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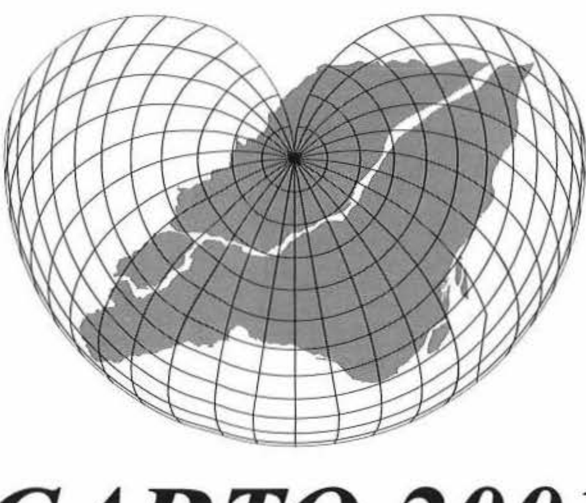

CARTO 2001

Montréal

30 mai au juin 2001/ May 30 to June, 2001

NORMAN DRUMMOND

1927 - 2001

On March 3, 2001 Dr Norman Drummond passed away in Montreal at the age of 74. Norman was retired from McGill University where he spent 40 years in a distinguished career as an academic and administrator.

Norman had been a CCA member since its inception and worked extensively for the Association in several capacities. He served on the executive as Education Interest Group Chair (1981-83). He was elected Vice President in 1987 and served as President in 1988-89 and Past President in 1990. Besides his distinguished service to the CCA he was a charter member of the Canadian Association of Geographers and Carto-Quebec. He was also a member of the Canadian Institute of Geomatics where he most recently served as Technical Councillor for Cartography.

Equally important for the Association and the Canadian cartographic community at large was his nomination by the Canadian Cartographic Association and subsequent appointment by the Canadian Institute of Geomatics to serve the maiden four year term as chair to the Canadian National Committee for the International Cartographic Association. In this role he represented Canadian cartographers on the international scene in an exemplary fashion with his always present modest manor and charm and professionalism. In 1995 he was presented with CCA's Award of Distinction for Exceptional Contributions to the CCA.

In 1992 Norman chaired the Organizing Committee for the Montreal conference and was on the Organizing Committee in 1980. Ironically this years meeting will be held in Montreal. The conference will not the be the same without him and he will be sadly missed by all his colleagues.

I wish to express my condolences to the Drummond family and especially to Pat his loving and charming wife who was always at his side. Our next issue of Cartouche will feature a special tribute to Norman.

Gary McManus, editor

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EDITORIAL

Cartouche is published quarterly by the Canadian Cartographic Association. Members are welcome to submit articles for publication. Articles and notices submitted for publication are subject to editorial approval. Please address your submissions to the editor. All other articles will appear in the language of submission. While every effort is made to ensure accuracy of content, the editor cannot be responsible for errors in compilation, or loss of any item submitted. Opinions expressed in the editorials, submitted articles and letters are not necessarily those of the Canadian Cartographic Association. The Canadian Cartographic Association gratefully acknowledges the financial support given by the Social Sciences and Humanities Research Council of Canada.

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THE EXCEL GENERATION IN AUTOMATED CARTOGRAPHY

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Abstract

The latest versions of Microsoft Excel have made it possible to use it to meet many needs in cartography. Edit is particularly powerful and fast, as data and maps are in the same program and the controllable command menu makes it easy for inexperienced operators and Excel symbology is very easy to set up. The paper (and associated CD-ROM) describes new macros that make Excel useful for cartography.

Introduction

The phrase "Automated Cartography" had almost died out in the last 20 years, as map production became standardized in the larger cartographic establishments. It also became hidden within the larger area of the now accepted phrase "Geographic Information Systems (GIS)".

However, three things have started to change this and automated cartography has once again started to be a subject on its own as the mapping component of GIS. The first was the rapidly reducing cost of powerful PCs, enabling an individual to do creative map work without involving a team of specialists. The second was the enhanced versions of spreadsheet programs. The third was the need for individuals and small groups, particularly Non Government Organizations (NGOs), to do their own computations and present these in an acceptable, understandable and attractive manner, particularly in map forms.

This paper was first presented at the Carto2000 meeting in Edmonton, Alberta. Raymond Boyle is a long time member and a past president of the CCA and recipient of the CCA Award of Distinction for Exceptional Scholarly Contributions to Cartography.

