cartographic perspectives

bulletin of the
North American Cartographic Information Society

Number 17, Winter 1994

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in this issue

messages

MESSAGE FROM NACIS PRESIDENT

Greetings to one and all from the president. I trust everyone has recovered from the annual conference held in October in beautiful downtown Silver Spring, and that you are looking forward to the joint meeting in August 1994 in Ottawa with the Canadian Cartographic Association.

Many of you approached me at the conference with positive comments about our meeting in Silver Spring and I thank you. I would again like to thank our local arrangements chairperson, Susan Nelson, for a job well done. I would also like to take this opportunity to apologize for what I feel was a grand faux pas in failing to publicly thank those who helped make the conference a success. Even now I hesitate because of the possibility of overlooking someone, but I would still like to thank Allen Feldman (tours), Juan Valdez (workshops), Howard Danley (exhibits), Donna Schenström (poster session), and Sona Andrews, Chris Baruth and Susan Peschel (program/registration). I would also like to thank all

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ISSN 1048-9085
Cartographic Perspectives
is published triannually

those who chaired sessions.

I am sorry that many of you missed the workshops on Saturday afternoon with Henry Castner and Joel Morrison. I attended Dr. Morrison's workshop "Cartographic Design in the World of Digits" and found it enlightening and educational. Perhaps Saturday afternoon should be left open for sight-seeing and shopping. Ron Grim also did a fine job leading the tour to Mount Vernon and historic Gadsby's Tavern in Alexandria.

I look forward to working with many of you this next year as well as serving all of you in making NACIS all it can and should be as a professional cartographic organization.

Chuck Harrington
President, NACIS

NOTES FROM THE EDITOR

As we begin 1994 I remind you that this is the last issue of ***Cartographic Perspectives*** you will receive if you have not paid your 1994 dues. To renew your NACIS membership and continue to receive ***CP*** please fill out the membership form in this issue of ***CP*** and send it along with your renewal check.

I would also like to make you aware that the Spring 1994 Issue (#18) of ***Cartographic Perspectives*** will contain the preliminary conference program for NACIS XIV and therefore, will not be mailed until June 1994 .

in passing

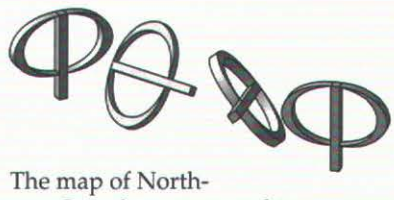
Richard Edes Harrison died, after a brief illness, at his home in Manhattan on January 5, 1994, at the age of 92. He was one of the country's most creative and original map makers. His demonstrated use of perspective, orientation and plastic shading are still the hallmarks of innovative mapping. Rikki was also an ardent bird watcher and a past president of the Linnaean Society, the ornithological and natural history organization of New York City.

Born in Baltimore, he graduated in zoology from Yale University in 1923 and earned a BFA degree in architecture in 1930. He supported his family as an illustrator, architect, and free lance designer and cartographer. Beginning in 1933, he made maps for *Time Magazine* and subsequently for *Fortune*. He was a consultant to a number of organizations such as the State Department, the DSS, the Geological Survey, NBC, etc. By 1939 he had opened his own independent cartographic office, which kept him active until a few years ago. From time to time he lectured at various universities and taught courses in cartography at Syracuse and Pittsburgh.

He will be remembered for his use of variably oriented world maps on the orthographic projection: his unique annotated perspective views of the earth with realistic physiographic detail; and his dramatic shaded relief images. His skills with relief shading, which brought the landscape renderings of Raisz and others to new heights of expression, have provided the background for many maps published in many journals and books; as well as for a variety of educational materials.

written by
Henry W. Castner

about the cover



The map of Northeast Canada was created in Geocart using a Tilted Perspective projection centered at 50N, 55W and bounded at 55N, 130W, 30S, and 50W. The perspective angle is 55° from vertical looking Southwest (220°) from a point 1600 kms above the surface. From here you can see Ottawa, Canada (45.25N, 75.43W), the site of NACIS XIV. The map was imported into Freehand where line weights were set to .2 mm and color to white, the map was then cloned, lines set to .4 mm and 20% gray, and sent to a lower layer. This process was repeated to 1.6 mm and 40%. The logo was given a similar treatment. The map, logo and text were laid over a graduated fill background.

Aldus FreeHand is a trademark of Aldus Corp., Geocart is a trademark of Terra Data, Inc.

featured articles

HOW PRACTICAL ARE MINIMUM-ERROR MAP PROJECTIONS?

John P. Snyder

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Ever since the Mercator projection gained wide acceptance for general geographic world maps, there have been attempts to replace it because of its serious area distortion. Most minimum-error projections, however, are difficult or nearly impossible to construct without a modern computer. Does this negate their use? The answer is probably yes if most users need to digitize maps or do their own programming of formulas, but no if the goal is to make the map easier for measurement of distance, area, and shape. We too often still choose projections to suit pre-computer criteria involving ease of construction, rather than to meet the needs of the map user. This paper reviews the practicality of minimum-error map projections and illustrates a wide range of minimum-error projections.

WORLD MAPS

Making a flat map resemble the round world has been a goal through the years for map makers. The smaller the region being portrayed, the more the flat map can look like that part of the globe. When the portion is decreased to a province or town, the distortion is often so small, although cartographically significant, that it can be perceived only by measurement, not by appearance. The differences among map projections are most evident when comparing various world maps.

The classic world map is of course based on the Mercator projection (Figure 1), presented in 1569 by the Flemish map maker Gerardus Mercator as a navigational aid, not as a general world map. With the importance of navigation, especially during the 15th and 16th centuries, the Mercator projection gained such high visibility that it became the standard for maps of world geography and has never really lost that role. Cartographers have regularly decried its general use, writing in prominent technical books of the past century, but it is so entrenched that Arno Peters had fertile ground for attacking the Mercator's gross area distortion as a basis for independently re-presenting Gall's hundred-year-old Orthographic Cylindrical projection (Figure 2), with the implication that Peters' approach was the first equal-area solution to supplant the Mercator.

Peters' presentation, beginning in 1973, was only the most vocal of several attempts to counteract the area distortion of the Mercator projection. Several innovators explicitly stated that their world map projections were attempts to resemble the Mercator with less distortion: Gall's Stereographic projection of 1855 (Figure 3), Van der Grinten's circular projection of 1898 (Figure 4), and O.M. Miller's "modified Mercator" cylindrical of 1942 (Figure 5) are familiar examples. These compromise projections made no claim to minimum error; they tried to reduce the visual distortion. Further steps were taken by numerous inventors who retained straight, parallel lines of latitude, but who curved the meridians, producing what are generally called pseudocylindrical projections. The area scale is frequently true throughout the world map, but angles and shapes are often badly distorted. The Sinusoidal projection (Figure 6), the Mollweide projection (Figure 7), and Eckert's Nos. 4 and 6 (Figures 8 and

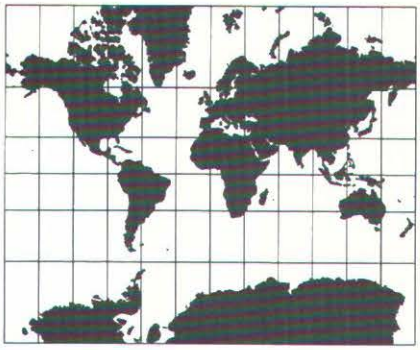


Figure 1. Mercator projection.

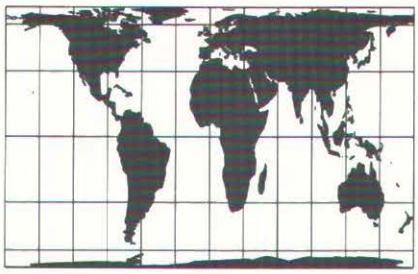


Figure 2. Gall Orthographic (Cylindrical Equal-Area) projection.

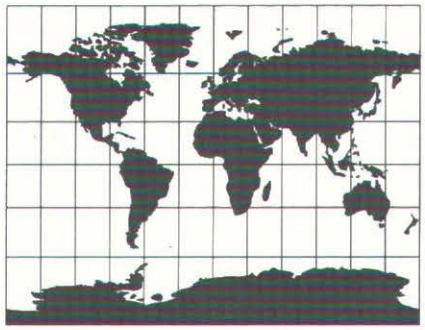


Figure 3. Gall Stereographic projection.

Figure 4. Van der Grinten projection.

Figure 5. Miller Cylindrical projection.

Figure 6. Sinusoidal projection.

Figure 7. Mollweide projection.

Figure 8. Eckert IV projection.

Figure 9. Eckert VI projection.

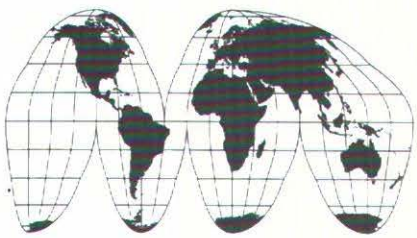


Figure 10. Goode Homolosine projection.

Figure 11. Robinson projection.

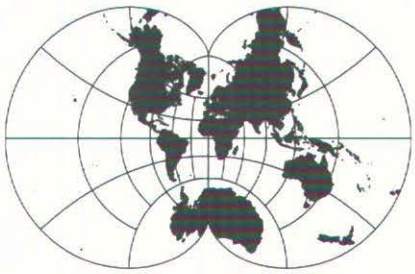


Figure 12. Eisenlohr projection.

9) are all equal-area. Goode's Homolosine (Figure 10) is also equal-area, but using interruptions he reduced the shape distortion. Interruption has its drawbacks, and Arthur H. Robinson designed what is now probably the best-known compromise pseudocylindrical in 1963 (Figure 11) for Rand McNally; it is neither interrupted nor equal-area. Rand McNally used the projection on a limited basis, but when the National Geographic Society adopted it in 1988 with an effective press conference, it became far better known.

There have been minimum-error world map projections, however, beginning a few decades after the development of minimum error as a mathematical concept in the early 19th century.[1] When applied to map projections, innovators soon found that the concept had to be applied narrowly. In 1870 Eisenlohr presented a minimum-error conformal world map projection by figuring out how to have the scale constant all around the edge of the map. The only problem is that the map (Figure 12) looks awful. A conformal map projection is one on which all small shapes and local angles are shown correctly. The Mercator is one example. In 1910 Behrmann presented a cylindrical equal-area projection with what he determined to be as little distortion of angles as possible, but it (Figure 13) is only a slight improvement over the Gall-Peters projection. With computers available to do the mathematics, there have several attempts since 1980 to develop minimum-error world maps which are neither conformal nor equal-area by Peters' son Aribert in Germany, by Canters in Belgium, by Laskowski in the U.S., and by others. So far they remain academic, lacking commercial application.

Figure 13. Behrmann Cylindrical Equal-Area projection.

REGIONAL MAPS

There is much more justification, however, for minimum-error regional map projections. The Russian mathematician Chebyshev had theorized in 1856 that a conformally mapped region bounded by a line of constant scale has the least overall error, or is minimum-error. If the region is circular, this is achieved with an azimuthal projection, because the projection of the globe onto a plane tangent at the pole (Figure 14) or somewhere else (Figure 15) produces an azimuthal projection on which lines of constant distortion are circles centered on the point of tangency (Figure 16). Chebyshev's theory was later proven, and it was applied in effect by Eisenlohr to his world map projection and by others in the 20th century to several projections used for map regions bounded by a rectangle or consisting of a particular landmass. In 1926 Laborde applied it to topographic mapping of the island of Madagascar, in 1953 O.M. Miller used the principle for an Oblated Stereographic projection of the combined continents of

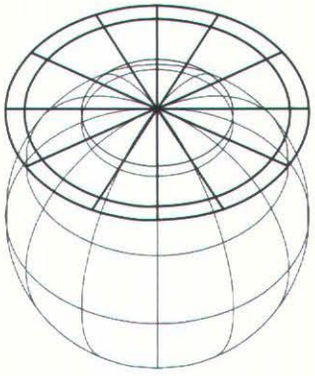


Figure 14. Concept for a polar azimuthal projection.

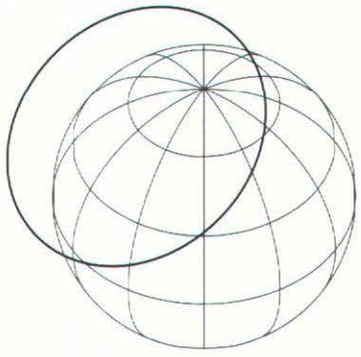


Figure 15. Concept for an oblique azimuthal projection.

[1] The concept of minimum error is closely tied to that of least squares, developed by mathematicians Gauss and Legendre early in the 19th century. This principle states that the best value for a quantity, given a set of measurements of that quantity, is the value for which the sum of the squares of deviations of these measurements from this value is least. For a minimum-error map projection, the sum of the squares of the deviations of all the actual scale values from the stated scale is made a minimum according to a prescribed definition.

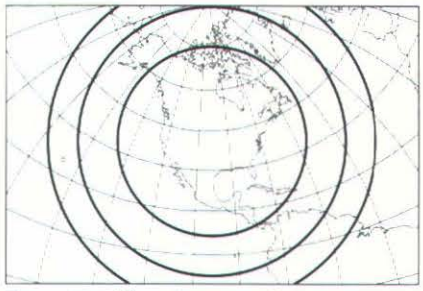


Figure 16. Oblique Stereographic projection, with lines of constant scale factor (1.1, 1.2, 1.3).

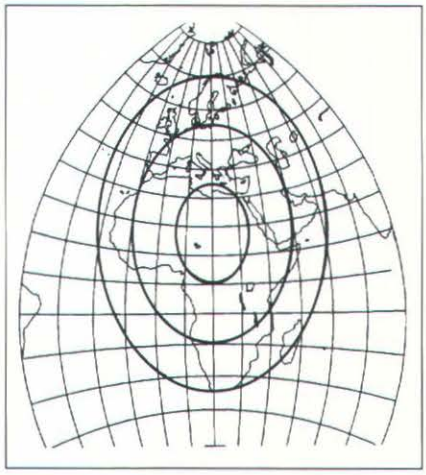


Figure 17. Miller Oblated Stereographic projection for Europe and Africa, with lines of constant scale factor (0.94, 1.00, 1.08).

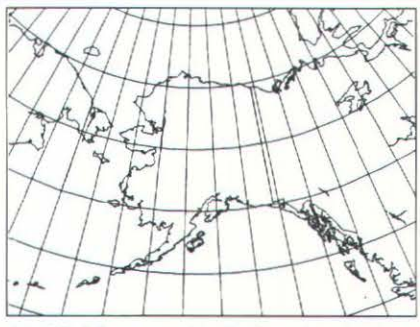
Europe and Africa (Figure 17), and it was later used, as computers facilitated the handling of more complicated equations, by Reilly for New Zealand, and in my development of low-error map projections for Alaska (Figure 18) and for the "lower-48" States (Figure 19).

The most recent application was published in 1992 as the Optimal Conformal projection developed by physicist Mitchell Feigenbaum for Hammond Inc. and used for the continental maps in the new *Hammond Atlas of the World*. In the Hammond maps, the bounding line roughly follows the continental coastlines, including related islands, and the maps were reasonably touted as "the most distortion-free that can ever be made," although the words "conformal maps" should really be inserted, and calculations are extremely complicated.

The Chebyshev principle appears to be applicable to equal-area map projections, although I haven't heard of an analytical proof, and I have used it to develop an Oblated Equal-Area projection for oval (Figure 20) and rectangular (Figure 21) regions. John Dyer developed formulas to apply the minimum-error concept to irregular regions, and I applied his system to Alaska (Figure 22).

As with world maps, arbitrary or compromise projections, neither equal-area nor conformal, can also be developed for regions on a minimum-error basis. George B. Airy in 1861 was the first with a minimum-error azimuthal projection (Figure 23) which looks very much like an Azimuthal Equidistant projection. A century later, Bomford of England and later Ginzburg of the Soviet Union (Figure 24) devised low-error compromise versions to suit rectangular or oval regions. Tobler devised an Optimal projection of the 48 States, minimizing scale variation between all the intersections of a 5° graticule of meridians and parallels.

If we are talking about a map of a full hemisphere, with a meridian, the equator, or an oblique great circle as its circular boundary, the solution is straightforward. The projection will be azimuthal, as discussed previously, and the minimum-error equal-area projection is the Lambert Azimuthal Equal-Area (Figure 25), the minimum-error conformal projection is the Stereographic (Figure 26), and the minimum-error projection in general is that by Airy.



Modified-Stereographic Conformal projection for Alaska, without lines of constant scale factor.

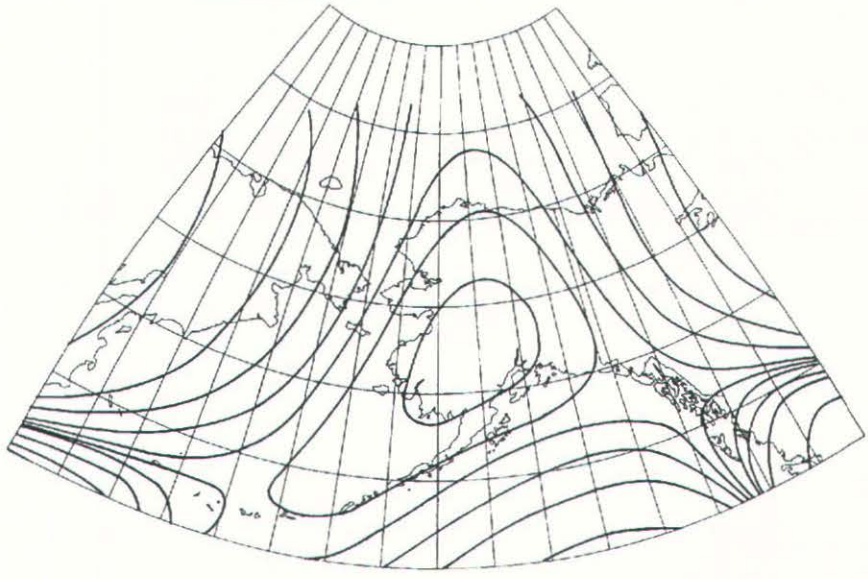


Figure 18. Modified-Stereographic Conformal projection for Alaska, with lines of constant scale factor.

The improvement obtained by using minimum-error projections varies considerably with the circumstances. For world maps, the use of the "minimum-error" Eisenlohr projection with its two large cusps may be rejected even over the Mercator almost out of hand, because of appearance. Minimum-error maps of hemispheres, just discussed, are standard and quite satisfactory in appearance. For regional maps, appearance is much less of a factor because even a large continent looks much the same on any of several good projections. When the region is the size of the United States or smaller, the choice among good projections makes almost no visual difference, but the range of scale can vary significantly. This variation can be quantified in different ways. Two useful measures of this variation are (1) the maximum and minimum values of the scale factor over a map, and (2) the root-mean-square error or RMSE of the scale factor. Although calculating the RMSE gives the computer a little mathematical workout, the concepts involved are not very complicated.

