EDUCATION EVENT REPORT AND RECOMMENDATIONS

Attendee's Name and Report Writer:
Joseph Kerski, Geographer:
Education/GIS, USGS, Denver, Colorado.

Event:

Conduct Hands-On Training for USGS Staff in *Introduction to ArcGIS Using USGS Data*.

Location: Denver, Colorado. USGS National Training Center.

Date: 8-12 September 2003

Summary

I taught a one-week course in geographic information systems at the USGS National Training Center. The class was entitled "Introduction to ArcGIS Using USGS Data." The class featured theory and hands-on use of ArcGIS 8.3, focusing on:

1) How to apply GIS tools and methods to Earth-based problems in geography, earth science, biology, history, and hydrology.

2) Practical hands-on work with GPS and with ArcGIS 8.3, including ArcMap, ArcCatalog, and ArcToolbox, with Spatial and 3D Analyst extensions.

3) An introduction to the research base, resources, organizations, subject matter, and literature of Geographic Information Systems and Sciences.

4) Downloading, formatting, and using USGS spatial data, including NHD, NED, DOQ, DEM, NLCD, DRG, and DLG data in ArcGIS. The sites included National Atlas, The National Map, the seamless data server, Earth Explorer, GIS Data Depot,

ESRI TIGER, NRCS SSURGO, and others.

5) Discussion on where to continue one's GIS education—online courses, books, journals, universities, community colleges, USGS training, USGS Geographic Information Office, and via other means.
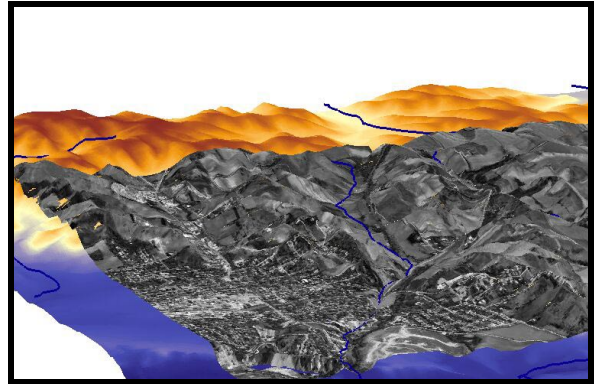
Participants in the course analyzed the best location for a fire tower, using USGS DLG, DEM, and DOQ data, and created a three-dimensional perspective of the study sites during the activity.

GIS course participants during our GPS collection activity. I thank the participants for their expertise and enthusiasm. We had a multidisciplinary group that represented all USGS disciplines and regions. Professions included information specialist, scientist, and publications.

Gloria Armstrong of the National Training Center addresses the class. Ms Armstrong was a pleasure to work with and I thank her for her role in ensuring the class was a success. In a course such as this, success is in large part based on whether the software and hardware works. Therefore, I greatly appreciated the technical assistance of Ralph Root, Alan Ward, Gloria Armstrong, and Bri Lochrie for their assistance. If others were involved in the planning for this course, know that I am most appreciative. I look forward to working with the National Training Center staff in the future in upcoming courses.


USGS Geographer Joseph Kerski was the facilitator for the GIS course. I thank Jennifer Sieverling and the GIO staff for paying my salary to prepare for and teach the course. I thank David Litke and Steve

*Char for their technical assistance.*

I thank Stewart Wright, Cartographer from the Geography Discipline, above, for his expertise in helping with the metadata portion of the course. I thank the USGS Rocky Mountain Mapping Center staff for their support of the event.
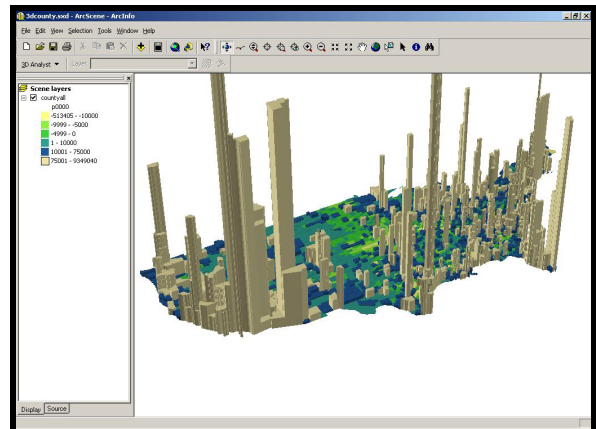
Participants in the course analyzed USA demographics and population change for the past 100 years, and created a 3-dimensional map as part of this activity.
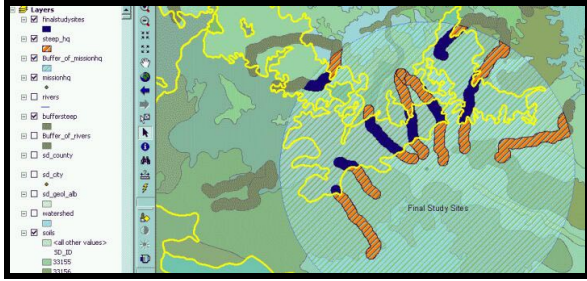
Final results of our Stipa Comata *(needle grass) site selection analysis, which involved several overlay, query, and buffering operations.*