Automated cartography has always been regarded as map data entry (digitization), editing interactively from the map and printing out the results. This paper focuses on the first two. The most important advance in the last few years has been the enhancement in Microsoft Excel™ to Excel 97, and the work in this paper is based on this version and Excel 2000. The PC requirements to work from the CD-ROM programs and data are minimal by modern standards, involving only 300Mhz, 64meg RAM, 1gigabyte of hard drive and a CD-ROM drive.

The major conceptual change with the use of Excel for mapping, is the fact that the maps displayed on the screen are in bitmap format, whereas most of the older automated cartography systems used digital line graph (DLG). This means that every pixel on a displayed raster image must be assigned a value in geographic coordinates. This is usually Universal Transverse Mercator (UTM) in Canada, but any others may be used, planar relationships being the simplest. The relationship must be set up as work proceeds, or map images may exist and have their relationships already recorded.

The method of setting up the relationship is to select two widely separated points (in the X and Y axes) that have known UTM or other coordinates and are map 'obvious' so that they can be selected without any ambiguity. Spreadsheet calculations then record and continually calculate the required relationships for any pixel.

In the older automated cartography approaches, the data relative to lines or points was stored separately and even in a different program. This led to connectivity problems and low speed of operation. The new possibilities of Excel overcome many of these problems. The first is that the *draw* mode of Excel is almost as powerful as previously could only be obtained in CAD programs or in some special mapping programs. The second is the very powerful and effective control of the command menu line to appear as required for each phase of the work. As most of the drawing work here described uses the *freeform* method, the *freeform* symbol is moved onto the command menu line for easy access and to avoid having to call the more complex *draw* toolbar.

The controllable aspect of the command menu line is a very valuable property. It makes it easy for an occasional and untrained user to be able to select the next available option, or an alternative, in a simple manner. Most of the work described here with Excel is aimed at making all important operations simple for a non-specialist. This might well be the administrator of a small town who uses Excel for normal administrative work and is comfortable with such operations even when a map is being displayed. The advantage will particularly appear in easy updating and editing of mapping operations. This is essential if data is to remain valid.

An interesting issue appeared when using an earlier intermediate method of trying to combine spreadsheet and CAD programs. The programs have entirely different approaches to work. The CAD program uses complex macros to aid the user in first setting up a drawing, but does not help when continuous updating is necessary. On the other hand macros in spreadsheets expect continuous change, even sometimes automatically from another set of dynamic data. As a result, combining the two types of macro approach into one use is very difficult, slow and clumsy. There are enormous advantages in doing everything in a single program, in this case Excel.

In the set of macros described in this paper, there are certain ones that are critical and are used in many variations, and others that are auxiliary. The macros relating to creating the pixel/UTM relationship are somewhat complex (but well hidden from the user) and in this presentation use a combination of cell formulae and macro calculations, although other variations of the mix could be used.

Digitization

There are two aspects to be discussed, line and point digitization. Both use the same methodology, which depends on the obtaining the vertices from a *freeform* drawing. This particularly important macro is 'GET-VERTICES'.

Freeform can be used in either of two modes. In the first one it is a matter of left clicking on point after point. In the second, the left mouse button is held down and the line drawn or traced continuously. It should be noted that the latter may produce so many points as to be unmanageable in subsequent routines. For line digitization either method can be used with the same GET-VERTICES routine. In point digitization only the point to point click method can be used. For such digitization work, a rolling ball 'mouse' is much the best because it avoids any accidental movement, which might start the digitization in the stream mode.