The scale factor on a map is the ratio of the actual scale at a given place to the nominal scale of the map. That is, if the nominal scale of the map is 1/250,000 or about 3.95 miles to the inch, and the scale at a particular place on the map is 3.85 miles to the inch, then the scale factor at that point is 0.976. The scale "error," so-called, although it isn't an error as much as just the way flat maps work, is then (1-.976) or 2.4%. If we take all these scale errors for small equal portions of the map, square them, add up the squares, divide by the number of measurements, and find the square root of the quotient, we get the root-mean-square error for the scale factors on the map. The mathematician Gauss found in the 1820s that this is an excellent measure of the overall error of a map or of many other sets of measurements, and that the lower, the better. Depending on the distribution of scale, the range between maximum and minimum values may not be least when the RMSE is least.

Applying these concepts to a specific case, we can first divide the land, islands, and adjacent waters of North America into about 240 quadrangles 5° of latitude x 5° of longitude in size, giving each a weight in proportion to its area on the Earth. Several world atlases use the Lambert Azimuthal Equal-Area projection for maps of this continent. If this projection is used, with the best possible center for these 240 quadrangles, the result is 4.5% for the RMSE or mean scale factor error, and a range of scale factors from 0.92 to 1.09, or 17%. With an Oblated Equal-Area projection, the RMSE drops from 4.5% to 3.3%, and the range is 14% instead of 17%. In other words, the true scale of the map is generally about 3.3% from the nominal scale on the Oblated Equal-Area, and about 4.5% on the Lambert Azimuthal Equal-Area. The resulting general improvement in scale error is a moderately significant 27%, although the extremes are only 18% closer. Because North America is more elongated than most other continents, the improvement using the Oblated Equal-Area projection rather than the Lambert is much more pronounced for North America. Therefore, in a recent selection for use in equal-area continental land-use maps by the U.S. Geological Survey's EROS Data Center at Sioux Falls, the Oblated Equal-Area was recommended for North America, and the Lambert was recommended for the rest of the continents.

If the region is reduced in size to the 48 conterminous United States, using almost a thousand 1° x 1° quadrangles of lat/long for the calculations, a suitable Oblated Equal-Area projection gives an RMSE of 0.81% in scale factor error and a range of 2.8%, while the commonly used Albers Equal-Area Conic has a mean error of 1.02% and a range of 3.1%, an improvement using the Oblated Equal-Area of 21% in mean error, and 10% in range. In this case, the improvement is moderately good, but the

ANALYSIS

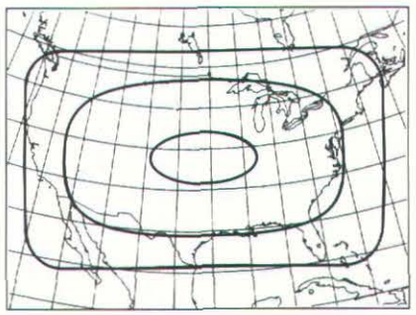


Figure 19. Modified-Stereographic Conformal projection for 48 United States, with lines of constant scale factor (.99, 1.00, 1.011).

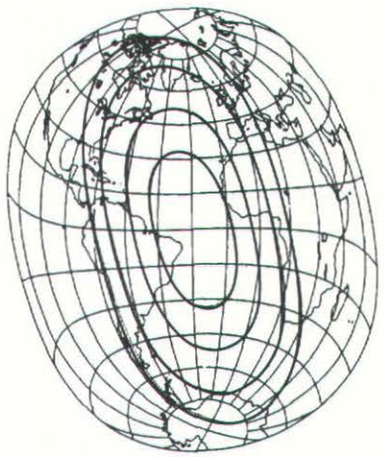


Figure 20. Oblated Equal-Area projection for Atlantic Ocean with lines of constant max. scale factor (1.02, 1.05, 1.10, 1.15).

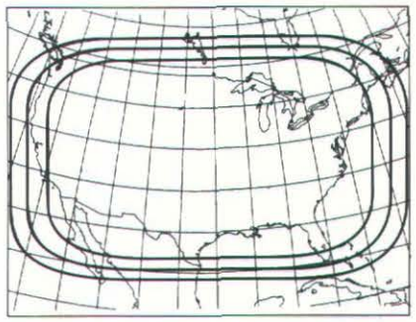


Figure 21. Oblated Equal-Area projection for 48 United States, with lines of constant max. scale factor (1.01, 1.0125, 1.015).

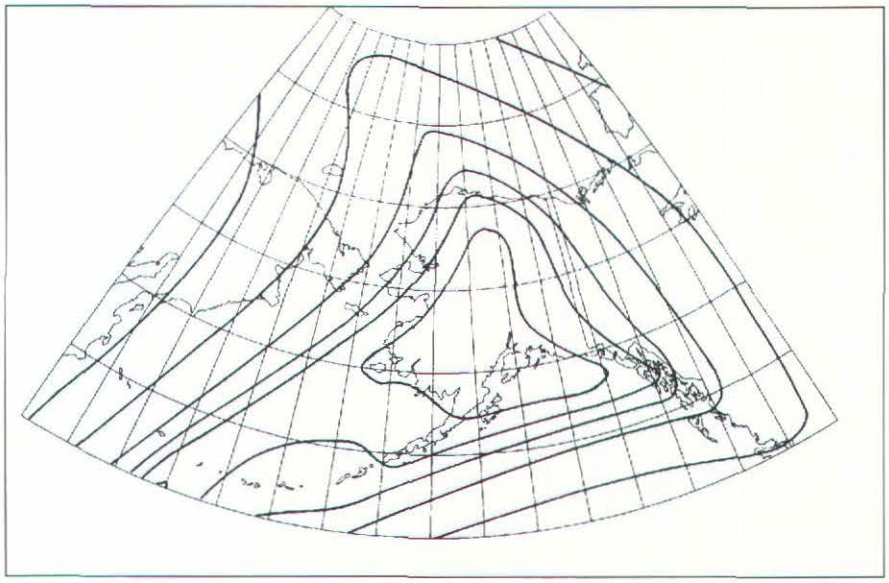


Figure 22. Low-Error Equal-Area projection for Alaska, with lines of constant max. scale factor.

scale is within 3% of the nominal scale anyway at any given point using either projection. To recommend a change of projection for the 48 States is hardly worthwhile.

With a region reduced to say a 10° x 10° quadrangle centered at 40°N. latitude (which is a region 30% longer in a north-south direction than east-west because of the narrower degrees of longitude) a Lambert Azimuthal Equal-Area projection, ideal for circular regions, is 60% better in mean error than an Albers, which is better for east-west regions, and the range is about 30% better. But, we are only talking about a scale factor ranging less than .5% within the entire quadrangle. A 1° x 1° quadrangle shows about the same RMSE improvement, but the scale factor range is 100 times closer to 1.

CONCLUSIONS

In conclusion, the choice of a map projection should be based on several criteria: the purpose of the map, the shape and size of the region being mapped, and whether the particular map is part of an established series or is to stand alone. For a new stand-alone map of a region, a minimum-error projection is clearly mathematically "better" than a projection that is not minimum-error. If all users are going to rely solely on the nominal map scale for measurement and will not be digitizing, and if the map maker can use the formulas for a minimum-error projection or software containing them to construct the map, then such a projection can be recommended for a region with a size of the order of North America. If these criteria are not met, the improvement in accuracy is probably offset by the mathematical complications, both in plotting, scale determination at a given point, or digitizing. In spite of the pervasiveness of computers, we still need to understand

Figure 23. Airy Minimum-Error Azimuthal projection for hemisphere centered on Washington, D.C.

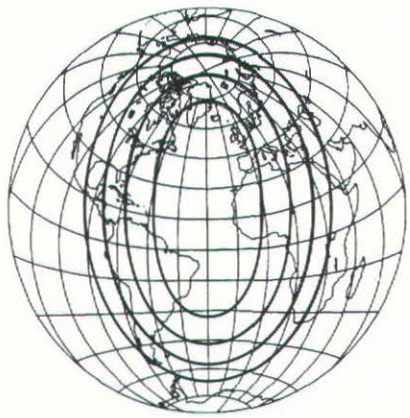


Figure 24. Ginzburg Pseudoazimuthal projection for Atlantic Ocean, with oval lines of constant maximum angular distortion (5°, 10°, 15°, 20°).

the map projection we are using. Projections are considered confusing enough by many cartographers because of the amount of math involved. A map used for accurate measurements must have a known projection, and it is necessary for the user to become familiar with the projection used. With all the tools, especially computers, available to us, we should not limit ourselves to pre-computer criteria in choosing the projection to be used, but we should know the pros and cons involved in the choice of a more complicated projection.

Figure 25. Oblique Lambert Azimuthal Equal-Area projection for hemisphere centered on Washington, D.C.

Figure 26. Oblique Stereographic projection for hemisphere centered on Washington, D.C.

For further details and references see:

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_____. 1993. *Flattening the Earth: Two Thousand Years of Map Projections*. Chicago: University of Chicago Press.

RESUMEN

El proyector Mercator ha ganado amplia aceptación para la proyección de mapas geográficos mundiales, pero han habido intentos de reemplazarlo debido a la seria distorsión del área. Sin embargo, la mayoría de errores de proyección, son muy difíciles o casi imposibles de detectar sin un computador moderno. Niega esto su uso? La respuesta probablemente es sí, si la mayoría de usuarios necesitan digitalizar mapas o hacer su propia programación de fórmulas, pero no, si la meta es hacer el mapa más fácil en medidas de distancia, área y forma. Nosotros todavía con frecuencia escogemos proyecciones que se ajustan al criterio pre-computarizado que ofrece facilidad en la construcción, a cambio de suplir las necesidades del cartógrafo. Este trabajo repasa la practicalidad de proyecciones de mapas con errores mínimos e ilustra una amplia variedad de ejemplos de proyección de errores mínimos.

RESUME

Depuis que la projection Mercator a reçu un accueil favorable du monde de la cartographie générale, des tentatives ont été faites dans le but de la remplacer à cause de la sévère déformation régionale qu'elle entraîne. La plupart des projections à erreur minimum, cependant, sont difficiles, même presqu'impossibles à construire sans l'aide d'un ordinateur moderne. Est-ce que cela nullifie leur utilité ? La réponse est probablement affirmative si la plupart des utilisateurs ont à convertir les cartes en numérique ou à programmer eux-mêmes leurs formules; elle est négative si le but est de faciliter sur la carte la mesure de la distance, de la région et de la forme. Trop souvent, nous continuons à choisir des projections qui respectent les critères antérieurs à l'ère de l'informatique qui impliquent la facilité de construction, au lieu de répondre aux besoins de l'utilisateur de la carte. L'article passe en revue les aspects pratiques des projections de cartes à erreur minimum et illustre une large gamme d'exemples de projections de ce type.

Reexamining the Role of Maps in Geographic Education: Images, Analysis, and Evaluation

James E. Young

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The ability to make, understand, and use maps is essential for anyone trying to think about the world around them. Children's failure to make and use maps in a meaningful way contributes to the lack of geographic awareness across the country. The "linguistic map" (a graphic representation of the mental connections between words, sensory images, abstract concepts, and value judgments) is proposed as a model for evaluating maps used in educational materials. An evaluation of social studies textbooks found that the maps failed to promote learning at all three levels proposed by the linguistic model: concrete images, abstract analysis, and value evaluation. Problems with the textbook maps are examined and suggestions developed for using maps in educational materials.

INTRODUCTION

A map is a common and valuable way to show locations, describe places, illustrate distributions, demonstrate the interaction of phenomena, indicate movement between places, or to characterize regions. The ability to make, understand, and use maps is essential for anyone thinking about the world around them (whether a student in the classroom, a social studies teacher, or a professional geographer).

The purpose of this paper is to reevaluate the role of maps in geographic instruction, using the concepts of image, analysis, and evaluation presented in a linguistic model (Gersmehl and Young 1992). This reevaluation will occur in two parts. First, a critical appraisal of how published textbooks treat maps, along with examples of how maps fail to address image-building, analysis, and evaluation needs of students will be presented. This is followed by a description of how maps might be designed and used to overcome the shortcomings of the existing materials.

Children attending school in the United States typically receive little training on how to make and use maps. Teachers neglect the teaching of map skills, often because they share the same map use deficiencies as their students (Muir 1985). This is attributed to a variety of reasons, including educators not having worked out the methods and sequences for teaching map skills; not understanding the ability of individuals at different ages to deal with maps; not using maps as problem-solving tools; and seldom associating maps with topics outside the social studies classroom (Kirman 1988). The maps children see in school often are difficult to understand or are simply boring. These maps (and the skills to use them) have little value in the lives of too many children. Children's failure to make and use maps in a meaningful way contributes to the lack of geographic awareness across the country.

Many factors must come together if students are to learn how to understand and use maps. First, cartographers need to design maps that are suitable for the intended audiences and educational objectives. Publishers have to make available, at reasonable prices, a wide variety and great quantity of maps. Teachers need to develop an understanding of what a map is and to improve their map use skills. Finally, educators need to recognize the value of maps as learning tools, then integrate maps and map skill instruction into the school curriculum.

Educators and geographers in the United States are looking for ways to

improve the quality of geographic education. All too often, maps still have a very limited role in the new curricula. What is needed is a fresh approach to teaching geography, an approach that uses the full potential of maps to excite, entertain, surprise, and inform students of all ages.

The ARGUS Project (Activities and Readings on the Geography of the United States) is an effort to create and test innovative and interesting high school teaching materials.[1] The overall objective of ARGUS is to improve regional geography instruction in the schools. Improving students' abilities to understand and manipulate maps is a primary objective of the ARGUS materials.

What is needed is a fresh approach to teaching geography, an approach that uses the full potential of maps to excite, entertain, surprise, and inform students of all ages.

The model for creating the ARGUS materials uses the idea of a linguistic map (a graphic representation of how words, sensory images, abstract concepts, and value judgments are linked together in a person's mind). The mental connections differ among individuals because linguistic maps are the products of age, gender, ethnicity, and education. Linguistic maps also seem to be strongly related to place– where people are, where they grew up, and where they have been (Gersmehl and Young 1992).

A linguistic model of geographic education assumes that learning about places occurs on three conceptual levels: concrete images, abstract analyses, and value evaluations. At the concrete images level, students focus on what is at a place– associating words with features. At the analysis level, students examine why things are the way they are at a particular place. Finally, at the evaluation level, students form and study opinions about how things ought to be.

Two processes (one "forward" and one "backward") operate at each conceptual level, producing six connections:

1. Forward Images. The student learns words to name features in a place. Geographers have words to label things that they see in the world, words such as lake, mountain, coulee, bayou, or central business district. Children need to learn words to apply to images of places and features within those places. Knowing words makes it easier for children and other novice geographers to see the unique features of a place.

2. Images Backward. Students learn new features to associate with familiar words, because a word can mean different things at different places. For example, a lock in Alton, Illinois, is a large concrete-and-steel structure that allows barges to float around a dam in the Mississippi River. In Miami, the same word means a metal object that can be put on a playground gate to keep drug dealers from using the area at night (Gersmehl and Young 1992, p. 232). Children need to learn words to associate with features they see around them, but they also need to be aware that a familiar word can have more than one meaning.

3) Forward Analysis. Students learn theories to explain why things are the way they are at a particular place. Geographers have developed many theories to explain the presence of features in particular places, and children need to learn the economic, political, cultural, and physical factors that influence the spatial patterns of features. For example, the

[1] Geographers from several universities in the United States are working to produce a textbook, student activities, a teacher's manual, and a book of readings for high school classrooms. The materials cover the cultural and physical geography of the United States. The ARGUS project is part of an effort to develop curriculum exchanges with several countries. A parallel project led by Russian geographers is currently underway to create materials about the geography of Russia. The U.S. and Russian materials will be translated and made available to students and teachers in both countries. Similar exchange programs are planned for the future. The National Science Foundation provided funds for the ARGUS project. The Association of American Geographers is overseeing the project. For additional information, contact Dr. Osa Brand, Educational Affairs Director, Association of American Geographers, 1710 16th Street NW, Washington, DC, 20009.

widespread presence of tobacco fields in North Carolina might be explained by a combination of climate, soil, landforms, political clout in Washington, cultural acceptance of tobacco use, and economic inertia. The explanation for the production of a different crop (corn) in a different state (Iowa) likely are very different.

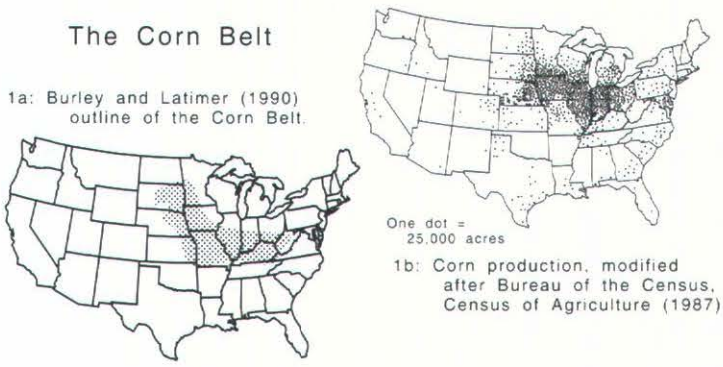


Figure 1: Maps can create different images of a place.

4) Analysis Backward. Students learn what happens when they apply theories in particular places. In addition to the theories and models developed by geographers, people in different regions also develop distinctive causal models. These ideas can influence behavior and create observable differences in human landscapes. For example, people in different regions of the United States have different ideas about taxation and the allocation of tax revenues. These differences result in great regional disparities in spending for schools, roads, welfare, and other public services.

5) Forward Evaluation. Students learn to assess conditions at a place and form opinions. Behavior and activity appropriate in one place often is unacceptable, or even dangerous, in another place. Students should be able form knowledgeable opinions about what occurs in different places. For example, plowing an Iowa field in long, straight rows can make a lot of sense, but doing the same thing up the side of a steep hill in Appalachia likely will have harmful economic and environmental consequences. Students can evaluate human activity in different places and evaluate the value and impact of that activity.

6) Evaluation Backward. Students learn to appreciate that geographic conditions can affect people's opinions. People in different places have different views, and these views influence the variety of human activities that exist in those varied places. Developing an awareness, tolerance, and appreciation of other opinions and lifestyles should be a primary objective of geographic education.

The linguistic model has considerable potential for improving geography education in the United States. If the linguistic model is a valid way of approaching geographic instruction, then maps should generate images of places, aid analysis of those places, and elicit judgments about the places. In short, the maps must help students create the mental connections between words, images, theories, and opinions that are at the very heart of geographic knowledge.

EVALUATION OF TEXTBOOK MAPS

Maps have three general uses: (1) navigating from one place to another, (2) measuring to gather quantitative information about a place or to compare quantitative information about two places, and (3) inferring information from symbols and patterns in order to visualize what a place is like (Board 1978). Maps are sources of information that allow students to generate questions and arguments, evaluate and test hypotheses, appraise the value of the information, and create impressions of places. Unfortunately, few young people learn to use maps for little more than getting from one place to another. They do not know what to look for, where to look, what questions can be asked, nor what kind of conclusions are possible when working with maps (Bartz 1970).

