Education Event Report

Name of Event: **GIScience 2000 - The First International Conference on Geographic Information Science**

Location: **Savannah, Georgia**

Dates: **28-31 October 2000**

Other USGS attendees: Barbara Poore, Rick Pearsall, Stephen Guptill, Lynn Usery

My Activities at Conference

Present poster entitled "The Implementation and Effectiveness of Geographic Information Systems Technology and Methods in Secondary Education," and attend conference sessions.

Evolution of Geographic Information Sciences

The maturation of spatial technologies and methods involving geographic information systems (GIS), remote sensing, surveying, and cartography prompted Dr Michael Goodchild [University of California Santa Barbara] back in 1992 to propose that a new field was emerging -- geographic information science (GIScience). Information science studies the fundamental issues arising from the creation, handling, storage, and use of information. GIScience practitioners should study the fundamental issues arising from geographic information. The conference organizers felt that despite GIScience's emergence in journals and in the University Consortium for Geographic Information Science, an international GIScience conference was needed to bring together researchers in this field.

The Role of Geographic Information Science at the USGS

Geography as a Linking Discipline
What do nearly all of the data, research aims, and services that the USGS provides have in common? Nearly all are geospatial in nature - they are concerned with places on the earth's surface. I contend that GIScience is not merely the domain of the national mapping program, although geography in NMD provides its disciplinary home, but is a key component of all USGS disciplines. Whether we are addressing invasive weeds, urban growth, fire and emergency management, public health, water quality, or natural hazards, geospatial data and the surrounding scientific issues to that data is central. This is why I recommended that I attend this conference, and why I believe that the entire USGS should increase its activity in GIScience.

Opportunity for the USGS
Although government and industry have always been involved in GIScience research (e.g.--Canadian Land Inventory System during the 1960s; the USGS national mapping program), the field has been dominated by academic geographers. This conference made it quite clear that industry has an ever-expanding role in terms of guiding the research aims. This observation by conference attendees prompted a long discussion on the appropriateness of the presence of industry in GIScience research. Does science drive industry, or vice versa? *Should* science drive industry, or vice versa? It is in this

milieu that the USGS can and should be involved. We must be involved with these debates and more importantly, with GIScience research. The year 2001 and beyond represents a prime opportune climate to do so.

Conference Description

Attendees and Sponsors
This First International Conference on GIScience brought together scientists from academia, industry, and government from around the world to analyze progress and to explore new research directions. The USGS was listed as a co-sponsor of the event, along with ESRI, NOAA, and Taylor and Francis publishers.

Conference attendees were scientists from the fields of geography, cognitive science, computer science, engineering, mathematics, philosophy, psychology, physical science, social science, and statistics. The organizers of the conference hope that this conference will continue every two years in different parts of the world. Even at this conference in the USA, I would estimate that the percent of international attendees was high, at 20%.

Nature of Conference
While there were occasional posters and papers dealing with concrete "applied" issues such as land cover from Landsat TM Data using spatial statistics, the conference was largely focused on the definitions and schema underlying GIScience (ontology) and other broad-based research issues. Therefore, it represented a radical departure from most GIS (GI *Systems*) conferences that the USGS usually participates in, which are usually focused on real-world applications of GIS to specific problems and disciplines. These, such as the Texas GIS conference, the California GIS conference, GIS/LIS, URISA, GITA, GIS in Public Health, and others have proven valuable to us to meet customer needs and forge data and research partnerships. Nevertheless, again, I advocate that the USGS be involved with the GIScience conference and its research aims in the future and others like it. Geographic information studies have to do with access, equity, and standards, which the USGS NMD has been involved with in the past.

Major GIScience Organizations

Organizations
The University Consortium of Geographic Information Sciences (UCGIS) [www.ucgis.org] is an organization of approximately 50 North American universities is by far the major force behind this conference. It formed around 1993 after the initial grant that funded the successful National Center for Geographic Information and Analysis (NCGIA) expired. The NCGIA universities were the University of Maine at Orono, SUNY Buffalo, and the University of California Santa Barbara. Much of the research in GIScience comes from NCGIA's three universities and UCGIS member universities. The University of Colorado Boulder is one member of UCGIS. The Association of Geographic Information Laboratories in Europe (AGILE) is another organization important to GIScience, and is the UCGIS's counterpart on that continent. The research agenda from these organizations manifests itself in software development, university projects, and funding opportunities from the NSF, for example. Therefore, the UCGIS, NCGIA, and AGILE are quite important in setting the goals and aims of the GIScience community.

Web Sites
The three sites that provide and guide research agendas regarding where this field is heading are those of the UCGIS at http://www.ucgis.org/research98.html, those of the AGILE at http://castafiore.uni-muenster.de/agile/Themes_Topics/Themes_main.html and the Varenius topics of the NCGIA at http://www.ncgis.ucsb.edu/varenius/vmtgs.html.

Conference Chairs
The chairs of the conference included Michael Goodchild (UCSB), Max Egenhofer (University of Maine), David Mark (SUNY Buffalo), William Huxhold (UW-Milwaukee), David Maguire (ESRI), and Vanessa Lawrence (AutoDesk).   Those familiar with GIS are no doubt aware that these are some of the biggest names in the field.