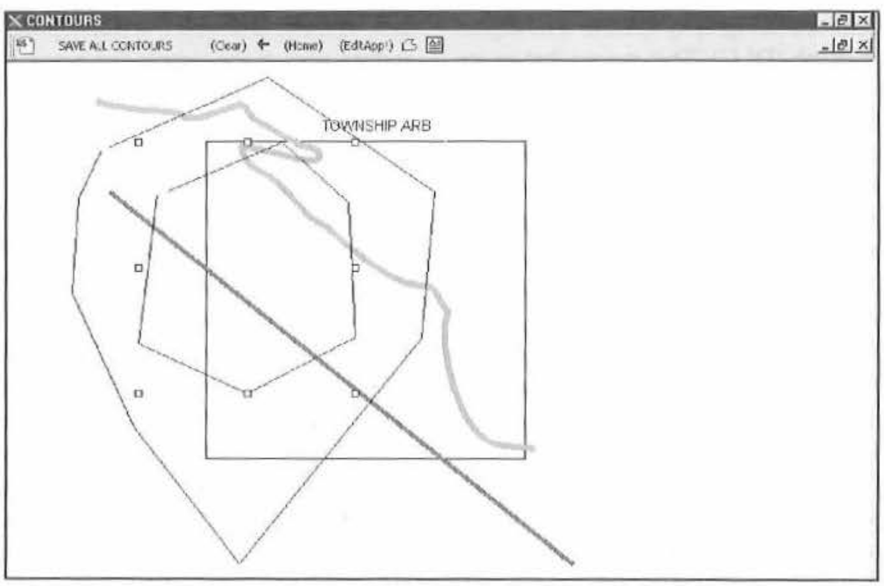


Figure 1

Examples of Digitization

Lines: A geologist presented the problem of requiring a method of line (actually contour) digitization within Excel, where the geological calculations were already being done. For this purpose a background map was scanned; in this case, the map of a township. The corners of the township in UTM values were then entered by keyboard (important road intersections could also have been used). The background map image was then displayed and the cursor clicked on the two reference points, after clicking on the *freeform* symbol on the command menu line.

The user then clicked on the *freeform* symbol again and then point to point (or continuously) around the first contour shape to be entered. The contour should not be completely closed, as Excel will automatically add a white fill; if subsequent routines require closure the first coordinate is easily added at the end of the list of vertices. The user can then repeat for another contour (see Figure 1). When all the drawing has been done, the user clicked on the menu bar item "Record All Lines" and the lists of vertices appear in the form of both pixel and calculated UTM coordinates. The user can then use these in any way appropriate for the work.

Points: An example of point digitization is to digitize the point locations of trees in a parcel in a city block. First the block has to be created. This can be done in a number of ways. Some users will prefer to do this in a CAD program rather than in Excel as the operation is only done once at the time of survey.

The selection of the block for display can be done in many ways. One method is to enter the address of one parcel in the block. Another, used more commonly, is to click on one block of a map of multiple blocks. In a larger city such as Saskatoon, it is necessary to first click on a city area and then on the actual block.

It is assumed that after the initial field survey, the full survey spreadsheet and survey map have been entered into Excel and the pixel/UTM relations for the block have been set up. The trees will have been noted as numbered dots on the field survey map. These locations are then placed onto approximately the same positions on the displayed image, using the *freeform* vertex method in a point to point mode. When the first parcel has been completed, the user clicks on "Record first parcel" (see Figure 2).

GET-VERTICES then finds the vertices, converts them to UTM and adds them, this time, into the column of coordinates in the DATA spreadsheet. A visual check is made that the length of the list agrees with the list of trees in the first address. If satisfactory, the map is called again and the second parcel is recorded which now appends to the coordinates in the previous list. Another check is made and UNDO or continue are used. When all trees have been done, the new version of the DATA block is recorded and the next block called.

The creation of symbols to make a symbolized tree map

In Excel this is a very simple but effective process. This uses the built in function of oval symbols, where the symbol is defined by two axes and colour. In the tree example ovals are used to create symbols based on a list of species and tree height. The whole process of symbol generation has been set up to be automatic and can be done either before or after the coordinates have been entered. Special symbols generated as small bitmaps in PAINT can also be used. The background block map is then

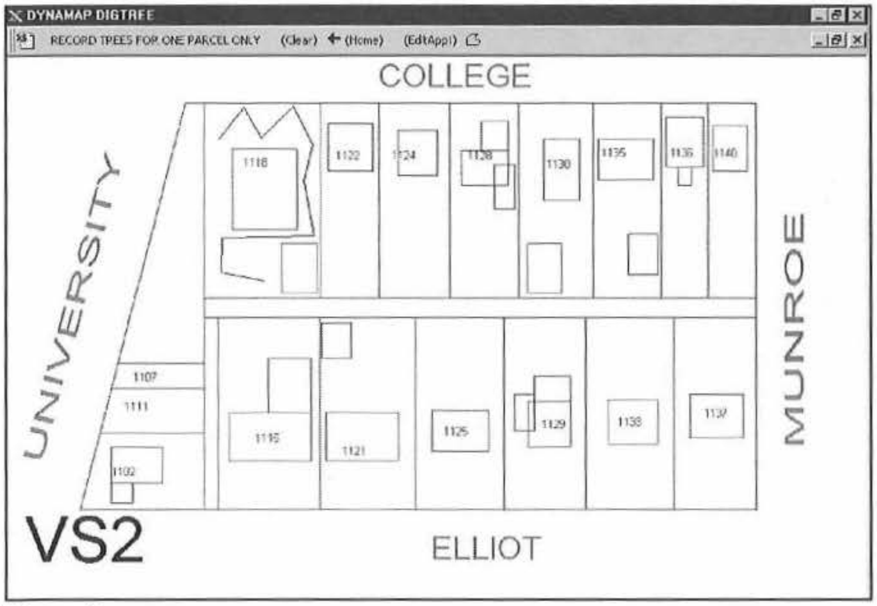


Figure 2

called as was done when the tree points were digitized. However, the symbols generated as above now appear overlaid on the background map.

