The background of the cover features a world map with a red-to-black gradient. A large, semi-transparent magnifying glass is centered over the continent of North America, with its handle pointing downwards. The map shows political boundaries and some geographical features like rivers.

cartographic perspectives

bulletin of the
North American Cartographic Society

Number 15, Spring 1993

cartographic perspectives

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MESSAGE FROM NACIS VICE PRESIDENT

Greetings from Chuck Harrington, newly elected VP. Thank you for your vote of confidence. I hope to serve NACIS in a manner that will enhance the good work that has gone before me.

I take this opportunity to express my impressions of NACIS. The size of the organization is beneficial, and I say that in contrast to another related organization that is several times larger and more acclimated toward academia. Size, I realize does not necessarily determine quality of a group, but it can and more often than not, does affect the quality of relationships within it. An organization whose majority of members are academic does not guarantee success either. I am not saying that size and academia are not good assets to have in an organization because we have many in our society. You may have guessed by now the point I am driving at. I believe the relationships within any organization will make or break it. Although I have not been with NACIS since its inception, I do

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appreciate the relationships that I have, and am developing. Good relationships, as in a marriage, do not just happen. It takes an all out effort on both the husband and the wife to make an excellent marriage come about. The effort each of us has put forth has made NACIS what it is today. But like a marriage, we can not stop and rest on our laurels. Keep up with even greater zeal to make NACIS all it can be.

As VP I have the responsibility of planning and organizing our annual conference. It is being held at the Quality Hotel, October 20-23, 1993 in Silver Spring, Maryland. Already I have had much assistance from Jeff Patton and Ron Bolton. Fred Anderson and

Susan Nelson have volunteered to assist in the local arrangements. I appreciate those who have stepped forth as I can visualize the work it will entail to make NACIS XIII an educational and exciting event.

The NACIS Executive Committee met on Saturday March 13, 1993 at the Quality Hotel in Silver Spring, MD. However, the snow-storm kept yours truly holed up in his home in Damascus for three days. Susan Nelson, who lives within vicinity of the subway was able to fill in for Fred Anderson and myself as a member of the Planning Committee. If one has ever been in the Washington, D.C. area during a snowstorm, he understands the dilemma of trying to move from one place to another.

The Committee functioned quite well and accomplished all they needed to for this year's conference. A call-for-papers letter was issued in April 1993. A quick response would be very encouraging to the conference planners. Additionally, if anyone would like to organize a session, or if anyone has a suggestion that would be beneficial to this rookie conference planner, it would be given careful and thankful consideration.

Thank you. I look forward to seeing you in October.

Charles Harrington
Vice President and
Program Chair, NACIS XIII

NACIS XIII

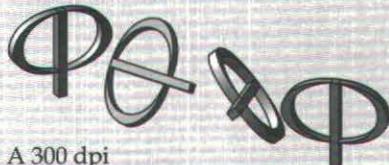
October 20-23, 1993
Washington, D.C.

see announcement on page 33

passings

In the course of this year's membership renewal drive, we received word of the deaths of two of the organizations longtime members, Leonard Abrams and Bob Lyons. Abrams of Philadelphia, was a master model builder, who, at the 1982 NACIS meeting in Washington, gave fascinating accounts of his model building activities for the army during World War II and of his construction of a large relief globe. Lyons, a charter member of NACIS and former mining cartographer from Albuquerque, is probably best remembered as the designer of the NACIS logo.

about the cover



A 300 dpi gray-scale TIFF scan of a portion of Ravenstein's gores of the reproduction of the Behaim globe was opened in Adobe Photoshop on the Macintosh. The logo was created in Aldus FreeHand, scanned and imported into a new channel where the oval part of the logo was selected and saved. This selection was then loaded and Photoshop's spherize filter applied to create the magnifying effect on the underlying map. The logo was copied from its channel, aligned on top of the spherized oval, given a border of 8 and a feather of 5, then filled. The spherize filter was reapplied to the oval portion of the logo to give it a raised glassy appearance. The text was added and given a stroke darker than the fill. It was then copied, given a slightly darker fill and pasted offset slightly to the left.

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Inc., Aldus FreeHand is a trademark of Aldus Corp.

featured articles

On October 15, 1992 NACIS members were honored to have Emeritus Professor Arthur Robinson deliver the banquet address at the Twelfth Annual NACIS meeting in St. Paul, Minnesota. Professor Robinson enlightened and entertained us with the following presentation on Martin Behaim, the making of the Behaim Globe (in 1492), and an interpretation of the geographic relationships depicted on that globe.

By now scarcely anyone is unaware that this year is the 500th anniversary of when Christopher Columbus ran into some land that turned out to be a new world to the Europeans. Until he died Columbus thought he had reached Asia, but that monumental misconception should not detract from the fact that his voyages were triumphs of careful planning, seamanship, and dead reckoning navigation. Almost completely unheralded, certainly by the media, is another occurrence in 1492 that is also worthy of a quincentennial celebration, especially by all of us here. In that year a 33 old native of Nürnberg, Martin Behaim, compiled a world map that was transferred to a globe. In human history that ranks as a remarkable occurrence. I believe I am correct in that that was the first ever attempt to compile a general, geographical map of the entire earth. Furthermore, Behaim's globe is the oldest terrestrial globe that still exists. It may be seen in the German National Museum in Nürnberg.

Some two years ago I became more than casually interested in Behaim's 1492 globe. Naturally I began noting anything about 1492, and soon I got hooked. Of course, ninety-nine percent of it concerned the "discovery," or to use the euphemism adopted by the official United States Christopher Columbus Quincentennial Jubilee Commission, the "encounter." It is hard to believe the volume of things that were generated by the opportunists who took advantage of the quincentennial celebration. The number of articles, features, books, atlases, TV specials, documentaries, as well as all the other activities and hoopla, including icons, such as ship models and replicas, coins, medallions, ties, T-shirts, and so on is truly quite remarkable. The creative spirit is alive and well. There is even a *Guinness Book of Records*, 1992, a 190-page book. It devotes all of 40 words to Martin Behaim's globe.

Although Columbus and the quincentenary are not what I am going to talk about, I want to take a few minutes to share with you a few of the countless number of things that came to my attention. Most impressive were the exhortations by the groups that urged that the 500th anniversary should be a period marked by remorse over the subsequent ruthless oppression of America's peoples and civilizations. For example, the governing board of the National Council of Churches resolved that in consideration of the "genocide, slavery, 'ecocide,' and exploitation" the quincentenary should be a time of penitence. Leaders of the American Indian (Native American) movement felt strongly: Russell Means of that group has said that Columbus "makes Hitler look like a juvenile delinquent." The City Council of Berkeley, California, resolved that last Monday should not be celebrated as Columbus Day, but should be Indigenous Peoples Day, for which they were roundly criticized by the chair of the National Coalition of Ethnic Organizations, Inc.

Then there are the nationally-based claims that we should abandon the recurring centennial celebrations of 1492 because, really, it wasn't

A Cartographic Quincentenary

Arthur H. Robinson

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Columbus but someone else who first landed in America. This includes Japanese fishermen some 5,000 years ago, second century Jews fleeing from Roman persecution, a fifth-century Chinese Buddhist priest who is supposed to have spent 40 years in Mexico, a sixth-century Irish monk named Brendan whose alleged journey led directly to the appearance on maps for centuries of a nonexistent St. Brendan's Island, Leif Ericsson around 1000 A.D., a Welsh priest named Medoc in the 12th century, and British fishermen off the coast of Newfoundland about 1480. One ought also include reference to Thor Heyerdahl's expeditions, rune stones, pottery similarities between Japan and Ecuador, and so on. But among all the way out hoopla spawned by the quincentenary I have a favorite.

In the introduction to a long, interesting article in the *New Yorker*, mainly about Hispaniola and President Belaquer's weird, horizontal lighthouse honoring Columbus, the author points out that the quincentennial fever reached its peak in Spain. Among other things he reported that a Spanish sculptor arranged a symbolic marriage between the statue of Columbus that overlooks the harbor of Barcelona, as the groom, and his bride, our very own lady, the Statue of Liberty. Outsize garments were actually prepared for a traveling exhibit, and a symbolic ceremony was even performed on last St. Valentine's Day in, where else, Las Vegas.

Now to the main topic. What I want to do this evening is to tell you about Martin Behaim and his 15th-century conception of the earth, described his globe, explain how it was made, what it cost, and why the map showed the relation between Europe and the Orient the way it did. Some of the significant antecedent factors date from classical times. Although it is unlikely that Columbus ever saw or even heard of Behaim's globe, the world according to Martin Behaim is probably essentially the same as Columbus' conception. Thus, the globe map provides a clear, graphic exposition of why he thought he could sail to Japan and China. Incidentally, the record shows that Martin Behaim also proposed to make the same voyage.

First a little background about globes as vehicles for representing the heavens and the earth. There is no question that the earth was known to be a sphere since at least the time of Aristotle in the 4th century B.C. That is not to say that possibly a lot of less educated folk might have thought it possible to fall off the edge of a flat earth. Some, but probably not many, are still with us. Only some 60 years ago Mr. Glen Voliva, the leader of the Flat Earth Society, lived in Zion, Illinois, just north of Chicago, where he had been mayor for many years. I suspect that the development of man-made satellites has caused some members of the Society to reexamine their faith.

When one looks at the heavens one is clearly looking at the inside of a vast bowl around which the stars and planets move. Since their positions in the celestial dome were of great interest it was natural to represent them on a celestial globe. The oldest extant is the 20-inch diameter globe in the statue of the mythical Atlas who is holding it on his shoulders. It is dated as of about 130 B.C. The earliest reference to a terrestrial globe is to a diagrammatic one of about 150 B.C. made by Crates of Mallos, who was the librarian at Pergamum. Apparently it was an hypothesis of the earth's structure that postulated four symmetrical, habitable regions, only one of which, of course, was known at the time. Strabo, writing at about the time of Christ, describes the surface of a globe as being the best way to map the inhabited earth. Since at that time no one knew anything about the other three-fourths, it is understandable why there are many references to celestial globes, but only a few to terrestrial.

The earliest reference to a terrestrial globe is to a diagrammatic one of about 150 B.C. made by Crates of Mallos, who was the librarian at Pergamum.

In the Christian Middle Ages there seems to have been little interest in terrestrial globes. This may have been partly because the early Church Fathers did not look kindly on pagan ideas, and partly because of the Biblical statement by Isaiah: "It is He that sitteth on the circle of the earth." That circle was conceived to be a flat disk around which the Ocean Sea circulated. Clearly, a terrestrial globe would not be of much use. However, belief in spherical earth did not die, and by the end of the Middle Ages it was again generally accepted, except of course, by flat-earth diehards. But, as far as I am aware the 1492 globe of Martin Behaim is the first globe to portray a carefully compiled, general geographical map of the entire earth. Its production thus qualifies as a major event in intellectual history, and it alone deserves to make 1492 a year to celebrate. It is unfortunate that it was upstaged by a lucky mariner who made a mistake.

Martin Behaim was born about 1459. His father was a general merchant in Nürnberg, and the Behaims ranked as one of the city's "good" families. The boy probably had private schooling or a tutor in reading, writing, Latin, logic, and arithmetic. He had commercial training in his father's business, and finished his apprenticeship in 1476. He then went to the Netherlands where he worked with cloth merchants in Mechlin and Antwerp. He frequently visited the Frankfurt Fairs, a major trading scene for the Netherland's textile industry. In 1484 Behaim went to Portugal.

In Lisbon, Martin Behaim did very well indeed. He became acquainted with the governor of Fayal and Pico, two of the Azores Islands, a group in the Atlantic about 800 miles west of Portugal, discovered by the Portuguese navigator Diego de Seville in 1437. Martin married the governor's daughter in 1486 or 87. Whether because of family influence, or because he had fought against the Moors, or because of an expedition he is alleged to have accompanied, Behaim was knighted by King John. He was also named to the Junta of Mathematics, appointed to formulate rules by which to determine latitude from observation of the sun's altitude. In the spring of 1490 he returned to Nürnberg to assist in the settlement of his mother's estate. This was completed in 1491, and it was after that the matter of the globe was raised.

Georg Holzschuher, a traveler who had been to Egypt and the Holy Land, was interested in geographical discoveries. He was also a member of the Nürnberg City Council. He suggested to the Council that Behaim be commissioned to make a world map to show the recent discoveries of the Portuguese south along the coast of Africa, the map then to be transferred to the surface of a globe, or "Erdapfel" (earth apple). The Council agreed, and the globe was completed in 1492.

Behaim returned to Portugal in 1493. In a curious twist that, in a sense links him with Columbus, the record indicates that Behaim carried a letter to King John from a Dr. Muntzer, a German astronomer. The letter provided evidence that Asia could not be very far west of Portugal, especially from the Azores, and urged the King to finance an expedition to sail there. The letter also stated that Martin Behaim was ready to take charge of the voyage and sail westward whenever the King gave the word. As luck would have it, unknown to Behaim and Dr. Muntzer, Columbus had already returned from his first voyage before the letter was even written.

Little is known of the rest of Behaim's life. He seems to have fallen out of favor with the court of the new King Manuel who had succeeded King John. Apparently Martin Behaim was poor when he died about 1507. It is not known where he was buried.

Before turning to Behaim's geographical map and why it showed the world the way it does, I would first like to describe the physical character

But, as far as I am aware the 1492 globe of Martin Behaim is the first globe to portray a carefully compiled, general geographical map of the entire earth. Its production thus qualifies as a major event in intellectual history, and it alone deserves to make 1492 a year to celebrate.

of the 20-inch sphere on which it lies, how it was made, and how much it cost. We are unusually fortunate in that Georg Holzschuher who suggested the project, also oversaw its execution, and submitted an accounting of the costs which has been preserved. To convert costs in 1492 to comparable dollar values today is speculative at best, but there is a clue. In 1908 a British geographer, E.G. Ravenstein, produced an authoritative study of Martin Behaim and his globe in which he converted the costs into pounds, shillings, and pence. I assume he did that correctly. In addition, he noted that one shilling and sixpence per day in 1492 was about the going rate for graphic artists, writers, map copiers, and so on. Today such an hourly employee would likely be paid about \$9 an hour, which adds to \$72 a day or a little less than \$19,000 a year, not a bounteous sum by any means. I am confident that I am not overestimating.

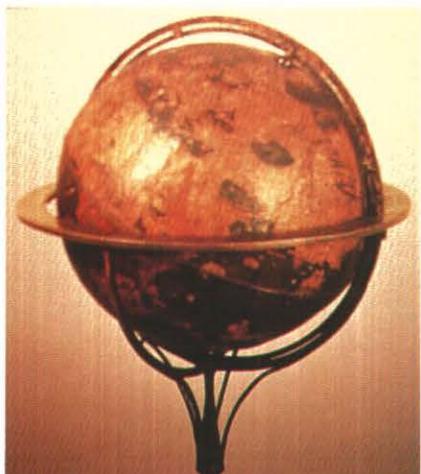
Martin Behaim first had to compile a world map. This was not an easy task in an era when there was very little to depend on for regions beyond Europe, the Near East, and North Africa. We will look at those compilation problems a bit later. Behaim was paid \$652 for compiling the *mappa mundi*, or world map. A limner, or draftsman, was employed to make a fair drawing of the compiled map. The limner received \$480, so the preparation of the world map cost a little less than \$1,200. Incidentally, that flat, general, geographical map of the whole world, probably the first ever made, hung for a time in the office of the Clerk of the Nürnberg City Council, but has long since disappeared. It would be worth a fortune today.

The manufacture of a hollow sphere was no problem. The Nürnberg workshop of Regiomontanus, the celebrated astronomer, had produced many spheres for celestial globes and the traditions were still alive. A spherical mold was prepared first and then covered by what we would call papier maché to form a strong pasteboard shell. The dried shell was cut at the future equator, removed from the mold, and each half reinforced with an interior wood skeleton. Then, with holes for the axis, the halves were glued together and covered with sections of vellum of calf or lamb skin. The mold cost \$960, the shell \$1,440, and the vellum \$152, for a total of a little over \$2,500. Then came the expensive part, the transfer of Behaim's flat world map to the globe surface.

