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: Menlo Park, California. USGS Western Geographic Science Center (WGSC).

Date: 22-26 September 2003

Summary

I taught a one-week course in geographic information systems at the USGS Western Geographic Science 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, demography, 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.

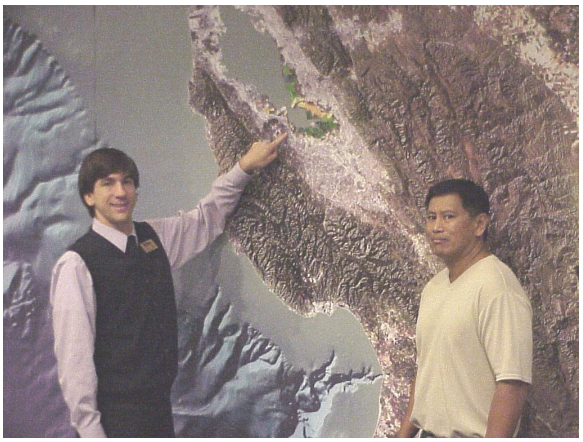
4) Downloading, formatting, and using USGS spatial data, including Landsat imagery, NHD, NED, DOQ, DEM, NLCD, DRG, and DLG data in ArcGIS. The sites included National Atlas, The National Map, the seamless data server, Earth Explorer, GIS Data Depot, ESRI TIGER, NRCS SSURGO, the Global Land Cover Facility, and others.

5) Discussion on where to continue one's GIS education—online courses through ESRI and universities, books, journals, universities, community colleges, USGS training, USGS Geographic Information Office, ESRI direct courses, and via other means.

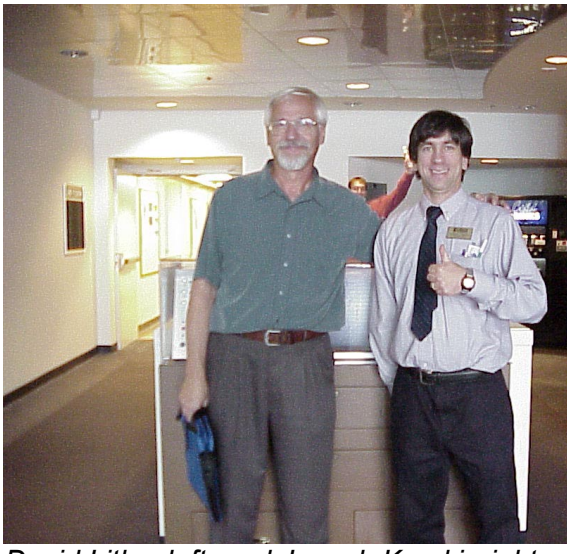
GIS course participants during our GPS collection activity. I thank the participants for their expertise and enthusiasm. We had an excellent group that represented research, information technology, the Earth Science Information Center, digital spatial data production, and other units.

I thank Bob Vitales, Dario Garcia, Rachel Trusty, Alicia Torregrosa, Christian Raumann, Ben Sleeter, Amy Mathie, Joyce Cook, Wally Oliver, Mara Tongue, and Tom Sturm for inviting me to the USGS Menlo Park campus and for their support in ensuring the success of the class. It was a pleasure to work with them and I thank them for their 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 by these people and others. If others were involved in the planning for this course, know that I am most appreciative. I look forward to working with them in the future with technical questions and in upcoming courses.



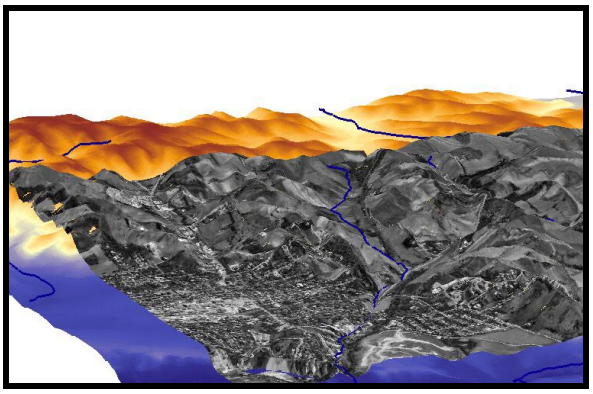
Bob Vitales, right, and Joseph Kerski, at the beautiful Landsat satellite image at the USGS Western Geographic Science Center. I greatly appreciated all that Bob Vitales did to ensure the success of the class.