The class was broken up into sections of discussion, hands-on joint activities, and independent "challenge" exercises.


I was impressed with the kinds of questions that the participants asked throughout the week. We all learned from each other and therefore the educational environment was excellent.

GPS coordinate collection brings in a host of considerations important to GIS work, particularly those of coordinate systems and datum shifts. We later brought the coordinates into ArcGIS, overlaying them on top of a USGS DOQ and a DRG. ***We also used the Terraserver tool from ArcScripts online, which I highly recommend! It automatically brings in DOQs and DRGs from Terraserver into ArcMap in a seamless format!***
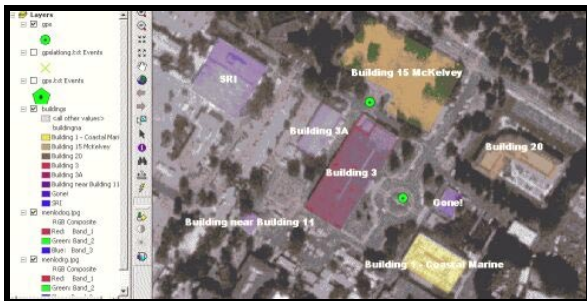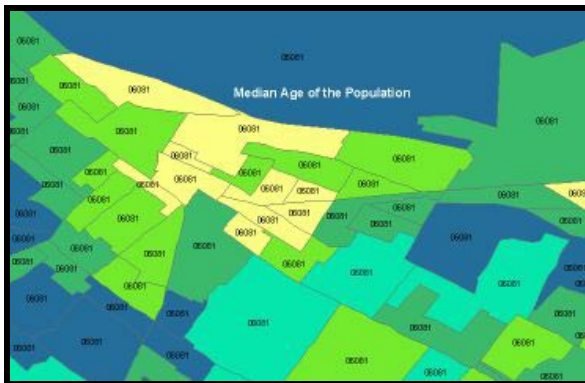

GPS coordinates and attributes from our field activity on USGS DOQ. We also digitized buildings on the Denver Federal Center campus.
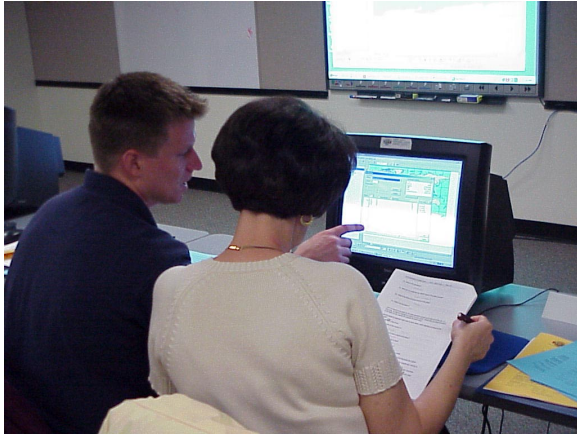
The GIS course work with ArcGIS 8.3 running on a Windows 2000 platform, including ArcMap, ArcCatalog, and ArcToolbox. I kept the "lecturing" to a minimum, but encouraged discussion and hands-on work.

One of the results of our demographic analysis of Denver County using TIGER data. We used this data set to practice address geocoding and to locate an Internet Café given certain attribute and spatial criteria.

I handed out questionnaires at the end of each day that aided me in preparing the class for the following day. We had the typical oddities with ArcGIS, Microsoft, and the Internet, but fewer glitches than in most labs I have taught in.