The artist employed for the transfer was Jorg Glockendon. He may have been a namesake, but probably is the craftsman who also did woodcuts and is better known for his rendering, also in 1492, of the map "Plan of Nürnberg and its Environs" by Erhard Etzlaub who holds a prominent place in the history of cartography. Jorg Glockendon, assisted by his wife, worked on the project for 15 weeks. Jorg received \$6,720 while his wife received \$480. In addition, they received their dinners, with wine, at an additional cost of \$480. If they worked six days a week that works out to a little over \$5 for dinner for two, with wine which is not too bad. A stand, a meridian ring, and a dust cover cost an additional \$692.

The total cost of the manuscript globe was slightly over \$12,000. For those of us old folks who wince at today's prices, I remind you that that sum is in today's fiat dollars. If I had made the conversion 50 years ago, when we could mail a first class letter for three or four cents, the total cost would have been only about \$1,500.

Jorg Glockendon and his wife certainly earned their money. So far as I can tell the globe map was not made the modern way, that is by making the maps as flat, tapered longitudinal sections, called gores, which are then fitted and glued to the ball. Instead, the Glockendons had to transfer all the map information and the additional detail, by eye, to the spherical surface of the ball. Drawing and lettering on a spherical surface is



Behaim Globe

not easy.

Now I would like to show you figures of the globe map taken from Ravenstein's reproduction of the globe map in the form of gores. The land areas are, or were, a brown or buff with some forested areas shown with patches of green. Perennial ice and snow regions are in silver. The seas except for the Red Sea are a dark blue (figure 1). This is Cipangu, or Japan (figure 2). There are 111 miniatures consisting of 48 flags, 48 kings seated within tents or on thrones, and 15 coats of arms (figure 3). Missionaries and travelers are shown. These are the Canary Isles (figure 4). The seas contain fish, seals, sea lions, sea cows, sea horses, sea serpents (figure 5), 11 vessels (figure 6), a merman and a mermaid (figure 7). Animals on the land include elephants, leopards, bears, camels, ostriches, parrots, and serpents. The only fabulous beings are the merman and mermaid. Ravenstein calls this a "commendable forbearance in an age which still rejoiced in mirabilia," such as satyrs and men with dogs' heads. The map is crowded with more than 1,100 place names and numerous legends, some quite long, in black, red, gold, and silver.

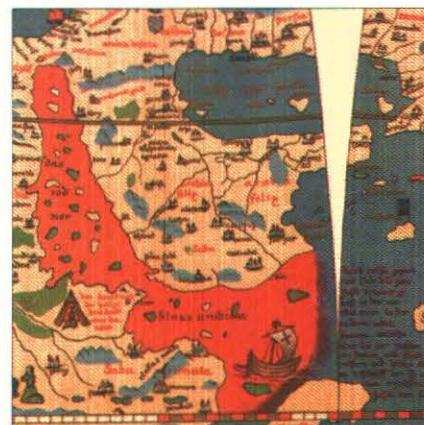


Figure 1. The Red Sea as depicted on the Behaim Globe (from the Ravenstein globe gores).

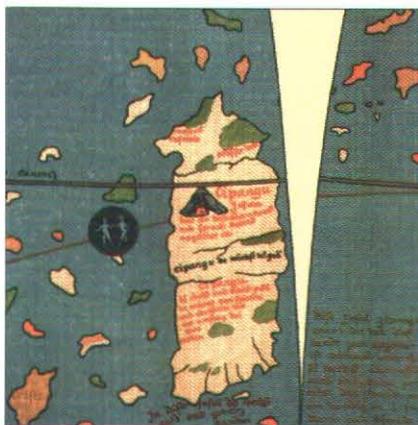


Figure 2. Japan (Cipangu) as depicted on the Behaim Globe (from the Ravenstein globe gores).

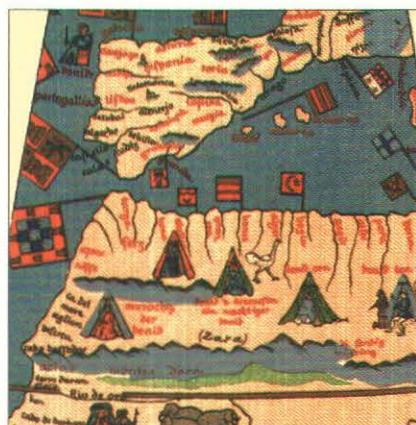


Figure 3. Miniatures of flags, kings, and coats of arms as depicted on the Behaim Globe (from the Ravenstein globe gores).

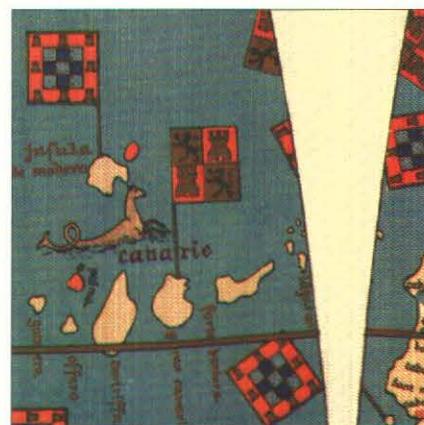


Figure 4. The Canary Islands as depicted on the Behaim Globe (from the Ravenstein globe gores).

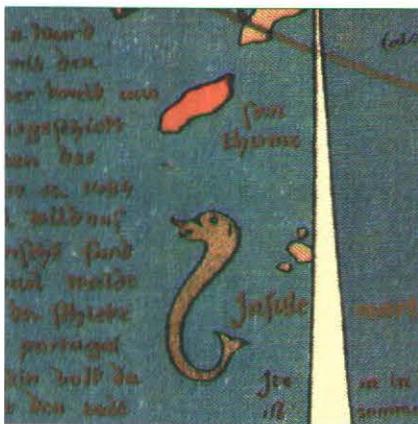


Figure 5. Fish, seals, sea lions, sea cows, sea horses, and sea serpents as depicted on the Behaim Globe (from the Ravenstein globe gores).

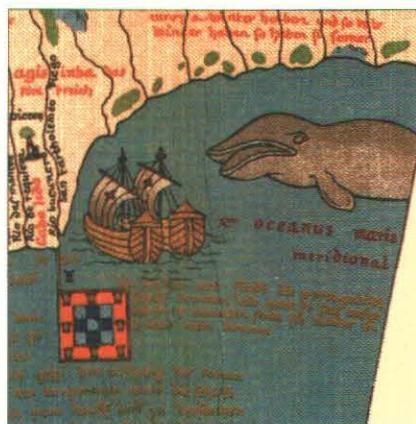


Figure 6. A vessel as depicted on the Behaim Globe (from the Ravenstein globe gores).

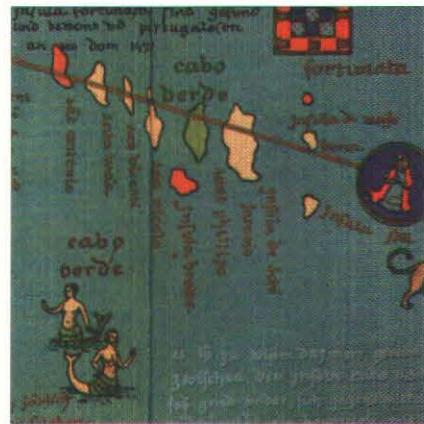


Figure 7. Merman and mermaid as depicted on the Behaim Globe (from the Ravenstein globe gores).

In 1510 the original iron meridian was replaced by one of brass, and the wooden stand by a tripod of iron. The globe map has been repaired twice. The original brilliant colors had darkened or faded, parts of the surface had been rubbed off, and names had become illegible or disappeared. The first renovation was in 1523, and at that time the globe was judged to be fragile. A second renovation was undertaken in 1847. Ravenstein points out that the renovators were turned loose without any guidance and did "irreparable mischief." Numerous place names were corrupted beyond recognition. Although the globe is not the equivalent of George Washington's ax that has had three new heads and six new handles, it is fair to say that it has some characteristics of a palimpsest.

Several spherical facsimiles of the globe have been made, the first in 1847 for the Bibliothèque Nationale. In 1892, on the globe's 400th anniversary, a copy of that facsimile was made and exhibited at Chicago. Subsequently it was moved to the National Museum in Washington. Last summer it was in the Division of Naval History and History of the Armed Forces of the Smithsonian Museum. Its next home is to be the Smithsonian's Dibner Rare Book Library. The Ravenstein gores were mounted on a shell and exhibited in the American Geographical Society. More recently the National Geographic Society reproduced Ravenstein's gores and mounted them on a globe.

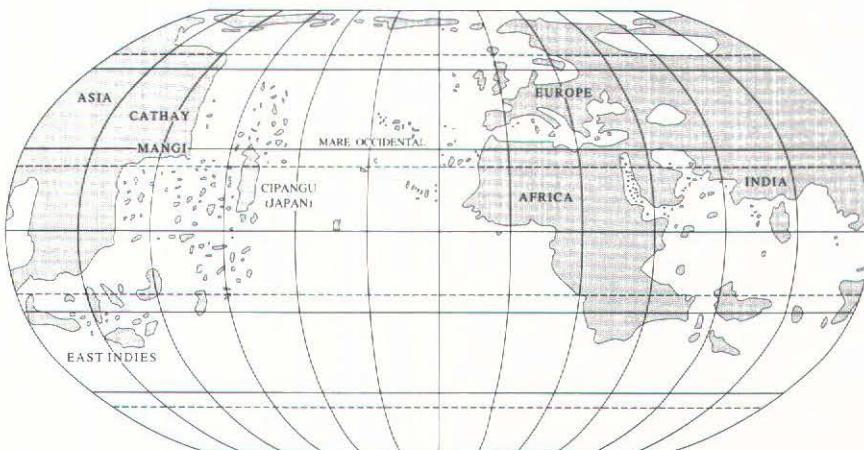
There have been at least a dozen flat representations of the Behaim map, all but one in the form of paired hemispheres on globular projec-

tions. This map is my conversion of the globe gores to a single, world map projection (figure 8). The unavoidable distortion is mostly in the very high latitudes which, in any case, were largely a complete mystery in 1492. Clearly Asia has been shifted far to the east locating Japan about where Cuba is. The fundamental question to which I next want to turn is: How could Behaim and some others, including Columbus, make such a colossal error?

It is difficult to identify the origin of geographical conceptions that were given substance by portrayal on maps or that led to innovative travel, especially in the distant past. An example of how elusive certainty can be is provided by the study of Christopher Columbus. Probably no secular mind has ever been so thoroughly probed at long

distance. Only a few of the books he owned have survived, and four of these have over 2,000 annotations in his own hand. From this material a rather sketchy notion of the development of his ideas emerges, but the conclusions of the hundreds of scholars who have quarried this material are abundantly larded with unverifiable surmises and inferences.

As to Martin Behaim we are much less fortunate. We must depend on his travels, and especially on what is known to have been the prevailing geographical ideas of the latter part of the 15th century. As to those generally accepted conceptions we are, to use an appropriate metaphor,



Martin Behaim, 1492

Figure 8. Representation of the area covered on Behaim's map drawn on a Robinson projection.

on firmer ground. The relative position of Asia, Japan and Europe on Behaim's map, and in Columbus' mind, is the result of logical reasoning from cosmographical matters that were of considerable concern in the 1490's. One had to do with the possible location and extent of the habitable, dry-land part or parts of the earth that were surrounded by the waters of the Ocean Sea. The other was simply the question of how large was the earth. These two interrelated topics had been matters of study and conjecture since Classical times. I will summarize the background that led to the conceptions accepted by both Behaim and Columbus. In spite of the fact that it is not known that they ever met, apparently they thought very much alike on these matters.

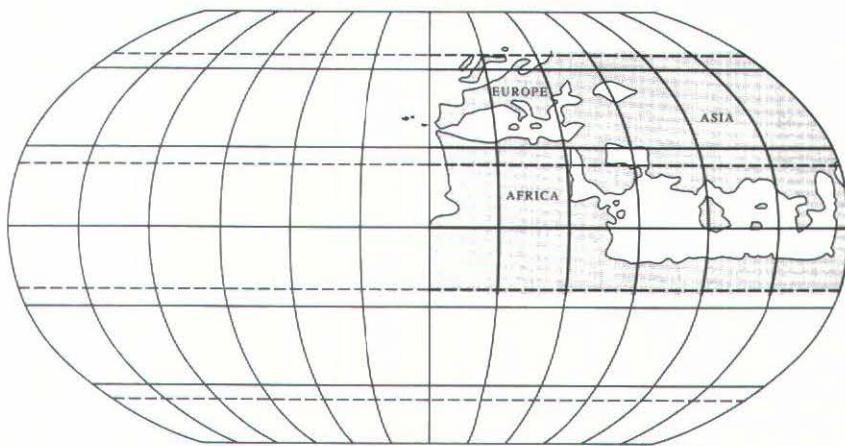
First let us consider some of the ideas about the extent of the habitable earth. As long ago as the 4th century B.C. an "island of great extent," (Plato called it Atlantis) was thought to be in the Ocean Sea beyond Europe. That notion may have arisen because Phoenician seafarers might have ventured even beyond the Azores. Aristotle wrote of the calm, seaweed-rich region in the Western Ocean that we now recognize as the Sargasso Sea. Strabo, in his Geography describes Crates' globe as showing a region beyond the ocean opposite the Mediterranean that was inhabited by the Antipodeans. The possible existence of such an inhabited region off to the west of Europe persisted into the 15th century even though it was difficult to reconcile it with the Biblical assertions that all peoples were descended from Adam and Eve and that the Apostles had preached throughout the world.

A persistent legend in Spain and Portugal told of the flight of seven Bishops in the 8th century to escape from the conquering Moors. They went far to the west, beyond the Azores, and established the Island of the Seven Cities that came to be known as Antillia, which in Latin simply means "opposite island." Antillia was shown on more than a dozen pre-1492 charts, and Behaim shows it and tells of it in one of the legends on his globe. It survives today in the name Antilles for the cluster of islands fringing the Caribbean. On Behaim's globe the legendary St. Brendan's Isle is portrayed as larger and even farther west from Europe than Antillia. St. Brendan's Isle was shown in various locations, always escaping visitation, on maps and charts from 1275 to 1620. It was generally agreed that there were islands out in the Atlantic beyond the Azores, but the fascinating question was: what lay beyond? To seek the answer to that Behaim, Columbus, and others had to turn their attention to the east of Europe instead of to the west. Their primary source were the writings of Claudius Ptolemy, a Greek scholar who lived in Alexandria in the 2nd century A.D. Among other things he wrote an influential treatise on geography and cartography. Although the works of Ptolemy remained known to Arab astronomers and geographers from the 2nd century on, his book the *Geography* began its dominance over European geography and cartography only in the early 1400s when it was translated from the Greek into Latin. It was first printed with maps in 1477, and by 1490 six editions had been produced. Since each edition probably numbered at least 500 copies the Ptolemaic ideas and maps became widely distributed. The only generally available map of the known world was the one that accompanied the manuscript and printed editions of the *Geography* but that so-called "world map" portrayed only half the northern hemisphere (figure 9, page 10). None of the rest of the world was shown. Africa had been barely rounded in 1487, so there was plenty of terrestrial space to be filled in by creative analytical and wishful thinking.

The land area on the Ptolemaic world map was simply cut off at its eastern edge, the clear implication being that land extended even farther

The relative position of Asia, Japan and Europe on Behaim's map, and in Columbus' mind, is the result of logical reasoning from cosmographical matters that were of considerable concern in the 1490's.

Antillia was shown on more than a dozen pre-1492 charts, and Behaim shows it and tells of it in one of the legends on his globe. It survives today in the name Antilles for the cluster of islands fringing the Caribbean.



Claudius Ptolemy
Florence ed. 1478

Figure 9. Representation of the area covered on the "world" map in Ptolemy's *Geography* drawn on a Robinson Projection.

by calculating longitudes from the travelers' accounts. To do this they simply divided the reported distance between two places by the length of a degree of longitude at that latitude to find the number of degrees between the places. Clearly, the length of a degree is important, and to see what effect this had we need to turn to the second of the cosmographical matters that are important in this context, namely the size of the earth.

The first serious attempt to determine the circumference of the earth was by the Greek Eratosthenes in the 3rd century B.C. His calculation was based on straightforward geometry and he arrived at a figure of 250,000 stades, or about 695 stades to the terrestrial degree. Unfortunately, we do not know for certain the length of the stade Eratosthenes used, but his circumference was clearly fairly close to the true value. The various observations and assumptions he made were all somewhat incorrect, but fortunately they tended to cancel.