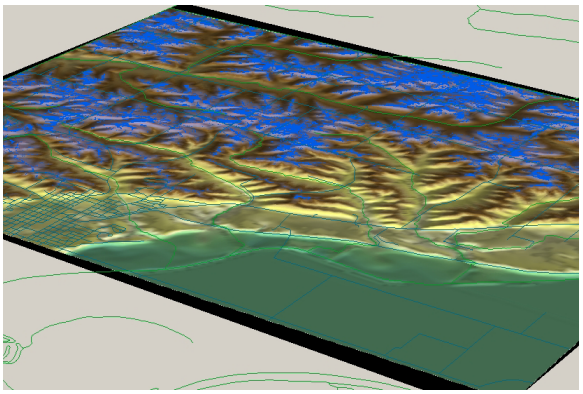
David Litke, left, and Joseph Kerski, right, at the seismograph station at the USGS Western Geographic Science Center. I greatly appreciated the assistance and expertise of David and I know the participants did as well.

Building 3 of the USGS Menlo Park campus, location of the GIS training, San Mateo County, California.

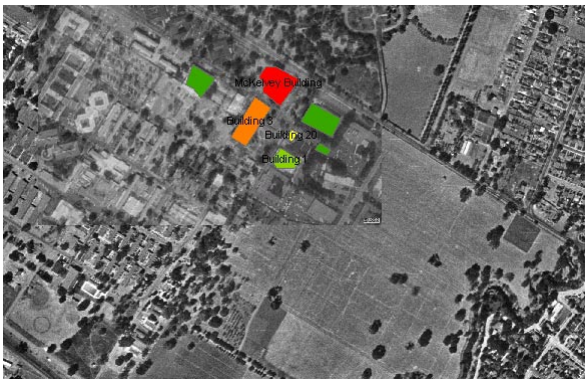
I was impressed by the new USGS Visitors Center in Menlo Park!



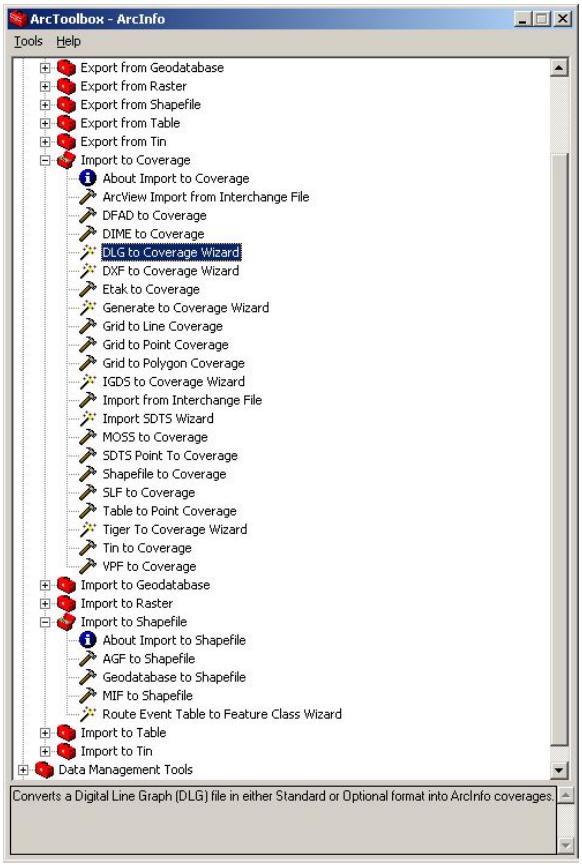
Participants in the course determined the best location for a fire tower, using USGS DLG, DEM, and DOQ data, and created a three-dimensional perspective of the possible sites.



The blue represents areas under consideration for the fire tower, created by the participants using USGS data.

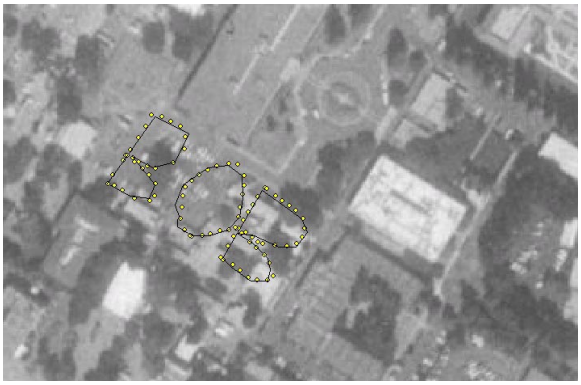


We downloaded and compared 1948 and 1999 digital orthophotoquads for the Menlo Park area. The above photograph shows fields and the military barracks that covered the USGS campus in 1948. We made extensive use of the California Spatial Data Library web site because of its wonderful collection of historical and current digital data sets.