Speakers and Issues

NSF and USGS
NSF personnel made repeated ardent appeals at the conference for greater numbers of submissions by the GIScience community to NSF funding programs. The Information Technology Research Program (ITR) and Geography and Regional Science Program were identified as receiving *few* requests from GIScientists. The first round of ITR awards went to 75 proposals over $500,000 and 156 under $500,000. Of these, *only 2* contained "geographic information" and/or "GIS" in the title or abstract. This type of appeal should generate additional interest in proposals by the GIScience community. The USGS should be working closely with the academic community, so we can be involved in these future funded projects.

NSDI
Of particular importance to the USGS was a paper given by Dr Francis Harvey, "Potentials and Problems for the Involvement of Local Government in the National Spatial Data Infrastructure."   Dr Harvey's point was that pride of ownership, copyright, transfer of use rights, policy, and financial issues affect the participation of local governments in the NSDI.

Location-Based Services and the Future of GIS
Mobile computing also was a major theme, or "location-based services."   Indeed, just this week, Webraska, the worldwide provider of personal navigation, traffic information services and maps for mobile Internet devices and Blue Impact, the designer of mobile hardware navigation solution, are cooperating to develop personal navigation services on wireless & GPS enabled PDAs. This technology combines real-time routing, enhanced spatial searching, maps, GPS precise localization with the wealth of information from the Internet on a color PDA. PDAs are becoming wireless devices with features similar to the car navigation systems like precise positioning, large color screens and soon vocal interfaces.

However, many in the conference voiced concern that the huge potential market for location-based services (which dwarfs the traditional GIS market) would divert industry development away from the needs for better GIS models by such researchers in public health, wildlife biology, planning, and other current GIS-using groups.

Terraserver

Terraserver, where USGS DOQs are served in a compressed browsable format on the web (http://terraserver.microsoft.com) has been extremely popular with the general public and by educators in general. Based on numerous requests I and others have received from GIS users since 1998, I recommended to Tom Kreyche of Microsoft that the GIS user community needs the ability to download *registration information* about the images in Terraserver. This would allow the DOQs in Terraserver to be directly importable into GIS environments and would be incredibly valuable to academia, business, and government GIS users of the site.

New Internet Top Level Domain Proposed: .geo
Lee Iverson from SRI International (a private research company headquartered in Menlo Park, California) mentioned the new .geo Internet proposal that SRI recently proposed to the ISO standards board. This would enable .geo to be a top-level domain (like .edu, .com, .gov, and others), allowing web users to locate web pages and data by their geographic coordinates. I have sent a more detailed version of this proposal as an email to mapping staff.

Education Recommendation
I observed that relatively few people at the conference seem to be involved with the larger educational community, such community colleges and K-12. I see this as unfortunate, as some of the research has an inherent educational component, dealing with perception and cognition. For example, I spoke with several individuals who are designing modified graphical user interfaces (GUIs) as front-ends to GIS. I recommended to them that they think about possibly testing these GUIs on K-12 and university student population and sharing these with the many educators who are seeking to use GIS in their classrooms.

Other
David Maguire spoke about the "S" in GIS - systems, science, services, and space. He commented that GISystems have been good on answering what and where, but have been lacking on answering why or "what if." He and Lee Iverson from SRI International emphasized the next GIS market will be "location-based services" using mobile, hand-held devices.

The application environments that these developers favor is a "com-based" architecture, that emphasizes interoperability between applications, scriptable objects with visual basic, and those that are upgradable with plugins by developers.

Dr Bajcsy spoke from NSF; she served on the President's IT advisory committee (www.ccic.gov). She and the committee determined in a report to President Clinton that the federal IT R&D was inadequate. The FY 01 NSF budget is $4.4 billion, p 12.6% over FY 00.

Cliff Kottman spoke about the Open GIS Consortium, which began in 1994 as a not-for-profit international trade association, now with 220 members. Its focus is the interoperability of geospatial systems. GIS has evolved from few users to many, from standalone to web-enabled, from fixed-based to mobile, from analysis-centric to information and communication-centric, from information-push to information-pull. "Location Services" include traffic and roadside information, emergency management, law enforcement, package tracking, cell phones, and vehicle tracking.

William Jepson from UC Los Angeles demonstrated an animated virtual reality presentation entitled "Virtual Los Angeles." This very well illustrated the expanding media that GIS plays a role in.

My Poster Presentation at the Conference

My poster illustrated research I conducted on the effectiveness and implementation of GIS by the educational community. I drew on both qualitative and quantitative methods, advocated by Zorica Nedovic-Budic of the University of Illinois, one of the speakers at the conference. She said that mixed-method research promises to yield more comprehensive and diverse perspectives on the representation of spatial phenomena and the use of geographic information.

Joseph Kerski with GIS education poster at conference.

Acknowledgements and Final Recommendation

I gratefully acknowledge the forward-looking vision of the RMMC senior staff, particularly Mark Eaton, which resulted in the approval of my participation in this conference. Not only should the USGS participate in future GIScience conferences, but we should be an integral part of the discussions in this discipline that we helped create, thereby helping to shape its future.

Savannah River and bridge linking Georgia (left) and South Carolina.

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