History might have been considerably different if Eratosthenes' good result had been permitted to stand, but a century or so later another Greek philosopher, Posidonius, possibly recognizing Eratosthenes' errors, replicated the procedure using different observations and assumptions, but his errors did not cancel, and he arrived at a much too-small circumference of 180,000 stades, or 500 stades to the terrestrial degree. Assuming a reasonable length for the stade that value is at least 20% too small, and Ptolemy's authoritative *Geography* flatly stated that there were 500 stades to the degree.

Support for a too-small earth came from another source. Seven hundred years after Ptolemy the Arabs undertook a third measurement of the length of a terrestrial degree. It was carried out by astronomers on the Plain of Sinjar in what is now northwest Iraq. The degree was found to be about 56 2/3 Arab miles. Since that Arab mile was a little less than 2,000 meters the result was within about 2% of the true figure. The value of 56 2/3 miles to the degree was reported by Al-Farghani in his influential work *Compendium of the Science of the Stars and Celestial Motions*. The book was translated into Latin and Hebrew in the Middle Ages and circulated widely in Europe. Columbus, and no doubt others, seized upon the value of 56 2/3 miles to the degree, but wrongly applied it to the Italian nautical

to the east. The missions of Friar Carpini and others to the Great Khan at Karakorum in the mid-13th century had quickened interest, but it was the written account of Marco Polo's journey in the late 13th century that captured the most attention. It first appeared in 1298, was frequently copied, and was among the most widely read books. Soon after the development of printing in the mid-1400s it became very popular.

The accounts of overland journeys on foot or by pack train probably tend to exaggerate the distances traveled. Also, unlike north-south locations, east-west positions could not be determined from observations of the sun or stars. Consequently, map makers could only plot east-west locations

mile not realizing that the Italian nautical mile was about 25% shorter than the Arab mile. Thus in 1492 all the evidence pointed to a much too-small earth.

That too-small earth had a profound effect on the world map. A too-long estimate of distance traveled from Europe to the Far East divided by a too-short degree of longitude resulted in too many degrees of longitude. Since there are only 360 degrees around the earth the excessive number of degrees assigned to the distance between Europe and the Orient pushed the fabled lands of China and Japan far to the east and thus fairly close to Europe. Actually, on Behaim's map the distance from the Azores to Japan is shown as a bit less than the length of the Mediterranean Sea. Sailors had traversed the Mediterranean for millennia.

This conception of the geographical relation between the Orient and Europe was not original with Behaim or Columbus. It had been suggested as early as 1410 by Cardinal Pierre d'Ailly of France in his book *Imago Mundi* (Image of the Earth) which was printed in the 1480s, as well as by a communication to the Portuguese king by the Florentine cosmographer Toscanelli in 1474. There is a large, very faded, manuscript map dated around 1490 by a Henricus Martellus who was working in Florence, and who like Behaim, was native of Nürnberg (figure 10). It is now in the Beinecke Library of Yale University. I transferred its coastlines to the same base as I did for Behaim (figure 11). It is the only other 15th century, non-Ptolemaic world map that shows longitudes, and although it does not quite show the entire earth, the relative positions of the Orient and Europe are about the same as on Behaim's map. So far there has been no convincing evidence of any connection between Behaim and Martellus.

That brings to an end my analysis of why Martin Behaim plotted the relation between Europe and the Orient the way he did. You and I probably would have done the same thing.

Before concluding I would like to try your patience just a few minutes longer and tell you about a suggested possibility. In the Preface to his 1991 scholarly book on Columbus, Felipe Fernandez-Arnesto took pains to dismiss summarily the numerous attempts to deny Colum-

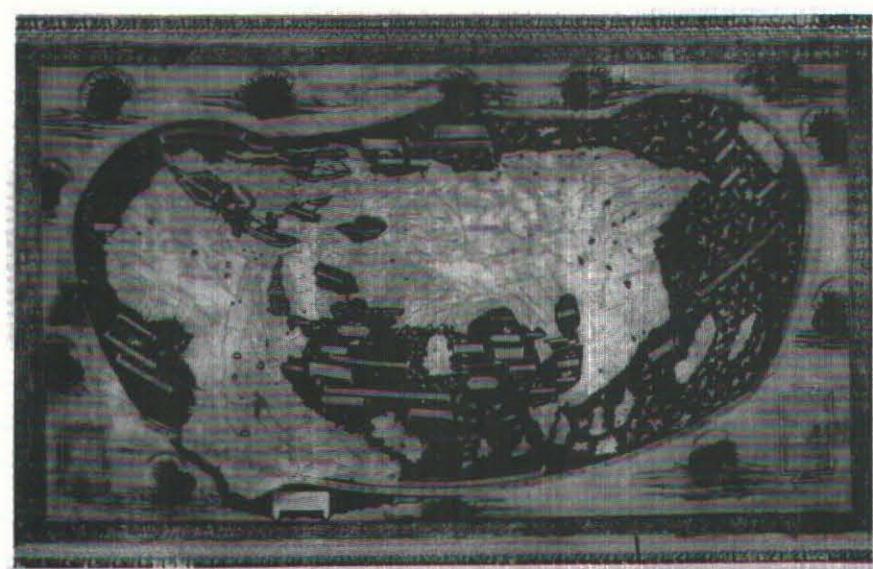
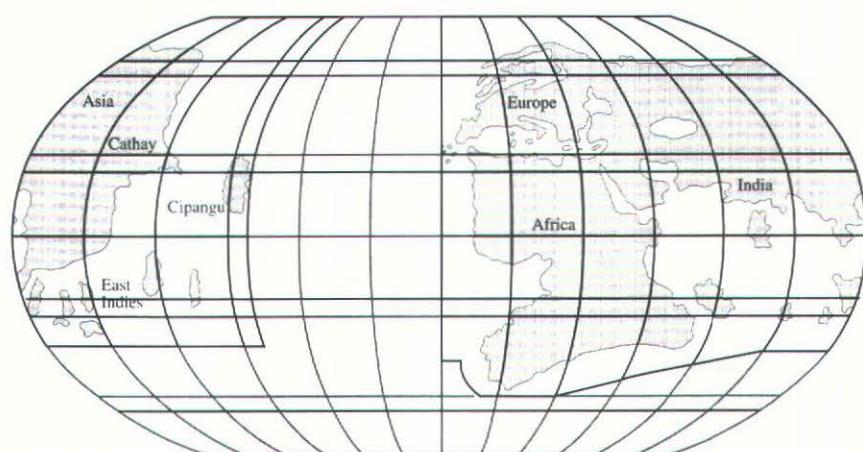


Figure 10. Photograph of Henricus Martellus 1490 manuscript map.



Henricus Martellus 1490?

Figure 11. Representation of area covered on Martellus's map drawn on a Robinson Projection.

The author, Paul Schmidtchen, points out that the *Nürnberg Chronicle* claims Behaim to be the discoverer of America, and he makes what can best be described as a plausible case based on a variety of facts, suppositions, and coincidences.

bus his Genoese origin and to make him out to be Greek, English, French, Portuguese, Castilian, Galician, Corsican, Swiss, Catalan, and Ivizan, which is one of the Balearic Islands off Spain. But Fernandez-Arnesto missed one, probably because, being a distinguished historian at Oxford University, he never ran across an article in the magazine *Hobbies* that appeared in its Volume 70 nearly 30 years ago. The title of the article is "Was Christopher Columbus Really Martin Behaim?"

The author, Paul Schmidtchen, points out that the *Nürnberg Chronicle* claims Behaim to be the discoverer of America, and he makes what can best be described as a plausible case based on a variety of facts, suppositions, and coincidences. For example he observes that their ages match closely, that the young Columbus is generally described as being tall, with a fair complexion, and having blond hair, characteristics more Teutonic than Italian. He suggests that after Columbus' proposal was turned down by King John of Portugal and after his wife died while he was still in Portugal, for some reason Columbus disappeared and his identity was then adopted by Martin Behaim. He points out that the new Behaim-Columbus fell in love with Beatriz Enríquez after going to Cordova. She bore him a son, but Columbus never married her. The author suggests that the real Columbus could have because his wife had died, but that Behaim-Columbus could not because he was still married. And so on.

Such investigative activity five centuries after the events occurred is intriguing, but not likely to lead to any certain conclusions. I am rather sorry that this identity problem did not come to the attention of movie producers, such as the one who made *J.F. K.*, the film about who killed President Kennedy. Perhaps they might have fallen all over one another to have a potential box-office bonanza in this year of the Quincentenary. Maybe then the non-cartographic world would have paid some attention to Martin Behaim and his globe.

The author would like to acknowledge that the photograph of the Behaim Globe on page six was provided courtesy of Rand McNally from transparencies made by the German National Museum.

RESUMEN

El 15 octubre de 1992 los miembros de NACIS fueron honrados con la presencia del Professor Emérito Arthur Robinson, el cual dirigió un discurso en la décimo segunda reunión anual de NACIS en St. Paul, Minnesota. El Profesor Robinson nos ilustró y divirtió con la presentación sobre Martin Behaim, titulada, la edición del Globe de Behaim (en 1492), y una interpretación de la relación geográfica representada en ese globo.

Desktop Map Design: Some Odysseys of Form and Flow

Making maps on today's desktop platforms can be something of an odyssey that often obliges the designer to traverse minefields of non-integrated software. This article details the workflows for nine maps produced with desktop computer software. Each workflow falls across a row; each row references a captioned map that was a tangible outcome of the author's implementation of desktop cartography using image processing and other software tools. A need for early articulation of appropriate verbal goals to guide the power and charm of map design software is discussed.

Few people dispute that creating maps "on the desktop" (i.e. cartography using microcomputers) has considerably altered both map genesis and map production. My goal here is to usher a reader through a few specific desktop mapmaking processes undertaken during a half-year sabbatical. Creation and production processes afforded by new technology are often thought to be faster and more flexible than traditional methods and may result in workflows worth documenting and sharing. Of some interest is the way these flows express and interact with aesthetic zeitgeists past and in emergence today.

Making maps today that effectively communicate probably demands more than any single software application can alone provide. Grant Thrall speculates why (Thrall 1992):

At the first stage of the mass-market microcomputer revolution, a fantasy existed that integrated software could successfully combine into one program several interconnected modules whose functionality could otherwise only be obtained in stand-alone products.

He observed that it is rare that a module of an integrated software program can compete in features with the very best stand-alone applications. He claimed that such an integrated program lately "has been relegated to novice computer users or undemanding 'executive' computer users." Though Professor Thrall was referring in particular to "wholly self-contained [GIS] integrated software," his lattermost assertion seems generally true across the microcomputer worlds of Macintosh, and Microsoft DOS and Windows. But squarely within map design and pre-press production there does exist integrated software that seems to actually work; it is found on workstations offered by proprietary vendors (example: Intergraph) who supply "turnkey systems" (example: MGE). Common wisdom suggests one might best take a balanced view of the value of such integrated systems. For example, if modules of turnkey systems have a uniformly designed interface one may argue that as a clear benefit to desktop users. On the other hand, cost and steep learning curves are usually present as liabilities.

Until something quite revolutionary happens in the world of micro-computer software, a key to effective map design and production may be, on the one hand, to grin and bear the "disintegration" of our times, while on the other to continue identifying relevant individual software tools and intelligently interconnecting them, in the right order with the best conceptual and communication goals in mind.

Kevin Byrne

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SOFTWARE TOOLS FOR MAP DESIGN: CAN WE TOLERATE TODAY'S DISINTEGRATION?

TOOLS IN ACTION: TRACKING MAP WORKFLOWS ACROSS A MATRIX

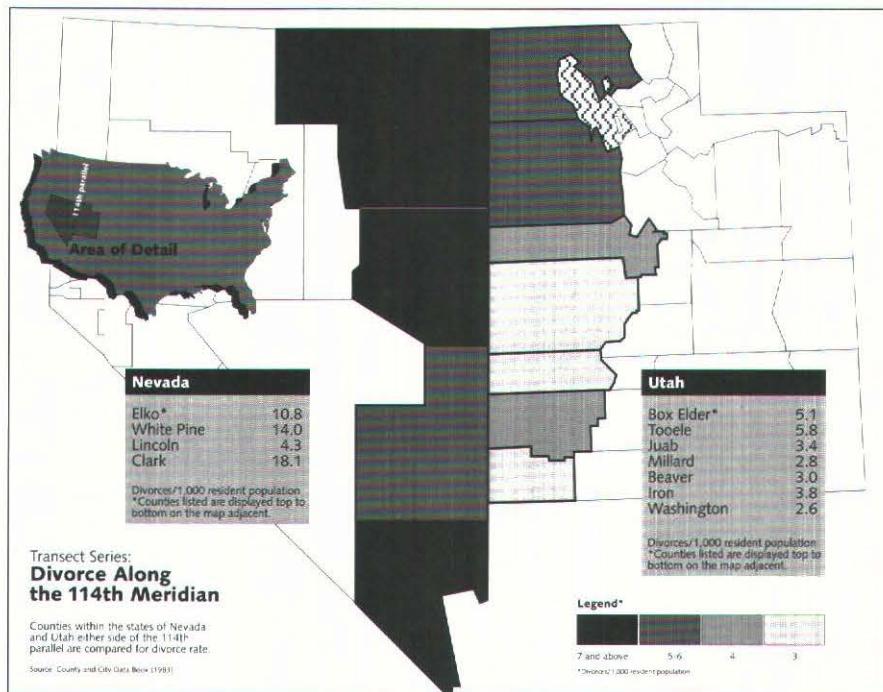
A reader's strategy for tracing the software workflows below might be to 1) track the lower case letters in a chosen sequence across its corresponding row, and 2) refer to the article's captioned figures which appear on pages that follow.

The smooth passing of data and imagery between stand-alone software tools has probably thus become the desktop map design "challenge of the 90s." I sought to better understand this "disintegrated" new world of desktop cartography by undertaking the design and production of six "demonstration" maps. The matrix shown below is a detailed tabular expression that focuses on the presentation of workflows completed for these maps. Additional descriptions of anecdotal and technical interest accompany specific workflow depictions. The matrix also features three minor experiments in "illustrative" image processing, each also shown as a workflow sequence.