The class spent most of its time immersed in ArcMap, ArcCatalog, and ArcToolbox (above) components of ArcGIS, as well as WinZIP and Internet Explorer software.

The class used networked laptop computers and a portable Internet connection.



I wrote "BOB" with my GPS on the Menlo Park campus (above) in appreciation for Bob Vitales' work in setting up this event!

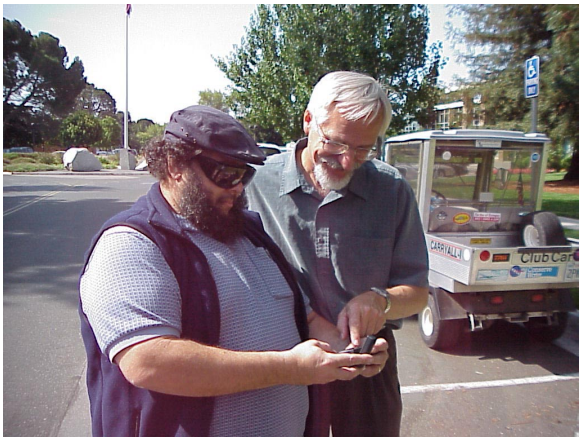
Most of our class participants can be seen in this photograph.

We collected GPS coordinates and temperature data on the USGS campus, and then mapped those coordinates and attributes in ArcMap. I also demonstrated an automated method of GPS-to-GIS using a free Minnesota DNR Garmin program.

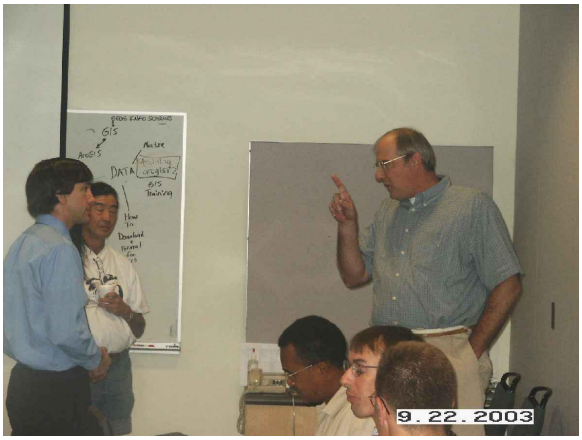
One of the class participants, armed with three GPS units!

I was impressed by the questions the class asked, and the way they helped each other.

David Litke, center, works with class participants on map projections.



David Litke, right, works with one of the class participants on GPS data collection. 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!

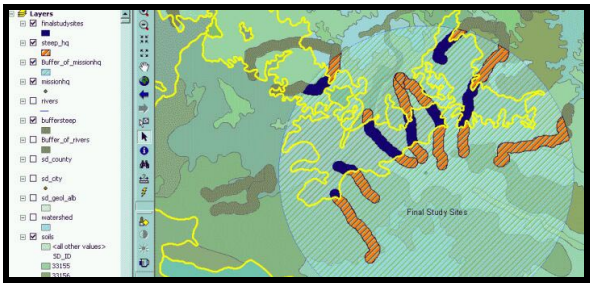


I handed out questionnaires at the end of each day that aided me in preparing the class for the following day. We had the typical oddities with ArcGIS, Microsoft, and

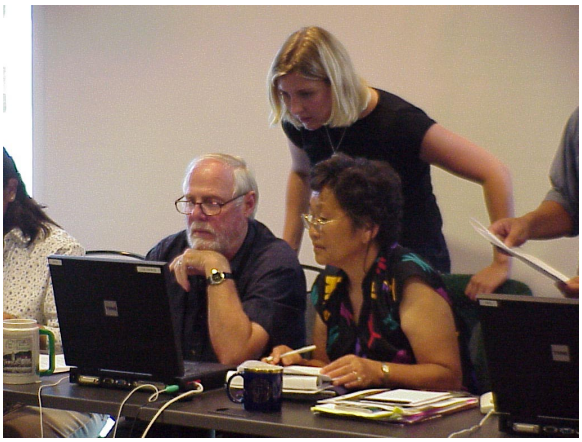
the Internet, but fewer glitches than in most labs I have taught in, thanks to the hard work of the Menlo Park staff.

