cartographic perspectives

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One of the original—and most persistent—motivations for map making is the desire to delineate and revise boundaries. Boundary disputes are a source both of steady business and endless frustration for map makers, keepers, and users. The New York Times recently reported on two North American boundary disputes that bring to light some of the political ramifications of lines drawn on maps.

In "New Negotiations in Fishing Dispute" (8/7/89), the Times reported that "New confrontations between American fisherman and Canadian patrols on the Georges Bank, one of the world’s richest fishing grounds, have brought the two nations back to the conference table . . . Last month, the Canadian authorities chased an American scalloper across 100 miles of sea for 18 hours . . .” turning back “. . . only when the fishing boat, based in New Bedford, Mass., reached United States territorial waters 12 miles off the coast of Nantucket.

“The incident was the latest of at least 10 in the past two years. In
October, a .50-caliber machine gun was fired across the bow of an American vessel whose skipper refused requests by Canadian agents to board.

"Trouble arose after the two countries extended their offshore boundaries in 1977 to 200 miles. The line overlapped in an area that included the Georges Bank, 1,200 square miles of ocean rich in scallops, flounder, haddock and cod, 80 miles off the coast of Cape Cod at its closest point. Both countries laid claim to the area, which had been fished jointly for generations.

"In 1984, the World Court divided the area, giving the United States five-sixths of the Georges Bank, but allotting to Canada what most fishermen consider the most fertile fishing waters. American fishermen said the grounds they lost had been harvested by this country 100 years before the Canadians fished there.

"The two sides met in December but failed to settle the dispute.

"American fishermen say they run when challenged because they fear the Canadian fines, which can be as high as $500,000. If the fishermen are convicted instead in the United States, they face a $10,000 civil penalty under the Federal Lacey Act, which prohibits transportation of fish or animals across international lines."

THE SOUTH WILL RISE AGAIN
In "Parties Draw Up Plans for Redistricting Battle" (8/9/89), the Times cites Democratic and Republican party specialists who predict that "battles over how to draw the political map for the 1990's... will be more complicated, more litigious and more partisan than ever" after the 1990 census.

"Drawing the lines of political maps is an important but arcane art in which either party can take the same voting population and produce radically different results." As Jeffrey Wice, counsel to the Democratic State Legislative Leaders Association, explains, "Taking the politics out of reapportionment is an oxymoron in the sense that reapportionment is politics. No matter what kind of criteria you have, you're going to have politicians finding loopholes for them."

"In 1980, the Democrats controlled the line-drawing process in many of the largest states, notably in California, where an artfully drawn set of lines helped them gain up to six seats.

"The crucial states in the reapportionment battles will be those that gain or lose seats in the United States House of Representatives as a result of the population shifts shown in the 1990 census. At this point, the Democrats control the governorship and both legislative house in 14 states, and Republicans in four.

"Election Data Services, a Washington, D.C. consulting firm, says its latest projections indicate that California stands to gain six or seven seats, Florida possibly four, Texas three, and Arizona, Georgia, Virginia and possibly North Carolina a seat each.

"Among the states expected to lose seats will be New York, projected to lose three house seats, Michigan and Ohio, two seats each, and Illinois which could lose one or two seats. Iowa, Kansas, Massachusetts and Montana are projected to lose one seat each."

States projected to gain or lose seats in the U.S. House of Representatives as a result of reapportionment following the 1990 Census (no change projected for Alaska and Hawaii)
In 1986 Temple University began applying desktop mapping and publishing software developed for the Apple Macintosh microcomputer as alternative tools for cartographic production. Our experience indicates that these tools can significantly reduce the costs associated with photomechanical production of thematic atlases while actually resulting in superior products. This article presents an overview of Temple's desktop mapping activities with the intent of stimulating wider discussion of this important alternative approach to map design and production.

The term "desktop mapping" was coined by John Sculley of Apple Computer in an attempt to define a new marketplace for consumers and developers of software based on Macintosh computers. The term has since been used to refer to a wide range of mapping products for all types of microcomputers. For the purposes of this article, "desktop mapping" will refer specifically to computer-assisted thematic cartography done at Macintosh workstations.

Desktop mapping borrows many of the tools and techniques of "desktop publishing," another Apple buzzword for a much larger hardware and software market. Desktop publishing involves the integration of word processing, page layout, and graphics programs, allowing designers to manipulate text and graphics through "what you see is (more or less) what you get" interfaces. Desktop publishing packages are based on PostScript, a "simple interpretive programming language with powerful graphics capabilities" developed by Adobe Systems, Inc. In principle, PostScript obviates the traditional procedure of pasting-up mechanicals for subsequent photographic processing. High-resolution PostScript output devices now afford the ability to generate color separated, plate-ready negatives direct from the designer's desktop. In the context of thematic cartography, the computer becomes an entire cartographic laboratory capable of doing everything from data analysis to high level cartographic production and typesetting.

Prior to our initial experiments with Macintosh, our lab was devoted to the conception, design and subsequent rendering of hand-scribed thematic maps for multi-colored publications. In 1986 we initiated a survey of desktop mapping products as alternative production tools. Our search was task-specific. The mandate of our activities forced us to assess hardware and software from the perspective of its applicability to publishing and printing. This approach, although arguably myopic, worked in our favor by offering a unique vantage point from which software products could be judged and immediately categorized on the simple basis of whether they were useful or not for the production of color separations. Our survey led us to look to Macintosh for a hardware/software solution that could deliver high quality products within the context of our everyday activities.

Based on the simple categorization scheme suggested above, we found that software products fit nicely into one of two groups. The characteristics that distinguish these two groups are helpful in understanding what software is capable of doing now and where development should proceed in the future.

Desktop Mapping at Temple University
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HOW WE GOT STARTED AT TEMPLE

DESKTOP MAPPING: TWO SOFTWARE FAMILIES
Figure 1: Typical output of "Group one" software packages (LaserWriter paper original)

Figure 2: Typical output of "Group two" software packages (Linotronic film original)
Software group one consists primarily of mapping packages that are capable of generating displays of cartographic symbols in response to the output of general purpose or custom spread sheets. Typically, these packages offer poor graphic quality and no intrinsic relationship to the steps normally followed to produce color separations for offset printing. Maps generated by software of this kind tend to be simple “bit map” images embellished with a limited palette of colors and patterns to distinguish qualitative differences in areal phenomena and quantitative differences in choropleth classes (Figure 1). Once created, symbols are keyed to base maps that are either provided as part of the software package or are user-defined and created with utilities contained within the software.

Group two is comprised of desktop illustrating programs based on PostScript. These programs work wonders graphically, fit perfectly into the photomechanical production flow, but offer no data display capabilities or associated utilities designed for cartographic symbolization. They are, in effect, professional drawing tools with enormous typographic and drafting advantages that are easily capable of generating maps organized as true color-separated negatives ready for the printing plate with high density tint screens, flawless linework and superb typography (Figure 2).

Shortly after our initial software assessment, we developed a full-fledged desktop mapping lab comprised of four Mac IIs with color monitors and assorted hardware peripherals. With the help of an equipment grant from Apple, we devised a plan to use our new system to produce an entire thematic atlas (the Atlas of Environmental Issues), believing that a real working environment would generate a set of pertinent—if sometimes troublesome—questions about desktop mapping as a discipline in and of itself. The basic configuration of our lab at this point is illustrated in Figure 3.

Along with our acquisitions of equipment, we purchased a variety of software programs which collectively represented what we hoped would be a solution capable of handling the atlas project as we first conceived it. Our approach was to mimic our standard photomechanical production flow, substituting computer-assisted techniques for each manual step. In a conventional production scenario, maps are designed at one table, then passed along to be produced at another. We used information display programs (Group one as described above) for data analysis and design, and illustrating programs (Group two) as digital replacements for drafting, scribing, typesetting, peelcoat making and photomechanical production. Programs such as MapMaker, MacAtlas, MacLink, Image Studio, and Superpaint, combined with Microsoft Excel are examples of the Group one programs we used. Adobe Illustrator, Aldus FreeHand, and Quark Xpress served as our illustrating and typo-

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**THE TEMPLE PLAN**

![Diagram](image-url)

*Figure 3: Temple’s desktop mapping hardware and software configuration*
graphic (Group two) tools. In day-by-day operation, statistical data was entered into and stored in Microsoft Excel, maps were designed with MapMaker, bases were scanned with MacScan, and composite film was produced using Illustrator output to a Linotronic L-300 imagesetter. As a final step, maps and charts were put together with text, into atlas page layouts, using Quark XPress.

THE EFFECT OF MACINTOSH ON CARTOGRAPHIC PRODUCTION

The best way to understand the impact of the configuration described above on the production of the Atlas of Environmental Issues is to look at the production flow chart used to produce the ten thousand hand-scribed and peeled separations used in the Atlas of Pennsylvania (in press, pro-

![Flow Chart](image)

Figure 4: Photomechanical production flow

duced at Temple's Cartographic Lab). Figure 4 is a graphic representation of the steps involved in traditional map and atlas production. Each step has certain economic and chronologic ramifications (the flow presented in Figure 4 was designed following the example set forth by the Historical Atlas of Canada and, as such, is indicative of any number of similar project-specific guidelines or plans). Figure 5 represents a flow associated

![Flow Chart](image)

Figure 5: Desktop mapping production flow
with the production of an identical product using Macintosh-based
desktop mapping tools.

In the Macintosh flow individual tasks melt together, such that many
production steps result as technological by-products of other operations.
Let me explain using a well known example. In pen-and-ink cartography,
linework production is a discrete step in the production flow. A subse-
quently photographic step is required to convert the inked linework to high
contrast negative film prior to plate production. If scribecoat engraving is
substituted for drafting, inking and photography melt into one step where
negatives result from the exact same stroke of the hand that only produce
black lines in the earlier system. This is the essential impact of desktop
mapping: individual production tasks melt together and are given as by-
products of previous steps.

Although desktop and traditional cartographic production techniques
have (to my knowledge) not been compared in a formal efficiency study,
some intuitive points can be made using a graph that I produced five
years ago to help estimate time and costs for bids on contract, four-color
mapping jobs (Figure 6).