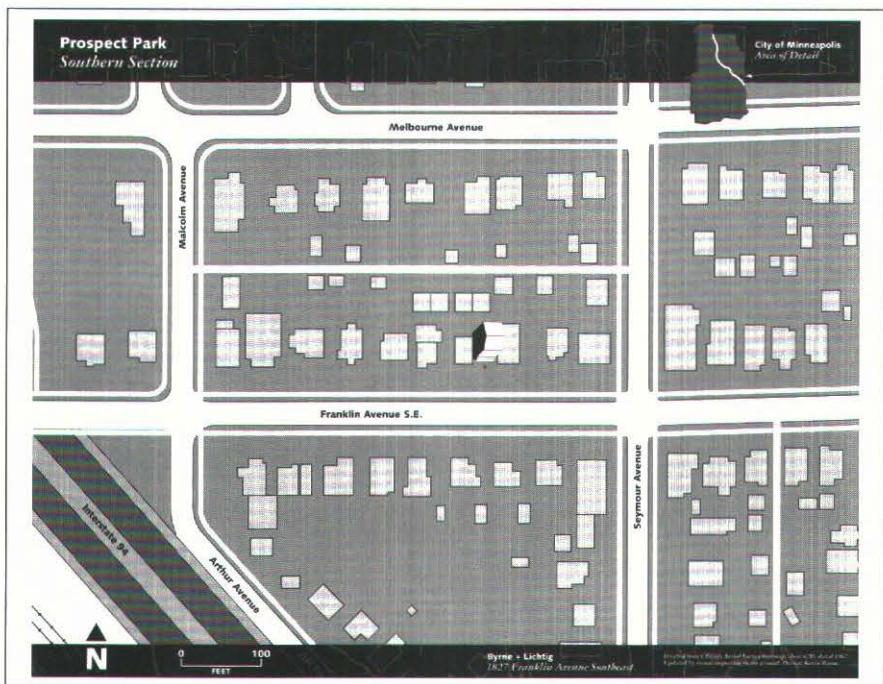
	scale (S=SMALL, M=MEDIUM, L=LARGE)	software tools										output			notes		
		utility			specialty			drawing		image processing							
		HP DeskScan	ScreenShot	Adobe Streamline	PickTure	Azimuth	QuickMap	Stratavision 3D	Quark Xpress	Adobe Illustrator	Aldus Freehand	Image Studio	Adobe Photoshop	total tools count			
demo map titles... Divorce transect	M									•				1	•	This map was started in MacDraw but had to be redrawn in Freehand.	
Ghost dance	M/S	a								b				2	•	Relief base map was taken from Thelin and Pike.	
City neighborhood	L	a								b	c			3	•	Source of base map data was Minneapolis aerial survey (1967)	
Horse diffusion	M/S	a								c		b		3	•	see notes Output to following printers: QMS, Oce, Seiko, and Dupont 4Cast (latter was dye-sublimation printer)	
Frontiers travel	S		b	d	a				e		c	5	•	•	see notes Output was to Lino film negative. Negative was enlarged 350% onto film positive and sepia diazo print was made.		
Farm relief	M/L	a	e	b			g	c	d, i	f, h	7	•					
a few experiments... U. S. divorce map 'texturized'	M/S					a	c			b	3	•				Service bureau imported final Photoshop file into Quark Xpress prior to outputting	
Neighborhood map 'texturized'	L	a							b		c	4			see notes	Output to laserprinter	
Raisz patterns	-	a								b	3				see notes	Output to laserprinter	

Divorce Transect: One-Tool Map

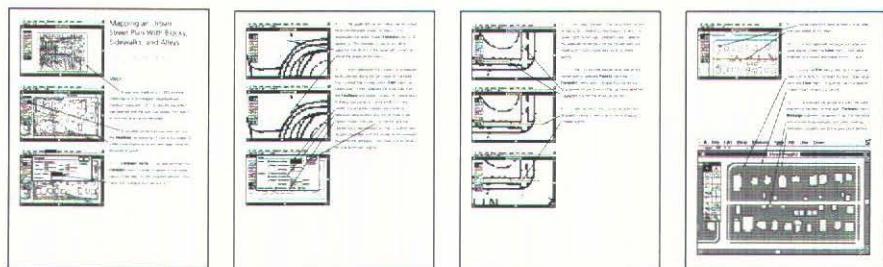
This map (right) demonstrates use of the geographer's technique of *transect analysis*, i.e. data collection along a line that one traces across a landscape. I used the 114th meridian as my transect line and hypothesized notable differences in divorce rates in counties on opposite sides of this line because it separates a "Mormon" Utah from a more "Godless" Nevada. Choropleth data expression was employed. Software used was Aldus Freehand.

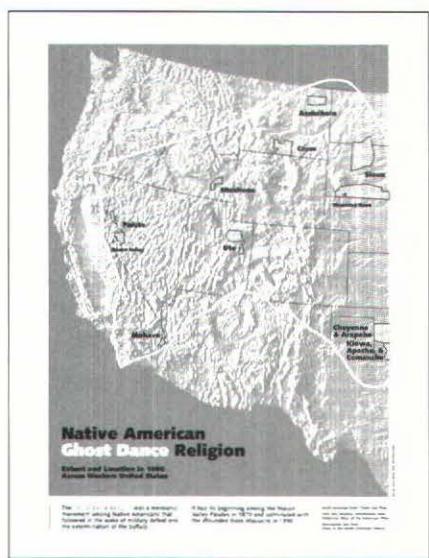
**Minneapolis Neighborhood:****Three-Tooled Map**

The map at right depicts a four block neighborhood. A blueprint of streets, sidewalks, and house plans was procured from a county source, scanned, and then placed in the background layer of a Freehand document for drawing reference. An effort was made to plan the best use of gray values to portray various line and area features. ImageStudio was used to create black horizontal bands that functioned as distinctive backdrops for headline and sub-head labels.

**Short Printed Tutorial**

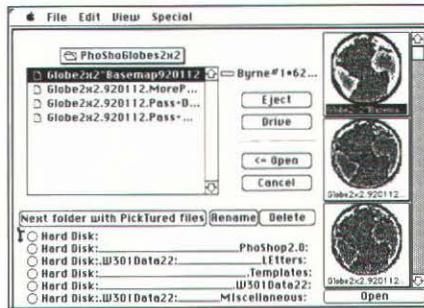
A detailed log of notes on map genesis and development was made for the urban map. I created screen dumps of the various phases and wrote captions that referenced key steps. This was assembled into a narrative form within a Quark Xpress document (sequence of four pages featured to right). My goal was to transform images and notes into a brief tutorial on the specifics of large-scale urban map design.



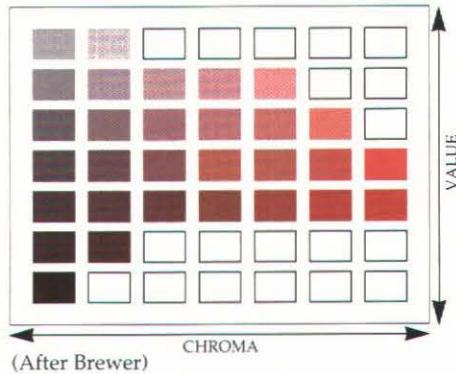
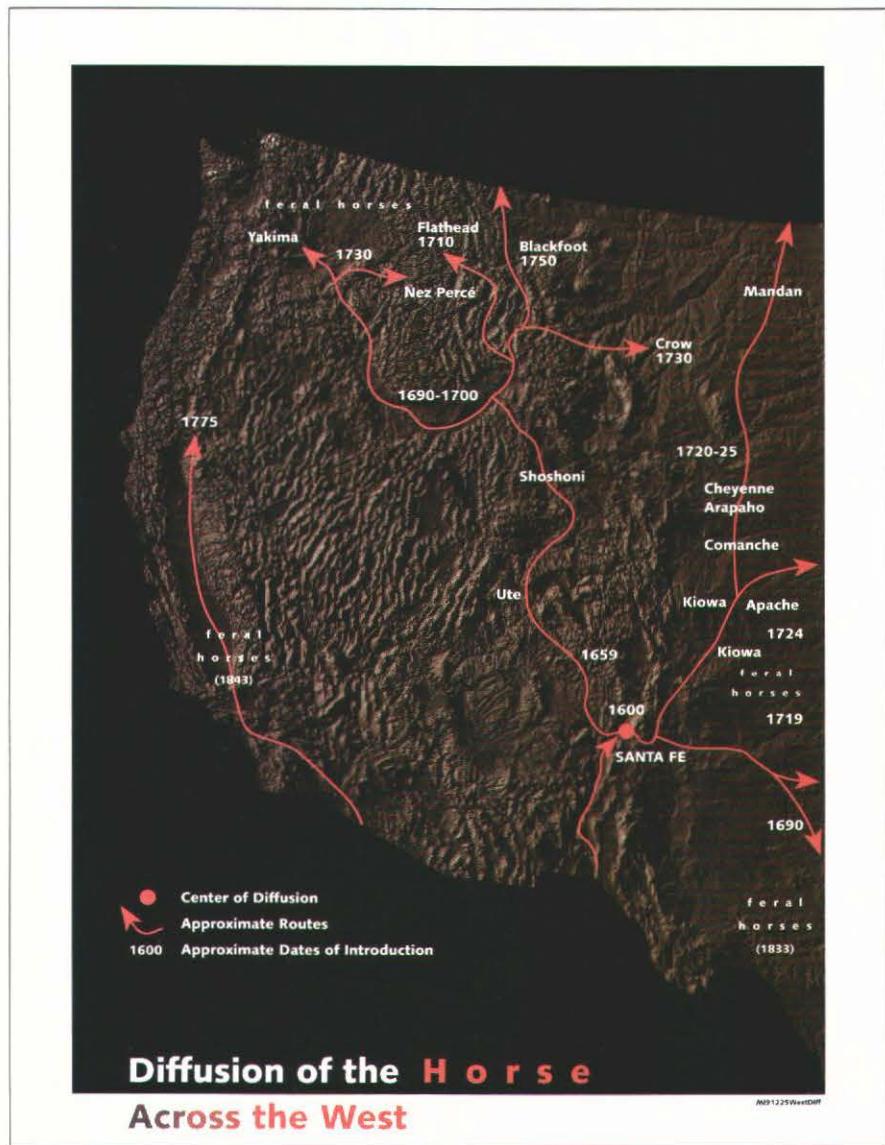


Ghost Dance: Two-Tooled Map

Content for the demonstration map to the left was taken from an atlas of the western United States (Beck and Haase 1989). The goal was to restyle an existing atlas page completely on a "Macintosh desktop" in an effort to see what substantial value-pattern enhancements could be realized. (The context for this pursuit was purely experimental and non-commercial.) The basemap featured was scanned directly from Pike and Thelin's shaded portrayal of relief that was featured in *Cartographic Perspectives* (Pike and Thelin 1990-91). This scan was placed in Freehand and its value was uniformly lightened. Historical atlas information on Native American ghost dances (Beck and Haase 1989) was scanned and placed in a background layer as a reference for redrawing. Line, shade, and text were added to complete the map.



(Picture visual file selection software tool.
Refer to page 17 caption.)

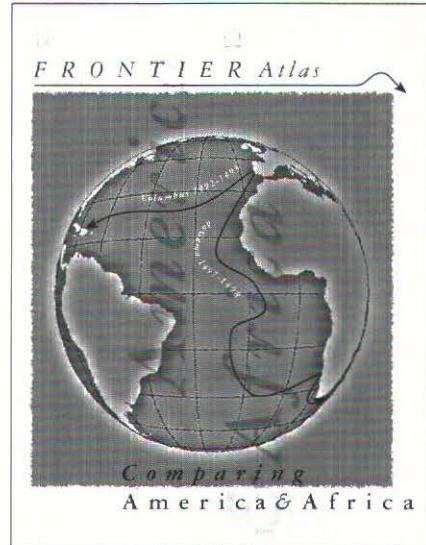
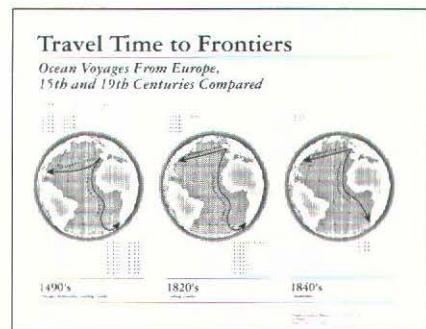
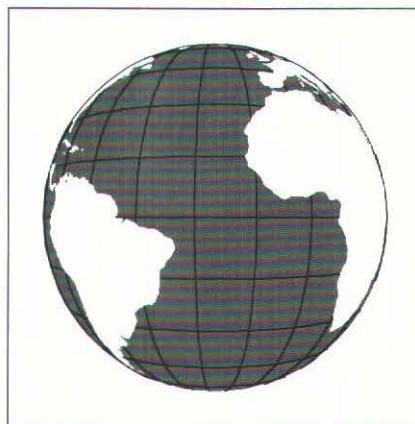


Horse Diffusion: Three Tools in Support of a Systematic Color Progression

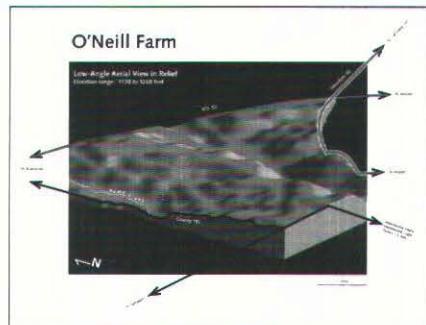
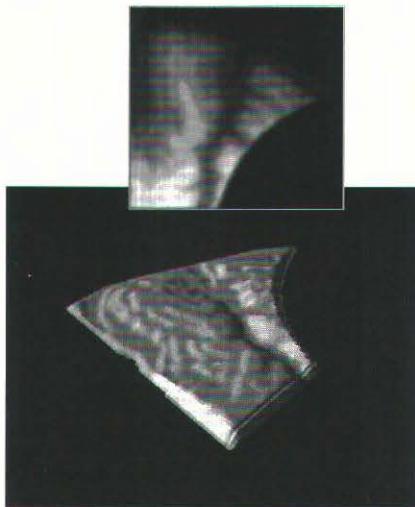
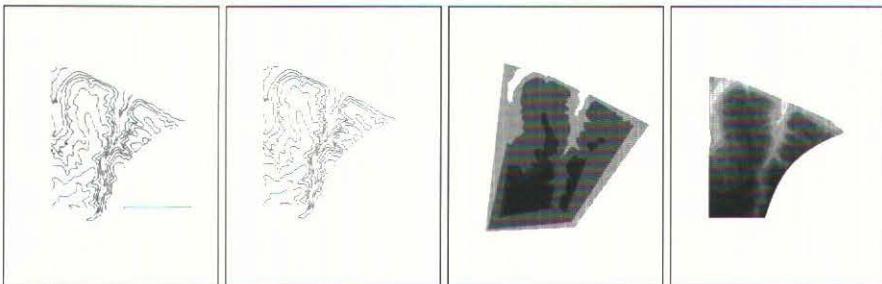
A demonstration map (left) was another effort at redrawing from an existing atlas. The scan from the aforementioned United States shaded relief (Pike and Thelin 1990-91) was opened in Adobe Photoshop for coloring. An earth hue was chosen and applied across the entire map. The resulting file (3.5 megabytes in size) was placed in a Freehand document as an underlayer. An atlas page featuring the diffusion of horses (Beck and Haase 1989) was scanned and placed in a background layer as reference. I utilized a well-conceived color chart that featured perceptual dimensions of Munsell's color system (Brewer 1985) to help me make a modest selection from harmonic color progressions. I created a digital CMYK swatch table using red as a target hue (figure above). Several color progressions were then taken from this swatch and worked into line and text features on the map. (The map was then output to five different printers for making judgements about the appropriateness and quality of today's pre-press proofing technology.)

Frontiers Travel: Five-Tooled Map

A demonstration map was conceived that would compare travel times of the first Columbian and daGaman trips with later ocean voyages. Five tools were utilized. Azimuth software was first used to create an azimuthal projection aimed at a globe with the goal of precisely featuring Southern African and North American continents with attendant graticles (upper left figure). The screen was captured using ScreenShot and opened in Adobe Photoshop for "illustrative" image processing. Filters such as blur, diffuse, high-pass, and sharpen were employed (lower left) in pursuit of a distinctive roughness and glow that connoted "age." Dozens of Photoshop versions were created, thus demanding cataloging software; I used Piktire for the purpose of quickly comparing and organizing the retrieval of visual results (see figure on page 16), eventually leading to a final choice of a globe to serve as a basemap. This globe was exported as an EPS file and then placed into a Freehand document. There it was duplicated and line features and text were added (upper right). The file was output to an imagesetter for final review. The illustratively-processed globe with its flowlines was also incorporated into the design of a cover for hypothetical atlas pertaining to this theme (lower right, second over) using Freehand.

**Farmland Relief: A Seven-Tool Traverse**

This map was a response to a request made by an author who is writing about a farm in the Rochester, Minnesota area. A topographic sheet was provided that showed the farm property as a penciled boundary. I made an ink tracing of the contour sheet and scanned it (top figure left). This file was opened in Adobe Streamline which was used to auto-trace the scanned lines. The Streamline file was opened and saved in Adobe Illustrator (top, second from left), then opened in Freehand for manipulation. Each contour was closed into a shape. Each shape was then assigned a gray value based on contour interval (top, third from left). The farm boundary was crisply delineated (top, far right) and a screen dump was made using ScreenShot. This was opened in Photoshop and filtered so the value ramp was smoothed. The file was then inverted (middle row left) and placed in Stratavision 3D, which has a feature that creates relief based on value (i.e. the lighter values are projected higher than darker ones, simulating dimensionality). Viewpoints were explored (lower left) and one was saved, opened in Photoshop, lightened, saved as a TIFF file, and finally placed in a new Freehand document. Roads, creeks, buildings, and text were added to finish the map (lower right).