The instruction provided by social studies textbooks contributes to the generally poor map skills among students in the United States. Social studies textbooks are the primary tool for teaching map skills in U.S. classrooms. The textbooks create the curriculum framework for map study and furnish teaching methods and materials. Many educators, however, seriously question the adequacy of map instruction provided by the published materials (Askov and Kamm 1974; Downs, Liben, and Daggs 1988; Hawkins 1977; Petchenik 1985). Criticism of the map instruction focuses on poorly developed skill sequences, a weak understanding of children's perceptual and cognitive development, inadequate map design, and a general disregard for the value of maps.

Most map activities focus on locating and identifying objects, tracing routes, measuring distances, and making simple comparisons. These types of activities treat maps as simple reference tools in which students gather isolated pieces of information. Mapping activities that focus on "where is" questions reinforce the idea that maps primarily serve as spatial dictionaries (Castner 1987), doing little to create the images, analysis skills, or evaluation abilities that are an important part of geographic knowledge. This kind of activity creates a simplistic view of mapping and geography.

Social studies textbooks typically include a large number of maps, drawings, and photographs. The maps and other graphics, however, generally do a poor job of helping students associate words with features (to help create mental images) for a number of reasons.

Inaccurate maps create confusion and interfere with students' ability to associate words with geographic features and places. For example, most geographers would not consider northern Kentucky or West Virginia as part of the Corn Belt (Figure 1a). A student viewing this erroneous map would develop a very different image of the Corn Belt than would a student seeing the dot map of corn production (Figure 1b).

The repetitive use of maps is a second factor interfering with the creation of mental images. Students see some types of maps over and over (e.g., line maps of explorer's routes or iconic point symbol maps of minerals and products in an area), regardless of the textbook publisher. Maps from one publisher often bear a striking resemblance to maps in other textbooks. A single publisher might also use the same map at several grade levels. The end result is that students do not encounter the quantity and variety of maps they need in order to form images. This seems to be changing; some of the more recent textbooks included maps of interesting topics, such as tornado death days, fallout from nuclear testing, Ku Klux Klan membership, a Canadian view of North America (see Figure 8), and acid rain (Figure 2). The dearth of innovative and exciting textbook maps, however, remains a big problem.

A third shortcoming is the lack of attention given to maps in the written text. The books certainly contain a great number of maps (over 1,850 in the 39 textbooks reviewed), but the maps tend to be poorly integrated into the textbooks (Figure 3). The written text made no mention of over half the maps in the elementary level social studies textbooks that were surveyed. The books made some reference (a simple statement directing the students attention to the map) for 34.7% of the maps. The written text made detailed reference (described the map, provided instructions to help the student interpret the map, or compared the map to another map) for only 10.9% of the maps.

Textbook maps also contribute little toward improving students' abilities to conduct geographic analysis. Geographic analysis requires students to learn and apply theories; maps are valuable tools for this

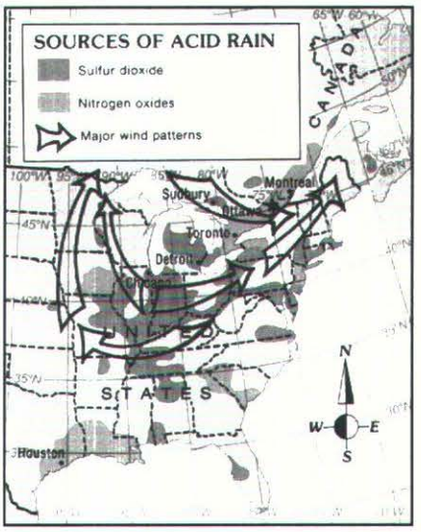


Figure 2: Maps are showing more interesting information (Boehm and Swanson 1992).

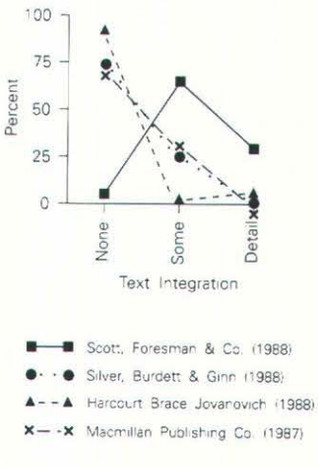


Figure 3: Integration of maps with text, elementary level textbooks.

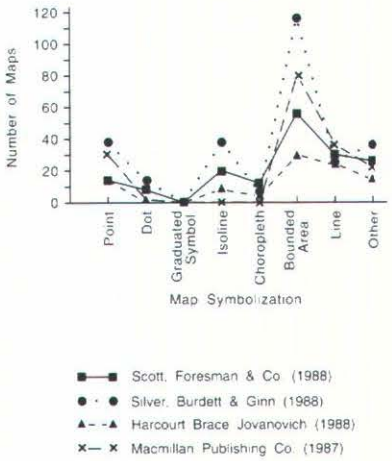
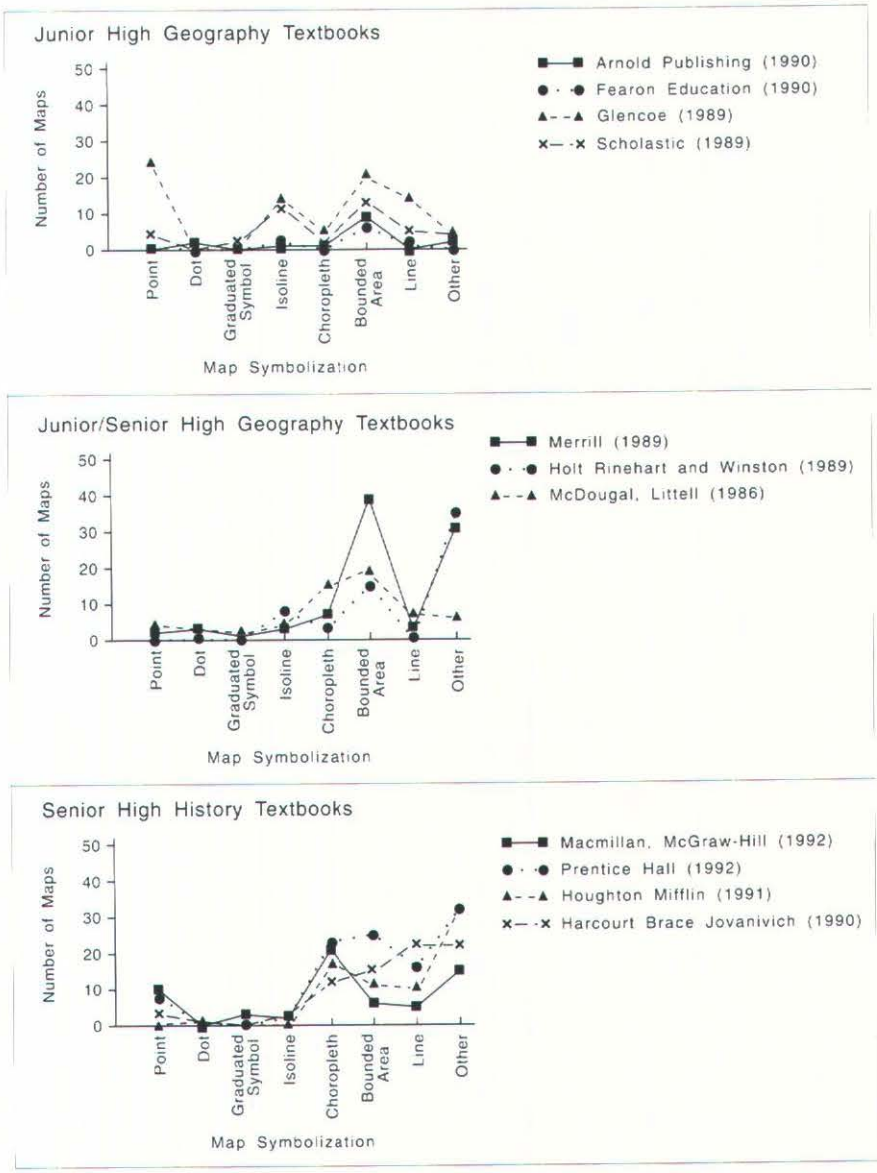


Figure 4: Map types in elementary school textbooks.

undertaking. Students see a variety of map symbolization in the textbooks, but generally have repeated experience with only a few types (Figures 4 and 5). Children in elementary school view bounded area maps (maps that show the actual area over which a phenomenon occurs) most frequently (40% of thematic maps) (Figure 6). Young children have little exposure to dot maps (dots or other point symbols show the distribution pattern of the phenomenon), isoline maps (line symbols connect places of equal value), or choropleth maps (area symbols applied to enumeration units such as counties or census tracts). Bounded area maps remain the most common form in junior and senior high geography textbooks (34% of the thematic maps). Choropleth maps, however, are most numerous in senior high history texts (bounded area symbolization fell to 18% of maps, choropleth maps accounted for 23% of the total). Almost all the books contained map skill lessons that introduced students to a wide variety of map types, but students seldom saw many of the map types outside of the skill lessons. The textbooks simply failed to use several map types on a regular basis. Consequently, students did not learn about the many map types available to help them understand and apply geographic theories.

Figure 5: Map types in junior and senior high school textbooks.



The textbook publishers' heavy reliance on a few map types (particularly, bounded area symbolization) might be due to the relative difficulty of mapping quantitative data. Quantitative data is often difficult to obtain, requires the cartographer to have a strong knowledge of data characteristics and data manipulation, and involves complicated design decisions. These are problems a graphics designer can avoid by using qualitative information. A few textbooks did use quantitative data widely (Backler and Lazarus 1986; Boehm and Swanson 1989; and Harper and Stoltman 1989 most notably), but overall, only about 18% of the maps depicted quantitative data (Figure 7). Maps of qualitative information certainly can be a valuable component of geographic analysis (Figure 8). However, qualitative information does restrict the possible types of analysis, and the map user must be aware of the limitations of these maps. Maps of quantitative data provide students with opportunities to undertake a wider variety of analysis procedures, to test a

greater range of theories, and to more closely approximate what geographers actually do.

In many ways, the issue about data types is somewhat of a non-issue, because the textbooks do a poor job teaching students about map analysis skills. Students encounter a limited number of analysis techniques. Typically these basic skills are: reading specific map types, location, scale, distance, direction, elevation, listing information found on a map, locating places on a map, and making visual comparisons. The same skills are repeated at many grade levels and seldom do older students learn any of the sophisticated procedures available to working geographers. Even geographic information systems, currently one of the most widespread analysis technologies, received little mention in the textbooks.

The textbook maps do little to help students learn how to evaluate information or places. The written text, skill activities, and maps seldom require students to do more than make simple comparisons or learn facts about a place. The maps encourage acquisition of geographic tidbits, not analysis and evaluation of the places under study. Students do not learn how to integrate information from maps in order to create an opinion of a place.

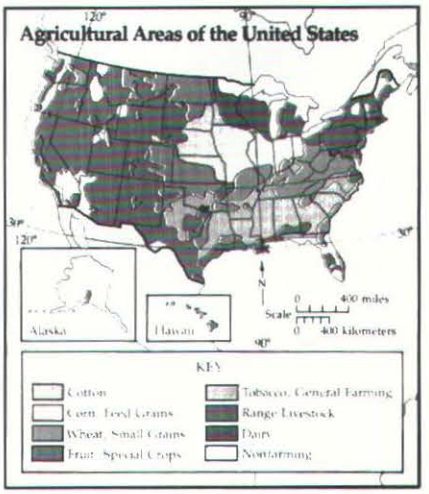


Figure 6: Bounded area maps such as this one are the most common textbook maps (Harper and Stoltman 1988).

Learning to evaluate maps as sources of information is an important component of geographic education that the textbooks typically overlook. Trained geographers and cartographers are aware of the many problems associated with showing spatial information on maps. Most students (as well as teachers and textbook publishers) simply assume that maps are accurate and they do not recognize potential problems. There exists a need to train map users how to recognize problems, and outright lies, on maps (Monmonier 1991).

DISCUSSION AND RECOMMENDATIONS

Textbook maps have a multitude of problems: inaccurate and repetitive maps, a limited number of map types, a scarcity of quantitative data, an absence of even simple map analysis techniques, and low expectations of what students should do with maps. These problems make it difficult for students to learn words for features (the concept of forward images), learn how words and features can vary between places (images backward), learn theories to explain what is in a place (forward analysis), apply theories in places (analysis backward), assess conditions and form judgments (forward evaluation), and examine how conditions affect opinions (evaluation backward). Despite the large number of maps, the textbooks give little attention to maps, treating them as isolated items rather than as tools of geographic analysis. Given the many problems of the textbooks, it should come as no surprise that many students consider maps to be boring and irrelevant to their lives.

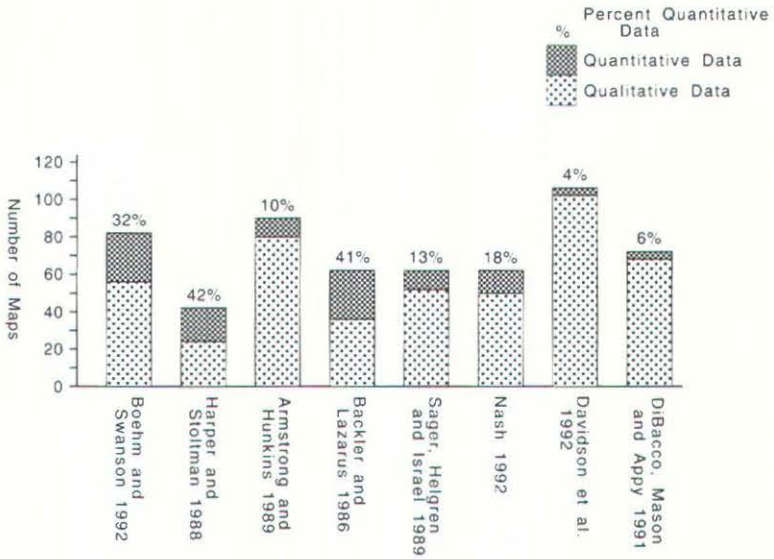


Figure 7: Data used for secondary level textbook maps.

The role of maps in geographic education is changing. In general, the textbook maps reviewed had many problems, but there were signs of improvement. The more frequent use

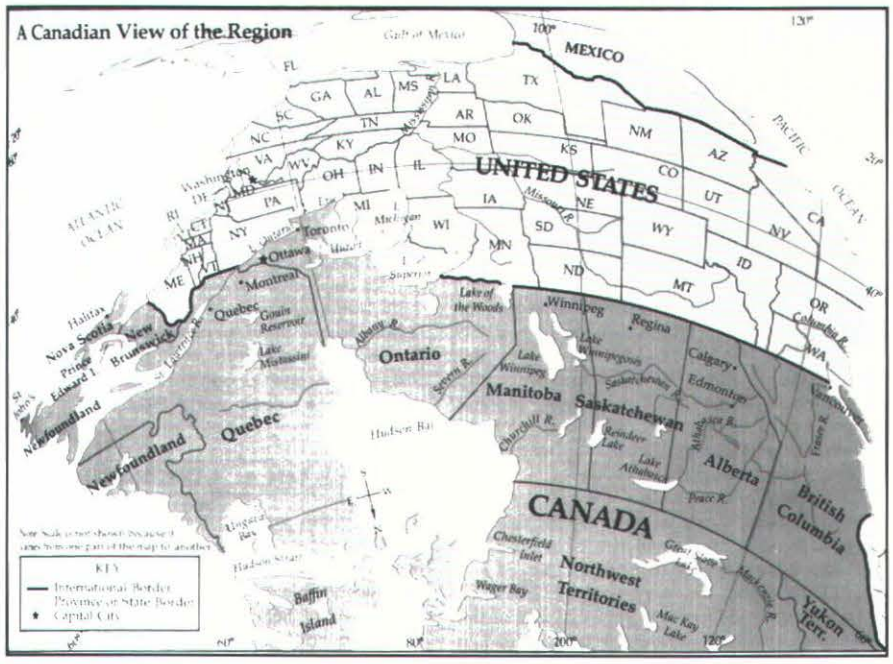
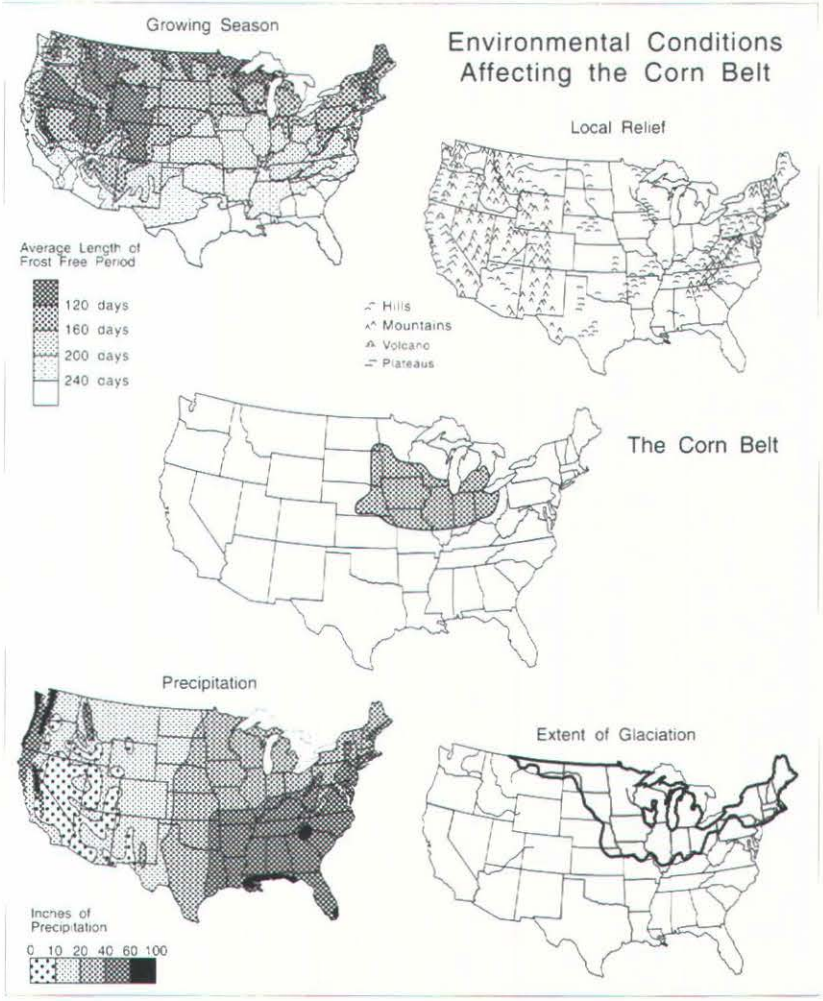


Figure 8: Different perspectives can add interest (Harper and Stoltman 1988).

Figure 9: Maps can aid the formation of mental images.



of quantitative data, a wider variety of map symbolization (including choropleth maps and cartograms), different projections and perspectives (Figure 8), and activities focusing on data categorization are positive developments. Several of the recent books, both in geography and history, made some effort to discuss the five themes of geography: 1) Location– Describing the absolute and relative position of a place; 2) Place– The physical and human characteristics at a location. The special features that distinguish one location from another; 3) Human-Environment Interactions– The relationships within a place. How people interact with and change their environments; 4) Movement– The mobility of people, goods and ideas. The interactions between people at different places; and 5) Regions– Areas defined by unifying physical or human characteristics. How regions form and change.