Without assigning dollar values or without taking materials into
account, Figure 6 shows the relative time given to different tasks during
map construction (Of course, different labs spend different amounts of
time on various tasks depending on the systems and equipment used to
accomplish those tasks). Obviously, a theoretical bill, given any standard-
ized rate of pay, would be adjusted accordingly if steps were eliminated
or for that matter affected in any way by a new piece of equipment or a
new technology based on new equipment.

As eluded to earlier, tasks in the Macintosh flow of cartographic
production tend to melt into one another. What this means to overall pro-
duction costs, in terms of bottom-line savings, can be anticipated using the
next simple bar graph where time is considered money and the percent-
ages from the previous pie chart are regarded as cents in a hypothetical
production dollar (Figure 7).

These hypothetical savings result from the following economies. On the
Macintosh bar design and planning are fixed components that are made
more efficient through the use of desktop mapping. What this means is
that design does not decrease as a cost or time factor. It is our experience
that designers work as many hours on the Mac as they did in the tradi-
tional process. What changes is the level of their productivity. In the
same time, many more design experiments can be reviewed on Macintosh.

Figure 6: Time spent on production tasks as a proportion of total project time

Figure 7: Hypothetical production costs by (a) photomechanical methods
and (b) desktop mapping methods

ECONOMIC RAMIFICATIONS

ECONOMIES EXPLAINED
The net result of desktop mapping is a potential savings of fifty-seven percent over traditional production methods.

Several choropleth maps, for example, can be run past the designer every minute on the CRT, with new classification schemes and color arrangements. Maps can be instantaneously reproportioned for experimentation in a multitude of page layouts. Type can be changed in size and style at the push of a button, giving designers an opportunity to work toward the ultimate artistic and functional presentation less inhibited by the constraints of time and project cost.

Scribing is replaced by on-screen drafting and represents another fixed cost factor. Our experience, once again, shows that both screen and table lines take the same time to draw. If, however, a base map is already in digital form and can be brought straight from disk to screen, the drafting task is reduced considerably and used mainly for symbolization.

Peelcoat production and photomechanics are eliminated as cost factors being totally absorbed into the technology of the new system. Pasteup and type production, likewise, are dispensed with as a cost considerations in the production flow, having been created as a by-product of the map's original design.

The net result of desktop mapping, when looking at theoretical cost, is a potential savings of fifty-seven percent over traditional cartographic production methods.

Undoubtedly, there will be cartographers who will not be impressed with savings alone and will ask immediately about desktop mapping quality. Most cartographers, and I consider myself one of them, have spent a lifetime refining their craft and would be reluctant to turn to a new technology that might create work that was not up to an accepted standard for cartographic presentation. One of the most wonderful surprises for us was the realization that desktop mapping, when done using programs like Illustrator, actually increases map quality.

In desktop mapping, quality results from the resolution of the printing device attached to the computer. Programs capable of generating a PostScript document, such as Adobe Illustrator and Aldus Freehand, are device independent (assuming that the device happens to include a PostScript interpreter). This means that the quality or resolution of final output is not determined by the software itself but instead is a function of the output printing device. The greater the resolution of the printer, the greater the resolution of the map. This resolution, given the capabilities of today's laser imagesetters, exceeds 2500 dots per inch. Under magnification, imagesetter output far exceeds drafting or scribing in quality and consistency. Unfortunately, high printing costs make it impossible to present an example of four color desktop mapping here in Cartographic Perspectives. Figure 8 is offered as a monochrome example of the level of quality one can expect [Editors' note: The printing plate for Figure 8 was generated directly from negatives produced by a Linotronic L-300 imagesetter operated by Waldman Graphics, Pennsauken, NJ. Tint screens are 133 lpi].

To date, desktop mapping techniques have been used on four atlases in our lab: the Atlas of Pennsylvania, the Atlas of Environmental Issues, The Atlas of African American History, and the Atlas of the United States for Middle Schools. These atlases, comprised of nearly 2,000 maps and illustrations, have each benefited from our desktop mapping and publishing lab in some unique way.

The Atlas of Pennsylvania, which started as a hand-done volume four years before the development of our desktop mapping lab, finished as a hybrid compendium involving several production methods. Desktop
Figure 8: Examples of cartographic products created by desktop mapping techniques at Temple University.

**Top left:** Originally designed as a four-color image, converted to monochrome in minutes. Note type placement and registration of point symbol fills.

**Top right:** A fictitious distribution highlighting registration of area fills to .003” lines.

**Lower left:** Note screened type and lines. Size, color and character of map elements can be changed with the stroke of a key. **Lower right:** Wiggly isolines due to unsteady hands are a thing of the past thanks to editable Bezier curves and freehand lines.
We found that the Mac was pushed to its limit when we attempted to do choropleth maps of the United States at county level.

Desktop mapping means hardware and software purchases. The basic Mac II computer system with a 14” color monitor, a flatbed scanner, a laser printer, and software runs about $14,000. A larger 19” color monitor adds $3,000–$5000 to the cost of a basic configuration. Minimum hardware requirements include 2 Mb RAM and hard disk.

Service bureaus Since most cartography labs will not be able to afford a top-of-the-line laser imagesetter at $65,000, the establishment of a vendor network is essential if computer files are to be turned into high quality photomechanical products. Vendors providing such services are called “service bureaus” and should be capable of delivering output of 1270 dots per inch (minimum resolution) for linework and type and 2540 dots per inch for separations that are made up of halftones or fine tint screens. A good service bureau will also be able to generate color proofs from imagesetter-
produced film while offering technical advice on file formatting and PostScript programming.

Prices for laser output vary with output resolution, page format, and job size. The going price for typewriter size pages is between five and eight dollars for resin coated paper. Film output, as positive or negative, should cost no more than fifteen to seventeen dollars per page.

Quality control for paper is exactly the same as that for commercial typesetting. Film should be examined for density and evidence of raster lines. Poorly exposed or developed film will be translucent despite a black color and will be etched with highly visible and equally unacceptable horizontal or vertical lines.

Like any technology, desktop mapping takes some up-front time to understand a new computer interface and the specifics of individual applications. Fortunately, the learning curve is short and the entire process is rather painless due to the natural friendliness of the Macintosh itself. Based on my own experience and the troubles I see students go through, I suggest that one should learn the computer first before learning its applications. This method, although not as exciting as plunging straight into a four color atlas page, will short-circuit simple but deadly problems.

Lenny Schafer, president of ImageSet Corporation, commented in a recent article that “The connection between desktop publishing and professional printing does not yet exist.” He goes on to warn that “No desktop publishing software programs or hardware, and no service bureaus working in desktop, are able to deliver four-color professional documents to the inexperienced graphics user.” If you are serious about desktop mapping as an alternative to photomechanical production, be warned that generating color-separations via laser imagesetters is by no means automatic.

The biggest problem associated with desktop production is the fact that PostScript does not deliver accurate printer screen angles at pre-specified standard dot densities. As an example, a laser imagesetter driven by a PostScript Raster Image Processor (RIP) prints 45° at 123 lines per inch when the printer driver is calling for 45° at 133 lines. The net result of this and peculiarities at other angles is the development of screen moirés when composite negatives are overprinted in four color printing.

To solve moiré problems, service bureaus are following a set of instructions developed by Adobe Systems whereby files are output using non-standard printing specifications (Table 1).

<table>
<thead>
<tr>
<th></th>
<th>PostScript workaround specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>45° 120 lpi</td>
</tr>
<tr>
<td>Cyan</td>
<td>72° 133 lpi</td>
</tr>
<tr>
<td>Magenta</td>
<td>18° 127 lpi</td>
</tr>
<tr>
<td>Yellow</td>
<td>0° 127 lpi</td>
</tr>
</tbody>
</table>

These specifications define a simple set of parameters that seem to solve problems in screen juxtaposition. To make sure that a service bureau is aware of these specifications it is good idea to have several proofs made from random files before an entire project is committed to paper or film. Checking proofs with a ten power loupe and overlaying negatives on a light table will reveal project-threatening screen angle problems. As a final note, it is not unreasonable to ask that these tests be done free of change as a tangible demonstration of a service bureau’s competence.
Remember—it is not your responsibility to ensure good output if you have sent a good file. It is your responsibility, however, to maintain quality control over the entire process even if it means sending output back when contracted services do not meet an established criterion for professionalism.

Another problem is size. Imagesetters such as the Linotronic L-300 currently are able to output paper and film of 12" maximum width. Large format thematic mapping necessitates tiling, which is usually unacceptable. Presumably new generation PostScript output devices will eliminate this constraint.

PROSPECTS

If current trends are any indication of future developments, we can expect more powerful microcomputers, faster, larger-capacity, and less-expensive data storage hardware, and improved desktop to press connectivity. Pressures brought to bear on industry by the massive desktop publishing market seem likely to work in favor of desktop mappers, at least with regard to hardware.

I think it’s important to look at the future of software development. The two group system outlined in this article must, in my opinion, give way to a single class of product that handles everything from map design and analysis to cartographic production. What I envision is a single desktop mapping package that embraces the best features of both software groups. When or if such a product will emerge is not immediately apparent, but MicroMaps, Inc. (Lambertville, New Jersey) has made a good start with its QuickMap program. QuickMap converts data sets to choropleth maps that can be saved in either MacPaint (a Group one program) or Adobe Illustrator (Group two) format. What this means is that with one menu choice the advantages of Group one programs can be merged with those from Group two.

QuickMap has important limitations. First, it only makes choropleth maps. Second, it is not so much a program as it is an interface that links the two software families. The important thing is that the developer has recognized issues pertinent to cartography and is coming up with solutions that are broad based.

My hope is that developers will follow suit by introducing a comprehensive tool for desktop mapping soon. Such a package ought to include high quality digital base maps and a wide range of symbolization options including dot mapping, isarithmic mapping, and point symbols that can be generated from existing spreadsheet programs. In the meantime, practitioners of desktop mapping will need to be proficient with a variety of special purpose programs. Despite the problems discussed in this article and elsewhere, it seems clear that desktop mapping techniques represent an important alternative to traditional photomechnical thematic map production.