Edit

While digitization only has to be done once at the time of survey, EDIT must be simple and easy to use by an unskilled operator at any time. This is where the power of the present system comes into its own .and is by far the most important gain of a combined Excel operation.

Lines: Using the example of the contour drawing program described earlier, the line data, the pixel/UTM conversions and the background image will have been saved as an Excel file. This file is now re-called and the original contour drawing will appear. Using the right button on the mouse when pointing to one of the contours the "edit points" will appear in the drop down menu. The contour can be reshaped as desired and, when all contours have been done, a new Excel file is made by once again clicking on "Record All Lines."

Points: While this is complex in its macro structure, it is so simple to use that there is no excuse for not keeping data up to date, even in the smallest town administrator's office. The use of the special command menu bar and the associated macros is what makes it so simple for the user. It is very fast because it is all in one program, merely switching between worksheets. The command menu has a list of options, namely QUERY, CHANGE, DELETE, MOVE AND ADD. There is an additional one called SPREADSHEET in case the user wants to work directly on the data instead on the symbolized map (see Figure 3).

The method of use is as follows. The user clicks on a tree symbol and then on ONE QUERY. Immediately the system jumps to the spreadsheet with the selected tree highlighted. ONE CHANGE does the same but enables the user to change any parameter (species and height change the map symbol). ONE DELETE and the tree symbol vanishes while the spreadsheet line is automatically deleted as well.

The edit operations are more sophisticated than the others. The program has to detect which tree has been selected. This is made possible because Excel allocates a sequential number to each symbol as it is loaded onto the display and this number can be tied to the spreadsheet row. This row can then be modified or deleted. The program also has to detect the movement of any tree symbol and automatically allocate new coordinates when MANY MOVES is clicked.

ADD trees is by clicking on one or more of the small squares at the top of the map, dragging it to the desired location and clicking on MANY ADD. The highlighted rows that now appear at the bottom of the spreadsheet must then be entered, particularly adding the address, species, height, date and name of operator; others may be added as well.

A particular point of the macros which increases their complexity, is that only the row(s) to be modified have their symbology changed. This is much faster than re-symbolizing the whole spreadsheet each time. Consequently the time for an edit is well within the time of 2 seconds,

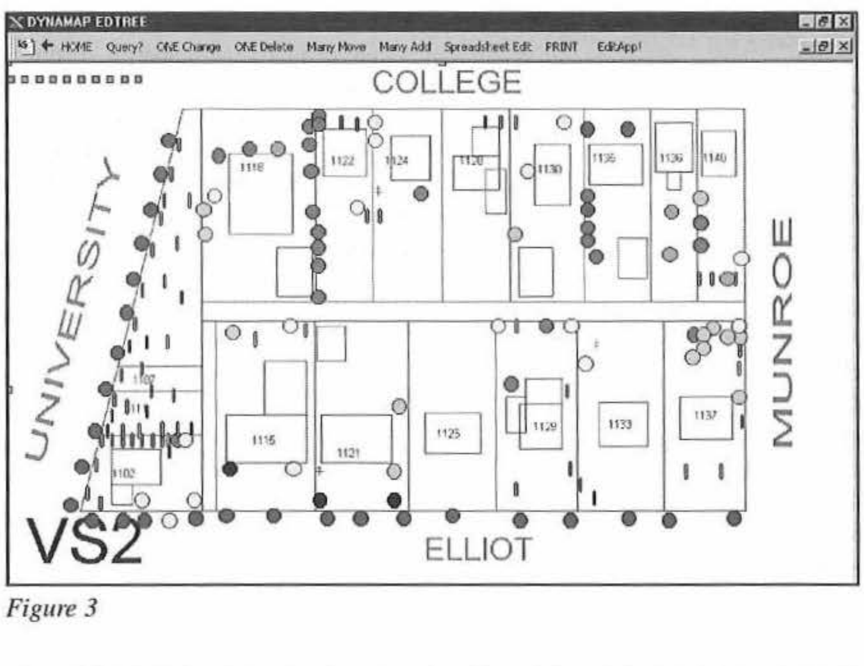


Figure 3

which is the normally accepted maximum time for a useful edit. In all cases new symbols are created and the new data stored away automatically.