However, much more can be done to improve the role of maps in geographic instruction. Careful handling of data will help assure map accuracy, which, in turn, will help students create better images of places. It is also possible to add map information that will increase the richness of the images. For example, maps showing features that define the Corn Belt borders would add to students' mental images of the region (Figure 9). Cartographers should keep in mind the simple fact that maps can tell a story about a place. Judicious selection of maps can provide a wealth of information about a place (Figure 10), as well as help students see the differences between places.

The use of a greater variety of map symbolization is a simple step toward improving students' map analysis abilities. Students need to learn about the many ways to

show specific information on a map. Textbook maps also need to make greater use of quantitative data. However, a wider variety of maps and greater use of numerical data will not increase geographic abilities unless students learn how to perform analysis techniques. Students should learn analysis methods early and should use the skills often. A one-time exposure to a map type or analysis technique will have little impact on a student, but repeated application of maps and skills (at increasing levels of complexity) will improve students' abilities for geographic analysis.

The maps in Figures 9 and 10 are examples of the graphics included in the ARGUS materials. The ARGUS creators envisioned maps as a crucial part of the materials, and maps appear in all ARGUS components. Students see maps in the textbook and work extensively with maps in the activities. The teacher sees additional maps in the teacher's guide, along with information for interpreting and using the maps. Maps in the readings book reinforce images of the places and regions studied in the vignettes and activities. A preliminary count of ARGUS textbook maps indicated the presence of many map types (Figure 11); students working with the ARGUS materials will see a greater variety of map symbolization than they would find in a typical geography textbook. There is some variation in how often the different map types appeared, and some effort has been made to increase the number of underrepresented map forms (i.e., the number of isoline maps). Additional maps, using the many forms of cartographic symbolization, also appear in the activities. Students have the opportunity to work with and make all types of maps.

The maps in the ARGUS textbook make extensive use of

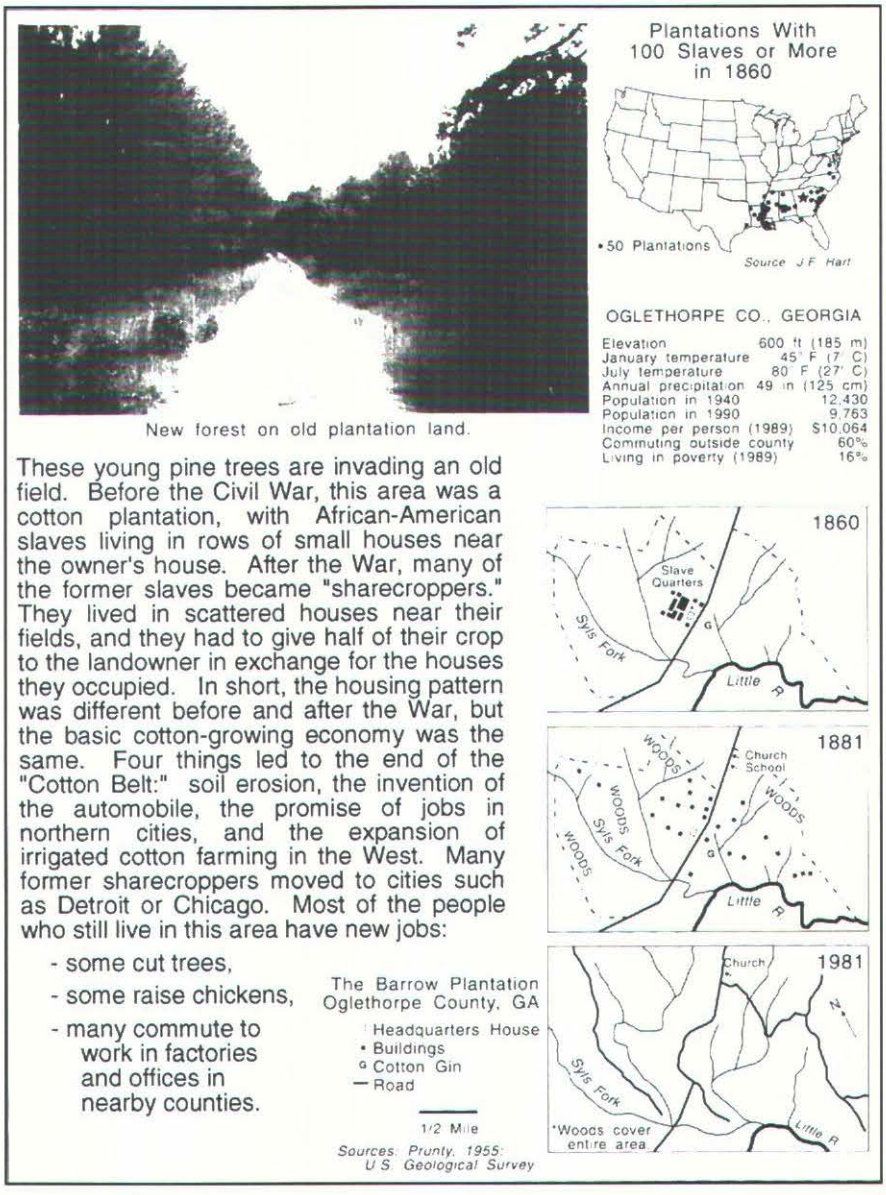


Figure 10: Telling a story about a place – an example of an ARGUS vignette.

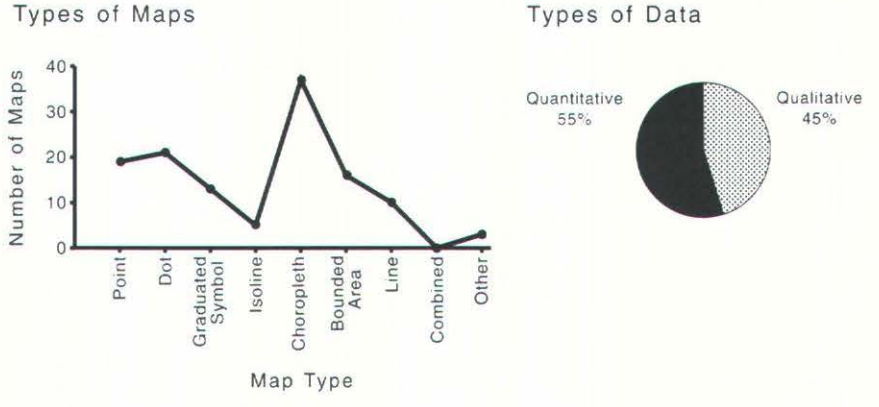


Figure 11: Thematic maps in the ARGUS textbook.

quantitative data (Figure 11). In the preliminary count of the ARGUS textbook, 55% of the maps used quantitative data, compared to an overall 18% of the maps in the surveyed junior and senior high school textbooks. Another important difference between the ARGUS materials and other geography materials is the repetition of the map skills. The students work with the different map types at many points in the ARGUS textbook and activities (not just once, as is the case with most social studies textbooks), each time increasing their levels of map understanding and skill.

The ARGUS materials provide students with opportunities to learn and apply geographic theories and methods. Among the many activities, students will compare maps (both visually and statistically), measure areas, develop and use sampling procedures, plan routes, use air photographs to draw land use maps, work with a model of agricultural planning, weight values to generate a locational index, divide an area into market regions, calculate a connectivity index between places, construct a profile of a landscape, construct maps to help support an opinion, and use a simple geographic information system. The students make use of a wide variety of map use and map making skills as part of their efforts to analyze and evaluate places.

Solutions such as using maps to tell a story, adding support information to a map, using quantitative data, increasing the quantity and variety of maps, and making frequent use of analysis techniques all play a part in helping students evaluate places.

Solutions such as using maps to tell a story, adding support information to a map, using quantitative data, increasing the quantity and variety of maps, and making frequent use of analysis techniques all play a part in helping students evaluate places. Students also need to understand how data is collected and manipulated, how maps are created, and how analysis techniques can be applied and manipulated. This means that students need to see and work with a lot of maps, to study and evaluate maps, to collect and map data, and learn how maps can be used to argue and state an opinion.

The suggested remedies put forth here seem very straightforward, but have considerable potential for improving geographic education. Existing textbooks generally treat maps as a minor part of geography (despite text statements to the contrary). The linguistic model provides a basis for giving maps the prominent place they deserve. The ARGUS materials attempt to redress many of the problems associated with existing social studies books and materials. Maps are at the very core of the ARGUS activities and readings. The ARGUS materials treat maps as important geographic tools. If handled well, maps can aid the formation of mental images, can increase the power of analysis performed, and can form and change opinions. In short, maps can help students of all ages think geographically.

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EDITOR'S NOTE

This paper won first place in the 1993 Association of American Geographers Cartography Specialty Group Student Paper competition.

RESUMEN

La habilidad de hacer, entender y usar mapas es esencial para aquellas personas que piensan en el mundo y sus alrededores. La falta de algunos niños de no hacer o usar mapas contribuye de manera significativa a la falta de conocimiento geográfico en el país. El "mapa lingüístico" (representación gráfica de las conecciones mentales entre palabras, imágenes sensoriales, conceptos abstractos y valores) es propuesto como modelo para evaluar mapas usados en materiales educativos. Una evaluación de textos de estudios sociales encontró que los mapas no promueven el aprendizaje en los tres niveles propuestos por el modelo lingüístico: imágenes concretas, análisis abstracto y evaluación de valores. Se examinaron problemas con los mapas de los textos y se hicieron sugerencias para usar mapas en materiales educativos.

RESUME

La capacité à élaborer des cartes, à les comprendre et à les utiliser est essentielle à tous ceux qui s'efforcent de réfléchir au monde qui les entoure. Le manque de connaissance de la géographie dans le pays découle du fait que les enfants ne savent pas dessiner les cartes ni s'en servir intelligemment. La "carte linguistique" (une représentation graphique des connexions mentales entre les mots, les images sensorielles, les concepts abstraits et les jugements de valeur) est proposée comme modèle pour l'évaluation des cartes utilisées dans les écoles. Une évaluation du manuel d'études humaines note que les cartes manquent de promouvoir la connaissance aux trois échelons proposés par le modèle linguis-tique : images concrètes, analyse abstraite et évaluation des valeurs. Les problèmes posés par les cartes du manuel ont été examinés; des suggestions ont été développées pour l'emploi des cartes dans le matériel éducatif.

cartography bulletin board

Cartography Labs at NACIS XIII

by Jim Anderson, Director
Florida Resources & Environmental Analysis Center
Florida State University

A wide variety of projects and techniques were displayed by university cartography labs at the recent annual NACIS meeting in Washington D.C. As an observer and participant in these poster sessions for the last several years, I have seen computer-assisted cartography (Macintosh and DOS platforms and large format and small format projects) become the norm rather than the exception. What is also of interest are the wide variety of clients that use cartography laboratory services, ranging from university faculty and state agencies to the private sector.

Although this once a year opportunity is very useful for those who are able to attend our meetings, the need exists for ongoing communication between cartography labs. I propose two ways in which to accomplish this. The first is the creation of an Internet listing for cartography labs in order to create an inexpensive vehicle that will encourage communication on a regular basis. If you are a cartography lab manager, academic cartographer, or other interested party and have access to Internet, please forward your Internet address to Jim Anderson at janderso@garnet.cc.fsu.edu along with a brief description of the type of work you do and the hardware and software you are currently using. If you do not have access to Internet please send me the information by mail and you will be included in future communications. A listing will be compiled and sent to those who respond.

The second way to increase communication and the exchange of ideas amongst cartographic laboratories is through this column in ***Cartographic Perspectives***. In future issues of ***Cartographic Perspectives*** I would like to include features on university cartography labs that highlight their activities, discuss their organizational structure, and list the hardware and software that they are using. To begin this dialog I offer a description of the cartography laboratory at Florida State University.

Cartography at Florida State University. The cartography lab at Florida State University was established 20 years ago as part of the Florida Resources and Environmental Analysis Center (FREAC). Although independent from the Geography Department, close ties are maintained through the employment of students and the teaching of courses. The lab employs two full-time cartographers and several student assistants. Additionally, we offer the opportunity for students to take Directed Individual Studies in computer and production cartography.

The lab is equipped with standard, traditional cartographic equipment including a process camera, contact frames, platemaker, Kargl Reflecting Projector, light tables, and darkroom facilities. Computer resources include two Macintosh IIci computers, a Centris 650, a Quadra 950, a Quadra 840AV, two 386 DOS Computers, and one 486 DOS Computer as well as laser printers. The machines are connected via Internet, which provides access to an HP pen plotter and HP color inkjet plotter.

The principal software available in the lab includes Aldus Freehand, Adobe Illustrator, Corel Draw, Azimuth, Adobe Streamline, Pagemaker, Aldus Persuasion, Superpaint, Adobe Photoshop, Authorware Professional, Macromind Director, and Sound Edit Pro. Access is also available to Intergraph software, ARCINFO, and GEOVISION through FREAC's GIS facility.

The objective of FREAC is to assist state and local government agencies in the areas of cartography, computer mapping, database development, geographic information systems applications, and public lands records. An equally important objective is to train university students in these areas through direct involvement in projects, providing real-world experiences. The laboratory also provides services to public agencies and university departments including: preparation of maps and graphs for publication, and typesetting and layout for books and brochures. During the past twenty years the lab has produced two four-color state atlases, a state water atlas, and several specialty atlases in addition to numerous other cartographic products.

At present, the lab is working on the development of a multimedia CD-ROM product based on the *Atlas of Florida* and new versions of the *Florida County Atlas* and the *Water Resources Atlas of Florida.* The revisions of the county atlas and the water atlas have created production dilemmas since the maps in both books were originally created by traditional manual techniques. Some maps from the old atlases can be reproduced with no changes, in other cases minor changes are needed, and in a few instances maps need to be completely redone. With a great deal of experimentation, we have been able to create correction negatives from an imagesetter using Aldus Freehand that register perfectly with our manually produced negatives from the original county atlas. We are still working to

resolve screen percentage discrepancies between photographic screens and computer generated screens, however, this appears to be a viable solution for the time being. We are also able to scan the text from the previous atlases using character recognition software, and edit and format it using desktop publishing software, however, some manual compositing will be required to combine the computer generated and manually generated negatives for printing.

Although the lab produces most maps today using computers, the task of converting all of the previously produced maps to a computer format is cost prohibitive and in many instances we still find it useful and necessary to employ the "old" manual production techniques (although it is difficult to find people who possess these manual skills). Another trend we see taking place is that as computer mapping software becomes more readily available at a reasonable cost, the demand for cartography lab services has declined from many sectors. Unfortunately, the software does not make a "cartographer" and the quality of maps being produced is certain to suffer when the cartography lab is bypassed.

To ensure our viability we are expanding our interests into two relatively new areas. The first is multimedia. In cooperation with IBM, Apple, and the State Department of Education, CD-ROMs are being developed for distribution to the schools in Florida. The initial effort is an adaptation of the *Atlas of Florida*, which will not only display many of the maps and photos from the atlas, but will contain additional photographs, video, and audio. Future projects utilizing CD-ROM technology are being discussed with state agencies and university faculty members. We are also working with the Florida Geographic Alliance in developing curriculum materials, with the Earth Science Information Center as a state affiliate to disseminate cartographic information throughout the state of Florida, and in the development of GIS applications. We also actively participate with state agencies in researching and developing specific strategies, methodologies, and implementation plans for improving public access and usability of digital spatial data sets and maps.

In conclusion, the cartography lab at Florida State University has remained a viable operation for over twenty years. This has required a willingness to change to new technology and explore ways to reach non-traditional clients by reaching beyond the university and state government. ❑

map library bulletin board

ESIC: A Key to Earth Science Data

by Marsha L. Selmer
Map Librarian, Associate Professor
University of Illinois at Chicago

The Earth Science Information Centers (ESICs), operated by the U. S. Geological Survey (USGS), National Mapping Division (NMD), are "primary sources of public information on the cartographic activities of the Division as well as the earth science products of the Survey's Geologic and Water Resources Divisions." The Map Library Bulletin Board for this issue is devoted to a brief history of ESIC and an overview of the specialized cartographic and geographic reference tools available to members of the ESIC network.

History

For many years, the USGS maintained several Public Inquiries Offices (PIOs), a network of earth-science information offices whose primary responsibility was to provide information about the USGS and its products. In addition, they provided a link to information held by State and other federal agencies. The PIOs were located at the USGS' National and Western Regional Centers and in the downtown areas of major cities, where they were convenient for walk-in customers. The PIOs also answered mail and telephone inquiries.

In 1974 the USGS established the National Cartographic Information Center (NCIC) as a national service to make information on cartographic, geographic, and remotely sensed data of the United States more accessible to both the general public and to federal, state, and local agencies. The NCIC's goal was to provide centralized access to all types of cartographic data generated by the federal government, state and local agencies and some private producers. The initial NCIC offices were located at the Survey's national headquarters and at its regional mapping centers. As the NCIC expanded its data collection at the state level, it established, beginning in 1976, a formal network of state affiliated offices to provide local access to information. State affiliates were responsible for acquiring and disseminating cartographic data within their states and for coordinating this activity with their respective Mapping Center NCIC office. Initially, the NCIC network was limited to one affiliate per state with most being a state governmental agency. By 1989, the USGS

had decided to merge the PIO and the NCIC offices into the Earth Science Information Center (ESIC) network. The USGS also continued to expand the network by increasing the number of affiliates within each state, and by accepting map libraries into the network. For example, the Map Section of the University of Illinois at Chicago (UIC) Library became a member in July 1993. The process was initiated by sending a letter of application to the Chief of the Mapping Center in whose region UIC is located. Final acceptance into the ESIC network was accomplished through a "Memorandum of Understanding" that was agreed to by both the USGS and the University's Board of Trustees.

Cartographic and Geographic Resources

In order to fulfill their roles as earth-science data providers, ESIC members maintain a reference file of information brochures, posters, booklets, fact sheets, and price lists for USGS products; and data bases in microform or compact disc format. In addition, ESIC members maintain a supply of the titles most frequently requested that may be distributed to their clientele. Many of these paper titles are already found in Federal Depository Library collections, e.g., "Catalog of Cartographic Data," "NAPP, The National Aerial Photography Program," "Catalog of US GeoData," and "Topographic Mapping" (see Superintendent of Documents number I 19.80: or Depository Item number 619-G-02). Digital data on compact disc, e.g., the "1:100,000-scale Digital Line Graphic (DLG) Data, Hydrography and Transportation," was also made available to depository libraries (see Superintendent of Documents number I 19.120: or Depository Item number 621-J). Although useful in the map library setting, other ESIC data bases that use proprietary software cannot be distributed through the Depository Library Program. The data held by each State ESIC member are generally limited to the state in which the ESIC is located. Depending on the format of the data base (microfiche versus compact disc), information on other states may also be available. An annotated list of the resources unique to ESIC members is listed below:

USGS 15' and 7.5' topographic quadrangles (microfilm)

High quality black and white 35-mm microfilm of all editions of the maps in these series. Although this microfilm is not distributed through the Depository Library Program, it is available for sale to the public and may already be available in your local map collection. Microfilm provides a compact storage medium for the information contained in out-of-print maps, but one should remember that reproductions are generally smaller than the original scale and that the loss of color may make feature interpretation problematic.