ACKNOWLEDGMENT

The author wishes to thank David DiBiase for his substantial contribution to this article.

REFERENCES


2. Schafer, L. (1989), “Teenage sex and color publishing,” Pre- 1:3, p. 10. [Editors' note: the subtitle of Schafer’s article reads, “The allure, anticipation, and excitement may be there, but the result is still overrated”]
El desarrollo de la aplicación de paquetes de software para la publicación de mapas por la Temple University fue instigado en 1986 por la necesidad de buscar una alternativa para la producción de mapas por la micro-computadora Apple Macintosh. Nuestra experiencia indica que estos aperos pueden reducir significadnente los costos asociados con el diseño y producción de atlases temáticos sin sacrificar la calidad de los gráficos. Este artículo presenta concisamente las actividades cartográficas de la Temple University con el propósito de estimular discursos plásticos sobre formas alternativas para el diseño y producción de mapas.

**cartographic techniques**

**COLOR PRINTER TECHNOLOGIES**

Sales of color printers are reported to have totalled $365 million in 1988, surpassing other output devices such as pen plotters and film recorders. Despite their relatively low resolution (180–400 dpi), market analyst CAP International projects that annual sales of color printers may exceed $1 billion in three years.

Kinnucan classifies color printers by five general types. Dot matrix color printers "employ small wires (or hammers) in the print head to transfer ink from a multicolored ribbon onto the paper." Dot matrix printers are popular because of their relatively low cost. Ink jet color printers “propel ink droplets, either continuously or on demand, toward the surface of the paper . . .”, producing highly saturated colors and sharp, continuous-tone images. Thermal wax transfer printers “create images by melting pinpoint spots of colored wax onto paper. Because this dot formation technique entails no head movement, thermal transfer printers can create high-resolution images (200-to 300 dpi) with highly saturated colors at twice the speed of ink jet printers . . .”. Dye diffusion printers “heat a dye-impregnated ribbon, causing dye spots to vaporize and diffuse onto paper . . . [creating] images that rival photographs in clarity and sharpness.” Dye diffusion printers are as yet not in widespread use, due to high cost and small image size (maximum 4” x 6”). Electrostatic printers “put electric charges on paper where a spot is needed, and then apply colored toners to create an image.” The high price of electrostatic color printers is offset by their capability to produce high-resolution (up to 400 dpi), large-format (up to E size) images at high speed.

Kinnucan is optimistic that color printers will improve with regard to both performance and price. Kodak and Hitachi, for example, are currently working on page size dye diffusion devices. An emerging technology dubbed the "Cycolor" process (developed by Mead Imaging, Miamisburg, OH) “creates latent images by exposing a donor sheet containing photosensitive ink capsules to light. The donor sheet is then pressed against a receiver sheet or transparency to create a final copy.” Color laser printers, currently under development by Canon and Colorocs, are expected to appear in the coming year.

The article concludes with a "Color Printer Survey" matrix that compares 32 color printers from 18 vendors by output size, resolution, imaging time, interfaces, graphics device emulation, and price.

**MacATLAS**
MacAtlas, a product of MicroMaps Software Inc., Lambertville, NJ, is a collection of clip-art map boundary files for Macintosh drawing and paint programs. The maps can be opened in software such as MacDraw, MacPaint, Adobe Illustrator and Aldus FreeHand, and used to create choropleth maps, or as bases for other location or thematic mapping tasks.

Four MacAtlas products are currently available. The MacAtlas EPSF (Encapsulated PostScript Format) version ($199) includes 2 world maps, 11 regional maps, maps of the USA by state, and all 50 states by county. The MacAtlas Professional Version ($199) includes a similar set in PICT format. Also available are the MacAtlas Paint version 2.0 ($79) and the MacAtlas Presentation Pack ($199).

For more information, call MicroMaps at (800) 334-4291.

**A WORLD SOILS AND TERRAIN DIGITAL DATABASE**
Marion F. Baumgardner
*International Society of Soil Science*

In 1985 a provisional working group was established by the International Society of Soil Science (ISSS) to consider the feasibility and desirability of developing a world soils and terrain digital database at a map scale of 1:1M. The project, known as SOTER, won a contract from the...
United Nations Environment Programme (UNEP) in 1987. It had two obligations: to produce a general soil degradation map of the world at a scale of 1:15M, and to develop a soils and terrain digital database at a scale of 1:1M for an area of approximately 250,000 sq. km which includes portions of Argentina, Brazil, and Uruguay.

OBJECTIVES
The long range objective of the SOTER Project is to produce a world soils and terrain digital database containing digitized map unit boundaries and their attribute (descriptive) database. The database has the following characteristics:

§ general average map scale, or accuracy, of 1:1M;
§ compatible with global databases of other environmental resources and features;
§ amenable to updating and purging of obsolete and/or irrelevant data;
§ accessible to a broad array of international, regional, and national decision-makers and policy-makers;
§ transferable to and usable by developing countries for national database development at larger scales (greater detail).

This is an exceedingly ambitious project, one which will require sustained, innovative effort over a period of many years.

Specific short range objectives are required in the initial phases of the Project to provide a logical and orderly sequence of activities to produce an operational world soils and terrain digital database. Emphasis will be on research, development and testing of methodologies in the field and in the laboratory and demonstration of the uses of the database. Specific short term objectives are as follows:

§ development of an implementation plan;
§ adoption of a universal legend for the SOTER Database;
§ development of guidelines for correlation of soils and terrain mapping units;
§ definition of soils and terrain parameters and specifications to be included in the Database;
§ development of a detailed set of specifications and logic which define the minimum set of capabilities/functions required for the Database;
§ selection of three specific areas of 250,000 sq. km each in developing countries for initial database construction;
§ acquisition and correlation of all relevant maps and data about the selected areas essential for the Database;
§ input of data, including digitized maps, into the Database;
§ test and demonstration of the reliability, accuracy and utility of the Database;
§ conduct of an assessment of current geographic information systems and development of recommendations on the optional system for the SOTER Project; and
§ documentation of results, conclusions and recommendations from the initial phase of the SOTER Project.

A UNIVERSAL LEGEND FOR THE SOTER DATABASE
A draft version entitled "SOTER Procedures Manual for Small Scale Map and Database Compilation" was produced by an International Committee of Soil Scientists in 1988. This Manual describes procedures for compiling and coding the following kinds of data for entry into the SOTER Database:

§ Polygon file (15 attributes)
§ Terrain component file (28 attributes)
§ Soil layer file (73 attributes)
§ Soil degradation file

The Manual also presents coding forms on which to enter all the attribute file data which have been translated into the universal legend from whatever soil classification system that is being used.

SELECTION OF BASE MAP FOR SOTER DATABASE
In 1984 a joint Working Group of the International Geographical Union (IGU) and the International Cartographic Association (ICA) was established to explore the feasibility of developing a standard global data set. This project, entitled World Digital Database for Environmental Science (WDDES), concluded that the Operational Navigation Chart (ONC) series produced by the US Defense Mapping Agency provides consistent global map coverage of high cartographic quality at a scale of 1:1M. The IGU/ICA Working Group recommended the use of digitized ONCs as the best available 1:1M base map for input into world databases for registration and overlay of other natural resource data, including soils and terrain.

Representatives of the SOTER Project, having participated in many of the deliberations of the IGU/ICA Working Group, accepted the recommendations of that Working Group and have made the decision to use digitized ONCs as the base map for SOTER.

PROGRESS REPORT
LASOTER (Latin American SOTER Pilot Area). Scheduled for completion on 31 December 1989, database development for the Latin American Pilot Area is on schedule. In March 1988 a regional workshop was held in Montevideo to develop an implementation plan and to train soil scientists from Argentina, Brazil and Uruguay to use the universal SOTER legend and procedures manual for correlating soil maps of different classification systems to a uniform system of description and attribute entry into the database.

This workshop was followed by two separate correlation field trips
by participants of the three countries and an external soil correlator into the pilot areas of each country. By mid-December 1988 acquisition of all map and attribute data from each of the three countries for the Pilot Area was complete. All attribute data have been coded and entered into the SOTER attribute files. Entry of polygon or map data into the SOTER Database will be done in the latter half of 1989 after selection of a geographic information system (GIS) for SOTER. Once the polygon and attribute files are in place, testing and demonstration of utility of the database will be conducted.

NASOTER (North American SOTER Pilot Area). Work was begun on a US-Canadian Pilot Area following a workshop and implementation planning meeting in Ottawa in March 1989. This pilot area includes the state of Montana USA and the southern portion of the Canadian provinces of Alberta and Saskatchewan. A cooperative effort by the US Soil Conservation Service and the Land Resource Research Centre of Agriculture Canada, the SOTER Database for this Pilot Area is scheduled for completion by 31 December 1989.

WASOTER (West African SOTER Pilot Area). Negotiations are proceeding now to define an area which will involve six countries in West Africa in the development, testing and demonstration of the utility of a SOTER Database for that area.

Within the next two or three years it is anticipated that the SOTER Project may expand into other areas of the world. Particularly interest has been expressed for cooperative implementation of the SOTER concept in an area of the Middle East, India, Southeast Asia, northern South America, Central-Eastern Europe, and Western Europe.

In general, the overriding objective of the SOTER Project is to improve the capability to deliver accurate, timely and useful information about soils and terrain resources to decision-makers and policy-makers. It is expected that a World Soils and Terrain Digital Database will provide this improved capability of information delivery. Some more specific expected results are as follows:

- Orderly arrangement of resource information;
- Improvement in standardization and compatibility of reporting soils and terrain data/information;
- Improvement in accessibility of soils and terrain and related resource information;
- Dynamic resource information system with updating and purging capabilities;
- Information service for national resource planning in developing countries; and
- System model for technology transfer.

