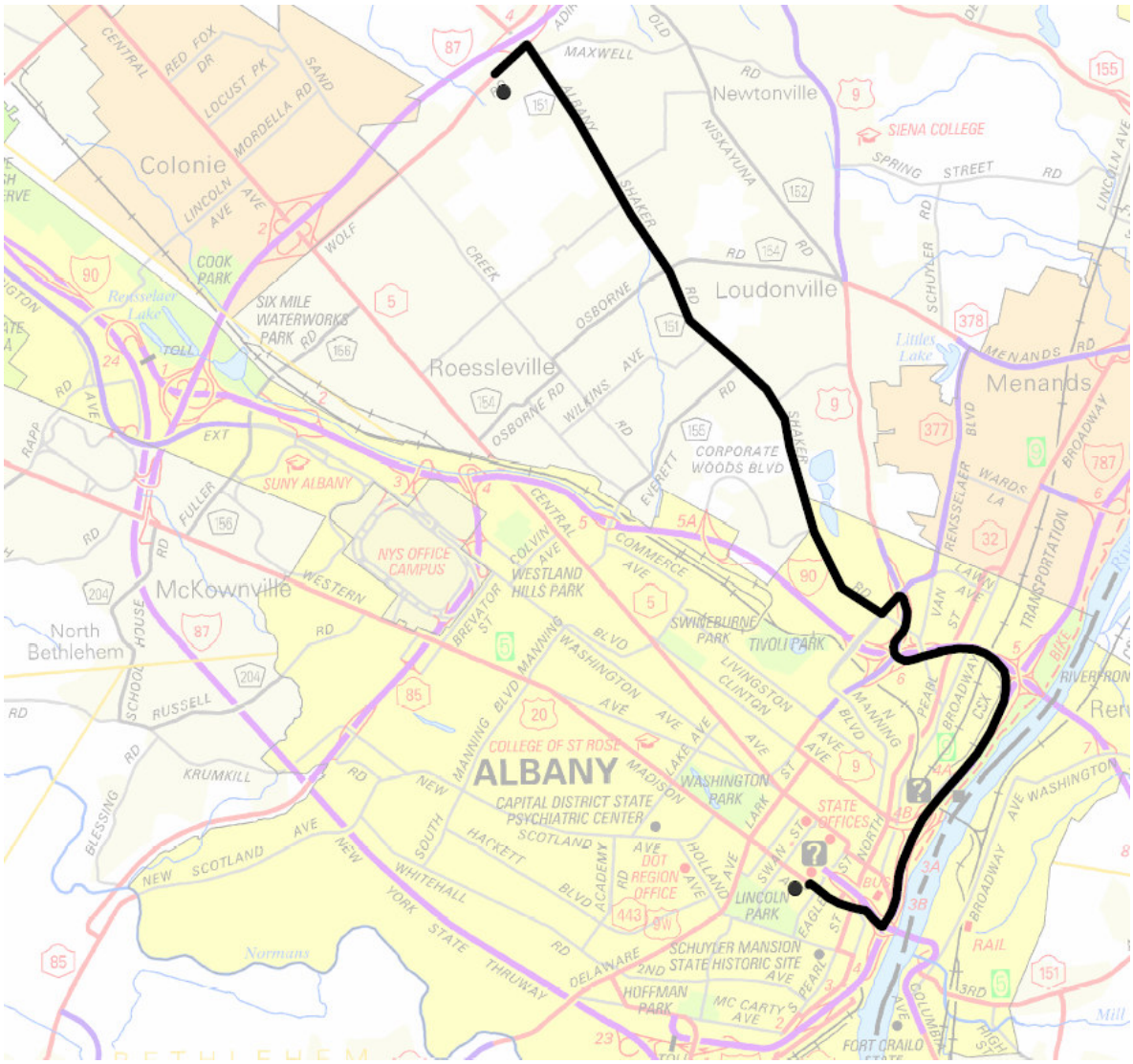
NYS GIS 2007

23rd Annual New York State GIS Conference

Pre-conference Reception at the NYS State Museum
Sunday, September 30, 2007, 5:00PM – 7:30PM

Join us for drinks, hors-d'oeuvres, and great conversation at this wonderful venue

Please note: *-Food and drink limited to the Adirondack Room*
-The fourth floor will close at 6:00PM, so be sure to enjoy those exhibits first (including a ride on the carousel!)



There are many ways to get from the hotel to the museum. This is the fastest and most direct (about 15 minutes):

- Exit the Holiday Inn and turn right on Wolf Road.
- At the light, turn a right onto Albany Shaker Road.
- Continue 4.5 miles and make a left onto Northern Blvd.
- Make an immediate right, following the signs to I-90 east.
- Take the first Exit to I-787 south towards Albany.
- Go 1.5 miles, and Take Exit 3B (Madison Avenue).
- Continue 0.5 miles on Madison Avenue, and park in the Cathedral parking lot on the left (parking is free on Sunday).
- The museum entrance is about 100 yards further up Madison, on the left (under the bridge).