Map and Chart Information System (MCIS)

A system for organizing the ESIC's information about domestic maps and charts, this file contains the name, scale, publisher, publication, revision and survey dates, content and geographical bounds of each map in the file. Information in the MCIS file can be retrieved by any map descriptor as well as by area of coverage. State ESIC members receive this data base in microfiche format in sequence by type of product, latitude/longitude, or State/county. The MCIS microfiche also serves and an index to the microfilm reel on which the topographic maps listed in the first item above are located. A nationwide version of the MCIS appears as a file on the APSRS compact disc discussed in the next section.

Aerial Photography Summary Record (APSRS)

The core of this data base is built on a systematic compilation of aerial photography projects from the following Federal agencies: USGS, the National Aeronautics and Space Administration, the National Ocean Survey, the Environmental Protection Agency, the Department of Agriculture, the Department of Defense, and the Tennessee Valley Authority. This is supplemented by the addition of aerial photography projects from other Federal, State and local agencies and private corporations. Access to projects held by the EROS Data Center is provided by map index graphics, produced in microfiche, showing available photographic coverage, by category. The complete file of detailed information about every aerial photography project and the name, address, and phone number of contributors, is available in the APSRS data base produced on compact disc.

Geographic Names Information System (GNIS)

This data base provides primary information for all known places, features, and areas in the United States, identified by proper name, and consists of three files. GEON, the most frequently used, is the primary and largest data base in GNIS. It contains 60 files representing each state, territory and outlying area, the District of Columbia, and certain specialized files. Each State file contains, as a minimum, the names compiled from the USGS topographic maps series, but many State files contain information from other source materials.

To learn the location and phone number of the State ESIC office nearest you contact the national ESIC office at 1-800-USA-MAPS. ❑

reviews

SOFTWARE REVIEW

Geocart
version tested 1.3.1. $499, academic pricing $449. From Terra Data, Inc., Bramblebush Croton-on-Hudson NY 10520. Phone (212) 675-2971.
System requirements: A Macintosh computer with a floating point unit, System 6.0 or greater, and 1 MB of memory. Supports 1-bit (monochrome), 8-bit (256 colors) or 32-bit (millions of colors) monitors.

Reviewed by
David W. Tilton
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Geocart is often referred to as a map drawing program, but to do so is a bit misleading as it lacks several critical features that would be expected in a stand-alone full-featured map drawing program. For example, it does not contain any drawing or text tools, nor does it have the ability to generate fills for polygons. However, Geocart's primary purpose is to generate base maps for importing into draw programs such as Aldus FreeHand and Adobe Illustrator, or into paint programs such as Adobe Photoshop, and in this role it performs admirably. It also serves as an excellent resource for both teaching and learning about map projections. Included with the program are two excellent books on map projections: *Introduction to Map Projections* by Porter W. McDonnell, and *An Album of Map Projections* by John P. Snyder and Philip M. Voxland. In addition, the Geocart manual devotes two chapters to explaining the basics of map projections within the context of using the program.

Without question Geocart's primary strength is its ability to generate map projections, and in fact one could argue that this is Geocart's real calling. In all there are over 100 map projections accessible from the main menu: 10 cylindrical, 31 pseudocylindrical, 13 conic, 20 azimuthal, 14 lenticular, and 21 miscellaneous. Eight of the projections were developed especially for Geocart by Daniel Strebe, its author. New with version 1.3.1 is the ability to create "tilted perspective" projections which create "space photo" type maps. This projection was used for the cover of this issue of *Cartographic Perspectives*. In addition to generating the projections, Geocart allows you to interrupt certain projections, and to perform longitudinal, latitudinal and transversal rotations. One interruption option allows you to generate globe gores with 24 segments. Geocart also provides the ability for users to enter coordinates for drawing great circles, great circle routes between two points, small circles, point locations and rhumb lines. The depth of Geocart's projection generating capabilities is demonstrated by the provision of ten standard ellipsoids to choose from, and by its ability to generate a Tissot indicatrix for a projection.

Two features make Geocart especially useful for generating base maps: its database capabilities, and its export capabilities. Geocart provides databases for US cities, world capitals, two levels of detail for world cities, hydrography, international boundaries (updated to show the new borders for Czechoslovakia, Yugoslavia, and others), and a US boundaries database that includes both state and county boundaries. In addition to the databases provided, you can import your own custom text databases, Microcam databases, or MapMaker lat/long native and text formats. Once you have created the base map, Geocart provides the option of exporting in PICT (Macintosh Picture format), Adobe Illustrator 1.1, or EPSF (Encapsulated Postscript Format). Further options allow PICT files to be saved as either bit maps or as objects, and lines can be converted to bezíer curves before exporting to EPSF and Adobe Illustrator 1.1 formats. All export formats allow you to set the output resolution so that the complexity of the file can be controlled. One additional feature, especially helpful for exporting files to draw programs, is that related lines (e.g. the graticule, coastlines etc.) are grouped prior to export. When the file is opened in the draw program, characteristics such as line weight and color for the grouped lines can be easily changed.

With the exception of a few minor glitches in the tutorial, I found the manual well thought out and written. Geocart is relatively easy to learn and use, and I was able to take advantage of most of the programs features after doing the tutorial, followed by an hour or so of exploring the In-Depth chapter while using the program. Users not familiar with map projections will probably need to allow more time to learn Geocart. I strongly recommend reading chapters 3 (Essentials) and 6 (Which Map Projection is Best). Both chapters are well written and do a good job of providing novices with a basic introduction to map projections within the context of using the program. The example maps provided in chapter 7 are helpful and well worth taking a look at.

I used Geocart to create figures 1-13, 25, and 26 for John Snyder's article in this issue of *Cartographic Perspectives*, and it worked quite well for the task. The projection gazetteer (chapter 5 in the manual)

provided a quick reference for locating the projection I needed, and the Center command from the Projection menu presents an intelligently designed dialogue that made centering the projection extremely easy. Setting the resolution of the graticule was straight forward, however one seemingly minor, but very nice feature deserves mention; the ability to trim the meridians at the poles. Because of the large number of illustrations in the article, each projection had to be reduced to fit in one column. By trimming the meridians, I could significantly reduce the convergence blobs at the poles which can hide detail and be visually distracting. Exporting the files to FreeHand was painless, and having the graticule and coastlines grouped separately made it very easy to assign them separate layers, and to change line weights and color. My only criticism is that I had to complete and/or close many of the polygons in order to fill them. This is a time consuming, tedious task in FreeHand, worse in Illustrator. Even though these were for the most part simple illustrations, closing polygons accounted for a major amount of the time spent in preparing the figures. For more complex jobs, such as a choropleth map, it might be easier to retrace the base map than to complete and close polygons. According to Paul Pugliese, President of Terra Data Inc., steps are being taken to correct this problem in the more detailed databases included with Geocart. This will be a welcome improvement that should greatly increase the value of Geocart to cartographers.

In general, I found Geocart to be intelligently designed, well documented and easy to use. I tested it on a 50 Mhz accelerated Mac IIci, a Quadra 950, and a Centris 650, and it performed well on all three machines. With the exception of its inability to create base maps with closed polygons, it fulfills its mission as a map projection/base map generator and addresses many of the needs of professional cartographers and designers. It also is an excellent resource for teaching and learning about map projections. ❑

Don't miss

NACIS XIV

August 11-13, 1994
Ottawa, Canada

held jointly with the
Canadian Cartographic Association
see call for papers on pages 40 - 41

BOOK REVIEW

Cartography: Thematic Map Design, Third Edition
Borden D. Dent. Dubuque, Iowa: Wm. C. Brown Publishers, 1993. 427 pp, 10 color plates, 270 black-and-white figures, 45 tables, 2 supplements. $57 cloth. (ISBN 0-697-13589-6).

Reviewed by
Cynthia A. Brewer
Department of Geography
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Borden Dent's textbook on thematic cartography is now in its third edition. I have used all three editions as texts for my introductory cartography courses. I also reviewed the manuscript for this new edition, so I am in the lucky position as a reviewer of having detailed information on changes in the text. I am impressed by the thorough edit that it received. Changes have been made throughout the text to fine-tune wording and update information as well as remedy minor errors. Because the book has been available in earlier editions since 1985, I will focus mainly on the changes in this new edition.

Overall, the book is an excellent text for teaching thematic cartography. The author uses the language of our discipline accurately and the chapter glossaries are helpful. The topics covered are well chosen and treated in appropriate detail. Basic research and alternate approaches are covered at levels appropriate for novice cartographers. The numerous references and the bibliographies supplied with each chapter highlight the scholarly literature of the discipline. The design of Dent's figures and map examples is excellent, which are essential in a text with the aim of teaching graphic excellence. With this new edition, many figures have been remade with a cleaner style and 15 new maps have been added, replacing dated examples.

The new edition is well organized into four Parts: Thematic Mapping Essentials, Techniques of Quantitative Thematic Mapping, Designing Thematic Maps, and Map Production and Reproduction.

Part I contains five chapters that introduce thematic mapping, describe projections and their use for thematic mapping, preview general characteristics of geographic phenomenon and symbolization, and review basic quantitative measures. The first chapter has been improved by moving an introduction of map design into Part III where it is more appropriately addressed. Welcome additions are discussions of ethics in cartography, global positioning systems, the resolution against rectangular world maps, the state plane coordinate system, the 1990 U.S. census, Canadian statistical references, and the use of remotely-sensed data. The presentation of the cartographic communication model has also been simplified.

Thematic symbolization techniques are treated in detail in Part II with six chapters; choropleth maps, dot maps, proportional symbols, isarithms, value-by-area cartograms, and flow maps. These chapters were well done in earlier editions and required few changes. Unclassed choropleth maps and the design of proportional circle maps are discussed in more detail than in the prior editions. New and up-to-date map examples sprinkled through these chapters are choropleth maps on crime, proportional symbol maps of cancer rates and 1990 populations, and cartograms of traffic congestion and American Indian populations.

Part III offers a detailed discussion of map design with four chapters that include visual hierarchy, figure-ground, map lettering, color perception, and color use. Consistent with new trends in cartography, visualization figures more prominently in the introductory material. The visual-hierarchy information is improved by completing the chapter with a reworked map example (a humorous error in the caption acknowledges a student at Geography State University). A discussion of automated map-label placement is added (with a parallel elimination of information on map lettering machines). The chapter on color, which includes ten color plates, has been augmented with Munsell-based printed color charts and extension of the review of color scheme types.

One revised chapter and one new chapter make up Part IV. The chapter on manual techniques has been retitled and improved with added sections on non-impact printing, photo-direct and digital platemakers, and proofing (information on manual non-scribing techniques has been reduced). The largest change in the book is the addition of Chapter 17, Digital Map Compilation and Desktop Mapping. Dent explains the basics of how maps are made by real businesses with real budgets on computers you can actually get your hands on. The text makes sense of elements of desktop computer mapping such as CRT function, affordable peripherals (such as digitizers and scanners), digital base map products (such as TIGER and Digital Chart of the World), and the myriad of file formats.

A switch from manual to computer-assisted mapping does not substantially change the lecture component of introductory cartography because students still need to understand basics such as projections, scale, classification, and isolining. Dent includes current software information but

appropriately sets it aside from the information on basic principles. A new appendix with reviews of five software packages has been added and separate boxed descriptions are distributed through the chapters that focus on symbolization. I would like to suggest a similar treatment of manual production techniques in these chapters (for example, the discussion of cross-screening in the chapter on choropleth mapping should be boxed).

The text is enhanced with new appendices and supplements. In addition to the new appendix of software reviews, an appendix has been added on defining constants for the 1983 State Plane Coordinate System. The appendix on census definitions and sources has undergone major revisions. The text is also sold with two supplements: *Maps and More, Your Guide to Census Bureau Geography* (a 16-page booklet published by the U.S. Bureau of the Census) and *Map Projections* (a poster from the U.S. Geological Survey). One disadvantage is that students that purchase used copies of their texts do not usually receive the supplements and, thus, it is awkward for the instructor to assign them as readings unless they require that the student obtain these items separately from the Census Bureau and the Geological Survey.

One overall negative impression is that the text is sometimes too wordy. For example, the introduction contains too many definitions that are of tangential relevance. They are not wrong, but they are not important to teaching cartography (example: "geographic cartographer" is not a necessary distinction). Likewise, the discussion of the communication model is obfuscated by distinctions between map author, map designer, and cartographer and distinctions between map reader, map viewer, map user, and map percipient. Students new to cartography will miss key concepts as they wade through the excess subtlety. This overly defined terminology is particularly unconvincing because the author does not stick with these distinctions in the remainder of the text and reverts to standard usage.

In summary, the third edition of Cartography: Th*ematic Map Design* is an excellent text for introductory cartography courses that emphasize thematic mapping. It is well written and contains detailed explanations of the nuts and bolts of thematic symbolization techniques. It is also suitable for courses on advanced map design that include color use, typography, and production techniques. Dent's text is comprehensive and accurate, and it allows students to master both the analytical and aesthetic challenges of mapping quantitative data. ❑

BOOK REVIEW

The Cadastral Map In The Service of The State: A History of Property Mapping
Roger J.P. Kain and Elizabeth Baigent. Chicago & London: The University of Chicago Press, 1992. 423 + xix pp., maps, appendix, notes. $49.95 cloth.
(ISBN 0-226-42261-5).

Reviewed by Margaret Pierce
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In *The Cadastral Map in the Service of the State*, Roger Kain and Elizabeth Baigent present a survey of the diverse forms and uses of state cadastral mapping throughout three centuries of history. Acknowledging that a cadaster may be defined generally as any property map, Kain and Baigent focus their study specifically on state and public property mapping as an activity apart from private cadastral mapping.

Initially, Roger Kain became curious about cadastral history while writing *Tithe Surveys of England and Wales* (Cambridge: Cambridge University Press, 1985) with Hugh Prince. As a result, he spend over five years conducting research with Elizabeth Baigent to write this new book. The two authors frame their inquiry in the context of Mark Bloch's work on cadasters in the 1930s. They note that although their research, like Bloch's, is concerned with rural cadastral mapping, they maintain a different purpose to their inquiry. Whereas Bloch looked to cadasters "as sources for reconstructing the past rural histories of European countries," Kain and Baigent define the context of their book to be "concerned with the relationships between cadastral mapping and contemporary society: we view cadastral maps as instruments for effecting state policies with respect to landed property and for exerting political and economic control over land." The authors do not examine urban cadasters in this book because of the difference in purpose and use from rural mapping, however, they note that they are in the process of constructing a similar history of urban cadastral mapping.

The story of the cadaster is the story of the state's representation of property when such representation is perceived to be a useful vehicle for power. Beyond this broad purpose, the uses to which cadastral maps have been put are diverse, and it is this diversity of use which the authors seek to analyze. The volume is divided into nine chapters which systematically examine the development of cadasters in different regions of the world between 1607-1907.

In the first chapter, Kain and Baigent provide a chronological overview of cadastral traditions, beginning in antiquity. Following a decline in property mapping in favor of the deed during the medieval period, the cadaster returned in the fifteenth century in the form of private estate mapping. Private use developed into public and ultimately state use during the sixteenth and seventeenth centuries. Though the strength of property mapping was first perceived to be in its ability to record tax information, the maps were soon used for storing other kinds of information relating to state control of property.

Chapters Two through Seven examine, consecutively, the cadastral surveys of the Northern and Southern Netherlands; Sweden, Denmark, and Norway; Germany, the Austrian Habsburgs; France; and England and Wales. Each state mapping project is distinguished by the century in which cadasters flourished or declined, the scale of the surveys, and the political contexts in which each project arose. For example, in Chapter Two the authors point to the strong, early cadastral tradition of the Dutch polder maps in the seventeenth century. The need for property maps was particularly strong in the "polder" areas of Northern Netherlands, where flooding from the sea necessitated the construction of polders and dikes. Additional factors creating a strong environment for cadastral development were the high value of arable land, the rise of capitalist agriculture, and a high population density.

By contrast, in Norway, Sweden, and Denmark, Kain and Baigent focus on monarchical power as the primary factor responsible for the rise of cadasters. Particularly in Denmark, monarchy required maps for centralization and dissemination of power, and for generation of tax revenues.

The chapter on Germany has particular importance as the first published study of cadastral material of the German region. Citing the strong tendency of German geographical literature to focus on the local region rather than on more nationalistic studies, the authors have compiled diverse source material to create a well researched, initial effort in this area. The result is a story in which military conflict figures as the primary context in which cadastral mapping arose. The need for further research work on German cadastral traditions is emphasized by the volume's Appendix, "A regional guide to German cadastral literature."

In Chapter Six, the French cadastral map is framed by the eighteenth century debate over tax reform, and the need for graphic documentation illustrating the relations between individual taxation and individual property. The impetus towards a national survey was epitomized by the "cadastre parcellaire," conceived by Napoleon as "a natural adjustment in matters of land ownership to the new legal code of post-revolutionary France." Taxation also motivated the mapping projects of England and Wales, although this was not to occur until the nineteenth century with the Tithe Commutation Act of 1836. After a history of ambivalence towards the graphic image in matters of property documentation, the English and Welsh created a "high point of Western cadastral achievement."

In Chapter Eight, the history of cadastral mapping is examined as a tool of colonialism in North America, Australia, New Zealand, and India. The authors compare two classes of colonial maps, those drafted prior to settlement, and those drafted after settlement. In addition, they discuss the relative uses to which the surveying techniques of rectangulation, triangulation, and metes and bounds were put.

In the final chapter, the themes of colonial history are pursued more formally, and in greater detail. Kain and Baigent look independently at how the maps were used for the purposes of reclamation, resources management, enclosure, colonization, and taxation. Clearly presented, the themes offer a useful guide for approaching the maps as a linked body of work.

The organization of Kain and Baigent's book makes it ideally suited for reading comparative histories of cartography. The story of each cadastral tradition may be read individually, or as part of broader, cross-cultural themes in cartography. There is a great deal of cross-referencing, encouraging the reader to look backwards and forwards in the text.

The volume contains plentiful reproductions of the maps, with accompanying locator maps which establish geographic and chronological contexts. It is the look of these half-toned reproductions which is perhaps, initially, the most compelling aspect of the book for anyone browsing its pages. The diversity of cadastral forms is awesome, ranging from the painted forests of Norwegian property maps, to the grand coats of arms of Dutch polder maps, to the cool lithography of Austria's Franciscan cadaster. The spectrum of materials, typographies, and patterns all serve to lead the reader into the text to discover the motivations and methods behind the graphics.

Also striking is the interdisciplinary magnitude of writing cadastral history. The breadth of extant research is enormous. Each chapter of regional history carries its own list of acknowledgments–this book is the result of the research efforts of many people. The scope of cartographic material

covered is thus equally large, which the authors estimate at millions of maps in 125 cadastral surveys.