As the world is being caught up in the “information revolution,” there is an increasing need to find innovative and more effective methods for using and transferring this technology. The SOTER Database Project can provide an excellent vehicle for training a cadre of specialists, especially in developing countries, for using the Database, providing new data and developing new uses of the Database. The operational World Database can also serve as a model for the design and construction of in-country databases with sufficient detail and scale (accuracy) for local and provincial use.

(reprinted from ICSU Newsletter, 6/89)

**EXPERT MAP PROJECTION SELECTION SYSTEM**

Doyle Smith and John Snyder
United States Geological Survey

Cartographers at the U.S. Geological Survey are developing a system for the computerized selection of map projections for special-purpose map and chart design applications. This system, named the Expert Map Projection Selection System (EMPSS), is a computer software package that uses object-oriented structures and artificial-intelligence programming methods. The EMPSS has been developed for use in the design of thematic maps and other customized map products of the type generally constructed within a geographic information system environment.

The EMPSS package includes a base of information that contains human-expert technical descriptions and evaluations of the physical attributes of more than 50 of the most commonly used map projections.

The EMPSS operates by asking the user a series of general questions about specific needs or applications. The answers to this series of 10 to 24 questions enable the system to construct an idealized set of specifications for the proposed application. Once this ideal model has been constructed, the system evaluates each of the map projections in the knowledge base against the ideal model, using the stored evaluative information provided by the human expert. The name of the map projection that compares most favorably to the specifications of the idealized model is provided to the user as the optional projection for the proposed application or usage.

(reprinted from U.S. Geological Survey Yearbook FY 1988)

**SPACE SHUTTLE DEPLOYS RECONNAISSANCE SATELLITE**

The space shuttle Columbia’s latest mission, a secretive Pentagon exercise undertaken August 8 to 12, reportedly focused on the deployment of a $1 billion advanced photo reconnaissance satellite known as the KH-12. The satellite, a spy craft with more powerful sensors and greater maneuverability than previous
models, is expected to photograph a large portion of the world, but spend the majority of its time flying over the Soviet Union. Its less predictable orbits are being hailed by industry analysts as the beginning of an era in which it will be “far more difficult for the Soviets to evade [American] surveillance.” Experts agree that the machine will greatly enhance the ability of the United States to verify treaties and arms control agreements, but have offered little clue as to just how powerful its sensors are. In this age of rumor mills, information leaks, and spy scandals, it is amazing that no one (without a high-level security clearance) seems to know what the image resolution capabilities of modern remote sensing surveillance equipment really is.
(adapted from the New York Times, 8/9/89)

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**cart lab bulletin board**

This forum is offered to encourage communication among practitioners at a time of rapid technological transition. Questions, comments, and announcements are invited.

**CARTOGRAPHY AT THE UNIVERSITY OF TORONTO**

G.J. Matthews, Chief Cartographer
University of Toronto

The cartography office at the University of Toronto is an integral part of the Department of Geography. The present office occupies a 2080 square foot open plan room, with natural light, in the basement level of Sidney Smith Hall in the Arts and Science Faculty.

The office was established in 1963 when I was hired to design and produce the *Economic Atlas of Ontario*. For that project the staff gradually increased to 6 cartographers. Cartographic supply and demand caused some fluctuations in staff levels over the years: from a low of 3 personnel in the early 70’s to the present high level of 8 female and 5 male full-time professionals.

In the early years the cartographic mandate was to provide a drafting service to the geography academic staff for slides, overhead transparencies, and for publication materials. If time was available the cartographers were also expected to extend this free service to graduate students in need of maps and graphs for their theses.

During these years, though, the *Economic Atlas* project had priority over all other work.

The office established, with the *Economic Atlas* publication, a style and quality of cartographic production second to none. When the applause abated the expected flow of major projects to our office failed to materialize, so once again we became a service lab for geography staff. Unfortunately the academic staff were now in the first hypnotic trances of the computer age and the demand for maps almost entirely disappeared. The mid 70’s introduced a new phenomena that effected our operation—the shrinking University budget! Partly, at first, to supplement the departmental budget, and later as a contribution to salaries, the “free” drafting service disappeared and “cost recovery” was now introduced. This had a profound effect on our operation and changed the direction of the office entirely. Academic staff now had to pay through pre-arranged grants for their previously free cartographic service, and our time and materials were charged to all jobs.

We now extended our cartographic service to all University departments, and later promoted our talents to provincial government departments and to interested publishing houses. Contract cartography for specific map work was now more frequent.

In 1978 a group of geographers, historians, and cartographers made a formal proposal to the federal government, through the Social Sciences and Humanities Research Council, to produce a three-volume *Historical Atlas of Canada*. The cartography office was an integral part of that proposal. When the project was approved in 1979 (with a $5 million budget) the gradual hiring of new staff began. Today the office is staffed by 13 cartographers with a combined total of 170 years experience.

Because of our professional reputation and high quality of production our atlases have been awarded 4 gold medals; all staff are full-time highly qualified cartographers. Only occasionally has the office hired students for summer help. The cartography operating budget for salaries, supplies and filmwork is well in excess of a half million dollars a year.

Volume I of the *Historical Atlas of Canada* was published in 1987. The French and English editions sold over 24,000 copies at $95 each and received very positive reviews and awards. Production is nearing completion on the second volume in the series which will be published in September, 1990.

About the time we were gearing up for the *Historical Atlas* the number of commercial mapping contracts increased dramatically. During the past ten years there have been few periods without 2 different atlases being produced concurrently. The office has now 12 full colour atlases to it’s credit and is currently working on numbers 13 and 14.

Although the office is an integrated unit and the cartographers are intermingled the cartographic responsibilities are divided. *Historical Atlas* staff work solely on that project, while geography staff work on all other contracts. On occasions when deadlines are critical manpower is rearranged temporarily to maintain production schedules.

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**cartographic perspectives**

Number 3, Fall 1989
Apart from the more complex thematic cartography the staff still produce a sizeable number of black and white maps for publication by academic staff, and for other publishers including the University of Toronto Press. An even greater volume of simple lettered graphs are produced for wide cross-section of departments within the University. We even produce the occasional thematic cartography the staff still produces for wide cross-section of departments within the University. We even produce the occasional poster. This is the bread and butter of our operation and ensures a constant flow of funds to the Department.

For colour cartography our methods are state of the art, although the office is not yet involved in the application of the computer for day-to-day production. The computer is involved, however, in the research and data manipulation for maps and on occasion for graphic illustration. Two members of the cartographic staff are specialists in computer cartography and it is inevitable that the office will eventually move in that direction.

Currently all type orders are prepared and coded on a word processor in the office and discs are supplied to a commercial typographic plant for setting. All our type is supplied on waxed stripping film.

All map production overlays are scribed. All colour separations are by the peelcoat method and peeled manually. All overlays are punch registered on a Ternes 6-hole punch. Preliminary and intermediate film requirements are produced by the Faculty of Art and Science Photographic Laboratory.

Colour proofs are contracted commercially using the watercote process. Type negatives and final plating film are also made commercially in Toronto.

The cartographic responsibility for a contract extends also to the printing stage, and a cartographer familiar with the job is always on hand with a representative of the publisher to approve the colours and registration on the printed sheet as it comes off the press.

Because each cartographer is allowed to use creative freedom in style and colour within certain guidelines, and are totally involved with all aspects of production of the maps they produce, there is a strong spirit of pride in the projects that issue from this office.

Kwik Proof Technical Note

Don Myrick

Energy, Mines and Resources Canada

Despite a whole new generation of colour proofing systems which have come into use during the past few years, here at the Map Reproduction Centre at Energy, Mines and Resources, we have continued to use the old Kwik-Proof wipe on system. This has given us the flexibility to mix our own colours (our colour book contains over fifty) and allows us to proof large format work up to 48" by 65".

For us, Kwik Proof "Brightner" has become a very important tool. Brightner is a powerful cleaning agent originally intended to remove background or scumming from a colour proof. However, in removing the scum, the Brightner renders the image very fragile and can in fact damage it unless great care is taken.

We use Brightner as part of our wash off stock solution. We mix three ounces of strong ammonia and fifteen ounces of Brightner per gallon of water. When doing a wash-off, we further dilute the stock solution to about 8 ounces to 48 ounces of water. Not only does this solution take care of any background, but, more importantly, it enhances the quality of the image itself. This is because the Brightner sharpens the screen dot, fine type etc., compensating for unevenness and slight over-exposure. This is particularly true of high percentage screens which tend to plug with normal exposure. Since we began to use Brightner, we have significantly reduced the number of remakes and are able to provide a better quality proof.

CCA Newsletter, 15:1, 1989

Fugitive Cartographic Literature

Interesting articles about cartographic information often appear in unexpected outlets. The goal of this section is to bring those publications to the attention of our readership. We invite synopses of papers appearing in journals other than those devoted to cartography, geography, and map librarianship.

CORRIGENDUM

CP number 2, Summer 1989 featured an excerpt from Mary Kingsley's Travels in West Africa (London: 1897) graciously submitted by Pat Gilchrist. The editors regret that CP2 stated that "Mary Kingsley was an English explorer who explored the Ogowé and Rembé rivers of West Africa in the late 1900's." In fact, Kingsley explored West Africa in the late 1890's.


This article, written for a popular scientific journal, reviews the state of computer cartography in the 1980s for a non-specialist audience. Guptill and Starr, of the U.S. Geological Survey, National Mapping Division, introduce the topic by discussing maps as a medium of communication, by outlining the characteristics of detailed topographic mapping, by touching on the rapid changes in mapmaking technology, and by...
reviewing the earlier limitations of computers in map production. The body of the paper is devoted to an explanation of how, in the 1980s, it "has become technologically feasible and cost-effective to assemble and use the data required to automate the mapping process." The application of graph theory to the creation of digital maps is outlined and the use of this digital data in the production of perspective views is graphically illustrated. Practical applications of this cartographic database, in the form of geographic information systems, are noted.

The paper is well illustrated by both color and black and white photography, and by a table on "Digitizing a map." The titles listed in the "Suggested reading" range from the general to the scholarly level. This article could be used in an introduction to cartography class that is aimed at an undergraduate or an adult education audience.