Clicking on SPREADSHEET is occasionally useful, such as when all trees in one parcel have been removed As has already been said, the original process was to use Excel for the spreadsheet and DESIGNCAD for the map, using its attribute font symbol. While this procedure is not used any longer by the writer, the routines have been retained and in fact, at present, symbols for both the CAD program and for Excel are made automatically. This can be changed, but the sequential procedure is to first make the CAD symbols and then the Excel symbols from them. Care has to be taken to check that no essential step is accidentally erased. All the actions except selecting the block, selecting the tree and checking on and editing the data are entirely automatic and very, very fast.

Other Special Programs

A method of correcting approximate coordinate points to UTM

This is a variation on the line or contour drawing program. It was set up following a request to set points of a survey to UTM values when only the end coordinates of a survey were known and all others were relative. There are many other variations of line digitization.

Public access for schools and libraries

An interesting program is one for Public Access intended for use in schools and libraries. This particular example is relative to Dutch Elm Disease (DED) and was in preparation for interesting students in reporting any signs of DED and at the same time learn about ecology, botany, spatial locations on maps and computer applications.

The student is asked to visually select a city block of interest and then how many trees of each species in that block. The other possible method of entering a house address is inhibited as it precludes the educational value of spatial selection (see Figure 4).

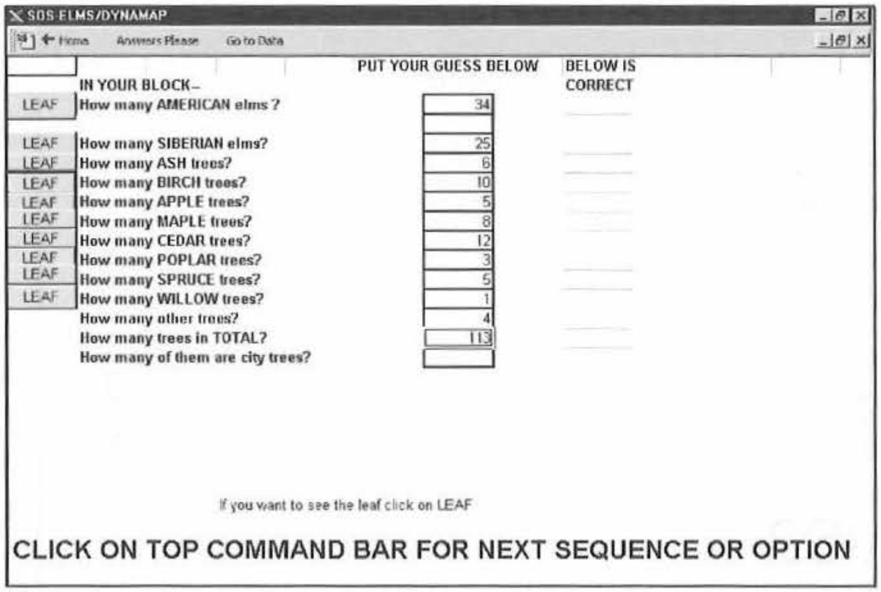


Figure 4

The full protection facilities within Excel are used, the function keys are made unavailable and the mouse cannot be right clicked or double clicked. As this is a teaching module, editing of the data is unavailable. When the program is to be modified a new version is loaded from a CD-ROM. The amount of map data in bitmap form is large (many gigabytes for Saskatoon). Later versions of this program use this bitmap data in zipped form which compresses about 100:1

Other useful programs not involving maps

Analysis

Excel is a very powerful sorting, selection and computational program. Analysis is a small program, which was set up to accumulate the numbers of each tree species in all the blocks in an area or small town. This is useful and very fast in operation

Derive

Derive is a somewhat more advanced form of analysis as it creates new selected spreadsheets for a specified selection, such as species, diseases or requirements for maintenance. The filtering operation is relatively slow compared with a simple count analysis, but again is completely automatic. The filtered spreadsheets are automatically converted to symbology for selected maps.

More detailed information on CD-ROM

A CD-ROM is available from the University of Saskatchewan bookstore (Fax 306 966 7416) which includes a full description of the macro procedures written in Word, and working examples of the macros built into systems in Excel. It is not expected that the examples will exactly fit a user's needs, but do show you that the macros actually work. The macros will have to be re-arranged and changed in buffersize, filter specifications, symbolization, etc. The viewer should not be misled into thinking that this work only applies to urban trees, although many of the examples use these. Any other locational objects can also be used. A recent example was of the characteristics and locations of computers in a large office building.

For demonstrations only (without saving of any changes) the prefix X programs can be operated directly from the CD, but the response is much slower than if they are copied to a hard drive. In either case in Excel the default drive must be set to the drive (and possibly directory) in use, using Tools/Options/General, as otherwise the auxiliary data files will not be found.