Simultaneously, the book highlights the need for far more work to be done on these maps. Some of these gaps are pointed out by the authors, as in the case of the German cadasters. There are other instances, however, in the book where the reader is left with the feeling that there is a great deal more to be said, particularly in the case of the comparative analyses of the final chapter. For example, the authors search for the kinds of historical and geographic circumstances which of necessity would result in cadastral mapping. After rejecting both the development of survey techniques and the establishment of the state as potential candidates for primary catalysts for cadastral projects, the authors conclude that it is only recognition of maps as a form of power which can be considered an inevitable precondition for a cadastral map. "To look for one, all-sufficient precondition for its use would miss the point. As an instrument of power, the cadastral map can be understood only in the context of the balance of power and balance of interest in each area and in each period."

Tantalized by the implied reference to the scholarship of J.B. Harley, the reader awaits some elaboration of this claim. The book ends here, though, leaving one to return to the chapters of the individual states with newly unanswered questions in mind, and attempt some critical elaboration for oneself. In some instances, particularly the cartography of Western Europe where a strong research base exists, this can be an interesting process. Where there is not such an extensive research tradition, particularly in colonial mapping, one feels a gap of analysis. Though the authors note that the cadastral process primarily involved "either erasing the precapitalist indigenous settlement or confining it to particular areas," there is no mention of indigenous people with respect to the individual mapping projects, and the reader must take it on faith that such indigenous erasure did occur.

Overall, Kain and Baigent have created a valuable resource for the study of cadastral history. The scope and clarity of the text, and the emphasis on including a large number of sample photographs of the different maps, encourages the scholar of cartographic history to search further for the meanings which link the maps both between and within the projects of the state. The sweeping nature of the subject material promises that it will be used as a touchstone for future research in cadastral analysis. The authors' forthcoming study on the history of urban cadastral projects sounds equally interesting and important. ❑

ATLAS REVIEW

Atlas Japan: in English and Japanese
Tokyo: Teikoku-Shoin, 1989. 55 pp., maps, tables, index. $20.95 paper (ISBN 4-8071-2705-5). Available from MAP LINK, 25 E. Mason, Suite 201, Santa Barbara, CA 93101.

Reviewed by Robert J. Werner
Department of Geography
University of St. Thomas

This is a delightful small atlas with a wealth of information. There are 10 general reference maps and 21 pages of thematic maps, many of which are wonderful and highly informative.

The general reference maps have excellent colors and symbolization. The legends are particularly outstanding. At the beginning of the atlas is a half-page legend with the full 112 map symbols used in the general reference maps. Each of the five maps showing subsections of Japan, and the metropolitan area maps, also include legends with the map symbols most used on that map. The result is that the relevant part of the legend is present on each page a reader is viewing. If the map reader is interested in all of the symbols, however, some amount of back and forth page-flipping is necessary between a map and the legend page with all the symbols. The extensive legend is particularly detailed with regard to industry and land use; showing such features as shrines, temples, historic sites, hot springs, transportation, district boundaries, energy, and minerals. The 10 general reference maps show Japan and its neighbors, Japan as a whole, Japan divided into five sections, and three metropolitan areas (Tokyo, Kyoto-Osaka-Kobe, and Nagoya).

The thematic maps are rich in information and often cleverly designed, such as a raster map of daytime and nighttime population in downtown Tokyo, and a graduated-symbol map of Tokyo's suburban housing growth. The thematic map section has 98 maps and graphs in 21 pages. The maps are thorough, covering basic physical geography, economic production, industrial structure, resources, and population. Readers interested in urban Japan will find the thematic maps especially informative. The maps of physical geography include geology, geomorphology, vegetation, soils, and climate (with climato-graphs). Major thematic maps are often illustrated with examples at larger scales, e.g. the map of natural disasters has insets showing a landslide in Sendai, damages by a 1978 earthquake, and crop failure due to the coolness of the 1980

summer. Several thematic maps also portray Japanese agriculture, fishing, mining, forestry, changes in industrial structure, foreign trade, and trends in industry and commerce. Of particular interest to those concerned with the urban geography of Japan are the series of maps of population, urban structure, examples of metropolitan growth and urban development, and over populated and under populated areas in Japan.

The atlas has two pages of statistical data and a 12 page index. Place names on the maps are given in English and Kanji and the index is in English, Katagana, and Kanji. Statistical data are population by city over 40,000; temperature and precipitation for major cities; and population, area, and composition of the labor force, by prefectures. The glossary of geographic word endings at the beginning of the atlas is also informative, e.g. that the ending *hama* means beach or shore, *shima* means island, or *yama* means a mountain or hill. The glossary has 90 such geographic suffixes.

A reader of this atlas can spend many hours discovering one delightful map after another, such as a graph showing the vertical distribution of vegetation, the expansion of Kobe by the filling in of Kobe harbor, or the distribution of dialects.

The atlas does have a few shortcomings. Sometimes the choice of what maps to include in the atlas seems eclectic. It is hard to imagine many users of this atlas needing a map of Mandarin oranges in Yawatahama-shi, or textile wholesale companies in Mino'o-shi. Also, there are no notes on the map projections used, and no map of elevation. The authors might have included a Landsat mosaic to help readers understand the extent of urban area in Japan and the distribution of natural environments. All in all, however, there is an enormous amount of information in 55 pages and for a small atlas of Japan, this is an excellent choice for researchers and educators. The size of 9.5" x 13" x .13" fits easily in a briefcase and the 12 oz. weight makes it suitable for travel. ❑

announcements

GIS Videos

AM Productions is pleased to announce the release of a series of videos dedicated to GIS. The video tapes are unedited documentations of presentations given at leading GIS/LIS/Photogrammetry and Remote Sensing Conferences. A list of titles and prices is available from AM Productions, Inc., 48 East 6th Avenue, Vancouver, BC, Canada V5T 4P4; (604) 875-9927, fax (604) 875-9971.

Aerial Photography Taken of The Mississippi River Flood

The National Weather Service (NWS) asked the Nautical Charting Division's Photogrammetry Branch (PB) to provide high-quality vertical metric photographs for the hydrologic study of the Mississippi River as well as site-specific coverage of the Des Moines, Iowa to St. Louis, Missouri, region. Dr. Thomas Carroll, Chief of the NWS National Operational Hydrologic Remote Sensing Center in Minneapolis, Minnesota, was the principal point contact for all project requirements. Video coverage was obtained from the NOAA Aero-commander 500S (Shrike) aircraft. The NOAA Citation jet aircraft was used by PB to obtain the high precision vertical metric photographs as well as provide flood damage assessment flights for Dr. Elbert W. Friday, Jr., Assistant Administrator for NWS. For more information contact: Robert Rodkey, (301) 713-2669.

Traveling Exhibition of Literary Maps and Photographs at Library of Congress to go on tour

The *Language of the Land: Journeys into Literary America* examines the nation's literary heritage through pictures, literary maps, photographs evocative of specific regions of the country, and quotations from authors who have created their own lasting images of America in their works of prose and poetry. Developed by the Library of Congress Interpretative Programs Office in cooperation with the Geography and Map Division and the Center of the Book in the Library of Congress, the exhibition was made possible by a generous grant from the Lila Wallace-Reader's Digest Fund. Additional support was provided by the James Madison Council of the Library of Congress.

The exhibition was on display at the Library of Congress from August 1993 to January 1994 and at the Currigan Exhibition Hall in Denver, Colorado (from Sept. 1 - Oct. 30, 1993), and the Susquehanna Art Museum, Harrisburg, Pennsylvania (from Nov. 14, 1993 - Jan. 8, 1994). The exhibition will now travel to libraries, museums, and other institutions around the county under the auspices of 16 state Centers for the Book. The grant from the Lila Wallace-Reader's Digest Fund will support educational programming at each exhibition site. The sites include:

North Dakota Heritage Center
Bismarck, North Dakota
(Jan. 30 - March 26, 1994)

Broward County Main Library
Ft. Lauderdale, Florida
(Feb. 13 - April 9, 1994)

Christensen Center, Augsburg College
Minneapolis, Minnesota
(April 17 - June 11, 1994)

Des Moines Main Public Library
Des Moines, Iowa
(May 1 - June 25, 1994)

Connecticut State Library
Hartford, Connecticut
(July 3 - Aug. 12, 1994)

Oklahoma Center for the Book
Oklahoma City, Oklahoma
(July 17 - Sept. 10, 1994)

Michigan Library & Historical Center
Lansing, Michigan
(Sept. 18 - Nov. 12, 1994)

Kentucky Department for Libraries
Frankfort, Kentucky
(Oct. 2 - Nov. 26, 1994)

Virginia State Library
Richmond, Virginia
(Dec. 4, 1994 - Jan. 28, 1995)

Oregon State Capitol
Salem, Oregon
(Dec. 18, 1994 - Feb. 11, 1995)

Kansas Museum of History
Topeka, Kansas
(Feb. 19 - April 15, 1995)

Indiana State Library
Indianapolis, Indiana
(March 5 - April 29, 1994)

Seattle Public Library
Seattle, Washington
(May 7 - July 11, 1995)

California Library and Courts Building II
Sacramento, California
(May 21 - July 15, 1995)

Using the metaphor of a journey, ***Language of the Land*** tours the literary landscape of the United States. The core of the exhibition begins with quotations that provide impressions of the United States by "roving authors" who toured the country, such as Walt Whitman, Mark Twain, John Steinbeck, and William Least Heat Moon. These quotes link four regional sections (Northeast, South, Midwest, and West), each of which is introduced or framed by images and other quotes that strongly evoke that region. Within each regional section, a map is used to highlight a famous literary journey associated with that region, such as Huckleberry Finn's travels down the Mississippi River with Jim and the Joad family's trek to California in Steinbeck's the *Grapes of Wrath*. Quotations from the authors who created works that are identified with a specific region are also included in the individual sections.

Microfiche of Maps from the National Archives of Canada

MicroColor International in cooperation with the National Archives of Canada has announced the release of a selection of maps on color microfiche. The maps represent some of the most historically significant maps in their collection. They include the 19th century bird's eye views of major cities from 1875 to 1903, land ownership maps, and a topographical survey of the Rocky Mountains. In addition to the Canadian maps, MicroColor also offers the Samuel Thornton Sea Atlas from the New York Public Library, and in cooperation with the British Ordnance Survey, more than 200 maps covering current street maps of major cities in the UK and the Landranger Series. For a complete catalog of available maps call 1-800-666-4054. ❑

cartographic events

THE MAP LIBRARY IN TRANSITION

On October 18 & 19, 1993 a special conference, The Map Library In Transition, took place in Washington D.C. The conference was jointly sponsored by the Congress of Cartographic Specialists Associations and the Geography and Map Division of the Library of Congress. The goal was to exchange ideas and information about the changes and challenges that digital cartographic technology was creating for libraries. Some members of NACIS attend the conference, however, many could not be present. We are, therefore, publishing in its entirety, the transcript report from the conference as a service to our members. The report was written by contributions from Edward H. Dahl [ED], Kathryn Womble [KW], Marsha Selmer [MS], Cathy Moulder [CMo], Trudy Bodak [TB], Carol Marley [CMa], and Alice Hudson [AH] compiled by Alberta Auringer Wood.

Report on The Map Library in Transition

The organizations participating in the Congress of Cartographic Specialists Associations are the American Congress on Surveying and Mapping, the Association of Canadian Map Libraries and Archives, the Committee of Southeast Map Librarians of the Association of American Geographers, the Geography and Map Division of the Special Libraries Association, the International Society of Curators of Early Maps, the Map and Geography Round Table of the American Library Association, the Map Online Users' Group, the North American Cartographic Information Society, the Northeast Map Organization,

and the Western Association of Map Libraries.

The meeting opened with long lines at a registration desk as over 100 attendees picked up their badges and final program. Fortunately, there were several people helping with this operation, and it was completed in time to start the meeting only a little bit off schedule.

Ralph Ehrenberg, Chief of the Geography and Map Division introduced Dr. Deanna Marcum, Director, Public Services, Collections Management 1 [Special Collections], Library of Congress, who welcomed the participants to the CCISA conference and thanked both the organizers and sponsors. Dr. Marcum mentioned the vigorous support of the Librarian of Congress, Dr. James Billington, for the concept of an "electronic library" which helps bring about "a library without walls." A major initiative to this end was the Library of Congress (LC) American memory project, launched in 1989. This is an ongoing project which places library materials in electronic form on optical disk. Dr. Marcum also described the LC's demonstration laboratory in which people can look at various technologies which have possible relevance to libraries. She also noted that the Geography and Map Division had in the past year created a GIS specialist position, now occupied by Gary Fitzpatrick.

Gary Fitzpatrick (co-chair of the organizing committee) followed with a few announcements and outlined the events to take place during the next two days.

Then Dr. Christopher Baruth, American Geographical Society Collection, University of Wisconsin, Milwaukee (co-chair of the organizing committee), who gave an overview of the conference goals and program. Chris noted that this conference was an outgrowth of a meeting that was held five years ago in Chicago of representatives from the sponsoring organizations. At this meeting two of the expressed goals were to encourage greater communication which was accomplished by the institution of MAPS-L by Johnnie Sutherland of the University of Georgia and to hold an international meeting which is occurring over these two days. What Baruth called "the digital revolution in cartography" challenges map librarianship. Information areas in libraries which are not well understood and have high space requirements are vulnerable. Digital cartography requires more advanced equipment, with higher associated costs and training. The aim of the conference was to provide map librarians with information on this revolution and to work towards an accord on needs and service delivery. [ED, CMo]

The first session entitled "Where Map Libraries are Today and Where They Are Headed" was moderated by Dr. Baruth with Colleen Beard of Brock University as the first speaker. A main challenge for map librarians is to create a reputation as experts about digital spatial data. After investigating options for her own library, she sees the functions of the map library as acquiring and providing digital data, electronic atlases, and custom maps or maps on demand, and providing some means for geographic information system (GIS) analysis. Map librarians must decide the types of data to collect for their users and the methods of access they will use, and they must gain the skills and knowledge to work with different digital formats, the off-loading of data files and some level of geographic data analysis using GIS.

Deborah Lords, University of Utah, asked whether there is a future for map librarians. She is concerned that library education is not keeping up with new technologies available, such as Gopher and Archie. She believes that the American Library Association should be setting standards for library education. Ms. Lords pointed out her concern about the "envelope of disenfranchisement" — those who do not have access to any of the new technologies. If librarians do not decide how to handle the challenges posed by new technologies, someone else will, and they will probably charge fees to their users. Librarians must actively move forward. "Stagnation is death."

Thornton P. (Patrick) McGlamery from the University of Connecticut spoke about map libraries as places. He asked the question, "Will anyone come to the map library anymore?" He encourages map librarians to begin thinking in terms of spatial data rather than maps. We can view maps as artifacts (form) or as carriers of spatial data (function). Mr. McGlamery found some useful ways of thinking about the transition from paper to electronic data in Michael Buckland's book Redesigning Library Services. System networking means the map library is not just in the basement anymore. A local area network (LAN) becomes a file server on another network. An analogy Mr. McGlamery uses in describing two computer hard drives in his collection is that they are like map cases. They store a lot of maps, they cost about the same as a map case and they're square like a map case!

People will come to the map library more for training than for data. Libraries will continue their role of providing cataloging and location devices for data and continue to provide reference service. Sophisticated data users will demand easy ways to get the data they need. Less sophisticated users will need training. How well we describe the data and point to it has been a traditional role for the

librarian and will continue to be in the future.

Gary North of the U.S. Geological Survey spoke next. Data is coming to map libraries on CD-ROM and this trend will continue. The Government Printing Office (GPO) must decide how to reproduce and distribute large quantities of this data to the library community. Data producers should work on ways to improve file structures for data and some government/private industry creative research and development agreements have begun in order to do this. New electronic metadata systems are emerging. Map librarians should think about plotting their collections graphically in addition to traditional descriptive cataloging. Standards must be set as more joint data production projects go forward. Map librarians must anticipate and plan for changes such as not receiving paper maps anymore, for changes at the GPO, and for people accessing information from their homes. Changes in the electronic information world have just begun. Librarians must define their role and not let it be defined for them by engineers and scientists.

Johnnie Sutherland at the University of Georgia envisions his map library installing a LAN hardwired to the campus mainframe with 4 workstations, CD-ROM drivers, 2 gigabytes of hard disk space and laser printers. As map librarians, we will use set ups like this to access hundreds of different sites for data. Mr. Sutherland will be a spatial data specialist, who will train users on GIS software and how to download data. He predicts that other specialists will continue to need help finding the data they need. He will employ a scanner system to make his large paper collection more useful for those working with digital data. Each library must determine and implement what level of service it can afford.

Linda Zellmer, University of Wyoming, is planning a new library and has developed a list of questions she is using to move forward in utilizing digital data in the map and earth science library. The choice of a library GIS should be based on the library's goals. A full GIS system would provide the information and technology needed to use and analyze all types of spatial data. A partial system would provide access to spatial data in all forms without analysis capabilities. Some criteria for selecting a library GIS are that it be user friendly, capable of being modified easily to accommodate new data sets, have a reasonable cost and be able to perform library-related functions. Research opportunities in this area include testing various systems against the criteria developed to select them, developing user friendly interfaces so that patrons can use the system with little assistance from library personnel and developing library-related applications. [KW]

After a short break, Diana Rivera of Michigan State University chaired the session on "Reports on Initiatives." This was begun by Alberta Wood who reported on the "GIS in Libraries Survey" that had been organized by the Congress of Cartographic Information Specialist Associations (CCISA) and co-funded by the Association of Canadian Map Libraries and Archives and the North American Cartographic Information Society. The survey was undertaken to see how well libraries were handling GIS and digital data and to provide a benchmark for future studies. Most respondents were from American academic libraries, and of the total responding, only 46 percent held digital data. The most frequently cited reason for the absence of digital data was the lack of funds. For additional information on this survey see the archives of Maps-L and the reports published in the journals of map librarianship.

Four initiatives currently underway at the Library of Congress, Geography and Map Division, were discussed by Ralph Ehrenberg, Division Chief. They are:

1) Establish a GIS reference capability through the creation of a GIS specialist position and the acquisition of GIS software and supporting hardware. This will allow the Division to create maps on demand for the U. S. Congress.

2) Use GIS technology to create graphic indexes for the over two million sheets in the Division's map series collection that lack sheet level control, and integrate the graphic and bibliographic control of the collections.

3) Assist in establishing and distributing standards for digital data and metadata by participating in the work of the federal interagency working group charged to deal with these data.

4) Establish a Center for GIS and move the Division from a paper to an electronic environment in its service to users beyond its Congressional constituency.

CCISA coordinator, Christopher Baruth, noted the associations and representatives currently participating in the CCISA. As a non-organization, and therefore, not funded, the CCISA must depend on its constituent groups for future direction. Recent initiatives included the GIS in Libraries Survey and the planning for this conference.