It isn't often that cartography and geography have been featured in a leading business magazine. In a recent issue of *Fortune* magazine, however, electronic maps and geographic information systems (GIS) were reviewed and characterized as revolutionizing the way many governments and businesses operate. Illustrative, diverse examples of use of this technology include: a large forestry company managing 600,000 acres and 4,900 timber stands using GIS; researchers predicting the effects of an earthquake on rescue vehicle response times; transportation planners calculating effects of new roads and traffic signals on travel times; and a department store chain determining new store locations based upon population, income, and other computerized demographic data. Perhaps most revealing about the growth of the automated mapping/GIS industry is a prediction by one market research analyst that sales of such systems will reach $590 million by 1992 and potentially be expanding by as much as 35% annually.

The article also highlights the availability of previously digitized maps and associated databases. In addition to well-known digital products from the U.S. Census Bureau and U.S. Geological Survey, mention is made of a private firm, Etak, Inc., which will be making available digital electronic maps to be used as automated navigational aids in automobiles. General Motors expects to begin equipping its luxury cars with "moving maps" in the next two years.

*Fortune* also profiles a few of the key figures in the GIS and automated mapping industry, most notably Jack Dangermond of the Environmental Systems Research Institute (ESRI) firm. The company's ARC/INFO software is the most advanced and widely used GIS package in the world, with reported sales of $40 million for 1988. Other companies' strong sales are cited and the article focuses on the fact that automated cartography and GIS are becoming big business indeed.

The decade of the 1980s has seen an unprecedented change take place in the usage of computers in geography and cartography. The far-ranging application of automated mapping and GIS software in such fields as profiled in this article indicates that a new preeminence is being achieved by these disciplines. Continued development of this trend will positively affect collegiate geography and cartography programs and the number of professionals in these fields. As the article sums up, "Geography has come a long waysince you memorized the state capitals for Miss McGonagle in the fifth grade." It's good to see the business world recognize that fact.


Abstract:
It has been suggested that CAD packages may reduce the burdens of cave map drafting. I constructed some simulated caves and performed timing tests to investigate the suitability of CAD for cave map compilation and drafting. I discovered dramatic increases in processing time as the maps increased in complexity. While vector (line drawing) approaches have inherent limitations for present cave maps, some methods of breaking down large cave maps into parts (tiling, Blocks) may apply. It appears that CAD cave mapping is only practical with very fast microcomputers, and that a number of conceptual and practical problems remain. In particular the issue tends to highlight the distinctions between sophisticated tools and skilled tool users.


A study undertaken to determine the effectiveness of reference maps in aiding children in the recall of prose presented either orally or in written form.

The authors, both educational psychologists, proposed two basic
hypotheses. First, that maps would aid, in the recall of map-related text, those students who heard a prose passage more than those who read the same passage. This supposition was based on previous studies of graphic stimuli (non-map stimuli) which had suggested that conflicting cognitive processes may be involved when an individual tries to maintain a mental graphic image and read simultaneously. However, no such conflict had been found between maintaining a graphic image and hearing information. The second proposed hypothesis was that the perceptual elements of the maps would affect a subject’s recall of the maps and of the map related prose.

THE TESTING PROCEDURE
To test both of these hypotheses three maps were created to accompany a prose passage presented to 113 fifth and sixth-grade students in a middle-class Phoenix, Arizona neighborhood. The different cartographic presentations were an attempt to vary two primary map components. First, the level of symbol abstraction (one set of maps had picture-like symbols while another used only geometric forms) and secondly the spatial distribution of features (one set of maps placed the map symbols in a “logical” spatial pattern according to the prose passage while the other was simply a pictorial list of features along the margin of an outline map).

Equal numbers of fifth and sixth-grade students were randomly assigned to a reading or listening group. Subjects in each group were then randomly assigned a picture, geometric, or list map. The subjects were asked to study their maps and told that the maps would be helpful in learning a story they were about to hear or read. The maps were then removed and a short prose passage was presented either orally or in written form. When the story was completed the subjects took their maps out again and studied them for an additional two minutes.

Recall of the text information was measured by the use of 32 completion questions which could be answered in a word or two. Sixteen questions were related to map feature information and sixteen assessing information not related to the maps. Memory for the maps was measured by having the subjects attempt to locate the features on a blank sheet of paper by placing an “X” where each feature should be and then labeling that feature. Correct location was defined as being within two inches of the actual location.

RESULTS
Results of this study failed to support the first hypothesis, as subjects who read the prose had scores on the map-related questions and on the map recall test that were not statistically different from the scores of subjects who had the prose presented orally. Reading was found to be superior for the recall of non-map related information.

Results did support the second hypothesis that the perceptual elements of the map would affect the recall of map related textual information as well as the map itself. Subjects who had the picture-like map symbols “logically” spatially arranged scored significantly higher than those subjects who viewed either the picture-like map symbols in a list or those subjects that were shown geometric symbols that were arranged “logically”. No significant difference was found between the last two groups indicating that spatiality or the mimetic level of symbols alone was not responsible for the improved scores, rather a combination of the two was necessary for increased learning.

COMMENTS
One must question the reasoning for allowing the subjects to re-examine their maps after the presentation of the text material. If the intent of a portion of the study was to determine if the subject could hold a mental construct of the map while simultaneously reading the text material the viewing of the map after the text had been read should clearly have been avoided. In addition the article would have been greatly strengthened if the test maps utilized in the study would have been included.

As a cartographer this article is particularly interesting; on one hand it is a main-stream cartographic study, and yet as it is the work of non-cartographers, it provides a perspective which can be highly beneficial and stimulating. Unfortunately the article also vividly portrays the ever present problem of specialization in academia as the authors appear to be totally unaware of the wealth of published cartographic research clearly pertinent to their study.

Spencer, Jim (1988).
Orienteering for deer.
reviewed by Kevin M. Kolb
Penn State University

Spencer recounts a hunting excursion on which his party conducts pre-hunt scouting of an unfamiliar forested region of north Georgia, using only USGS topo quads and their natural instincts. The party arrives after nightfall, leaves camp before daybreak, and succeeds in scoring two bucks by mid-morning.

Through the article, Spencer offers a brief explanation of magnetic declination, and the scale characteristics of USGS 7 and 15 minute quadrangles. He gives a few basics on how to use a map
and compass, and tips such as transferring pertinent information to the topo sheet from state highway, county, and Forest Service maps (i.e. access road numbers), and tracing over the secondary roads with a heavy pencil ("A topo map is very often used under less than ideal light conditions, ... since gravel roads are drawn pretty inconspicuously on topo maps ... I don't want to have to squint to make out important details like roads.")

Spencer also discusses the importance of not merely owning a topo map, but learning to use it efficiently both when scouting and hunting:

"First, a hunter must be able to 'think like a deer.' In other words, he must know enough about the whitetail's biology and habits so that he can predict a buck's needs and movements with some degree of accuracy during the period he plans to hunt."

"Next, he must be able to project himself onto the map. He must be able to look at contour lines, elevation markers, stream corridors, fields, bluffs, roads, woodlots, and clearcuts, see them in his mind's eye, and know how the animal will react to different terrain features."

"Topo maps are indispensable tools that no serious hunter should be without, whether he thinks he knows his hunting territory or not. Let's face it, you don't know the land as well as the topo does."


Reviewed by Karl Proehl
Penn State University

Referencing early fire insurance maps, the author has traced the location of houses of prostitution and the people who inhabited the first two "boarding houses" appear in 1891, and eight such structures appear in subsequent maps (1896 and 1904). Newspaper accounts can sometimes be coordinated with the fire insurance maps to provide information on the size, and to some extent the type of establishment. By 1910, female boarding houses disappeared from the Moscow fire insurance maps.


cartographic artifacts

INJECTING THE GEO-CARTO-GRAPHIC INTO PUBLIC THINKING
Peter Gould
Penn State University

Under the strong leadership of Professor Roger Brunet, of La Maison de la Géographie, Montpellier, and the perceptive investment of the publishing house of Reclus, we are beginning to see what computer cartography can do to make the spatial and geographic dimensions of human existence a present force and influence in public awareness, education and thinking. Quite apart from the quarterly Mappemonde, whose color plates are the envy of traditional journals, Reclus issues a bi-monthly 'newsletter' Informations Reclus, now in its 16th edition (juin, 1989), of 12 pages.

Brunet's editorial Contradictions sets the tone of this issue as he comments on the apparently insatiable appetite of the media and 'decisionmakers' for scientifically impeccable data to inform the complexities of modern life. Ironically, such expectations lead to some difficulties—the 'contradictions' of the editorial's title.

Reclus, with its growing reputation and graphic publications on space, place, region, town, country, and continent, is deluged with requests for information. While these are flattering, they simply cannot be fulfilled with the immediacy demanded. Few outside of the cartographic profession realize the number of hours of work that may have to go into single plate or graphic image.

Unfortunately, and in an ironic twist, the demand for applied cartographers also leads to aggravating, and totally unfounded rumors that geography is somehow moving away from its traditional teaching tasks towards consulting, a word which appears to lack the requisite tone of academic purity in France, and seems almost tainted with a Victorian gentlemen's disdain of 'trade.'

God forbid that geography and geographers should produce something useful!

At the same time, access to policy relevant information becomes more and more difficult. Data banks are often generated at great expense by the public authorities, who realize, perhaps better than most, that information is power. And power is ultimately at stake here, in a country whose civil servants have bitterly opposed a Freedom of Information Act. Proposals about future censuses are worrying, and several countries in Europe are proposing to merge in a Common Market with very little idea of what the real consequences might be.

What is required is not simply more information, but information presented in such a way that its many implication can be teased out. Ultimately a democratic form of life depends on access to genuinely public information, information that increasingly...
Number 3, Fall 1989

Cartographic Perspectives

seems to be guarded by bureaucracies afraid of the demos. Brunet, and the carto-chevaliers of Reclus, are doing everything in their power to prevent the gradual, but increasing erosion of the public's right to information, information that truly becomes informing when it is presented in all its dramatic visual impact on the map.