*see: **Boyle** page 25*

In rememberance

DONALD WALTER THOMSON

1906-2001

Dr Donald Thomson, author and historian, died on January 9th, 2001, nine days short of his 95th birthday. He was best known as the author of the three-volume history of the surveying and mapping of Canada titled *Men and Meridians* (Ottawa, 1966-69).

Don was born at Strathcona, Alberta, January 18th, 1906. He was educated at Edmonton public and secondary schools and at the University of Alberta where he studied law. He was admitted to the Alberta bar in 1927 but instead of practising law he moved to Ottawa the following year where he developed a successful career as a parliamentary secretary. As such he was mainly occupied writing speeches and position papers for a number of parliamentarians including three cabinet ministers: J. C. Gardiner, James A. MacKinnon and George Prudham.

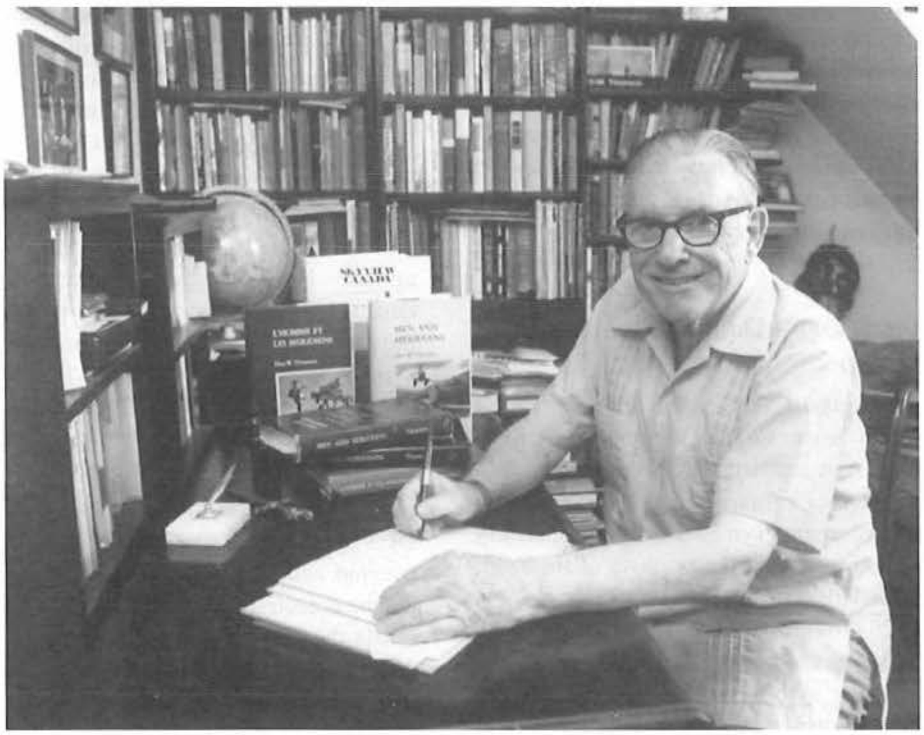
In the early 1960s, Dr Sam Gamble, the Director of the Surveys and Mapping Branch in the then Department of Mines and Technical Surveys, decided that the history of the mapping of Canada should be documented. He began a search for a suitable historian to take on the job. It was a sought-after commission leading to several years employment, and as such there were numerous applicants. At first Dr Thomson did not appear a leading contender. His only published writings were several short books of poetry but his work for the Hon. George Prudham, then Minister of Mines and Technical Surveys, illustrated his ability to describe technical subjects in clear and understandable English. This won the day.

For the title of his master-work Don chose "Men and Meridians". An important part in the overall story of the surveying of Canada was the dividing of the Prairie Provinces into farm lots for settlement. As these were all marked off and registered according to their position west of one of six surveyed meridians, Don, with poetic licence, seized on this theme to represent all Canadian surveys before and after the great prairie program.

Volume 1 starts the history with a description of the mapping of the world from the time of the earliest navigators, and carries the story forward to the Canadian experience up to the time of Confederation. This is beautifully told, and Don's training in poetry is clearly evident. As it covers a subject of wide interest it was the most widely read of his trilogy. All three books are superbly illustrated but Volume 1 in particular, with its reproductions of world-famous maps, was particularly well received.

Volume 2 carries the story forward to 1917 mostly describing the progress of settlement surveying. In this volume the story becomes more technical and some of the general readers fall by the wayside. But their places are taken by those who participated in the events being recounted or at least had memories of persons involved. Hence the readership tended to change but remained strong.