Larry Carver discussed the

goals of the "ARL Geographic Literacy Project," a joint initiative of the Association of Research Libraries (ARL) and the Environmental Systems Research Institute (ESRI), which is designed to educate and equip libraries in the provision of spatially referenced data in all formats. Sixty-seven American libraries were accepted in the first two phases of the program; negotiations for the third phase in Canada are underway. Participating libraries must own the hardware needed to support data sets from companies such as ESRI, GDT, WESSEX, DEC, and National Decision Systems. [MS]

After the lunch break, Dr. Deanna Marcum chaired the Keynote Speakers session. The first speaker was David Beddoe, Regional Manager, Washington Office, ESRI, Inc., who spoke on "Georeferencing and Mapping of Non-cartographic Information." Beddoe's topic was the implications of using GIS on data which formerly would not have been considered cartographic. Converging technologies, the combination of network computing and GIS, open new vistas and extend what information can be considered geographic. He emphasized that GIS is very multimedia now—data can be conventional maps, images or georeferenced data sets. Beddoe estimated that the U.S. federal government has approximately 12,000 databases. Forces influencing further GIS development are: privacy, free public access, cost recovery, copyright and commercial use. Marketing is an exciting growth area for GIS, as businesses use the technology to make better decisions and track user needs. Beddoe predicted that the map will become the index and GIS the front end to locating and using all spatial data. GIS users will geographically assemble data from all sources. His vision is that GIS belongs in every library, and eventually preschoolers will be accessing geographical information.

His talk was followed by "Paper Maps in an Electronic World" by Barbara Fine, President, The Map Store, Inc., Washington, DC. Fine spoke as the representative of international map vendors and addressed the future of the paper map. Basically, she felt the paper product will disappear by the beginning of the 21st century. Computer games have now replaced commercial maps as learning tools. Quality and resolution are not yet the same but will be soon. In the past five years, every commercial producer of road maps has gone for the ease, speed and economy of electronically generated versions. Ten years ago, the "clear type" line of products was dominant for business and reference use; today most lines have been discontinued and made obsolete by the microcomputer. Fine concluded that the commercial map business is in decline, and that many vendors are becoming antiquarian map dealers instead.

The third keynote address was on "Geographic Information in the Research Library of the 21st Century" by Larry Carver, Map and Imagery Laboratory, University of California, Santa Barbara. Carver called upon experiences in forming corporate partnerships to develop the Map and Imagery Laboratory, in order to formulate his vision of the role of GIS in the research library of the future. GIS hold the "seeds for the electronic library of the future." He predicted that within 10 years the speed of development in GIS will be vastly faster than in other technologies, and the present bottlenecks on the "national electronic information highway" to dense and huge datasets will be removed. Also in 10 years, data compression and exchange will be vastly improved by fibre optic distribution cables. Libraries must redefine their services to accommodate these developments. There will be no hours of service, as information will always be available. The information specialist will require new kinds of expertise, and teams will be necessary to provide an interface for users of digital data. Internet is at present very ad hoc; libraries can provide better defined access and standards. Permanent access is needed but not necessarily ownership, and libraries should take responsibility for unique data rather than duplicating holdings. Libraries fit into the "big business" of information delivery in terms of consistency and standards, and responsibility for information heritage. Research libraries must consider cost recovery as a method of providing service to non-primary clients. Adaptability is not prevalent in this community, but vision is essential now for survival. Carver advocates that we help each other, pool resources, and identify special collections for preservation and cost sharing. In the future it will not matter where data resides, and we must work with systems designers to develop flexible systems locally while also taking advantage of distant resources. Map librarians must create a technical support group to evaluate, test, produce and teach, but from the information and library perspective rather than from that of the vendor.

The last keynote was by Dr. Ron Abler, Executive Director, Association of American Geographers, who spoke on the "Essential Skills for GIS Competency in the Year 2000." Abler talked about GIS curriculum necessary to prepare students for entry into a $15 million rapid growth industry. His research indicates that emphasis should be on geography and general attributes. Most current curricula offer a single GIS course, one per year, with no prerequisites, emphasis on software training and digitizing. As re-

cently as 5 years ago, there were no journals and no courses. Abler expects gradual abandonment of the teaching of specific software, with curricula focus changing to manipulation, analysis, decision making and other managerial emphases. There will be more education, less training, more emphasis on analytical uses, map design, forecasting skills and ethical issues. Abler described this as GI "Science" rather than "Systems." He noted that training in network navigation will be essential for GIS in 10 years. [CMo]

On Tuesday morning, October 19th, the first session was chaired by Ralph Ehrenberg on "The Federal Geographic Data Committee and the Federal Depository Program: Prospects for the Map Library of the Future." The first speaker was Michael Domaratz, Executive Secretary, Federal Geographic Data Committee (FGDC), USGS, who opened this session by giving a review and status report of the activities of FGDC, such as establishing a national spatial data infrastructure. A copy of the FGDC newsletter issue 2, Summer 1993, was distributed at the conference, and it includes an outline of these activities. FGDC newsletters are available by email request to gdc@usgs.gov.

He was followed by Elizabeth Mangan, Head, Data Preparation and Files Maintenance Unit, Geography and Map Division, Library of Congress, who is on the FGDC Standards Working Group for developing the metadata standards. She described the work of the committee, such as the distribution to various librarians of the contents standards from which they received two feet thick worth of pages of comments. She felt that the description should be independent of the form or media. She noted that there were at least ten issues unresolved. The FGDC newsletter issue 2, Summer 1993 also provides more information about the Spatial Metadata Standard.

The next speaker, Sheila McGarr, Chief, Depository Program, Government Printing Office, addressed the GPO's role in the future with respect to map deposits and the difficult choices that have to be made in times of downsizing and economic constraints. There are 53 full deposit libraries in the U.S. and hundreds of partial depositories. All must make the deposit collection publicly available and provide user assistance; the program is based on the principle that the public has a right to information which the government has collected. McGarr indicated that GPO is a distributor rather than a publisher, and has no influence over format. At present, 60% of the information they distribute is microfiche and 1% is digital. CD ROM is becoming the medium of choice for spatial data. The system configuration being recommended for USGS data is: 486 PC, 4mb RAM, GIS software, plotter. Libraries may only be able to select the "Digital Ortho Photo Quad" for their state. Reinventing Support Services #2 recommends that GPO be an executive agency. GSA would then handle printing and the Superintendent of Documents would go to the Library of Congress. With this situation, it was difficult to tell what GPO's role would be.

Larry Carbaugh, Chief of Special Information Products, Data User Services Division, Bureau of the Census, followed up on Sheila's theme about the kinds of decisions and choices that must be made and future requirements for census data products. He emphasized that they need input from users. He pointed out that they had produced 10,000 block level maps in 1980 and none in 1990 as they developed digital files. All maps are now electronic and plotted on demand. There are now over 150 commercial softwares available to access TIGER files. Carbaugh speculated that libraries will have to charge the user for map production and data analysis. A 486 is not fast enough; there is 100mb of data for Los Angeles county alone. The Bureau of Census will produce block face statistics in CD ROM format rather than microfiche.

Lastly, Millington Lockwood, Deputy Director, Joint NOAA/USGS, Office for Mapping Research, outlined the work being done at NOAA, and he addressed some concerns about digital data distribution. He commented that four or five agencies produce maps showing the land/water boundary with the oceans, and that the shoreline is "rarely coincident" on USGS and NOS charts. They are trying to coordinate with USGS to eliminate this problem. He predicted that in less than ten years there will be no paper nautical charts! The Joint Office goal is a multipurpose GIS which supports many other applications, e.g. data visualization. Lockwood recommended Surfer software from Golden as useful for entry-level GIS, and commented that issues of data documentation were becoming more important than the data itself. CD ROM is the best distribution option at present, but the eventual goal is on-line real time update. Paper indexes to hydrographic charts are also gone, to be replaced by a prototype electronic bulletin board. Libraries should prepare to print on demand, as end users will still request paper copy. In principle, NOAA will maintain everything they produce, but how archival material will be treated in digital format is still unknown. [TB,AH,CMo]

After lunch there was a two hour block set aside for "Demonstrations of U.S. Federal Geo-

graphic Information Systems Applications." In one of the wrap-up sessions of the conference it was said that, "GIS is too important a topic to be left in the hands of the GIS industry." No more will it be, to judge by the informative GIS demonstrations for the map information community. Participating agencies included the Bureau of the Census, Department of Defense, Environmental Protection Agency and the Soil Conservation Service. We saw the capabilities of various systems including Grass, Intergraph, Arc Info and a related product, ArcView 1.

The most compelling demonstration was undoubtedly that of EPA, in the cause of environmental equity and/or justice. A population and characterization tool has been developed for the use of various EPA agencies. The application sifts through EPA data sets and census information, to estimate and characterize populations in circular areas around locations such as hazardous waste sites, toxic release facilities and monitoring sites. Information can be viewed using Arc View or other tools, such as E Map. We looked at a minority neighbourhood (over 85% Afro-American)) in Baltimore, Maryland, and what we saw was not healthy. In addition to environmental hazards, there was only one hospital in the area, and very few schools. We were able to find the congressional district lines and identify the congressman. We learned a lot about this neighbourhood in a short amount of time. It is clear that GIS technology is an incredibly powerful tool for assessing environmental quality.

The U.S. Army Corps of Engineers, in conjunction with its Construction Research Laboratory and the Cold Regions Research and Engineering Laboratory (CRREL), demonstrated a decision support system prototype for flood prediction and assessment. We looked at recent data from the Mississippi watershed. Another prototype application was a global commons decision support system for sensitive area route impacts. This particular study evaluated the environmental risks associated with different standard shipping routes, to transport a cargo of chemical weapons placed in West Germany during the Cold War. Proposed destination, a "safe" incinerator site on an island in the Pacific.

Resources Automated Management System (RAMS) currently maintains in its GIS approximately fifty data layers for the Patuxent River Naval Air Station in Maryland and the Chesapeake Bay region. It supports users with responsibilities for environmental protection, natural and cultural resources preservation, security, emergency response, disaster preparedness, range and aviation safety, and facilities management. Edward Air Force Base demonstrated a siting system for the base, which also includes environmental layers.

We finished off with the Mill Creek Project, Walla Walla District, Washington, the first water resources project in the U.S. Army Corps of Engineers to fully use a GIS. A complete information system has been constructed for Mill Creek, which can be used at different scales and in different combinations for synthesis, analysis, display and preservation by all agencies within the district. Data has been used, for example, by the Hydrology Branch, Real Estate Division, as well as by members of the public like the Camp Fire Girls.

If these demonstrations are typical of what is going on out in the "real" world, then GIS is going public, and quickly at that. The map information community is facing a real challenge in disseminating this information. I hope that we are in the right place at the right time to make a significant contribution in getting GIS technology to the people, and that things will not be left in the hands of the GIS industry! [CMa]

To conclude the business portion of the conference, Edward Dahl, National Archives of Canada, chaired the "Reports from Discussion Groups and Open Microphone." The first to report was Joan McKean of Education Affairs Division of NOAA who had chaired the group on "Toward Defining Training and Education Strategies for Map Librarians." There were 16 attendees. The areas of concern were: a) access, b) role of librarians, and c) budget considerations. Some of the highlights were: Librarians are the information brokers and advocates for the public interest. Librarians need to illuminate and make careers more relevant; do homework, learn the jargon and concepts, develop a knowledge base, read the literature, take a course. Offer to coordinate a GIS group on campus or in your community schools. Track library schools and get them to update the curriculum. The group summation was that "GIS is too important to society to leave it to the GIS industry."

Melissa Lamont of the University of Connecticut was the discussion leader for "Communicating with Library Directors about GIS, Remote Sensing and the Map Library." Diana Rivera, Michigan State University, reported for the group. There were 19 attendees. She reported five concerns: 1) lack of attention and funding for map collections, 2) downsizing of staff and space problems, 3) explaining GIS to Directors, 4) opposition to GIS in Library, and 5) defining level of library services. Solutions suggested included networking among ourselves, within the library and with academic departments on campus, and with state and local user groups; directors need to know wide use and

applications and how they benefit the library. Improve visibility by using products already in house, such as Streetatlas USA or PCGlobe, in reports, presentations and displays. Report statistics on use of GIS, time may be important as reference questions are more complicated and time consuming. Communicate with the director the level of service you need. Present the library as middle ground between academic needs and information producers, a neutral resource to share; learn politics and cultivate GIS advocates. Communicate with the director regarding level of service to ensure support; specify and be able to explain why equipment is requested/needed, equipment requests should support a specific service. Get outside persons to communicate the value of your collection to your director; impress visiting dignitaries; bring in neutral parties to assess the collection's strengths, worth, direction; use experiences of comparable and respected institutions.

Grace Welch of the University of Ottawa reported on "Toward Defining the Technical Requirements for a Map Library in the Year 2000" at which 12 were in attendance. This group arrived at no definitive answer. Technical changes come so fast that there is a constant need for new equipment which may be out of date in two years. Some libraries in this group did not have any equipment at all, while some were in the ARL GIS Literacy Project, and some were navigating the Internet. The group expected to see a lot fewer paper maps by the year 2001, and map libraries will require electronic equipment which will vary in quantity depending upon the funds available. One conclusion was that access is required to the Internet, or its successor, such as a data network using broadcast technology which requires large storage devices. One workstation is still one person access and can tie up the entire collections; multiple workstations and LANs are required. The CD- ROM is an interim and will disappear. The key to all our futures is metadata and making data easy to find. Improved Gopher systems are needed, as well as output devices, such as color printers and plotters. We will need a user foolproof interface. A basic workstation needs to be defined.

The last discussion group on "Inventories and Services: Looking at the Map Library of the Future" was reported by the discussion leader, Jim Minton, University of Tennessee. This was felt to include collection development and management and could only look ahead a maximum of five years. There should be a well defined mission statement to put in front of your administration which would include the digital aspect. Post your selection policies on the local Gopher. Develop ties with departments, regional and provincial/state agencies. Scan historical collections or provide special access tools for them. Develop policies on access and amount of time that can be spent using equipment. Paper map acquisition will not be a primary concern. The services of reference, teaching, interlibrary loans, on-demand mapping will take more time and more terminals. If there is only one terminal, the whole collection is tied up by one user. Develop training handouts, manuals, and computer tutorials. Use Internet for the transfer of data via ILL. Determine who are your users (primary, secondary and tertiary) and allocate your time carefully.

Following this presentation, Ed moderated a question and answer session. Jim Minton commented on terminology, advocating "cartographic information center" versus "map library." Will there be map libraries in the future? User friendly interfaces make for a lot of choices. New functions as a result of new technology, what is a librarian? Johnnie Sutherland noted that there is an intensive use of time and map files to know what is out there. How much time should be spent training people to use the equipment or should you do it for them? Colleen Beard felt that the main function should be to acquire and provide access to information. Can we develop recommendations or specifications for workstations? Reference was made to an "Administrative Notes" which recommended a 486, 8-16 meg RAM, 100-200 meg hd. The library of the future: archival collections, search center, service center for those who need products. A mission statement is required which gives the concept of operations and is being forced by government agencies and map stores. Do we categorize users by the amount of time spent on them? Someone noted that 1/3 of users are outside agencies, such as environmental consulting firms, who are money making, and we should be charging them. It was mentioned that for data outside the U.S. there are heavy licensing fees; such costs will require fees. Some problems with reliable data were noted. As a model for the future, it was noted that for a library that is a patent depository, when the library administration advertised this fact, they were overrun by users. People come to the library as a neutral locale, but it will have to recover costs. Models are needed for charges for time, services. Charging for services means limiting services to the groups that can pay. If you find yourself spending 10 hours per week working for some company, you will develop a fee for service very fast. There was discussion of tools or analysis; teaching how to use or finding the data. It was felt that all special

format libraries will face this soon. What are cartographic specialists to do? Redefine the profession? Create a new profession, philosophy and policies. Pat McGlamery noted that map collections are typically small units of much larger organizations, and we compete very poorly. For these issues we need the sanction of some national organizations to provide funds to study issues. For the first time, at this conference we had a variety of folk discussing in collegial fashion. We have been too splintered in individual professional organizations. Problems have been given form for the first time here. Someone noted that librarians would become vendors and creators.

The discussions were interrupted for a short while by a fire alarm requiring leaving the building from our sixth floor location (a sprinkler head broke in the parking garage). At the end of the discussions, Chris Baruth thanked the other members of the steering committee (Gary Fitzpatrick, Patrick McGlamery, Johnnie Sutherland, and Alberta Wood), and noted that the level of discussion all along has brought out the best in all of us. The steering committee met over lunch, and we hope to see a publication or proceedings come out of this meeting, in addition to this report. There was discussion regarding another conference with the suggestions of having one in 2, 3 or 4 years time and perhaps on another theme. [AH,CMo]

The conference ended with a reception in the Montpelier Room sponsored by the Geography and Map Division of the Library of Congress. It had been an interesting and invigorating meeting! ❑

EVENTS CALENDAR 1994-95

1994

February 18 - 19: ***International Map Trade Association European Conference and Trade Show.*** Bournemouth, England. Contact: Mike Cranidge, 5 Spinacre, Berton Lane, Barton on Sea, Hampshire BH25 7DF England.

March 29 - April 2: ***90th Annual Meeting of the Association of American Geographers***. San Francisco, Ca. Contact: Association of American Geographers, 1710 16th Street NW, Washington D.C. 20009-3198, (202) 234-1450.

March 31 - April 1: ***7th Annual GIS Conference (TSU/GIS '94)***. Towson State University, Towson, Maryland. Contact: John M. Morgan, Geography and Environmental Planning, Towson State University, Towson, MD 21204-7097; (410) 830-2964.

June 5-8: ***GIS in Business '94 Conference & Exposition***. San Francisco Hilton and Towers, San Francisco, California. Contact: GIS World (303) 223-4848.

August - 7-8: ***Symposium on Cartographic Design and Research***. Ottawa, Canada. Sponsored by the Canadian Institute of Geomatics. Contact Clifford Wood, Dept. of Geography, Memorial University, St. John's, Newfoundland A1B 3X9 Canada (709) 737-8988.

August 7- 11: ***URISA 94***. Milwaukee, Wisconsin. 32nd Annual conference of the Urban and Regional Information Systems Association. Contact: URISA Secretariat (202) 289-1685.

October 22 - 27: ***GIS/LIS'94***. Phoenix, AZ. Contact GIS/LIS'94, 5410 Grovemor Lane, Suite 100, Bethesda, MD 20814, (301) 493-0200.