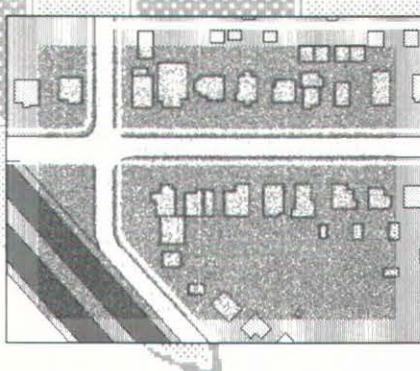
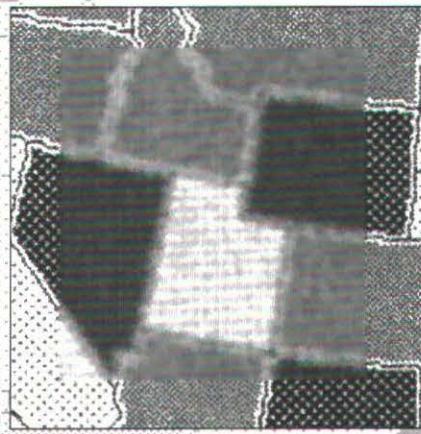
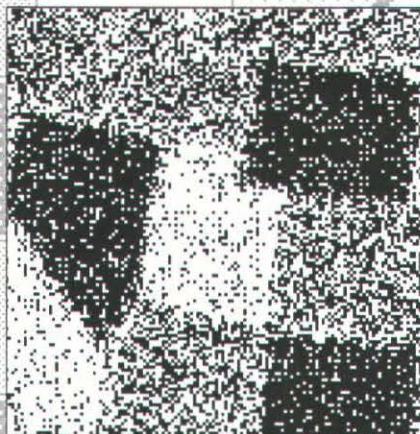


U. S. Divorce Map

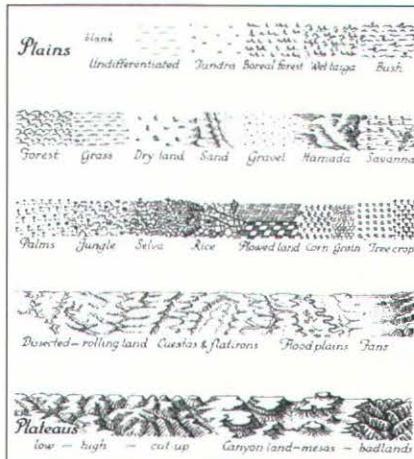
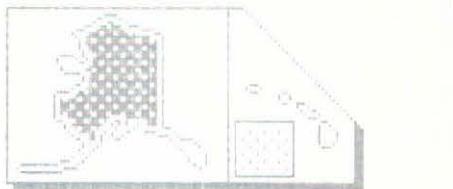
- QuickMap: a table taken from census data was imported into this Hypercard-driven G.I.S. tool and a map depicting divorces by state was automatically range-graded and drawn as choropleth. The result was saved in a MacPaint format (part of the map is adjacent, screened-back).

- Photoshop: the MacPaint file was opened in Photoshop and experiments were attempted to "texturize" the map, first using only the diffuse filter (center figure) and later using blur, noise, and diffuse in combination, the latter serving to create something of a "watercolor" feeling (far right).

- Quark Xpress: the service bureau placed the final Photoshop file into Quark before outputting it to an imagesetter.

**Neighborhood "Illustratively Image-Processed"**

- PICT: the neighborhood map that was previously created in Freehand (refer to page 15) was exported to a PICT format file.
- Photoshop: the aforementioned PICT file was opened in Photoshop and experiments were attempted. A portion of the map was selected and "texturized" using filters in a variety of sequences for the purpose achieving certain connotations. Example (to the immediate left): a goal of coarse graininess was pursued in monochrome using only "middle-key" values.

**"Digital Pattern Painting" Derived from Erwin Raisz's Classic Work**

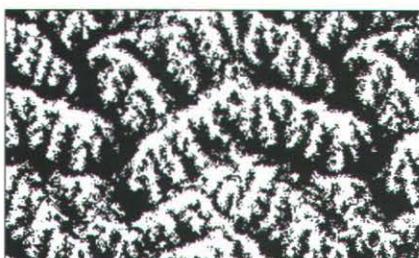
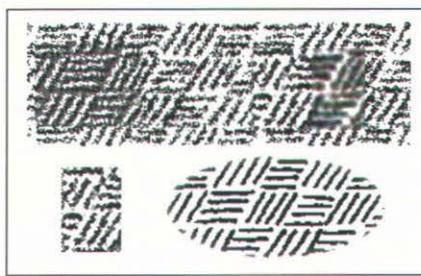
Erwin Raisz was a cartographic champion of a special kind of map symbolization featured in many of the landform maps and atlases he designed. His textbook on cartography contained a chapter displaying a variety of physiographic symbols applied (as patterns) to his landform maps. In support of his expressive patterns Raisz stated (Raisz 1962):

[Though] the idea of applying...obliquely viewed landform drawings to vertically viewed maps...is bad geometry, it turns out to be good psychology, as such drawings show the land more or less as we are accustomed to seeing it.

I endeavored to resurrect some Raisz landform patterns for a little digital experimentation (to serve educational goals).

- Scanning: I scanned a page of patterns from Raisz's textbook (Raisz 1962, 80) using DeskScan (figure top left).
- Photoshop: I launched Photoshop and opened the scanned patterns into it. I experimented to determine if and how some of Raisz's patterns might fare when brushed

across the page. "Badlands" (far left) and "plowed land" (immediately below) are shown. In advance of pattern painting I tried a suite of Photoshop filters to give a few pattern swatches some illustrative character (also below). Results evoke some ambivalence in my mind. Basically, one can get this kind of pursuit to work, but at a cost (in the end) of a visually-stiff appearance. Regarding the latter, perhaps a randomness algorithm (yet to be written) might be a desirable addition to the filtering task.

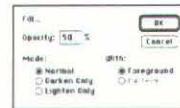


Has certain software that cartographers find most productive chained us to a limited set of connotative expressions? I recall Barbara B. Petchenik's seminal article from the early 1970's in which she articulated the need for "a systematic...attempt...in cartographic design to specify design goals for...maps...by means of several levels of verbal descriptors." (Petchenik 1974). Here are but a few the semantic descriptors she listed...

*texture...hard-soft, coarse-fine
light...bright-subdued, light-dark, high contrast-low contrast,
clear-blurred, transparent-opaque/dense
emotions...joyful-somber, modern-traditional, crude-elegant*

In many ways her list is quite timeless. Using it properly still can help one mix-and-match the right connotative feelings for a map to be successful. Image processing tools designers use today actually echo quite a few words from Petchenik's list—i.e. they are found as menu selections or dialog box buttons in Adobe Photoshop, Fractal Design Sketcher, and other art-based image-processing software applications: *bright(ness), light(en), dark(en), contrast, blur, and opacity* (refer to figures right). The presence of words like these in menus seems to suggest that by arbitrarily selecting software today we could in fact be led down predetermined pathways of forms and feelings, especially if we care little for the connotative goals that grow out of the map content itself. In my own mind assets and liabilities are starting to emerge more clearly from that creative haze over our digital desktops. *Liabilities:* given the ever-growing menus of our software tools, we may be in some danger of being too easily and too often "charmed." *Assets:* nevertheless, given the complexity achievable by the combination of such tools, we regularly uncover new choices that can yield quite surprising opportunities. What remains is a clear need for a verbal audit of map message goals (to be conducted jointly by map designer and client) that can then prime a "techno-inspired" pursuit of agreed-upon feelings. At that point connotations should be fully subject to the charm and surprise of today's most productive imaging tools. For now this may still remain something of an odyssey but, as the late Dr. Petchenik once suggested, it all might serve us better if guided by "a process...more comprehensive, coherent, and...explicit than it is now."

CONNOTATIVE CHARM: CONCLUDING THOUGHTS ON A DOUBLE-EDGE TO TOOLS



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ACKNOWLEDGEMENTS

The author 1) credits the University of Oklahoma Press and McGraw-Hill for atlas and symbol pages used as a central reference in several demonstration maps herein, and 2) acknowledges that copyright of such source material is held by them. Due to the wholly educational nature of this endeavor, the fair use clause of copyright law is deemed fully applicable. All other maps © 1993 Kevin Byrne.

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The author thanks Paul Stayert for editorial comments.

RESUMEN

La edición de mapas y de plataformas computarizadas de desktop es una odisea que obliga al diseñador a trazar campos minados de flujos de trabajo no integrados. Este artículo detalla el flujo de trabajo de 9 mapas producidos con software para computadoras de escritorio. Cada flujo de trabajo se ejecuta a través de una hilera y cada hilera hace referencia a una matriz de encabezamiento que es un resultado tangible de la implementación cartográfica de libre diseño de desktop, usando el procesador de imágenes y otros programas de software. La necesidad de articular las metas para guiar el poder y el encanto del software debe discutirse.

reviews**ATLAS REVIEW***Atlas of Florida*

Edward A. Fernald and Elizabeth D. Purdum (eds.), James R. Anderson, Jr., and Peter A. Kraft (cartographers). Gainsville: University Press of Florida, 1992. 280 pp., \$39.95 Hardcover (ISBN 0-8130-1131-0). (Order from University Press of Florida, 15 NW Street, Gainsville, FL 32611)

*Reviewed by Ruth Anderson Rowles
Natural Resources and Environmental Protection Cabinet
Frankfort, KY.*

The editors, cartographers, contributors, and staff are to be commended for this comprehensive atlas of Florida. Although, work began as a revision of the 1981 *Atlas of Florida*, this atlas emerged as a new book rather than a second edition. The Atlas design has been substantially changed and new topics, 1990 data, satellite imagery, color photographs have been added. The end result is a thoroughly modern atlas.

This 9x12 inch (22x30 mm.) atlas has approximately 600 maps printed with four-color process on 280 pages in six sections: *The Natural Environment, History and Culture, Population, Economy, Recreation and Tourism, and Infrastructure and Planning*. Each section is composed of subsections and then further subdivided into topics that are treated on one or two pages. For example, the Natural Environment section has a subsection on hydrology, which is further subdivided into surface water, groundwater, freshwater supply, and water quality. Each topic usually has several maps, text, and occasionally graphs,

diagrams, photographs, or tables. The last section is followed by a description of the origin of selected place names, county and city statistics for 1989-1990, photo credits, sources for the individual maps, and an index.

The objective of the Atlas project was to create a comprehensive reference volume for citizens, potential residents, tourists, students, researchers, policy makers, and planners. Although some of the information is complex, the text is aimed at the non-specialist reader and most of the graphics are self-explanatory. The editors chose to elicit a sense of place, as well as pattern by including photographs. Overall the authors accomplished their objectives and produced an admirable atlas.

The major reason that this 1992 *Atlas of Florida* has a new look is due to a change in the page design from 1981. Both atlases have the same physical dimensions and approximately the same number of pages, yet the elimination of the intensely colored half-inch margins used in 1981 made room to increase the map scale and add more graphics to a page. For example, the four early maps of Florida have all been enlarged significantly in the new atlas while remaining on a two-page spread. A page on social service programs in 1981 included four maps and text; in 1992 one of the four maps is enlarged and there is an additional graph. The practice of having an enlarged choropleth map with county names to reference the other smaller choropleth maps on the page is common in the new atlas. The colors in the 1992 Atlas are subdued compared to 1981. For example, the graphics on the population maps in the 1981 Atlas were tints of magenta and black, surrounded by an intense brown border. In 1992 the three maps and graph are pleasing shades of green and light yellow.

In addition, the legends for the choropleth maps were reworked to offer more information, the text was completely rewritten with a better explanation of the patterns of population change, and new data was added. The typeface was also changed to a pleasing serif style by replacing the earlier, heavy sans serif style. The result is an atlas with more up-to-date information in a pleasing format.

New topics were added in every section. The maps of cigar manufacturing, sponging, and language are particularly well executed. They are integrated into a broader geography than just Florida, showing the Florida and Cuba context of cigar manufacturing, the Mediterranean origins of Florida's sponge culture, and dialect regions of the eastern United States. Other new topics include religion, waste disposal, expansion of agriculture in South Florida, religion, population concentrations along the Gold Coast, retirement communities, and home ownership. Three pages of graphs and text on health care costs and health planning replace energy consumption, fuel conservation, and solar energy. The additional topics make the Atlas more comprehensive, timely, and relevant to Floridians.

Other topics are reworked to focus the reader toward particular themes or concepts. For example, the subsection on climate has more of a process orientation with topics such as the effect of latitude on climate, seasonal weather patterns, the effect of land and water on climate, mixing heights and ventilation, and humidity and temperature. Photographs from weather satellites effectively illustrate the seasonal weather patterns. Pages of monthly temperature maps have been eliminated and the text has been completely rewritten with simple and concise terminology.

The topic of hurricanes was

disappointing (partly because this atlas was published prior to Hurricane Andrew). The map for hurricanes consists of dots along the coastline showing where hurricanes made landfall. Two other maps on hurricane preparedness (one on evacuation time and the other on the flood zone for a 100-year storm surge) appear in the Infrastructure and Planning section of the atlas. Neither section, however, references the other in the text, leaving it to the reader to rely on the index to find all the information on hurricanes. Similarly, the information on storm surges is located in three areas: 'Tides' has a map of the 100-year storm-tide zone for the state (p. 34), 'Hurricanes' has a diagram of a storm surge (p. 57), and 'Hurricane Preparedness' has a storm surge map for the southern part of the state (p. 259). In this case, the topic 'storm surge' is not even indexed.

The *Atlas of Florida* illustrates some of the best use and worst abuse of colored photographs. In an atlas one expects the photographs to illustrate and enrich geographic patterns. The only topic where this is done is 'Ecosystems' where photographs are accompanied by a map showing the extent of an ecosystem, such as salt marshes, and some text summarizing substrate, topography, vegetation, fauna, processes, and human impacts. The photographs for 'Landforms' and 'Cultural Landscapes' have no explicit ties to regions on maps. The photographs for 'Architecture,' 'Drama, Dance, and Music,' and 'Attractions' are linked by points on their respective maps. No maps are included with the color photographs for art museums, public arts programs, and folk arts. In addition, black and white portraits of all the governors of Florida and photographs of the

state capitol seem out of place in the atlas. In general the editors might have been more judicious in their use of photographs.

The atlas maps, however, are clear and concise. Choropleth maps comprise the majority of the statistical maps and are classified with Jenks' Optimal method into five classes. This is a good choice for presenting the information. Rigid adherence to this method, however, hinders the portrayal of a time series on population density, and the maps of recreational facilities and visitor accommodations. The use of varying numbers of classes and unequal intervals makes it difficult to compare the geographic patterns between maps in a time series. If one color had been used on all the maps to consistently represent the state mean for each time period then Jenks' method might work for a time series. Another type of problem arises with the recreation facility and visitor accommodation maps where counties having zero rooms are placed in the same class as those with 2,000 rooms. The flexibility of a modified or alternative method of classification would improve some of these maps.

Florida State University is to be commended for embarking on a second atlas within seven years of completing the first one. It is a major organizational feat to produce such a comprehensive atlas involving two editors, two cartographers, nineteen contributors, and an additional atlas staff of eleven. That it was completed in such a timely fashion, shortly after the 1990 census was tabulated, is to be applauded. This atlas should be in all reference libraries and should be found in offices, homes, schools, and local libraries throughout the state of Florida. At \$39.95 the Atlas is a bargain!

BOOK REVIEW

*Monarchs, Ministers, and Maps:
The Emergence of Cartography as
a Tool of Government in Early
Modern Europe*

David Buisseret, ed. Chicago: University of Chicago Press for the Hermon Dunlap Smith Center for the History of Cartography, The Newberry Library, 1992. 189+xii pp, 8 color plates, 75 halftones, maps, illus. \$45.00 hardcover. (ISBN 0-226-07987-2).

Reviewed by Matthew H. Edney
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The Kenneth J. Nebenzahl, Jr., Lectures in the History of Cartography have long been key events in the fields of both cartography and history. This book is the long-awaited publication of the lectures of the eighth series of those lectures (1985) which examined a fundamental yet hitherto neglected episode of European history: the early development of state mapping before about 1700. Such an original excursion cannot hope to be comprehensive in its coverage. Instead, this book presents a series of reflections upon six countries and regions: the Italian states, England, France, the Spanish and Austrian Habsburgs, and Poland.

The logical starting point for this collection, considering their general cartographic precocity, is with the Italian states. John Marino presents the results of his sampling of the state archives, particularly of Naples, and finds a curious anomaly. Despite the many active commercial cartographers of the early sixteenth century, archival maps are encountered sporadically before the 1560s. Venice seems to have been the only state to use maps before 1500. Subsequently, map use in all the Italian

states seems to have been restricted to new or reformed agencies within each state's administration. That is, map use only flourished in those offices which were not bureaucratically bound to pre-cartographic practices.