Volume 3 takes the story forward to 1947. It therefore covers the inter-war years and ends with the first of the great changes that arrived with the digital age. Here we find the beginning of photogrammetry and electronic surveying. To describe the latter Thomson goes five years past 1947 (the titular cut-off year of Volume 3) to describe Shoran, the first practical use of electronic measurement. It was Shoran triangulation that allowed the Canadian 1:250,000 topographic series to be completed by 1971.



Don went on to write two additional books for Dr Gamble: *Skyview Canada* (the story of the air photography of Canada) and *Window on the Third World* (an account of Canadian assistance to developing nations by providing mapping and air photography). The latter was issued only in a limited photocopied edition.

In his retirement years Don worked tirelessly to defend authors' rights in such fields as copyright law and anti-plagiarism legislation. He was also a steward and pastoral elder for his church, Parkdale United Church in Ottawa. He is survived by his wife Wanda and sisters Norma Paradis and Elizabeth Thomson, both of Edmonton. Our deepest sympathies go out to them.

L. M. Sebert

Phil Dodds
Intergraph Corporation

Analytical Cartography and GIS session in Montreal 2001
- *Generalization and automated digital cartography* -

This article is my shameful way of promoting my session for the upcoming conference in Montreal. Having worked at Intergraph for 11 years and now working for one of ESRI's top business partners has its advantages. I know the Cartographic representatives from both companies and I am glad to announce that both companies will be presenting at my session for the annual conference. Dan Lee will be presenting ESRI's generalization offerings and Sam Avella from Intergraph will be presenting "Digital Cartographic Studio". I am going to include some information about the presentations to encourage people to attend the session.

Intergraph – Digital Cartographic Studio

Digital Cartographic Studio (DCS) offers the cartographic community the tools to design aesthetically acceptable, clear, and concise maps. In the DCS design environment, symbols are appropriately scaled to reflect the purpose of the map. Founded on rules-based vector symbology, DCS provides libraries of vector symbols, allowing the user to create new or change existing symbols. The symbols can be readily displayed on the screen in digital vector format in association with all other symbolized features.

DCS Features

- *Vector WYSIWYG Symbology* - Repeated cycles of map feature editing, rasterization, and color proofing associated with other map productions systems are eliminated by the vector WYSIWYG, assuring increased efficiency.
- *One Feature...One Symbology* - Rules defined in the Administrative Environment allow one-to-one mapping of features to symbols. Symbols are defined per feature.
- *Point, Line, & Area Symbology* - Typical symbology types for point, line and area features are fully supported. DCS also provides one-sided symbology (e.g. political boundaries), offset symbology (linear bridges along cased roads) and the ability to create, place and rotate line and area patterns. DCS provides all endcap (round, butt, square) and midline joint (round, miter, bevel) types. Tapering and custom endcap details are allowed.
- *Phasing* - The phasing of line styles/ patterns as features intersecting one another is performed automatically during symbolization or interactively by the user. Since DCS maintains the vector symbology separately from the feature, users can edit the symbology without affecting feature data. Symbology is maintained when features are edited.
- *Conflict Detection & Resolution* - Since DCS symbology is parametric, symbol overlap and lack of symbol separation can be detected automatically. DCS can notify the user of the conflict areas. The user is provided software tools for displacement and other conflict resolution strategies.
- *Display Hierarchies* - Users may define print/display priority on each symbol and its components, enabling the hierarchy of masking and overprinting to be determined.
- Powerful Text functions
  - o Automated text placement with conflict detection and resolution
  - o Text importation from names databases
  - o Leader lines and text boxes
  - o Attribute driven text
- Cartographic Grids and Marginalia
  - o Automatically generate geographic grids and graticules
  - o Margin templates are provided and may be populated with legends, scale bars, labels, text, seals and North Arrows

Powerful and Versatile Design Environment

The Administrative Environment allows for the creation of symbology and symbolization rules. The rules-based software permits the greatest precision in rendering point, line, and area features, so that the symbols are reproduced with the fidelity and quality that cartographic products demand. The quality of each symbol is assured because it can be designed and created at the finest resolution, which is expressed in paper map units.

Rules, defined in the Administrative Environment, promote a one-to-one mapping of features to symbols. For example, a single symbol may be defined for a cased road. One symbol can represent boundaries and fills for areas such as lakes. Therefore, features do not need to be subdivided to support varying symbology within the feature.

In the Administrative Environment all the rules for feature symbolization can be defined. These include the size and shape of the symbol as defined in map paper units, its orientation and point of origin. The level at which the symbol is printed on the map can be defined. This enables the hierarchy of masking and overprinting to be determined. All symbols created may be stored in libraries and called by name or number into the editing environment for preview prior to selection.