Challenge Questions

Sample questions that I handed out to the participants to work through these on their own. We then summed them up as a group before moving on.

World Demography Challenge

You work for the UN Environmental Programme (UNEP). You need to test a new program in a country that meets certain criteria of age, growth rate, and income, as follows:

1) Percentage of population between 0 and 14 years is greater than or equal to 40

2) GNP per capita is less than or equal to 500

3) Growth Rate is less than 3%

How many countries meet these criteria?

What are their names?

Earthquake Challenge

You work for FEMA and need to determine how many earthquakes in the USA were within 100 km of a plate boundary in 2001:

Historical County Challenge

You work for HUD and need to determine the following in planning a social program: how many counties lost population during the 1990s?

For the county that lost the most people during the 1990s: How many people left?

What percentage of people left?

For the county that gained the most people during the 1990s: How many people were added?

What percentage of people were added?

Principal Aquifer Challenge

You are a water resource specialist planning for population growth and water needs in the state. How many aquifers are partly or wholly in the state of Nebraska?

Which aquifer in Nebraska has the largest spatial extent?

How many different rock names are associated with Nebraska aquifers?

Stipa Comata Site Selection Challenge

Problem: As a biologist, you need to select study sites for Stipa comata, needle grass. The grass has the following characteristics:

1. Stipa comata grows best along riparian areas; that is, along streams. You would like to study these grasses within 1 kilometer of streams.

2. You want to study Stipa comata that grows along streams that are on a certain slope, of at least .01.

3. The Stipa comata that you want to study has an organic matter, weighted average (omwa) of between 0 and .40.

4. The study site should be within 30 kilometers of your office in Mission, South Dakota, to reduce costs of transporting your field equipment.

How many study sites can you select from?

Materials

I created a CD-ROM for each of the participants that included guidelines, data, lessons, and articles related to GIS. This included all of the exercises and data sets that we worked on during class so the participants could use this CD to further explore the data sets and review each class activity.

I also handed out and displayed the following materials to the training:

Lessons (Kerski)
How to Use USGS Data in ArcGIS (Kerski)
GIS Overview (Kerski)

GIS references—conference proceedings, journals, newsletters, books (Kerski)

ArcGIS Books (ESRI)
What is GIS? (ESRI)
Understanding GPS
Samples of GIS Journals
GIS in Education (Kerski)
UTM Coordinate System
Sample GIS Texts
GIS Touches Our Everyday Lives (ESRI)

Map Projections
Canada LIS-GIS movie
Yellowstone GIS movie
Geography Matters GIS movie
USGS GeoData
Terraserver Guidelines (Kerski)
ArcGIS procedures (ESRI)
Recommendations

I recommend that these types of training events be used increasingly in the future to prepare our workforce for new opportunities and challenges. As the comments I received during the daily surveys reflected, having one of our own people conduct the training supplements other training (for example, ESRI in-class trainings and Virtual Campus courses) in a cost-effective way by emphasizing how to use USGS digital data in GIS analysis. I recommend that our GIS training include:

1—courses taught by ESRI staff at USGS facilities
2—courses taught by ESRI staff at ESRI facilities
3—courses taught by USGS staff at USGS facilities
4—virtual campus ESRI courses
5—online GIS programs at universities across the country
6—GIS courses at local community colleges and universities

To maximize the effectiveness of the interdisciplinary sciences of the USGS, our employees must understand the nature of spatial analysis, even if they are not using GIS daily on the job. While we increasingly emphasize partnerships for The National Map, GIS training should be included as a component for our mapping liaison staffs. I would like to be considered as one of the trainers for this effort.

In addition, we cannot expect our data users

to understand how to use our spatial data in various ways if we cannot do the same procedures ourselves. Our own employees need to understand how our data is accessed and used.

We also are using data from other agencies and organizations, and we need to be familiar with some of the most common of these data sets as well, for example, Census TIGER data, and NWI wetlands data. Using other agency data will increase in the future and needs to be included in these GIS workshops.

Course Agenda:

ArcGIS Course at National Training Center

Facilitator:

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Geographer: Education/GIS
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What are Geographic Information Systems
and Geographic Information Sciences?
Why is GIS integral to the mission of the
DOI?
What is ArcGIS and its relationship to
Geographic Information Sciences?
How can DOI-produced spatial data sets be
downloaded, formatted, and analyzed within
a GIS environment?