Each day included short discussion topics on data models, map projections, ESRI software components, and other topics between the hands-on work.

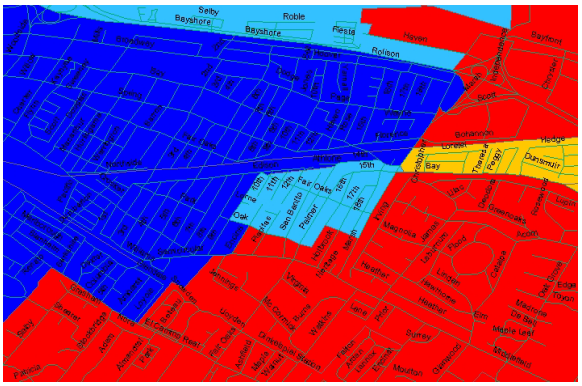
Joseph Kerski, above at the USGS flagpole where we collected our first GPS coordinate.



Final results of our Stipa Comata *(needle grass) site selection, which involved several overlay, query, and buffering operations.*



Rachel Trusty, above, was one of the helpers in the class; her assistance was much appreciated.



Final results of our analysis of neighborhood demographics in San Mateo County, California, from TIGER files and the 2000 Census.

GPS coordinates and attributes from our field activity on USGS DOQ. We also digitized buildings on the Menlo Park USGS campus.

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?

Fire Tower Challenge

Determine the best location for a fire tower in the Loess Hills of Blair, Nebraska, that has to be at least 380 meters high, less than 5 degrees of slope, within 50 meters of a road, and within 300 meters of a stream.

Registration Challenge

How can you register the Minnesota image with the state outlines shape file?

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
The World in a Box GIS Movie (GITA)
Geography Matters GIS movie
USGS GeoData

Terraserver Guidelines (Kerski)
ArcGIS procedures (ESRI)

Recommendations

In addition to the use of the Terraserver tool and the California Spatial Data Library, as I mentioned above, I recommend the following: These types of training events should be increasingly used in the future to prepare our workforce for new opportunities and challenges, such as creating The National Map. 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. I was astounded at the number of courses that the participants in Menlo Park have taken and continue to take. Kudos to these folks!

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:

GIS Training at USGS WGSC

Facilitator:

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Geographer: Education/GIS
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Denver CO 80225-0046 USA
Tel 303-202-4315 Fax 303-202-4137

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http://rockyweb.cr.usgs.gov/public/outreach/

What are Geographic Information Systems and Geographic Information Sciences? Why are they integral to the mission of the USGS, and how do the USGS and our customers use GIS? Learn all about these questions and pick up a wealth of practical skills with GIS through this engaging hands-on workshop!

Mon-Fri 22-26 September 2003

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, displaying

GPS:
Collecting, moving coordinates to GIS

Imagery:
Downloading, registering

Digitizing:
Points, lines, polygons

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

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.

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 Types

Evaluations

Day 2

AM

Review of Day 1

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?

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

Discussion: Types of Base Data

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

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

PM

Hands-On: Downloading and Analyzing Vector Data from National Atlas, part 2

Wrap-Up

Evaluations

Day 3

AM

Review of Day 2

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

Discussion: GIS vs GISciences

Hands-On: Digitizing new features
Creating and populating attribute tables

Discussion: GPS

Hands-On: Collecting GPS Coordinates

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

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

PM

Hands-On: County demographic analysis;

3D analysis

Data Classification
Normalizing data
Creating dot density and graph maps
Creating Graphs and Reports

Hands-On: Local demographic download and analysis

Wrap-Up

Evaluations

Day 4

AM

Review of Day 3

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

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

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

PM

Hands-On: 3D Analysis with DEM Data

Discussion: Data Quality and Metadata

Hands-On: Metadata

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

Wrap-Up

Evaluation

Day 5

AM

Review of Day 4

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

Hands-On: Site Selection in a Metropolitan Area, Geocoding

Hands-On: Independent Study Time

Discussion: GIS Literature, listservs, sources of information

Discussion: Where Do I Take My Training From Here?

Wrap-Up

Evaluation

Extracurricular Activity

After loading the data on the computers before the class began, David Litke and Joseph Kerski pilgrimaged to 37 North Latitude, 122 West Longitude using their GPS receiver, just north of Santa Cruz among some varied and wonderful California hillslopes and vegetation!

end of report