Peter Barber follows with two lengthy chapters on the situation in England, one to 1550, the second to 1625. The high quality of access to the English state papers results in a splendid discussion of map use which is thoroughly supported by documentary material. Barber is particularly taken by the generational changes in royal ministers and the replacement of older groups by younger, more cartographically literate administrators. The first shift occurred in the 1520s when power passed to men born after 1480 and who came to maturity just as Ptolemy's *Geography* was fresh off the presses; the result was an increase in the number of maps used in the ceremonial, business, and private lives of English statesmen. Barber traces the increasing sophistication of Henry VIII's cartographic enthusiasm, especially through the quizzing of architects for his large palace and fortifications projects. On the other hand, map use was not so common as to have caused many maps to result from the estate surveys following the dissolution of church property after 1534.

Barber's second generational shift occurred in the 1550s, with another increase in the level of cartographic appreciation; for example, the newer ministers "came to expect a greater precision in maps than had their predecessors" (p. 58). Map use was broadened in society generally; the state employed more English map makers rather than French or Italian émigrés; printed maps became common, but being cheaper and more plentiful than manuscript maps, they were used

more roughly and so relatively few survive. The third generational change occurred in the 1580s and 1590s, shortly preceding James I's 1603 accession from Elizabeth. Elizabeth seems never to have grasped the full potential of Saxton's and subsequent topographic mapping; James certainly did and he presided over a thorough naturalization of maps within the state apparatus.

Chapter Four, by David Buisseret, covers the use of maps by the French state before Louis XIV's and Colbert's 1663 reform of the administration of the country, the point where Josef Konvitz began in his *Cartography in France* (1987). French state mapping seems to have originated through France's military interests in Italy (1494-1559) which led to a very close encounter with northern Italian military mapping. Thereafter state mapping broadened to include fortification mapping and regional surveys (especially of border provinces). Buisseret's attention is directed to the commissioning of maps and surveys by individual monarchs and their chief ministers, whose attitudes to maps are assumed to be characteristic of that of the French bureaucracy as a whole (an assumption explicitly stated on p. 118). This is not necessarily a valid extrapolation, so that Buisseret ultimately fails in his implied purpose of explaining the French state's high degree of cartographic sophistication which was so evident after 1700. But Buisseret is not to blame; the history of the more bureaucratic mapping is clearly hindered by a lack of surviving documentation.

The question of surviving source material is of immense importance in the case of mapping under the Spanish Habsburgs, the topic of Geoffrey Parker's essay. The surviving record is copious, but it is clear that it represents merely a fraction of the original

materials, after losses not only to the usual ravages of time and fashion but also to the conscious habit of secrecy-minded ministers to periodically destroy whole categories of maps. Parker pays particular attention to the general-purpose surveys—made with and without map—undertaken of Spain and Portugal and to more special-purpose military maps, specifically those produced in support of the Armada (1588) and of the campaigns of the duke of Alba in and around the Low Countries (1568-73). This essay ends differently from the others, because Parker discerns a decrease in Spanish mapping activities (new surveys) after the 1570s.

Following Parker's essay is James Vann's on the Austrian Habsburgs. Unfortunately, Vann died shortly after the lectures and so the essay appears here with little editing and with no notes. It will nonetheless be essential reading for anyone interested in the cartographic self-representation of the early modern state, an issue sidestepped by the other contributors. Vann relates the form of maps commissioned by the Habsburg princes to their political mentality; general maps were made only of Germany, to which the Habsburgs laid claim as Holy Roman Emperors; the maps of the family territories were all 'local studies,' restricted to each individual lordship tied to the Habsburgs not by conquest or national affinity but solely by dynastic loyalty. It is not until the 1700s, with the end of the Spanish line and the rise of Prussia, that the Austrian Habsburgs embarked upon a campaign to create a modern state—a single political entity—and although that campaign failed, the cartographic result was the *Josefinische Aufnahme* (1763-87), the first single map of all Habsburg territories.

The final, brief essay by Michael Mikos describes the surveys

commissioned by the Polish monarchs in the sixteenth and eighteenth centuries. In style and content, especially with respect to the weakness of the monarchy and its effect on mapping, Mikos does not really advance beyond Karol Buczek's *History of Polish Cartography from the 15th to the 18th Century* (English translation, 1966).

All seven chapters present a similar chronological sequence in map use within each state, from occasional instances before the middle of the sixteenth century—sufficiently unusual to be worth comment by contemporary administrators—to the thorough naturalization of maps by the later 1600s so that their use disappears from the written record so that we can only discern cartographic activity from the maps themselves. Further comparison is difficult because each author has interpreted the topic differently. Marino, Barber, and Parker tend towards map use by the bureaucracy of each state; Buisseret, Vann, Mikos, and Barber (also) focus on map use (generally for military purposes) by the monarchs themselves. The first group are interested in 'special-purpose,' or dedicated mapping as part of the daily administration, mapping which does not necessarily require new surveys and data collection (and which might account for the apparent decline in map use in Spain, as Parker's gauge was the lack of new surveys). This special-purpose mapping is quite different from the more general-purpose maps of the second group, of whom only Vann makes the explicit caution that "an interest in geography must be distinguished from a systematic use of or dependence upon maps as instruments of national statecraft" (p. 157). Much of the information tendered by these authors falls in the category of general map appreciation rather than explicit map use; as a result they (excepting Vann)

appear to promote a rather old-fashioned view of the state as the person of the monarch rather than as a larger and more complex social institution. Clearly, there is much work yet to be done on the cartographic angle to the formation of the modern European state.

There are three other important themes which feature in several of the essays: the transition from a manuscript to a printed cartographic culture and the related conflict between map utility and map secrecy; the various forms of patronage and commission whereby the state supported mapping activities; and, the interconnections between the mapping activities of the different states. The precise manifestation of each of these is, however, contingent upon the internal constitution of the different states, so that they encourage little comparison.

The variation in essay content is reflected in the provision of illustrations; there seems to be an inverse relationship between the number of maps reproduced and the number of footnotes in each chapter. Barber's two chapters especially cry out for more illustration. More positively, the illustrations themselves—8 color and 84 monochrome—are of high quality and very few have been so reduced in size as to be hard to read.

In sum, this book is an important and significant 'first try' at understanding a fundamental episode of cartographic history. It has its problems but it nonetheless deserves a wide readership among geographers, cartographers, and historians (especially the chapters by Barber and Vann). It will feature in the cartographic literature for some time, yet it points the way to its own obsolescence: it questions more than it answers, it stimulates more than it satisfies. I look forward to the new research and the new books that will certainly follow.

cartography bulletin board

KNOXVILLE AND KNOX COUNTY, TENNESSEE: A Case Study in Postscript Large-Format Desktop Mapping

by Will Fontanez

Cartographic Coordinator
Cartographic Services Laboratory
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The University of Tennessee Cartographic Services Laboratory began its move from traditional photomechanical techniques to postscript desktop mapping approximately four years ago. This move was completely influenced by the valuable advice and information shared at annual NACIS meetings. Hopefully this article will give some help to cartography labs just beginning to use desktop mapping for the production of large-format (greater than tabloid size) projects.

For some time, large-format mapping on microcomputers has been hindered by software page size limitations, user inexperience, and the high cost and limited size of imagesetter negative output. Recent updated versions of software and advances in imagesetter technology have made it easier and less expensive to produce negatives for large, high quality four-color maps up to about 29" x 44". By combining sets of these large negatives, it is possible and economical to produce even larger maps.

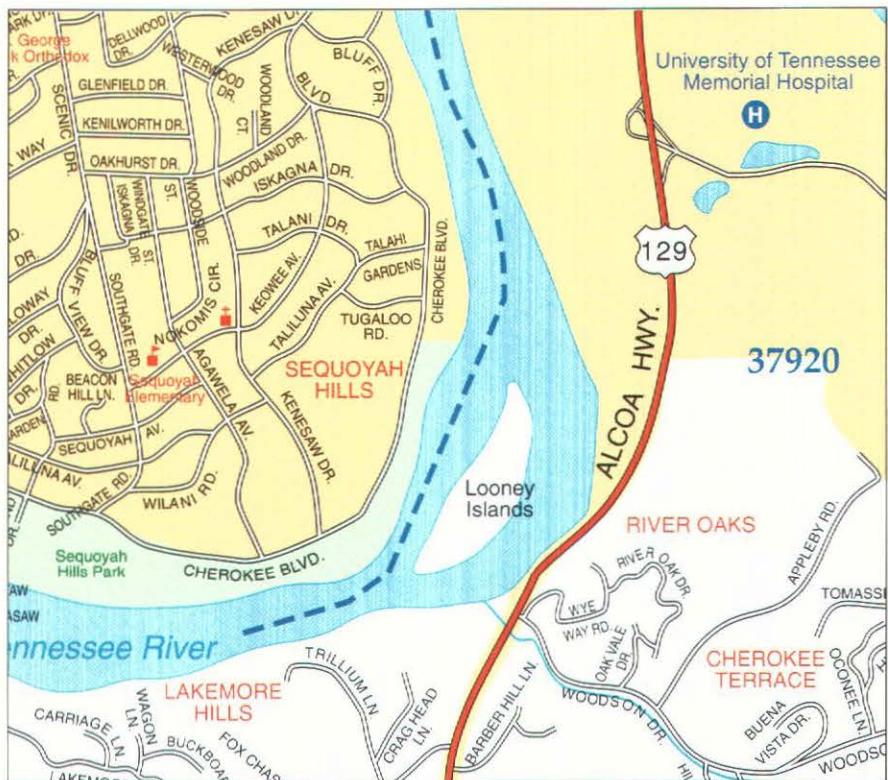
The project reported on here consisted of the design and production of a 62" x 52" four-color wall map of Knox County, Tennessee, along with a 60-page 10" x 14" companion street atlas. All cartographic work was done using Aldus FreeHand on Macintosh II and IIci computers with at least

five megabytes of RAM. Other in-house hardware used was an AppleScanner and LaserWriter IINT. Traditional cartographic equipment consisted of Rapidograph pens and the occasional use of a Kargl projector.

The street atlas was the first component of this two-part project. Base materials were compiled from maps provided by the local planning commission GIS and tax offices, subdivision plans, and USGS 1:24000 topo maps. Working at different sizes and scales between hardware, software and base materials was our first problem. The base maps ranged in size from the six foot by nine foot GIS map to letter sized new subdivision plans. The street atlas pages needed to be 10" x 14", our scanner was only capable of 8.5" x 14", and Freehand had a document maximum document size of 40" x 40". Before you begin drawing, it would be wise to spend some planning time experimenting with these size and scale differences.

We decided to cut the GIS map which contained street and hydrography information into manageable panels of not more than 40" x 40". Since it was plotted onto vellum at the same scale as our topo maps covering the county, adding additional information was an easy manual tracing task. Next, we cut the panels into legal sized sections and scanned them into the Macintosh. These scans were then reassembled to their panel size in FreeHand, placed in the background, and screen digitized using the drawing tools. Geographic information was separated into layers to avoid confusion and drawn in preview mode for speed.

Once initial digitizing (boundaries, roads, and water) was finished on a panel, it was cut into 9" x 12.5" sections in Freehand in order to fit in the 10" x 14" street atlas pages. On each page a reference grid was added, text



Sample piece of street atlas map

was placed, and styles for lines and polygons were assigned. Topographic maps provided most of the physiographic features, stream names, and place names not found on other maps. New information was scanned, scaled, placed in position, sent to the background, and digitized in. We found that text requires more memory than linework, especially when it is attached to paths for labeling curved features. Large quantities of text effects screen redraw time so cutting the panels back to the 10" x 14" page size allowed us to work faster.

A primary goal throughout the project was to economize as much as possible. In order to save on costs, all proofs were output on the LaserWriter. Negatives were then made of four selected pages on a Linotronic 300 in order to check colors and registration via a Cromalin proof. Satisfied that all pages were done, final negatives were imageset and we let the printer handle it from there.

After publication of the street atlas, we began the task of putting together the wall map. Our time was well spent planning, talking with the printer about his size limitations, and locating the negative source. Needless to say these are critical tasks which, if not done first, can lead to a large-format disaster! We again had some size problems to deal with. Printing limitations required each of the 46 map pages to be reduced to 70% of their original size and we still had to keep in mind FreeHand's size limitation of 40" x 40". This time the final negatives would be made on the recently released Linotronic 930 which is capable of producing large, high quality negatives with an image area of up to 29" x 44" at moderately low cost.

We divided the project into quarters and let the printer assemble the four sets of registered negatives into the full sized wall map. Early planning at the street atlas stage included the addition of

a reference grid which proved to be our salvation for putting together the wall map quadrants. We ran each map page through a simple set of commands at 100% scale. First, in preview mode on the highest layer of the drawing we drew a rectangle with no fill that snapped to the map corners of a page. The rectangle was given the same line weight as the reference grid lines. Second, we selected all features on the page, unselected the rectangle, and then cut the remaining selected features to the clipboard. To finish the sequence we selected the rectangle and pasted the cut features into it using the "paste inside" command.

Still working at full scale and moving horizontally from page to page, we began shifting line and polygon features that did not quite match along the join lines. We also edited text and road sign repetitions on adjacent pages. To edit, you cut the contents of one page at a time, make changes, and then repeat the "paste inside" routine. Once the horizontal matches were done we did the same for the vertical matches. Satisfied that all editing was complete we moved into the final stage of creating the quadrants.

From this point on we worked only in preview mode to avoid screen redraw time. The size of the wall map was based on the original reference grid reduced to 70% of its size. The common lines between the four quadrants were the central horizontal and vertical reference grid lines. By moving the origin of the map to the intersection of these two lines we were able to determine the document sizes and origins for each quadrant. The next step was to set up guides for the page placements on each document at the reduced scale. Finishing each quadrant required pages to be pasted into the document, reduced to 70%, and snapped into position. After all pages for a quadrant were

placed, additional information that was needed such as titles, insets, legends, the reference grid designations, and copyright information were added. The final result was a very large-format four color wall map assembled from four sets of process negatives at the platemaking stage.

Our experience with large-format desktop mapping has been good in many ways. Like most labs that are utilizing this new technology, we find that postscript mapping has proven to be practical and cost effective. It gives the cartographer great freedom to experiment with traditional and new ways of displaying geographic information in black and white as well as color. It allows students to gain valuable experience helping with parts of major four color maps that in the past only a veteran cartographer could handle. Eight undergraduate and three graduate students helped in one way or another, which may not have been practical on a manual project this large because of individual differences in drawing or scribing ability.

The myth we always have to point out is that drawing map features and placing text with the computer is not always much faster than traditional methods. The real time and cost saving come when corrections, additions, and new editions to maps are needed. In addition, variations of the same map become possible because of the layering and style editing features that FreeHand offers. We no longer need to supply our darkroom with costly photographic materials, thus making the cost of cartography more reasonable for our customers. Cost savings and faster turn-around time on projects attracts new customers in search of good cartography.

The following are some suggestions when working with large-format desktop mapping projects:

- During digitizing, use as few points as possible in order to cut down on file size. The handles associated with digitized points will help to more accurately trace your scan.
- FreeHand allows a wide range of design options for fills, linework, layering, and text. Use as many of these options as you feel necessary with one exception, do not use patterned fills or lines! They create havoc with linotronic imagesetters because they are bitmapped.
- Maximize your use of the layering capability. You can save time and confusion by isolating layers you are not working on, and it allows global changes to be performed if you change your mind about a style or a type spec.
- Forget about tiling negatives together as some service centers will suggest. The dots are hard to match and may leave lines across screened color areas. You will at best have to pay the printer more for the extra stripping time.
- Insist that the service center run your entire project at the same time and on the same imagesetter in order to avoid costly registration problems.
- Delete scanned TIFF images as soon as you have used all you need from them. Your document size will shrink and screen redraw will speed up.
- Larger scans are now available at reasonable cost. Using them may save you time during the initial digitizing process and Freehand for the Macintosh will accept PC TIFF images.
- Software packages such as Adobe Streamline are helpful for auto tracing lines and polygons. The drawback is that they tend to put down a large number of points thus adding to file size.

map library bulletin board

COMMUNICATING MAP COLLECTION SPACE NEEDS TO ACADEMIC LIBRARY ADMINISTRATORS

by Marsha L. Selmer

Map Librarian, Associate Professor
University of Illinois at Chicago

This column presents the methods used to assess the space needs in one medium-size map collection in an academic research library—the Map Section of the University of Illinois at Chicago (UIC). Librarians working with non-book formats have traditionally found it a challenge to communicate the space needs of their collections to non-specialists. Library administrators are familiar with the standards for books per shelf and can relate that figure to the annual number of volumes acquired. In addition, a quick tour of the bookstacks can provide visual confirmation of a supervisor's report of the need for additional shelving space. In contrast, non-book formats often require protective storage equipment that hide overcrowded conditions.