Learn all about these questions and pick up
a wealth of practical skills with GIS through
this engaging hands-on workshop!

Mon-Fri 8-12 September 2003

Software Used:

ArcGIS 8.3 by ESRI, including ArcMap,
ArcCatalog, and ArcToolbox

ArcGIS extensions: Spatial Analyst, 3D
Analyst

WinZIP, graphics program, Internet Explorer

Prerequisites:

Familiarity with Windows operating system
and computer data management

Willingness to learn from each other.

Skills Addressed:

Tables:
        Creating, downloading from Internet,
joining to maps, querying, modifying

Querying:
        Tabular and Spatial

Data:

Models, sources, downloading, formatting,
types of data, locations, producers,
analysis, quality issues, metadata

Mapmaking:
        Symbolizing, selecting, displaying,
printing, scale issues

GPS:
Collecting, moving coordinates to GIS,
attributing features with field data

Imagery:
Downloading, formatting, image types,
registering

Digitizing:
Points, lines, polygons, saving, attributing
features

GIS:
Definition, applications, evolution, GIS vs
ArcGIS, GIS vs Geographic Information
Science, sources of training, sources of
literature, sources of technical help

Core GIS Functions:
Vector and raster analysis, 3D analysis,
buffering, overlaying, projecting, clipping,
geocoding, hyperlinking

Agenda

Day 1

AM

Introductions

Goals of the Course:

1)   To understand the principles,
applications, trends, and pertinent issues of
geographic information systems and
sciences.

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2) To become competent in solving problems using spatial analysis methods through geographic information systems software (ArcGIS 8.2)

3) To understand how to download, format, and use USGS base spatial data within ArcGIS.

Joseph's Course Philosophy

Computer setup: folders, read-only/archive, view file types

Hands-On: World Demographic Analysis

Displaying and symbolizing data, querying data, joining tables

Discussion: What is GIS?

Discussion: What is ArcGIS and Extensions?

Discussion: ArcMap, ArcCatalog, ArcToolbox

--------------Lunchtime-----------------

PM

Hands-On: World Earthquake Analysis
        Symbolizing data, tabular and map query, buffering, select by location,
        changing projections

Discussion: Data Formats in ArcGIS

Hands-on: Downloading and formatting Current Earthquake Data for ArcGIS

Evaluations

Day 2

AM

Review of Day 1

Discussion: GIS vs GISciences
Hands-On: Digitizing new features

Discussion: GPS

Hands-On: Collecting GPS Coordinates

Hands-On: Creating attributes

Hands-On: Bringing GPS coordinates and attributes into ArcGIS; creating thematic maps

Hands-On: Hyperlinking photographs

----------------Lunchtime--------------

PM

Hands-On: County demographic analysis; 3D analysis

Hands-On: Local demographic download and analysis, site selection,
            Geocoding

Wrap-Up

Evaluations

Day 3

AM

Review of Day 2

Hands-On: Historical County Analysis
                Chart symbols
                Creating and mapping new tabular data
                Layouts and printing

Exporting for Graphic Production

Discussion: How is GIS used?

Discussion: Types of Base Spatial Data

Hands-On: Downloading and Analyzing Vector Data from National Atlas

--------------Lunchtime-----------------
PM

Hands-On: Stipa Comata Study Site Analysis using Projections, Buffers, Overlays, Selection Queries

Wrap-Up

Evaluations

Day 4

AM

Review of Day 3

Discussion: Metadata

Hands-On: Metadata workshop

Hands-On: Fire Tower Analysis: Downloading, formatting, and analyzing DLG data

-------------Lunchtime------------------

PM

Hands-On: Fire Tower Analysis: Downloading, formatting, and analyzing DEM, NLCD, satellite image data

Hands-On: 3D Analysis with DEM Data

Wrap-Up

Evaluation

Day 5

AM

Review of Day 4

Discussion and Hands-on: Coverages, Shapefiles, and Geodatabases

Hands-On: Registering Imagery: 2 methods: Header file adjustment, georegistering

Downloading and using data from The National Map, the National Atlas, Landsat sites, NHD, and the seamless data server

Hands-On: Time for your own projects

----------------Lunchtime--------------

Hands-On: Raster Analysis

Discussion: GIS Literature, listserves, sources of information

Discussion: Where Do I Take My Training From Here?

Wrap-Up

Evaluation

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end of report