August 11-13

XIV Annual Meeting

North American Cartographic Information Society

Ottawa, Canada

The 1994 NACIS meeting will be held in conjunction with the Annual meeting of the Canadian Cartographic Association

For more information contact
Henry Castner
164 Fearrington Post
Pittsboro, North Carolina
27312

(919) 542-1602
see call for papers pages 40-41

1995

September 3-9: ***International Cartographic Association Conference*** - Barcelona, Spain. See call for papers on facing page. ❑

CALL FOR PAPERS

17th International Cartographic Conference

Barcelona, Spain
3 - 9 September 1995

CARTOGRAPHY CROSSING BORDERS

The Organizing Committee for the 17th International Cartographic Conference (ICC '95) invites prospective presenters to submit abstracts for papers they propose to deliver as part of the scientific conference program. The Organizing Committee for ICC '95 prefers that U.S. authors submit their abstracts to the Screening Committee of the U.S. National Committee for the ICA (USNC / ICA - SC); they will accept abstracts directly only in unusual circumstances. Abstracts are due to the USNC / ICA - SC on or before 1 September 1994. The address for information about abstract requirements and abstract submission is:

Mr. Robert W. Marx
Chair, USNC / ICA Papers Committee
c/o Geography Division
U.S. Bureau of the Census
Washington, DC 20233-7400

Voice: 301-763-5636
FAX: 301-763-4749

The USNC / ICA - SC will forward all favorably reviewed abstracts to the ICC '95 Organizing Committee, which reserves the right to make final decisions as to acceptability. Authors wishing to submit abstracts directly to the ICC '95 Organizing Committee must do so by 1 October 1994; the address is:

Organizing Committee of ICC '95
Jaume Miranda i Canals, Chairman
Institut Cartogràfic de Catalunya
Balmes, 209-211, E-08006
Barcelona, Catalunya
SPAIN

FAX: 343-218-8959

General information about ICC '95 is available from:
A. Jon Kimerling
Chair, USNC / ICA.
Department of Geosciences
Oregon State University
Corvallis, OR 97331

FAX: 503) 737-1200

CALL FOR PARTICIPATION

Joint Meeting of the

NORTH AMERICAN CARTOGRAPHIC INFORMATION SOCIETY

and the

CANADIAN CARTOGRAPHIC ASSOCIATION

Ottawa, Ontario, Canada

August 10-13, 1994

at the UNIVERSITY OF OTTAWA

The CCA/NACIS Program Committee invites your participation in this meeting by:

- **giving a paper**
- **organizing a session**
- **developing a panel discussion**
- **conducting a workshop**
- **preparing a poster or exhibit**

HIGHLIGHTS: Plans are being made for paper sessions, workshops, panel discussions, poster sessions, field trips, and a special day at the National Atlas Information Service at the Canada Centre for Geomatics. There will be an informal banquet and special luncheons.

An extended session has already been organized on "Orienting Ourselves in Space: Implications for the School Curriculum" with paper sessions, workshops and discussions.

Poster and paper sessions on a variety of topics, specific sessions are also being organized on:

- **Cartographic Animation**
- **Map Projection Programs Under Inspection: Cartographers Discuss Their Latitudes– a round table discussion**– If you have had experience with a particular map projection program and would like to share that experience with others, please contact Patricia Chalk at (519) 661-3425; Fax: (519) 661-3750: or Email: CHALK@SSCL.UWO.CA.
- **Is There a Niche for the University Cartography Lab?– a round table discussion**– If you are interested in contributing to this discussion, please contact Joe Stoll, Department of Geography and Planning, University of Akron, 306 Carroll Hall, Akron, OH 44325-5005; (216) 972-7621; Fax: (216) 972-6080; Email: JOESTOLL@UAKRON.EDU.

Persons interested in participating should develop a proposal or abstract which includes the author's name, professional address, telephone number and a description not to exceed 250 words. Student participation is encouraged. Proposals and abstracts, in English or French, should be sent to either:

Henry W. Castner
164 Fearrington Post
Pittsboro, NC
U.S.A. 27312
(919) 542-1602
Fax: (919) 542-5072

Christine Earl
Dept. of Geography, Carlton Univ.
Ottawa, Ontario
Canada K1S 5B6
(613) 788-2600 ext. 2570
Fax: (613) 788-4301

PROPOSALS AND ABSTRACTS MUST BE RECEIVED BY MARCH 31, 1994

Participants will be notified by April 30, 1994 of the acceptance of their abstracts or proposals.

For those interested in traveling to Ottawa with your families, you may wish to write or call for information about attractions in the Ottawa area and elsewhere in Ontario or Quebec. Tourism Canada, at 1-800-265-4848, will send you a free trip-planning kit to Canada. For Ontario alone, call 1-800-ONTARIO. For Ottawa, call the National Capital Commission at 1-800-465-1867 or write to:

Ottawa Tourism and Convention Authority
111 Lisgar St., 2nd Floor
Ottawa, Ontario, Canada K2P 2L7

NACIS news

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CARTOGRAPHIC PERSPECTIVES

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cartographic perspectives
Back Issues

The first issue of ***Cartographic Perspectives*** *was published in March 1989. Back issues (for all issues) are now available at a cost of $20 per issue ($10 for members). Please specify the issue number (1-16) when ordering. Make checks / purchase orders payable to NACIS . Send your back issue request to*

Edward Hall, Treasurer
410 McGilvrey Hall
Kent State University
Kent, Ohio 44242-0001

NACIS Board Conference Call August 2, 1993

The following members of The Board participated in the conference call: J. Patton, C. Harrington, E. Hall, C. Remington, J. Anderson, J. Sutherland, J. Minton, R. Bolton, R. Rowles, and H. Castner.

The meeting was called to order at 9:02 EDT a.m. Minutes for the March 13, 1993 meeting in Silver Spring Maryland were approved with minor amendment.

Treasurers Report
Ed Hall reports a balance of $26,812.61 in NACIS accounts. The financial status of The Society remains strong. Hall reports that a checking account was established in Milwaukee that both he and Executive Director Baruth may draw upon.

Nominations Committee
The following names were placed in nomination for officers of The Society: Henry Castner for Vice President and Craig Remington for Secretary. The Board placed the following names in nomination for new seats on The Board: Hull McLean, Alan MacEachren, Patricia Chalk, Donna Schenstrom, Susan Nelson, John Sutherland, Caroline Weiss and David Tilton. Dodd will contact these members for their acceptance and resume. He will also contact Baruth to find if any further nominations were submitted through the *C.P.* Baruth and Sona Andrews will serve as the Tellers Committee.

NACIS XIII
Chuck Harrington reports that the preliminary program was sent to Milwaukee and that it is nearly ready to print. Richard Furno of the Washington Post will be the keynote speaker and Bill Wood of the Department of State will be the banquet speaker. Twenty-one papers have been accepted for the conference. NOAA, USGS, and The Department of Agriculture will have exhibits. A field trip to Mt. Vernon including lunch at a historic tavern will be offered. Tours of NOAA, The National Archives and the National Geographic Society have also been arranged. Included on the program of events are a reception and tour at the Library of Congress. Harrington reports that Juan Valdez is attempting to organize a workshop. The Board approved the display of an exhibit on the *Atlas of Mexico.*

NACIS XIV
Jeff Patton reports that the meeting in Ottawa will be held jointly with the Canadian Cartographic Association. The dates of August 9-13, 1994 were approved by the Board. These dates are still tentative. Betty Kidd was approved to work with David Douglas on local arrangements. The Board also approved reimbursement to Henry Castner for telephone charges associated with the Ottawa meeting.

Future Meeting Sites
Pat Gilmartin has been accessing the feasibility of the 1995 meeting in Charleston, South Carolina. Patton pointed out an interest, expressed by the membership, for a meeting in Salt Lake City, Utah. Dodd was offered several names to contact in order to begin planning. At this time, The Board felt that either Salt Lake City or Charleston might be acceptable for a 1995 meeting site.

Other Business
Ed Hall made a motion to establish a petty cash fund for use by Chris Baruth to aid in the day to day operation of The Society. The motion had a second and passed. The Board offered their best wishes to Jeff on his upcoming nuptials. The meeting adjourned at 10:10 EDT a.m.

Submitted,
Craig Remington, Secretary

NACIS Board Meeting October 20, 1993 Silver Spring, Maryland

The following members of the Board were present: J. Patton, C. Harrington, C. Remington, H. Castner, J. Anderson, J. Minton, J. Sutherland, R. Bolton, and Executive Officer C. Baruth

The meeting was called to order at 2:15 P.M. and the minutes from the August 2 conference call were accepted without change. The treasures report was postponed until the Friday meeting.

NACIS XIII
C. Harrington reported on preliminary costs of the meeting as follows: $900 for buses, $400 the reception at the Library of Congress, $650 for audio visual rentals. There were 123 pre registrations. The National Geographic Society field trip was open to all who wished to participate. J. Anderson suggested that a manual to guide in local arrangements be drafted. Anderson, Sutherland, Bolton and Baruth will work on this task.

NACIS XIV
Preparations continue for the Ottawa meeting. The meeting is scheduled for 8/10 to 8/13, 1994. H. Castner has been organizing the meeting through communications with David Douglas and Betty Kidd. Mr. Dan MacKay, representing the Canadian Cartographic Association, was present to answer questions from by the Board. There is an established division of

responsibilities between NACIS and the C.C.A. for the joint meeting. Dr. Cliff Woods will be presenting a program immediately before our meeting dates. To accommodate those interested in attending both Dr. Woods' program and the NACIS meeting, a motion was offered to allow those who attend the Woods symposium to register for the NACIS meeting at a membership rate. The motion passed. The Board will allow Dr. Woods the opportunity to send his meeting announcement with our call for papers. The early start of our conference (Tuesday) is an effort to bridge our meeting with that of Dr. Woods. A list of Ottawa accommodations is being prepared for those who wish to stay at locations other than the University of Ottawa. The Board expressed their thanks to Henry for his efforts.

Cartographic Perspectives
Editor Sona Andrews presented a written report to the Board. A motion was offered to increase the cost of back issues of C.P. to $20 for non members. Passed. The cost of back issues will remain $10 for members. It was suggested that extra copies of the C.P. be made available for C.C.A. members attending the Ottawa meeting. The C.P. was recognized as an excellent tool for recruiting new members to the Society. Bill Loy asked for and will be provide 650 flyers for his mailing to the A.A.G. Cartographic Specialty Group. Scheduling for the printing of the Spring C.P. will be adjusted to accommodate the Ottawa preliminary program. It was suggested that student dues be increased from $8 to $15 in order to cover more of the costs of C.P. The membership will be notified of this proposal and may cast a vote on the matter on next years ballot for the election of officers. A motion by J. Anderson called for the introduction of a C.P. subscription rate of $56.00. Further, that the current list of institutional members be reviewed to separate those organization who would qualify as institutional member from those who are subscribers to C.P. and to define the benefits afforded organizations that fall into the institutional classification. The motion passed.

Considerations of a Latin American Meeting
H. Castner asked that the Board consider the possibility of holding a meeting in a Caribbean or Central American nation. He offered a model for discussion to be taken up by the Board at the Friday meeting.

Other Business
Discussion of future meeting sites was postponed until Friday to allow input from new Board members. Election results were reported as follows: Henry Castner, V.P., Craig Remington Sec., and new Board members P. Chalk, B. Fine, D. Schenstrom, J. Sutherland and D. Tilton. Thus completing the meeting agenda, the Board thanked Jeff Patton for his service as President and adjourned at 5:25 P.M.

Submitted,
Craig Remington, Secretary

NACIS Business Meeting October 22, 1993 Silver Spring, Maryland

Beginning at 1:40 P.M., the Business meeting was conducted by President Harrington. Upon thanking the membership for their support of the Society, Chuck recognized those who worked on local arrangements for their contributions to a successful meeting. Ed Hall reported a balance of $23,992.77 in NACIS accounts. New officers were announced by Chris Baruth. Jeff Patton solicited suggestion from the membership for future meeting sites. San Antonio received a favorable response, and a preliminary investigation of this site will begin. Sites for NACIS XV are still being narrowed between Wilmington, Charlotte, Charleston and Columbia. The brief meeting was concluded at 2:00 P.M.

Submitted
Craig Remington, Secretary

NACIS Board Meeting October, 22 1993 Silver Spring, Maryland

The following members of the Board were present: C. Harrington, J. Patton, H. Castner, E. Hall, C. Remington, J. Sutherland, B. Fine, D. Schenstrom, D. Tilton, R. Bolton and Executive Officer C. Baruth

The meeting was called to order at 4:10 P.M. with Ed Hall's Treasurers report being the first order of business. Hall reports a balance of $23.992.77 in NACIS accounts. R. Bolton reports that we may have difficulty in meeting our required minimum number of room nights for the conference. Hotel registrations will be checked in an effort to avoid this additional cost.

Once again addressing a meeting in Latin America, discussion eventually turned to the possibility of an organizational meeting in San Jose, Costa Rica. Former conference attendees from Costa Rica have offered to help in arrangements for a meeting of this

type. J. Patton offered a motion to ask Diana Rivera to contact our friends in Costa Rica in an effort to gauge their interest in moving forward on this endeavor. The motion passed.

Turning to topics related to the Cartographic Perspectives, it was noted that student membership dues cover only one half of the cost of the publication. A motion was offered to require students to have a member of their respective institution's faculty sign the membership form to verify eligibility. Motion passed. The Board decided to investigate this matter further before putting it into effect. It was noted that a student membership is valid for a limit of three years. Library subscription rates will be $56 per year and not be considered as institutional members. It is the Boards desire to add notoriety to institutional members. C. Baruth will work on a finer definition of an institutional member and the benefits associated with this membership classification. B. Fine suggested that we investigate the possibility of encouraging contributors to the Society, perhaps for a special issue of C.P. This potential source of new support for C.P. will require that we reapply for tax exempt status with additional emphasis on the educational mission of the Society.

Concerning NACIS XIV, it was decided that bills for the meeting will be paid in Canadian funds. NACIS will deposit money in the Canadian Cartographic Association's account and settle our debts through their organization.

In other business, Michigan State wished to relinquish the NACIS archives. Baruth will find out if the A.G.S. Library will become the new depository.

Setting some dates included January 1 for the call for papers for NACIS XIV with a March 1 deadline, a Board meeting on April 9 in Washington and a phone conference call in early January. The final action of the Board was to grant $100 per Board member to defray travel costs to the April 9 Washington meeting. This grant will apply only to those members who are not residing in the Washington area. Adjourned 6:00 P.M.

Submitted,
Craig Remington, Secretary ❑

Cartography Faculty Position Available

Wisconsin, Milwaukee 53201. University of Wisconsin-Milwaukee. **Assistant Professor**. Tenure track appointment beginning Fall 1994 (position contingent on budget approval). Ph.D. required. The Department of Geography wishes to continue its strongly established reputation in Cartography and the History of Cartography by seeking a colleague that can contribute to the GIS, Cartography, History of Cartography, and Historical Geography components of our graduate and undergraduate programs. A successful candidate will be expected to teach courses in cartography, including the History of Cartography; form an effective liaison with the American Geographical Society Collection; and have a well-developed research agenda. Send a letter of application stating how you can contribute to our program, curriculum vita, and three letters of reference by March 1, 1994 . The names of those nominees and applicants who have not requested that their identity be withheld and the names of all finalists will be released upon request. UWM is an Equal Opportunity/ Affirmative Action Employer.

Apply: Faculty Search Committee, Department of Geography, P.O. Box 413, Milwaukee, Wisconsin 53201. Phone: 414-229-4866. Fax 414-229-3981. e-mail sona@csd4.csd.uwm.edu.

EXCHANGE PUBLICATIONS

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

ACSM Bulletin. Published six times a year by the American Congress on Surveying and Mapping. Offers feature articles, regular commentaries, letters, and news on legislation, people, products and publications. Contact: Membership Director, 5410 Grosvenor Lane, Bethesda, MD 20814; (301) 493-0200.

Baseline. Published six times a year by the Map and Geography Round Table, American Library Association. Contact: Editor Nancy J. Butkovich, Physical Sciences Library, 230 Davey Laboratory, Penn State University, University Park, PA 16802; (814) 865-3716; e-mail:njb@psulias.psu.edu

Bulletin of the Society of Cartographers. Published twice a year, the *Bulletin* features articles on techniques and ideas applicable to the Cartographic Drawing Office. Contact: John Dysart, Subscriptions Manager, Room 514, Middlesex Polytechnic, Queensway, Middlesex, EN3 4SF, England.

Cartouche. A quarterly publication offering news and announcements to members of the Canadian Cartographic Association. Contact: Canadian Cartographic Association, c/o Jim Britton, Sir Sandford Fleming College, School of Natural Resources, P.O. Box 8000, Lindsay, Ontario K9V 5E6 Canada; (705) 324-9144; e-mail: britton@trentu.ca; fax: (705) 324-9716.

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. ISSN 0317-7173. Contact: University of Toronto Press Journals Department, 5201 Dufferin Street, Downsview, Ontario, M3H 5T8 Canada; (416) 667-7781.

Cartographic Journal. Biannual Journal of the British Cartographic Society. Includes research articles, 'shorter' articles, official records of the Society, book reviews, and a list of recent cartographic literature. Contact: Hon. Secretary, Charles Beattie, 13 Sheldrake Gardens, Hordle, Lymington, Hants, SO4 10FJ, England.

Cartography. Biannual Journal of the Australian Institute of Cartographers. Each issue contains two parts, the Journal proper and the Bulletin. The Journal contains original research papers, papers describing applied cartographic projects, reviews of current cartographic literature and abstracts from related publications. ISSN 0069-0805. Contact: John Payne, Circulation Manager, GPO Box 1292, Canberra, A.C.T. 2601, Australia.

Cartography Specialty Group Newsletter. Triannual publication of the Cartography Specialty Group of the Association of American Geographers. Features news, announcements and comics. Contact: Ann Goulette, Editor, Intergraph Corporation, 2051 Mercator Drive, Reston, VA 22091-3414; (703) 264-7141; e-mail: ann@pluto.ne1300.ingr.com.

Cartomania. The quarterly newsletter of the Association of Map Memorabilia Collectors. Offers a unique mix of feature articles, news, puzzles, and announcements of interest to cartophiles. ISSN 0894-2595. Contact: Siegfried Feller, Publisher/Editor, 8 Amherst Road, Pelham, MA 01002; (413) 253-3115.

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GIS World. Published monthly, this news magazine of Geographic Information Systems technology offers news, features, and coverage of events pertinent to GIS. Contact: John Huges, Managing Editor, GIS World, Inc., 155 East Boardwalk Drive, suite 250, Fort Collins, CO 80525; (303) 223-4848; fax: (303) 223-5700.

Information Bulletin. Triannual publication of the Western Association of Map Libraries. Contains features, atlas and book reviews, WAML business, and news. Contact: Mary L. Larsgaard, Executive Editor, Map and Imagery Laboratory, UC-Santa Barbara, Santa Barbara, CA. 93106; (805) 893-4049; fax:(805) 893-8799, 4676, 8620; e-mail: mary@wash.uscdic.ucsb.edu.

Information Design Journal. *Tri*annual publication of the Information Design Unit. Features research articles reporting on a wide range of problems concerning the design and use of visual information. Contact: Information Design Journal, P.O. Box 185, Milton Keynes MK7 6BL, England.

Perspective. This newsletter of the National Council for Geographic Education (NCGE) is published five times a year in October, December, February, April and June. News items related to NCGE activities and geographic education are featured. Contact: NCGE, Leonard 16A, Indiana University of Pennsylvania, Indiana, PA 15705; bitnet: clmccard@iup. ❑

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REVIEWS

Book reviews, map reviews, and mapping software reviews are welcome. The Editor will solicit reviews for artifacts received from publishers. Prospective reviewers are also invited to contact the Editor directly.

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Materials should be sent to: Dr. Sona Karentz Andrews, Editor- *Cartographic Perspectives*, Department of Geography, 3413 N. Downer Avenue, University of Wisconsin-Milwaukee, Milwaukee, WI 53211; (414) 229-4872, fax (414) 229-3981; e-mail: sona@csd4.csd.uwm.edu.

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(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 graphicacy;

§ 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.

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