We recently conducted a survey modeled after one done in the departmental libraries at our sister library at the University of Illinois at Urbana-Champaign (UIUC). The UIUC survey was designed to measure traditional book collections housed on standard book shelving units. Its intent was to show the number of linear feet of material above the 'full' mark, i.e. above 80% shelving capacity or 29 inches of books per 36 inch shelf.

The challenge facing the UIC Map Librarian was the adaptation of a 'book' space survey technique into a methodology that could be applied to cartographic materials. Cartographic information is

produced in several formats—sheet maps, imagery, electronic, with book format limited to reference books and atlases. Even the latter are problematic because atlases are published in a greater variety of heights, widths, thickness and binding styles than found in the general book collection. When compared to books, cartographic materials follow the exception, not the norm, in the type of storage equipment required.

In developing a method for the measurement of cartographic materials, the following steps were taken. First, standards for map libraries, art libraries, and academic libraries were consulted. Second, basic types of storage used by the UIC Map Section were identified. Third, because no one survey technique could be applied to all storage types, a different methodology was applied to each. The basic storage types and the methods applied to each are discussed below.

The UIC Map Section holds a minimal number of cartographic materials in electronic and micro formats. Their storage is shared with the adjacent government documents collection, and therefore, they were not included in the Map Section survey.

HORIZONTAL MAP CASES

To estimate the volume of materials contained in the horizontal map cases every seventh drawer was counted. This sample was considered sufficient for measuring a medium size map collection. Smaller collections should decrease the size of their sample and larger collections should increase theirs. An adjustment in the application of standards was made for U.S. Geological Survey (USGS) 7.5' and 15' series topographic maps because they are double-stacked.

The standards for map libraries indicate that 200 sheets is the maximum capacity of a drawer 4 feet by 3 feet by 2 inches. The contents of each drawer should be divided into folders of no more than 50 sheets each. This division aids both map preservation and the filing and retrieval of sheets. Additional drawer space is consumed by oversize sheets that must be folded, the thickness of the map folders, and the dust covers that protect the contents of the drawer. When counting antiquarian material, this standard must be adjusted downward, and one must consider factors such as whether the maps are encapsulated or placed in individual folders. If the standards are not followed there are risks involved: (1) the weight of the map cases may exceed the building's floor load specifications, (2) the maps suffer increased damage, and (3) lifting overweight map folders may cause injury to the map collection's staff and patrons. One map folder containing 50 maps weighs approximately 17 pounds.

Categories of Cartographic Materials Storage

HORIZONTAL MAP CASES

(4 feet x 3 feet x 2 inches,
with 5 foot aisles)

- Single-stack, sheet maps
- Double-stack, sheet maps

VERTICAL FILE CABINETS

(4 drawer, legal size)

- Single sheets, maps folded in covers or envelopes and aerial photographs

BOOK SHELVING

- Standard (3 feet x 11 inches x 14 inches, shelved vertically, 13 inches of usable space)
- *Oversize (3 feet x 11 inches x 16 inches, shelved vertically, 15 inches of usable space)
- **Oversize (3 feet x 24 inches x 5 inches, shelved horizontally, 4 inches of usable space)

We considered the standard of 200 maps per drawer equal to one 36 inch bookshelf filled to 100% capacity. The number of sheets greater than 160, but less than 200, represented the amount of overcrowding in a drawer. If the number of maps per drawer exceeded 200 sheets those sheets were counted as 'not properly shelved.' Exceptions to the standard were as follows: (1) USGS 7.5' and 15' topographic series maps are double-stacked; a standard of 400 sheets per drawer equals 100% capacity was applied. (2) The thickness of sheets in some map series had been at least doubled because the sheets were mounted on cloth. These maps were counted as two rather than one sheet. (3) For map drawers containing 'other' cartographic materials, such as USGS Geologic Folios, the calculation was based on the height of the drawer's contents.

VERTICAL FILE CABINETS

We measured every seventh drawer to estimate the volume of material contained in the vertical file cabinets. The amount of space between the front edge of the cabinet and the interior front of the fully extended drawer was considered to be 100% of the capacity of the drawer.

Due to variations in the model of vertical file cabinet, the maximum usable drawer depth varied. A measurement was made of the total drawer capacity and the drawer contents to the nearest half inch. Twenty five inches represented the average 100% capacity of a drawer. Drawer contents that measured more than 20 inches, but less than 25 inches, represented the amount of overcrowding. Contents greater than 25 inches were counted as 'not properly stored.'

BOOK SHELVING

We included all shelves when counting the volume of maps contained in book shelves. Data for three different shelving configurations were collected. The UIUC 'book' method was used for standard and *oversize books. Two inches of material per **oversize shelf were considered equal to one 36 inch bookshelf filled to 100% capacity. If a shelf contained more than one volume, and if the volumes were stacked more than 1 and 1/2 inches, but less than 2 inches high, the 1/2 inch difference represented the amount of overcrowding on that shelf. If the height of the volumes per shelf exceeded 2 inches, the materials in excess of 2 inches were counted as 'not properly shelved.' Any **oversize volumes in a public access area on a shelf higher than 5 feet 4 inches were counted as not properly shelved.

A significant number of titles, especially atlases, exceeded the height, width, and thickness of the books in the library's general book stacks. The UIC cartographic reference collection contains 95% standard size, 9% *oversize, and 4% **oversize books. The UIC atlas collection contains 64% standard size, 16% *oversize, and 20% **oversize volumes. These percentages are based on a title, rather than a physical, volume count.

The standards for **oversize volumes assume that most have great thickness and should be placed one per shelf. This is not always the case with atlases; thus an exception to this standard was established by the Map Librarian after consultation with specialists in preservation and conservation. A shelf was considered to be at 100% capacity if it contained volumes stacked to a height of 2 inches. The juxtaposition of hard cover and paper bound atlases allows stacking to a greater height,

however, it increases the opportunity for damage when volumes are removed and reshelfed. If volume configurations permit, the volumes are double-stacked.

The UIUC Library space needs survey, from which this study was adapted, was designed to provide library administrators with statistics on the total number of linear feet of overcrowding in the library. To make a map collection's unique data more meaningful to non-map librarians, it is necessary to convert the data into their equipment equivalents, e.g., the number of five drawer horizontal map case units or vertical file cabinets that are needed to alleviate overcrowded conditions. This equivalent makes it easier to visualize and calculate the amount of additional space needed. Data gathering for this type of survey is more labor intensive for map collections when compared to book collections, but it must be done if map librarians are to present map collection needs with equal strength.

Selected References

Committee on Standards, Geography and Map Division, Special Libraries Association. 1987. *Standards for University Map Collections*. Washington, D.C.: Special Libraries Association, Geography and Map Division.

Ellison, J. W. 1979. Maps: storage and care self—evaluation form. ERIC ED. Amherst, NY: State University of New York at Buffalo, School of Information and Library Studies:181-182.

Art Libraries Society of North America. 1991. *Facilities Standards for Art Libraries and Visual Resources Collections*. Englewood, CO: Libraries Unlimited.

Metcalf, K. D. 1986. *Planning Academic and Research Library Buildings*. Chicago: American Library Association.

essay**ALL IN THE MIND**

The following is a direct transcription of an essay delivered by Mr. Roger Rosenblatt of Vanity Fair Magazine. The essay entitled "All In The Mind (recent exhibit of maps and thoughts about different types of maps)" aired on the Mac Neil/Lehrer Newshour on Thursday, March 25, 1993. We would like to thank the Mac Neil/Lehrer Newshour for granting us permission to share this essay with our readers.

Somewhere the map you need exists or can be made. That innocent sounding promise is tucked in the flier of an exhibit on the power of maps at the Cooper-Hewitt National Museum of Design in New York. In the high, rich rooms of the old mansion hang maps of the North Pole and of the Alps, road maps of North Carolina and of the ancient Roman empire, a map of the structure of the Sphinx, a map showing the locations of American Indian tribes, children's and sailors' maps, the maps of kings to certify their conquests, a map of the entire world, a map of lava flows on Mars. The point is made by the exhibition that maps are manipulable and relative documents, instruments of propaganda, persuasion and perspective, the map of Australia as a chastening example to Europeans and Americans shows Australia right side up, and the rest of the world down under. To move through this exhibition is to move through all the intelligences of human beings as they have tried to place themselves to orient themselves in history. People are trying to do that again today on a global scale so drastically has the world's map changed of late. Three times already in our century have the

world's Atlases revised their pictures. Once after the First World War to account for the ruins of the Austrian, German, Russian and Ottoman Empire, once again after the Second World War with the reconfigurations of Eastern Europe, the Middle East, Asia, and Africa, now, once again, due to the reunification of Germany, the disintegration of the Soviet Union and Yugoslavia. There is a new Hammond Atlas of the world, a new National Geographic Atlas of the world, and a revised New York Times Atlas of the world. Among these moderns, a beautiful ancient also showed up, the *Atlas of Atlases*, a book displaying mapmaking as one of the fine arts. Somewhere the map you need exists or can be made. It's a lovely consoling thought when you recall all the times you felt lost in the world, your little world, and how grateful you would have been for directions up or out, how grateful you'd be now if someone were to hand you a map of your life as it is about to unfold like a map, showing in clear colors and contours all the icebergs, all the shoals in your past, all the dragons, all the treasures. Yet, the exhibition proves that no map is trustworthy. If it were true an accurate at one time, it was only for a moment until history or science demanded a correction. In a way, the truest maps are the ones that flaunt their falsity. At the ironic extreme is Saul Steinberg's famous map showing the perspective of West side Manhattanites whose vision of the universe extends as far West as New Jersey. At the spiritual extreme, there is the map of the Possum Beings of the Australian Aboriginals who believe that the location of God and dreams is the only map that counts. Here, look at the exhibit's so-called picture of the world. It is a trick, a sham, a painting, not a map. One cannot photograph the whole of a sphere. Then see what this world leaves

out, clouds, depth, motion, time, political and national division. It leaves out you and me. The truest map, in fact, seems to be the one that announces, "You do not know where you are going and you will never know, but I exist to dignify the attempt." The deep appeal of maps, after all, is not the territories they show but our relation to them, a verification of being. You are here, as they say on museum tours, you are in the world, ancient and modern. You live and you are your own ocean and your own desert and one side of you is visible and one side is not, and one side of you is dark and one is light. The exhibitors say, "Somewhere the map you need exists or can be made." I think they had the mind in mind. I'm Roger Rosenblatt.

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recent publications**SOFTWARE****New Vertical Datum conversion (VERTCON) Software**

The National Geodetic Survey Division (NGSD) announced the availability of a new vertical datum transformation software program. Program VERTCON computes the modeled difference in orthometric height between the North American Vertical Datum of 1988 (NAVD 88) and the National Geodetic Vertical Datum of 1929 (NGVD 29) for a given location specified by latitude and longitude. This conversion is sufficient for many mapping purposes. The VERTCON software and database operate on standard disk-operating-systems (DOS) controlled computers with a math coprocessor. The VERTCON software and two files of modeling

coefficients are available on a single computer disk.

The horizontal geodetic datum, either the North American Datum of 1927 (NAD 27) or the North American Datum of 1993 (NAD 83), to which the latitude and longitude are referenced, should not affect the height difference that VERTCON computes because the height differences change very little in horizontal position of less than 1000 meters. The root-mean-square error of the actual NGVD 29/NAVD 88 height differences at bench marks of the National Geodetic Reference System compared with the computed height differences from the model is +/- 2.5 cm. Depending on the network and design and terrain relief, larger differences may occur the further a control point is located from the survey control that is used to establish the model's coefficients.

VERTCON costs \$89 per copy; prepayment is required. Checks, money orders, VISA, MasterCard, and American Express are acceptable for payment. Inquiries should be made to National Geodetic Information Center, Telephone (301) 443-8631, fax (301) 881-0390.

DATA

Global Environmental Data

The National Geophysical Data Center has announced the availability of global environmental data produced by the Global Ecosystems Database Project, conducted by NGDS and the U.S. Environmental Protection Agency's Environmental Research Laboratories, in Corvallis, Oregon. This data base contains raster girded map layers registered to a common latitude-longitude base. Each file has been inspected for optimal quality and usability for analysis, given the current state of data development. Parameters

have been chosen for their potential use in the integrated studies of the global environment. Individual data layers have been contributed by many scientific laboratories and individuals. The CD-ROM includes selected data such as ecosystems, landuse, wetlands, vegetation (including satellite-derived vegetation index), climate, topography, and soils. These data are on a range of compatible grids, from 2 degrees to 2 minutes. Vector data for coastlines and other features are also provided. The disk is provided to the scientific community for research and education, with documentation on the quality of the data and limitations. Periodic updates are planned as well as enhancements to this disk, as well as to other parts of the overall Global Change Data Base. The price for the Global Ecosystems Data on CD-ROM, with browse and visualization software and extensive documentation is \$100 (product number 1016-A27-001). Data contributors and academic researchers should contact the National Geophysical Data Center for information about obtaining data by special arrangement. National Geophysical Data Center, NOAA, E/GC1, Dept. 891, 325 Broadway, Boulder, Colorado 80303; phone (303) 497-6125; fax: (303) 497-6513; e-mail: infor@mail.ngdc.noaa.gov.

Canadian Terrain Data

3 Arc Second Terrain Data for Canada is now available in USGS and DOD/DMA format on one CD-ROM from Communications Data Services, Inc. (CDS). In addition to the Canadian data, CDS currently offers three other different sets on CD-ROM. These are United States Geological Survey 3 Arc Second Digital Terrain Data, United States Geological Survey Land Use and Land Cover (Composite Grid Cell),

and United States Department of Commerce, Bureau of the Census 1990 population data base. A guide to other products and services available from Communications Data Services, Inc. is available by contacting them at 6105-E Arlington Blvd., Falls Church, Virginia 22044; Phone (703) 534-0034 or (800) 441-0034; fax (703) 534-7884.

BOOKS, ATLASES AND MAPS

Factbooks and Maps

Interarts, Ltd., a cartographic firm specializing in geographic products has released some new and updated products. These include the *World Political Paper Map* (with and without flags), the *Earth MapBook Environmental Atlas*, the *Earth FactBook Maps and Facts Reference Atlas*, and two coloring books—*Countries and Flags* and the *Living Earth*.

The *World Political Map* is on a Van der Grinten, has been updated to include all the changes in the former Soviet Union and the former republics of Yugoslavia. The map is at a scale of 1:30,000,000 and measures 28" x 53" without flags (\$16.95) and 35.5" x 53" with flags (\$18.95). The *MapBook Environmental Atlas* is a revised edition of the *Concise EarthBook*. It too has been updated. In addition to the general reference maps it contains a country-by-country information section and an index. The atlas is hardbound, has 215 pages, comes in a handy travel size of 5.25"x7.25", and sells for \$18.95 (ISBN 1-879856-25-5). The *Earth FactBook* contains comprehensive information and maps that answer questions ranging from "what causes earthquakes?" to "why is an ant hill like a city?" Like the *MapBook Environmental Atlas*, it is published in the 5.25"x7.25" hardcovered format, has 184 pages

and sells for \$18.95 (ISBN: 1-879856-28-X). The coloring books are a fun way to learn about the world and are designed for both children and adults. Each diagram has a color key to help you select colors and explanations about the maps and diagrams. The coloring books are softcover, 8.5"x12", 39 pages each and cost \$7.95 (*Countries and Flags* - ISBN: 1-879856-15-8; *The Living Earth* - ISBN: 1-879856-16-6).

Directory of Canadian Map Collections

The 6th Edition of the *Directory of Canadian Map Collections*, by Tim Ross, is available at a cost of \$18.00 from the Association of Canadian Map Libraries and Archives, c/o Cartographic and Audio-Visual Archives of Canada, Room 1016, 344 Wellington Street, Ottawa, Ontario, K1A 0N3.