This issue reviews five recent publications, including the Atlas des Villes de France, the first volume in a new series on Territorial Dynamics (Dynamiques du Territoire); L’Atlas Mondial des Libertés (World Atlas of Freedoms), with the support of the two international groups, Doctors Without Frontiers, and Reporters Without Frontiers; and Les Géographies Universelles et le Monde de leur Temps, a study of a world and time when Alexander von Humboldt’s Kosmos, and Elisee Reclus’ Géographie Universelle, were to be found prominently in every educated home. Perhaps especially timely is La France dans L’Espace Européen, helping the French people to visualize the implications of a changing Europe for them; and Les Villes “Europeennes,” another work that encourages thinking beyond the national scale. The range and vitality of these works raises the question: where are their equivalents on the west bank of the Atlantic River? After all, we are meant to be good at this sort of thing: ‘computer technology’ is our middle name. Is it possible that technology is not enough? Could it be that it takes a vivid and persipient geographic imagination to produce works like these? An imagination grounded in a truly geographic, and not merely technical, education? Could it be that sitting at a CRT all day is not enough?

Not that technical matters are ignored: for example, reviews of CD-Rom plus Hypercard include a micro-atlas of francophone America, compiled by the geographers at Laval (Québec). Even this anglo-saxon, who lives in Lemont, Pennsylvania, and whose county seat is Bellefonte, never realized the overwhelming domination of the francophone presence in eastern America (Figure 1). There hardly seems a space for those unfortunate descendants of the barbarians living on the offshore islands of Europe. Hypercard, interrogated through Hypertalk, is also the basis for the research of cartographers at Nice, research that forms the core of extraordinarily rapid atlas production.

CANADIAN MAPPING
Two recent publications focus on the mapping of Canada. Exploration on the History of Canadian Mapping: a Collection of Essays, edited by Barbara Farrell and Aileen Desbarats, provides a selection of twenty articles divided into four categories: research background; exploring [and the mapping of] the coasts; routes and patterns of settlement; and survey and resources which focuses on the input of surveyors in Canadian mapping. This 1988, 274-page publication comes in hard cover ($35) and paperback ($25).


Both publications are available from the Association of Canadian Map Libraries and Archives, c/o Cartographic and Architectural Archives Division, National Archives of Canada, 395 Wellington St., Ottawa, Ontario K1A 0N3.

In brief, French cartographers and geographers seem to have taken to the computer, particularly the Macintosh environment, with a speed, imagination and practical engagement that leaves others standing. Reclus is to be congratulated on its forward look. We have much to learn when it comes to the thinking task of transforming technical ability into production pro bono publico.

Further information may be obtained from Informations RECLUS, Maison de la Géographie, 17 rue Abbé de l’Épée, 34000 Montpellier.
PUBLISHED SEARCH
Computer Aided Mapping.
January 1987-April 1989 (Citations from the NTIS Database).
This bibliography contains citations concerning theoretical aspects and applications of computer techniques in cartography. Topics include automatic mapping, discussions of data bases, and computerized photomapping, Satellite image analysis and processing techniques, and descriptions of specific mapping projects are discussed. (This updated bibliography contains 123 citations, 68 of which are new entries to the previous edition.)
The National Technical Information Service (NTIS) is a self-supporting agency of the U.S. Department of Commerce. It provides access to the results of both U.S. and foreign government-sponsored R&D and engineering activities. As the U.S. Government’s central source for scientific and technical information, NTIS announces more than 60,000 summaries of R&D and engineering activities annually. It can provide the complete technical reports for most of these results. NTIS also manages the Federal Computer Products Center which provides access to software, data files, and databases produced by Federal agencies. For additional information, call (703) 487-4780. (NTIS Newsletter 89:29, 1989)

SEISMICITY DATA AND SERVICES
The National Geophysical Data Center (NGDC) Earthquake Data Base holds information on more than 500,000 earthquakes, known or suspected explosions, coal bumps, rockbursts, quarry blasts, and other earth disturbances recorded worldwide for the period 2100 B.C. to 1987. It includes (where available) date and origin time of the event, location, depth, magnitude, maximum intensity, and related earthquake phenomena (including faulting, tsunami, volcanism, and resulting casualties and property damage). Summary of Earthquake Data Base, a publication available free from NGDC, describes the data base in detail.
The Earthquake Data Base was formed from data furnished by the U.S. Geological Survey (in earlier years by the U.S. Coast and Geodetic Survey and the National Oceanic and Atmospheric Administration), the California Institute of Technology (Pasadena), the University of California (Berkeley), the California Division of Mines and Geology (Sacramento), the Canadian Earth Physics Branch, the Institute of Physics of the Earth of the USSR, the earthquake Research Institute of Japan, and about 20 other worldwide sources. NGDC and the World Data Center A for Solid Earth Geophysics provide a variety of data outputs from this extensive data base to the scientific and engineering communities.
These data may be purchased in a variety of formats. Please refer to the appropriate product number when ordering data or services.
The entire Earthquake Data Base is available on magnetic tapes; please specify 1600 or 6250 bpi. (Product number 121-A07-001; price is $341 for one magnetic tape at 6250 bpi; $361 for two magnetic tapes at 1600 bpi).
The Earthquake Data Base Regional Files. The Earthquake Data Base comprises 11 files of data; each file may be ordered separately for $141 per file. Output is on magnetic tape.
The Quarterly Updates of Preliminary Determination of Epicenters (PDE) File. Quarterly updates are generated for the PDE file (listed above). Output is on 1600 bpi magnetic tapes as data becomes available (product number 121-P07-001; $364 for one year).
Earthquake Data Base Retrievals. A search may be generated using any combination of the following elements:
-Geographic boundaries (top, bottom, left, right)
-Area within a radius (in kilometers or degrees) around a center point
-Time period
-Magnitude range
-Modified Mercalli intensity
-Depth
-Cultural effects (e.g. damage, casualties)
-Associated phenomena (e.g. faulting, tsunamis, volcanism)
The retrievals are available in three output formats: on computer listing (121-A04-CUS, $116), on 1600 bpi magnetic tape (121-A07-CUS, $207), or on 5.25" high-density IBM® PC compatible floppy diskette (121-A25-CUS, $146). A publication-quality map is included in each of the retrievals. The maps are produced using PostScript™, a versatile and powerful graphics language for laser printers. The maps are printed at 300 dpi resolution on 8.5" x 11" paper. The PostScript programs used to produce the maps are available on floppy disks. This makes it possible for you to customize the maps yourself and to easily add other types of data to the maps.
Specialized Data and Analytical Services. Seismicity services have recently been expanded to include customized data and analysis services. These services might include such routine activities as: (1) reformatting earthquake data, (2) seismicity related graphics, (3) catalog merging, or more complex tasks such as network and catalog evaluation and analysis.
Educational Tools. Earthquake publications, printed maps, and slide sets are also available from the National Geophysical Data Center.
Center. For the latest listing of these products request free brochure Publications, Maps, and Data Services.

[The prices quoted here are valid through September 30, 1989. Prices applicable after that date may be obtained by calling (303) 497-6472.]

U.S. Department Of Commerce regulations require prepayment on all non-federal orders. Please make checks and money orders payable to COMMERCE/NOAA/NGDC. All foreign orders must be in U.S. Dollars drawn on a U.S.A. bank. Do not send cash. Orders may be charged to an American Express card, MasterCard, or VISA card by telephone or letter; please include credit card account number, expiration date, telephone number, and your signature with the order. A ten-dollar ($10) handling fee is required on all orders; an additional ten-dollar ($10) charge is required for non-U.S.A. orders.

Inquiries, orders, and payment should be addressed to National Geophysical Data Center, NOAA, Code E/GCl, 325 Broadway, Boulder, CO 80303. Please direct telephone inquiries to (303) 497-6472.

COMPUTERIZED IMAGE CATALOG

A campus-wide network called the Digital Image Database Project at the University of California—Berkeley is being designed to catalog the university’s visual materials. The project, still in its infancy, will eventually handle a million 1 MB digital images of maps, slides, paintings and rare manuscripts.

Because of its wealth of image resources, the Department of Geography has proved a worthy pilot site. It took programmers six months to develop the software for the Berkeley Coordinate-Based Geographic Catalog. They have developed a prototype database concentrating on California’s Mono Lake Basin. It displays a wide range of library documents including Landsat images, maps, aerial photographs and landscape views.

There are many applications for the geographic catalog. Images obtained from the library can be manipulated and used to examine and illustrate historic, current and future geographic relationships. Such analyses are helpful in studies of water and forest resources, land use planning, human impact on the environment, transportation and even tourism.

In addition, professors and students can locate and manipulate images on screen and save the digitized data on a disk without leaving the workstation. Ideally, they could then project the images for presentation.


WORLD BANK PUBLICATIONS
The following teaching resources are available from the World Bank:

§ The Development Data Book and Teaching Guide. Students use 16 pages of color maps, charts, tables, and text, to master five key statistical concepts in studying the developmental process: life expectancy at birth, primary school enrollment, population growth rate, GNP per capita and merchandise exports. The 52-page Teaching Guide contains up-to-date outline maps, comprehensive activities for varying aptitudes, reproducible worksheets for each chapter, and a test to measure achievement. Cost: $9.95 (includes 11 student books and 1 teaching guide).

§ Measures of Progress Poster Kits. Two poster kits are now available: Life Expectancy at Birth (Poster Kit 1) and Population Growth Rate (Poster Kit 2). Each poster kit contains:
— a colorful poster map of the world (24" x 36") with data on 148 countries, easy-to-read text, and three charts illustrating key concepts.
— six color photographs (8 1/2" x 11") that reveal the people behind the statistics, with texts that describe how these people are working to improve their lives.
— comprehensive teaching guide (16 or 20 pages) with a full range of activities or worksheets and a test to measure understanding of key concepts. Cost: $5.95 each.


Send orders to: World Bank Publications, Department 0552, Washington, DC 20073-0552.