Cartographic Citations

The Map & Geography Round Table of the American Library Association has published an informative booklet on forms of citation for cartographic materials. The twenty three page publication, entitled *Cartographic Citations: A Style Manual* is edited by Suzanne M. Clark, Mary Lynette Larsgaard, and Cynthia M. Teague, and was published in 1992 (ISBN 0-8389-7581-X). The booklet is an indispensable reference for anyone using maps. It provides the basic form for citing cartographic materials of all types and gives numerous examples of citation formats (see table of contents to left). The cost is \$10. Orders can be sent to Kathryn Womble, Map Collection FM-25, University of Washington Libraries, Seattle, Washington 98195; Phone (206) 543-9392; e-mail kwomble@u.washington.edu.

Cartographic Citations: A Style Manual

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cartographic events

EVENTS CALENDAR 1993

June 21-25: XVth International Conference on the History of Cartography. Chicago/Milwaukee. The Hermon Dunlap Smith Center for the History of Cartography, The Newberry Library, 60 West Walton Street, Chicago, Illinois 60610.

October 20-23

XIII Annual Meeting of the North American Cartographic Information Society

Washington, DC.

For more information contact
Charles Harrington
NACIS Program Chair
10904 Kingstead Rd.
Damascus, MD 20872
(301)443-8360

October 30 -November 1: XI International Symposium on Computer Assisted Cartography (Auto-Carto-Eleven). Minneapolis, Minnesota. Contact: Robert B. McMaster, University of Minnesota, 612-625-9883 or Marc. P. Armstrong, University of Iowa, 319-335-0153.

November 2-4: GIS/LIS '93. Minneapolis, Minnesota. Contact GIS/LIS '93, 5410 Grovenor Lane, Ste. 100, Bethesda, MD 20814-2122; (301)493-0200.

announcements

THE CONGRESS OF CARTOGRAPHIC INFORMATION SPECIALISTS ASSOCIATIONS - DIGITAL DATA SURVEY RESULTS

by Christopher Baruth
CCISA Coordinator

Since 1988, representatives of the major cartographic information specialist organizations and institutions have participated in an informal structure which has come to be known as the Congress of Cartographic Information Specialist Associations, or CCISA. The purpose of the CCISA is to facilitate communication between and help coordinate the efforts of the groups involved. A major undertaking of the CCISA has been to address the challenges posed by the introduction of digital spatial data on cartographic collections. As a preliminary measure, however, it was deemed necessary to attempt to assess the "current status" of collections with respect to these data. To this end, Alberta Wood and Diana Rivera, with the support of their respective organizations, the Association of Canadian Map Libraries and Archives and the North American Cartographic Information Society, undertook to create, administer and compile the survey. A summary of their survey appears below. The final preparation for publication was made by Alberta Wood.

The current representatives to the CCISA are as follows: Helenjane Armstrong, COSML; Edward Dahl, ISCEM; Ralph Ehrenberg, Geography and Map Division, LC; J.K. Herro, WAML;

Patrick McGlamery, MAGERT; Jim Minton, MOUG; Diana Rivera, NACIS; Johnnie Sutherland, GMD-SLA; Jim Walsh, NEMO; Alberta Wood, ACMLA and ACSM.

The CCISA Survey Results

*Compiled July 28, 1992
by Diana Rivera, Map Librarian,
Michigan State University
and Alberta Auringer Wood, Map
Librarian, Memorial University of
Newfoundland, St. John's, Nfld.,
Canada*

Geographic Information Systems are new and powerful tools that will enable users to obtain, manipulate and store information for various purposes. Early in 1992, it was not known what percent of libraries have this information and equipment available. In order to try to find out, this survey sampled libraries in the United States and Canada on their holdings of digital cartographic data and the necessary equipment. A random sample was taken from libraries listed in Guide to U.S. Map Resources, 2nd. edition, and mailed to 242 libraries. This included public libraries, as well as special collections such as museums, archives, and historical societies. Government agencies were also included in this special collections group. In addition, about 250 copies of the survey were circulated in the Association of Canadian Map Libraries and Archives (ACMLA) Bulletin, and it was posted on MAPS-L (the Maps and Air Photo Systems Forum). The total number of responses was 142. Diana's mailing produced 90 responses (37% of that mailing, a good response), while there were only 19 from the ACMLA mailing and 33 from the MAPS-L posting. Most of the responses were received by mail (106) with 18 arriving by FAX, 16 by electronic mail, and two by hand. The

survey was co-funded by the Association of Canadian Map Libraries and the North American Cartographic Information Society.

There were 117 responses from libraries in the U.S., 24 responses from Canadian institutions, and one response from a university collection in Great Britain. The university and college collections were the largest category with 96 respondents, while there were 20 from public libraries, 13 from government agencies (including one international organization), and 13 from special collections. In terms of the university and college respondents, 83 were associated with university libraries or library systems (66 in the U.S. and 17 in Canada) and 13 were associated with other departments, such as geography (eight in the U.S., four in Canada, and one in Great Britain). All the public and special libraries who responded were in the U.S. Three of the governmental collections were in Canada and ten were in the U.S.

Of those responding, 46% (65) have digital cartographic or spatial data in some form in their collections, while 54% (77) do not have any in their collections. Libraries associated with universities and colleges (57 of the 65) seem to be more likely to have such materials than the public, government or special libraries who responded. None of the special libraries indicated having digital cartographic or spatial data, only two of the public libraries out of 20 had any of these materials, and six out of 13 of the government libraries.

For those answering "no" (77 or 54% of those responding), no funds for software or data (39), no demand or interest (27), and lack of necessary equipment (33) were the major answers, while being low priority (7) or outside collecting area (9) were minor answers, with respondents citing more than

Continued on page 36

NACIS XIII

*Cartography in a Changing
World*

OUT OF THE PAST - TO THE FUTURE

*Silver Spring, Maryland
October 20-23, 1993*

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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 \$10 per issue. Please specify the issue numbers (1-15) when ordering. Makes checks or purchase orders payable to NACIS and send your back issue requests to:

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

NACIS Board Meeting March 13, 1993 Silver Spring, MD

The following members of The Board were present: J. Patton, E. Hall, C. Remington, J. Anderson, J. Minton, J. Dodd, H. Castner, R. Rowles, R. Bolton and Executive Director C. Baruth.

The meeting began at 10:07 a.m. with the approval of the minutes of October 16, 1992 meeting.

Treasurers Report

Ed Hall reported a balance of \$25,974.33 in NACIS accounts. Receipts have totaled less than \$25,000 annually, therefore filing IRS Form 990 was deemed unnecessary. Hall reported that deposits to the NACIS money market account are limited to 120 checks monthly, which requires him to withhold checks from deposit at certain times of the year. A suggestion was offered by Anderson, to establish an account in Milwaukee. Hall made a motion for the Executive Director to establish a checking account in Milwaukee, with a monthly statement of the account to be forwarded to the Treasurer, and for both the Treasurer and the Executive Director to have signature authority on the account. The motion was seconded and passed. The Executive Director has been authorized by The Board to investigate investment account options in Milwaukee and act upon these opportunities in the best interest of The Society. When the account is established in Milwaukee, the account in Ohio will be closed.

NACIS XIII

Action on NACIS XIII was hindered by the fact neither Charles Harrington nor Fred Anderson

were able to attend the meeting due to most inclement weather. Susan Nelson, however, was present to receive advice and direction from The Board. The opportunities for cartographically oriented field trips are so numerous that organizational efforts will be limited to NOAA, National Geographic and the Library of Congress Map Division. NACIS will sponsor an evening reception at an appropriate local venue. Access to the city's subway system will save transportation costs, as buses for field trips and the reception will be unnecessary. A further savings will be realized with a meeting attendance of 224 room nights, as the hotel will not charge for its conference rooms. Members are reminded to specify our meeting when making hotel reservations. Conference announcements will encourage our institutional members to participate in our exhibit program. Susan Nelson will contact Donna Schenstrom and ask that Donna once again help in organizing cart lab exhibits. A special effort will be made to invite students from local universities to the meeting. The Board is interested in organizing a session for student papers, if there is sufficient participation. Susan received direction from The Board with regard to free materials to be distributed to meeting registrants. A time table was established for the following: mid April - Call for Papers; June 15 - response to Call; early July - Board telephone conference call; early August - Preliminary Program. Final business on NACIS XIII involved a survey of the conference room facilities which meet with The Board's approval. Adjourned for lunch, 1:05 p.m.

Nominations

Reconvened at 2:35 p.m. Nominations are required for the offices of

Vice President and Secretary along with four Board seats. Dodd solicited The Board for nominees to these positions and noted suggestions. A special effort will be made to seek nominations from Canadian members. In a change from past practice, members elected to office will be notified as soon as the results of the election are communicated to The Board. A final call for nominations will be published in the May C.P.

Membership Growth

Baruth pointed out that our membership, while remaining reasonably constant in terms of total numbers, has a substantial turn over from year to year. The growth of The Society is tied to not only recruiting new members, but retaining those that have joined. In response to this issue, Membership Growth Committee Chair, Ruth Rowles will organize a letter writing effort to past members. This campaign will focus on bringing past members back into NACIS as active members. The use of C.P. was again seen as a positive mechanism for sustaining membership growth.

Cartographic Perspectives

Baruth stated that C.P. had enough material for both the Spring and Fall editions. There is a problem associated with the fact that we are running out of back issues. The Board authorized the xeroxing of issues out of print, on back to back copies, at a sale price of \$10.00 per issue. The xerox copies will be distributed if no original issues are available. A note to this effect will be published in the C.P. Further, the Board authorized the printing of a generic cover for the xerox copies. This can be accomplished by printing extra copies of the next C.P.'s cover. As C.P. does not get forwarded in the mail, Baruth will

in the future send all membership renewal forms via first class mail. This should help us keep current records of the members addresses.

NACIS XIV

Dodd reported on his recent trip to Ottawa and offered The Board his appraisal of the hotel facilities. He meet with local contacts Betty Kidd and Dan McKay, who are will be helping us with arrangements. The Board expressed an appreciation for their efforts. The Board acknowledged that Dodd had the authority to speak for The Board in his negotiations with Ottawa hotels. Upon a review of costs and facilities a motion was offered by Minton that the Radisson-Ottawa be accepted as the hotel of choice. Second and passed. Further negotiations will focus on this facility before any

contractual agreements are made. Dates for this meeting are tentatively set as October 12-15, 1994.

NACIS XV

After a discussion regarding future meeting sites, Patton offered a motion to contact Pat Gilmartin and ask her to proceed with a preliminary investigation of a meeting in Charleston, South Carolina. Second and passed.

Dues

The Board found no need to change current dues.

New NACIS Directory

A new directory of NACIS members, including those who have been members within the last two years, will be available without

cost to all Washington registrants. Additional copies may be purchased by request for a nominal fee.

Other Business

Aside from a discussion of when Washington's National Airport might reopen, other business focused on the function of the Inter-American Committee. Castner pointed out an opportunity to recruit new Canadian members. The discussion closed with a resolution by The Board to pay for the costs of translating papers presented at Ottawa into French. Adjourned 5:20 p.m.

*Submitted,
Craig Remington*

*announcements continued from
page 32*

one reason (or combination of reasons). Only three provided no responses to question 10 even though they had answered "no" to question 2. Some other critical reasons (though not critical in number) included the lack of staff and lack of information or policies. Nine (9) respondents noted that the information was available in other departments (probably campus departments other than the library) or was otherwise outside their collecting responsibility.

Most of the institutions reporting having digital cartographic data indicated having it in CD-ROM format (55) while 34 noted

having items on diskettes. A much smaller number had other formats, such as 11 for tapes, three for video discs, and six for others.

The equipment in use varies enormously (from the most basic (PC) (15 responses) to the several who reported the sophisticated, (Unix systems or Vaxes), but is generally the 286 (10 responses), the 386 (20 responses) and the 486 (10 responses). Out of the 65 responses indicating digital data in their collections, over 89% of respondents indicated having some type of equipment enabling them to use the data. Only a few institutions had a lot of equipment.

It is quite apparent that this is an area of great pending expansion for map libraries of all types. A danger is trying to offer service for these materials without adequate

equipment and/or training to do so. In the U.S. much of the material is arriving on deposit, forcing libraries to buy equipment and obtain training or the material will be unusable.

For a complete summary of the survey results, a tabulation of the survey data, and list of responding institutions (a list with complete names and addresses of respondents is also available), write or call Dr. Christopher Baruth, Map and Imagery Librarian, American Geographical Society Collection, University of Wisconsin-Milwaukee, P.O. Box 399, Milwaukee, WI 53201; phone 800-558-8993 (toll free in U.S. and Canada) or 414-229-6282; FAX 414-229-4380; Email cmb@gml.lib.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. Offering feature articles, regular commentaries, letters, and news on legislation, people, products and publications, the American Congress on Surveying and Mapping's *Bulletin* is published six times a year. Contact: Membership Director, 5410 Grosvenor Lane, Bethesda, MD 20814; (301) 493-0200.

Base line, Published six times a year by the Map and Geography Round Table, American Library Association. Editor, Nancy J. Butkovich, Physical Sciences Library, 230 Davey Laboratory, Penn State University, University Park, PA 160802; (814) 865-3716.

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 CCA. 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 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 Speciality Group Newsletter. Triannual publication of the Cartography Speciality 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. This quarterly newsletter of the Association of Map Memorabilia Collectors offers a unique mix of feature articles, news, puzzles, and announcements of interest to cartophiles. ISSN 0894-2595. Contact: Siegfried Feller, publisher/editor, 8 Amherst Road, Pelham, MA 01002; (413) 253-3115.

Geotimes. Monthly publication of the American Geological Institute. Offers news, feature articles, and regular departments including notices of new software, maps and books of interest to the geologic community. Articles frequently address mapping issues. ISSN 0016-8556. Contact: Geotimes, 4220 King Street, Alexandria, VA 22302-1507.

GIS World. Published six times annually, this news magazine of Geographic Information Systems technology offers news, features, and coverage of events pertinent to GIS. Contact: Julie Stutheit, Managing Editor, GIS World, Inc., P.O. Box 8090, Fort Collins, CO 80526; (303) 223-4848; fax: (303) 223-5700.

Information Design Journal. Triannual 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.

FEATURED PAPERS

Each issue of *Cartographic Perspectives* includes featured papers, which are refereed articles reporting original work of interest to NACIS' diverse membership. Papers ranging from theoretical to applied topics are welcome. Prospective authors are encouraged to submit manuscripts to the Editor or to the Chairperson of the NACIS Editorial Board. Papers may also be solicited by the Editor from presenters at the annual meeting and from other sources. Ideas for special issues on a single topic are also encouraged. Papers should be prepared exclusively for publication in *CP*, with no major portion previously published elsewhere. All contributions will be reviewed by the Editorial Board, whose members will advise the Editor as to whether a manuscript is appropriate for publication. Final publication decisions rest with the Editor, who reserves the right to make editorial changes to ensure clarity and consistency of style.

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.

TECHNICAL GUIDELINES FOR SUBMISSION

Literature cited should conform to the Chicago Manual of Style, 13th ed., University of Chicago Press, Chapter 16, style "B." Examples of the correct citation form appear in the feature articles of this issue. Authors of Featured Papers should submit four printed copies of their manuscript for review directly to Dr. Michael Peterson, Chair of the *CP* Editorial Board, Department of Geography, University of

Nebraska - Omaha, Omaha, Nebraska 68182. Manuscripts are reviewed by a minimum of two referees. The recommendations of the reviewers and the Chair of the *CP* Editorial Board are sent to the Editor of *CP*. The Editor will contact all authors to notify them if their paper has been accepted for publication and if revisions are necessary prior to publication. The following technical guidelines should be followed for all accepted manuscripts (these guidelines also apply to book, map, and software reviews).

Material should be submitted in digital form on 3.5" diskettes. Please send a paper copy along with the disk, in case it is damaged in transit. Text documents processed with Macintosh software such as *WriteNow*, *WordPerfect*, *MS Word*, and *MacWrite* are preferred, as well as documents generated on IBM PCs and compatibles using *WordPerfect* or *MS Word*. ASCII text files are also acceptable.

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Materials should be sent to:
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The North American Cartographic Information Society (NACIS) was founded in 1980 in response to the need for a multidisciplinary organization to facilitate communication in the map information community. Principal objectives of NACIS are:

- § to promote communication, coordination, and cooperation among the producers, disseminators, curators, and users of cartographic information;
- § to support and coordinate activities with other professional organizations and institutions involved with cartographic information;
- § to improve the use of cartographic materials through education and to promote 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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