(NCGE Perspective, 6/89)

NEWBERRY ACQUIRES RAND McNALLY COLLECTION
The Newberry Library in the fall of 1988 began to acquire Rand McNally’s entire archive of its printed works—books, atlases, maps, guidebooks, and globes—from the 1870’s up to the 1980’s. Current publications will be deposited regularly with the library in order to keep the collection up to date. The Rand McNally collections complement Newberry’s special subject strengths: Chicago history, printing and publishing history, and the history of cartography.

(Mapline 54, 6/89)

“TERRA COGNITA” TELEVISION SERIES PLANNED
Kevin Kaufman, a member of the History of Cartography project
headed at the University of Wisconsin—Madison, is researching and writing material for a television program called "The Mapping of America." Kaufman's script, covering the years 1492-1800, will be the first part of a television series on the history of cartography entitled "Terra Cognita" planned by LMcL Communications, Inc. Preliminary support for the project has come from the United States Geological Survey. (Mapline 54, 6/89)

**new maps**


NEBRASKA. Vegetative conditions in Nebraska viewed by satellite: 1987 growing season. (GRM-11). Lincoln: Center for Advanced Land Management Information Technologies, 1988. $2.50 (CALMIT, Conservation and Survey Division, Institute of Agriculture of Agriculture and Natural Resources of Nebraska, Lincoln, NE 68588-0517).

WASHINGTON. Washington at statehood, 1889-1989: a map celebrating 100 years of progress and statehood. Ellensburg, WA: Department of Geography, Central Washington University Foundation, 1989. Scale 1:900,000. $4.00 Webpco Printing, P.O. Box 2027, Wenatchee, WA 98801.


COLORADO. Topographic recreational map of Colorado. (Map R-1). Canon City: Western Cartographics, P.O. Box 2204, Canon City, CO 81212).


WEST INDIES. Map of modern reefs and sediments of Antigua, West Indies. DeKalb, Ill.: Department of Geology, Northern Illinois University, 1988. Scale 1:40,000. $11 (Payable to NIU Geology Department; send to M.P. Weiss, Department of Geology, Northern Illinois University, DeKalb, IL 60115).


**new RAISZ MAPS**

Kate Raisz, the new manager of Raisz Landform Maps, announced improvements in the reproduction and distribution of the classic maps drafted by her late grandfather, Erwin Raisz. The company has added a key of physiographic symbols to all maps and upgraded the paper stock on which the maps are printed to 60# vellum. The company also plans to reissue the 3-color maps of the United States and Canada in the near future. For a price list, contact: Raisz Landform Maps, P.O. Box 2254, Jamaica Plain, MA 02130. Phone: (617) 522-3901.

**new atlases**


US$170 (Geocarte International Centre, G.P.O. 4122, Hong Kong).


SAND HILLS ATLAS NOW AVAILABLE

The Conservation and Survey Division of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln announces the availability of An Atlas of the Sand Hills, the first compendium of knowledge describing the various cultural, economic, and natural aspects of the Sand Hills region of north-central Nebraska. The atlas was introduced to the public last March at the annual Nebraska Water Conference in Lincoln, Nebraska. Chapters covering diverse topics such as geology, climate, flora, fauna, anthropology, and land development and use are included in the volume. Accompanying the maps expected in an atlas are many graphs and color photographs. Several maps and images were produced by the Center for Advanced Land Management Information Technologies (CALMIT).

The atlas can be ordered by sending $10.00 plus handling fee ($1.00 fourth class; $1.50 first class) to the Conservation and Survey Division, University of Nebraska-Lincoln, 113 Nebraska Hall, Lincoln, NE 68588-0517. (CALMIT News, Summer 1989)

EVENTS CALENDAR

October 11-14: North American Cartographic Information Society Ninth Annual Meeting, Ann Arbor, MI. Contact: Diana Rivera, University Libraries, Michigan State University, East Lansing, MI 48824-1048; (517) 353-4737 ext. 4593.


November 26-30: GIS/LIS '89, sponsored by AAG, ACSM, ASPRS, URISA; Orlando, FL. Contact: ACSM, 210 Little Falls St., Falls Church, VA 22046-4398; (703) 241-2446.

1990


March 13-16: GIS '90, Vancouver, B.C. Contact: Hugh Legg; Reid, Collins and Associates, 15th Floor,
401 West Georgia Street, Vancouver, B.C. V6B 5A1; (604) 664-3922.

March 18-23: ACSM/ASPRS Annual Convention, Denver, CO. Contact: ACSM; (703) 241-2446.


June 10-13: Canadian Cartographic Association Annual Meeting, Victoria, B.C. Contact: Dr. C. Peter Keller, Dept. of Geography, University of Victoria, P.O. Box 1700, Victoria B.C. V8W 2Y2; (604) 721-7333.

June 22: ALA Preconference Workshop on Satellite Imagery and Aerial Photography. Contact: Ellen Caplan (OCLC) at (614) 764-6000 or Nancy Vick at (217) 333-0827. Complete registration information will be available this fall.

July 23-27: 4th International Symposium on Spatial Data Handling, Zurich, Switzerland. Contact: Dr. Duane Marble, Dept. of Geography, 103 Bricker Hall, The Ohio State University, Columbus, OH 43210.

September 23-28: ASPRS/ACSM Fall Meeting, Atlantic City, NJ. Contact: ACSM; (703) 241-2446.


NACIS OFFICERS, 1988-89
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Those positions marked by an asterisk are open for nomination for 1989-90. Three Directors-at-Large, The Vice President and Secretary will be elected at the October meeting.
You are invited to attend the Ninth Annual Meeting of the North American Cartographic Information Society (NACIS IX), to be held in Ann Arbor, Michigan, October 11-14, 1989. The goal of NACIS IX is to bring together specialists from leading private, government, and academic organizations throughout North America to display and present reports on timely topics and the latest research developments. The theme of this year's meeting is "New Perspectives" in cartography. In addition to several general paper sessions, NACIS IX will feature special sessions, exhibits, and workshops on:

- Atlases—Concepts to Production
- Cartographic Design
- Cartographic Education
- Cartographic Software
- Cognitive Cartography
- Computer Mapping
- Geographic Information Systems
- Historical Cartography
- The Cartographic Lab: Issues and Problems

**PRELIMINARY PROGRAM**

**WEDNESDAY, OCTOBER 11**
1:00 - 8:00 p.m.  Registration
1:00 - 3:00 p.m.  NACIS Committee Meetings
3:00 - 5:00 p.m.  NACIS Board Meeting
5:00 - 7:00 p.m.  Dinner break
7:30 - 9:00 p.m.  Welcome

**Keynote Address**
Judy M. Olson, Chairperson
Department of Geography
Michigan State University

9:00 - 11:00 p.m.  Reception and Cash Bar

**THURSDAY, OCTOBER 12**
8:00 a.m. - 7:00 p.m.  Registration
9:00 a.m. - Noon  Exhibits
8:30 - 10:00 a.m.  Sessions

**SESSION A:**
COLOR CHART USE IN MAP DESIGN
Cynthia A. Brewer, Michigan State University, East Lansing, Michigan

A Functional Model of Color in Cartographic Design
Charles P. Rader, Michigan State University, East Lansing, Michigan

The Look of Maps: Maintaining a Balance Between Form and Function
Jeremy Crampton and Debra Daggs, Penn State University, University Park, Pennsylvania
SESSION B: ATLASES
The Design and Production of the Political Atlas of Illinois
Richard Vaupel, Northern Illinois University, DeKalb, Illinois

Ukrainians in Canada
Geoffrey Matthews, University of Toronto, Toronto, Ontario, Canada

Boundary Symbols in World Atlases to 1800: Towards a Standard Vision of the Political World
James R. Ackerman, Hermon Dunlap Smith Center for the History of Cartography, Newberry Library, Chicago, Illinois

10:00 - 10:30 a.m. Break
10:30 - Noon Concurrent Sessions

SESSION C: ETHICS IN CARTOGRAPHY
Roundtable Discussion
Moderator: Patrick McHaffie, Kentucky Geological Survey, University of Kentucky, Lexington, Kentucky

SESSION D: MAPS AND LIBRARIES
Map Library Management
John Sutherland, University of Georgia, Athens, Georgia
Jim O. Minton, United States Geological Survey, Reston, Virginia

Use of Maps in Children's Literature
Nancy B. Ryckman and Jeffrey C. Patton, University of North Carolina, Greensboro, North Carolina

Noon - 1:00 p.m. Lunch break
1:00 - 5:30 p.m. Field Trips

FIELD TRIPS
Remote Sensing
Environmental Research Institute

of Michigan, Daedalus, and Geospectra.

Ann Arbor and Vicinity Geomorphology

Map Collections and Walking Tour of Ann Arbor
Harlan Hatcher Graduate Map Library—Host: Carl Longstreth, William L. Clements Library—Host: David Bosse, Bentley Historical Library—Host: Leonard Coombs

6:30 - 7:15 p.m. Reception and Cash Bar
7:15 - 9:00 p.m. Annual Banquet

President's Address
Juan José Valdés
Cartographic Division
National Geographic Society

Banquet Address
D.R. Fraser Taylor, President
International Cartographic Assoc.
Carleton University
Ottawa, Ontario, Canada

FRIDAY, OCTOBER 13
8:00 a.m. - 4:00 p.m. Registration
9:00 a.m. - 3:00 p.m. Exhibits
8:30 - 10:00 a.m. Sessions

SESSION A: MICROCOMPUTER-BASED CARTOGRAPHIC PRODUCTION
Microcomputer-based Cartographic Production
Part 1: Practical Problems and Prospects; John Krygier and Craig Flory, University of Wisconsin, Madison, Wisconsin

Part 2: Theoretical Problems and Prospects; John Krygier and Brian Goudreau, University of Wisconsin, Madison, Wisconsin

Marketing Cart Lab Services in Research-Oriented Universities
David DiBiase, Penn State University, University Park, Pennsylvania

SESSION B: GEOGRAPHIC INFORMATION SYSTEMS
An Integrated Software Package for Solution of Location-Allocation Problems
Jacek Malczewski, University of Warsaw, Warsaw, Poland

Thematic Mapping from Satellite Data on the Macintosh
Micha Pazner and Allan Buck Pang, University of Manitoba, Winnipeg, Manitoba, Canada

Issues to be Considered in the Development and Management of GIS/LIS Systems
Claudette M. Dellon and Ronald M. Bolton, Aeronautical Charting Division, NOAA/NOS, Rockville, Maryland

10:00 - 10:30 a.m. Break
10:30 - Noon Concurrent Sessions

SESSION C: CARTOGRAPHIC VISUALIZATION OF TIME-SPACE RELATIONSHIPS
Time-Space Mapping: Early Evolution of Skyscrapers in Lower Manhattan
Deryck Holdsworth and Matt Tharp, Penn State University, University Park, Pennsylvania

(Title to be announced)
Keith W. Rice, University of Wisconsin—Stevens Point, Stevens Point, Wisconsin
Animated Maps of Aggregate Data: Conceptual and Practical Problems  
Alan MacEachren and David DiBiase, Penn State University, University Park, Pennsylvania

Noon - 1:30 p.m.  Lunch break  
1:30 - 3:00 p.m.  Concurrent Sessions

SESSION D: MAP PROJECTIONS  
Map Projections Applications  
Ronald M. Bolton, NOAA/NOS, Rockville, Maryland

The Effects of Map Projections on Map Distance and Emotional Involvement  
Patricia Gilmartin and Robert Lloyd, University of South Carolina, Columbia, South Carolina

Microcomputer Tools for Teaching Map Projections  
Doug Dudycha, University of Waterloo, Waterloo, Ontario, Canada

SESSION E: MANAGEMENT OF GEOGRAPHIC INFORMATION  
The Cartographic Resource Development Program, A Management Approach to Better Local Information and Utilization  
David Wiltsee, President, Information Sciences, Applegate, California

Using the 1990 Census TIGER Files on CD-ROM  

SATURDAY, OCTOBER 14
8:00 - 11:15 a.m.  Registration  
8:30 - 10:00 a.m.  Sessions

SESSION A: CARTOGRAPHIC EDUCATION  
Cartographic Education at the College Level: A Cognitive Developmental Perspective  
Roger M. Downs and Lynn S. Liben, Penn State University, University Park, Pennsylvania

Anatomy of the Introductory Cartography Course  
James F. Fryman, University of Northern Iowa, Cedar Falls, Iowa

SESSION B: GENERAL PAPERS  
Regional Patterns on Choropleth Maps  
Ruth Anderson Rowles, University of Kentucky, Lexington, Kentucky

Color and the Figure-Ground Relationship in the Perception of Bipolar Choropleth Maps  
Richard E. Lindenberg and Audrey E. Clarke, Kent State University, Kent, Ohio

Can Survey Knowledge be Acquired from Procedural Knowledge?  
Scott M. Freudschuhr, State University of New York- Buffalo, Amherst, New York

SESSION C: MAP AND ATLAS PRESERVATION AND COLLECTION MANAGEMENT  
Maria Grandenetti, University of Michigan, Ann Arbor

3:00 - 3:15 p.m.  Break  
3:15 - 5:00 p.m.  Annual Business Meeting

SESSION D: INTER-AMERICAN MAPPING  
Bill Stewart, Ann Arbor, Michigan

Noon - 1:30 p.m.  Luncheon  
Luncheon Speaker

1:30 p.m.  Post Conference Social at Domino Farms - Frank Lloyd Wright Gallery, Classic Car Museum, Picnic

SUNDAY, OCTOBER 15
9:00 a.m. - Noon  NACIS Board Meeting
Limosine Service from Detroit Metro to Ann Arbor
Limosine service is available from Detroit Metro to Ann Arbor via Commuter Transportation Company, local 1-313-941-3252 or long distance 1-800-351-LIMO.

Driving directions to the Ann Arbor Inn
Take Interstate 94 to Huron Ave. (exit 172). Continue east on Huron Ave. approximately 2 miles. The Ann Arbor Inn is located at the corner of Huron and Fourth, one block east of Main Street. Parking is available in the garage directly behind the hotel at Fourth and Washington.
**EXCHANGE PUBLICATIONS**

*Cartographic Perspectives* gratefully acknowledges the publications listed below, with which we enjoy exchange agreements. We continue to seek agreements with other publications.

**Canadian Cartographic Association Newsletter.** A quarterly publication offering news and announcements to members of the CCA. Contact: Canadian Cartographic Association, c/o Department of Geography, Memorial University of Newfoundland, St. John’s, Newfoundland, A1B 3X9; (709) 737-8988; Bitnet: CHWood@MUN

**Cartographica.** A quarterly journal endorsed by the Canadian Cartographic Association/Association Canadienne de Cartographie that features articles, reviews and monographs. B V Gutsell, founder and editor. Contact: University of Toronto Press Journals Department, 5201 Dufferin Street, Downsview, Ontario, Canada, M3H 5T8; (416) 667-7781.

**Cartomania.** This quarterly newsletter of the Association of Map Memorabilia Collectors offers a unique mix of feature articles, news, puzzles, and announcements of interest to cartophiles. Contact: Siegfried Feller, publisher/editor, 8 Amherst Road, Pelham, MA 01002; (413) 253-3115.

**GIS World.** Published six times annually, this newsmagazine of Geographic Information Systems technology offers news, features, and coverage of events pertinent to GIS. Contact: Debbie Parker, Subscription Manager, GIS World, Inc., P.O. Box 8090, Fort Collins, CO 80526; (303) 484-1973.

**FEATURED PAPERS**

All featured papers will be solicited by the NACIS Publications Committee. The goals of the solicitation procedure will be to select high quality papers that provide a balanced representation of the divergent interests of the membership. The primary mechanism for soliciting featured papers will be a paper competition held in conjunction with the Annual Meeting. All papers prepared for the meeting and submitted in written and/or digital form will be considered. Three of these will be selected to appear in *Cartographic Perspectives* during the next year.

In addition to the competition winners, the Publications Committee (in consultation with the editors) will solicit one or more papers each year from other sources. The goal here is to ensure that all aspects of the membership are served and to attract some thought-provoking ideas from authors who may not be able to attend the Annual Meeting.

Authors of selected papers will be given an opportunity to respond to suggestions of the Publications Committee or meeting participants before submitting as final version. The writing quality must adhere to high professional standards. Due to the interdisciplinary nature of the organization, it is particularly important that papers are carefully structured with ideas presented succinctly. The editors reserve the right to make editorial changes to ensure clarity and consistency of style.

Papers ranging from the theoretical/philosophical to methodological/applied topics will be considered providing that ideas are presented in a manner that will interest more than a narrow spectrum of members.

To be considered for the paper competition, papers should be prepared exclusively for NACIS, with no major portion previously published elsewhere.

**TECHNICAL GUIDELINES**

*Cartographic Perspectives* is designed and produced in a microcomputer environment. Therefore, contributions to *CP* should be submitted in digital form on 3.5" or 5.25" diskettes. Please send paper copy along with the disk, in case it is damaged in transit.

Text documents processed with Macintosh software such as WriteNow, WordPerfect, MindWrite, Word, and MacWrite are preferred, as well as documents generated on IBM PCs and compatibles using WordPerfect or Word. ASCII text files are also acceptable.

Graphics generated with Adobe Illustrator or Aldus FreeHand for the Macintosh are most preferred, but generic PICT or TIFF format graphics files are usually compatible as well. Certain graphics formats for the PC may also be submitted (for example, HPGL (.PLT), CGM, EPS, and TIFF).

For those lacking access to microcomputers, typed submissions will be tolerated. Manually produced graphics should be no larger than 11 by 17 inches, designed for scanning at 300 dpi resolution (avoid fine-grained tint screens). Continuous-tone photographs will also be scanned.

Submissions may be sent to: David DiBlase, Department of Geography, 302 Walker Building, Pennsylvania State University, University Park, PA 16802; (814) 863-4562.

**COLOPHON**

This document was desktop-published at the Deasy GeoGraphics Laboratory, Department of Geography, Penn State University, using an Apple Macintosh IIX. Word processing was accomplished with WriteNow 2.0; page layout with PageMaker 3.01. Graphics not rendered with Aldus FreeHand 2.0 were scanned from paper originals using an HP 9190 ScanJet desktop scanner. The PageMaker document was output by a Linnotron 300 at FSU Printing Services. Due to the special requirements imposed by this issue's featured article, some graphics were stripped into the printer's negatives prior to platemaking. The bulletin was printed by offset lithography on Warren Fatina 70# text stock. The type face is Palatino, designed by Herman Zapf.
NACIS membership form

North American Cartographic Information Society
Sociedad de Informacion Cartografica Norte Americana

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Organization / Afiliacion profesional: _______________________

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Your position/Posicion: ___________________________________

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Cartographic interests / Intereses cartografico: _______________

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Professional memberships / Socio de organizacion: ___________

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Make all checks payable to/
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NACIS
6010 Executive Boulevard, Suite 100
Rockville, MD 20852
U.S.A.
The North American Cartographic Information Society (NACIS) was founded in 1980 in response to the need for a multidisciplinary organization to facilitate communication in the map information community. Principal objectives of NACIS are:

§ to promote communication, coordination, and cooperation among the producers, disseminators, curators, and users of cartographic information;

§ to support and coordinate activities with other professional organizations and institutions involved with cartographic information;

§ to improve the use of cartographic materials through education and to promote graphicy;

§ to promote and coordinate the acquisition, preservation, and automated retrieval of all types of cartographic material;

§ to influence government policy on cartographic information.

NACIS is a professional society open to specialists from private, academic, and government organizations throughout North America. The society provides an opportunity for Map Makers, Map Keepers, Map Users, Map Educators, and Map Distributors to exchange ideas, coordinate activities, and improve map materials and map use. Cartographic Perspectives, the organization's Bulletin, provides a mechanism to facilitate timely dissemination of cartographic information to this diverse constituency. It includes solicited feature articles, synopses of articles appearing in obscure or non-cartographic publications, software reviews, news features, reports (conferences, map exhibits, new map series, government policy, new degree programs, etc.), and listings of published maps and atlases, new computer software, and software reviews.