Specialized symbology is a powerful feature of DCS. Linear symbols may be positioned parallel to, and on one side of, a boundary line. This makes it possible to delineate the exact edge of political boundaries. Offsets to one side of any cased or uncased road enable the construction of bridge symbols.

Line styles and patterns showing intermittent features and lines shown as a series of even dashes and spaces can be correctly phased at points where these lines intersect one another. This provides an even overall appearance to these symbolized features. Since DCS maintains the vector symbology separately from the feature data it is possible to edit the symbology without affecting the positional accuracy of the line feature. Similarly, the symbology is maintained when the features are edited.

The Editing Environment eliminates the need for repeated cycles of map feature editing, rasterization, and color proofing, thereby guaranteeing increased economy of effort.

DCS operates in an interactive environment that dynamically maintains topologically structured data as input changes are made. The power of persistent, interactive topology allows specification of different symbols based on their spatial relationships. This capability eliminates the need to create new or subdivide existing features. It also enables fine adjustments to be made to the map design, such as handling phasing for line styles and patterns where features intersect each other and intersect the map neatlines.

DCS History

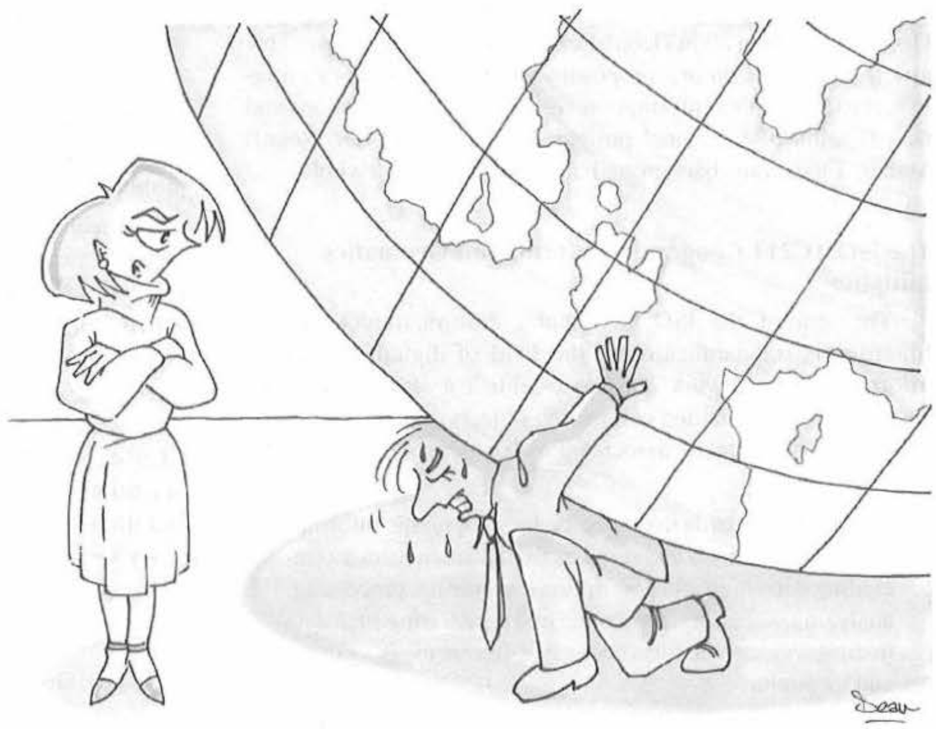
- Founded on Vector WYSIWYG symbology using true color display and hardware independent design
- Custom software originally developed on UNIX
- Recently granted approval for port to Microsoft Windows NT
- Commercial-Off-The-Shelf (COTS)

ESRI – Generalization

The generalization research and development at ESRI have focused on the support for both database and cartographic generalization with GIS-based technology. Workstation ArcInfo contains a full range of geo-processing tools to transform data from a master database to specific outputs through feature queries and selections, spatial analysis, data conversion, and interactive editing. A set of most requested generalization tools has been added to the system in recent years (Lee, 2000). These tools automatically simplify linear features and buildings, collapse dual-line features to single-lines, aggregate features (natural features or buildings), and detect some feature conflicts. Generalization quality and status are usually recorded for these processes and reflected in outputs, which facilitate post-editing and QC processes. One-to-one or one-to-many data relationship between input and output is always maintained for attribute transfer or other data integration. A number of customized generalization tools have been derived and successfully tested in benchmarks to solve more specific and complicated problems.

The new generation of ESRI's GIS software, ArcGIS 8.1, has adopted an object-oriented technology and data model. Geographic features can now be defined and stored as objects with intelligence, including their natural behaviors and relationships to other objects. It is significant to have intelligent data for generalization so that the analysis and decision-making in the process can be easier and more precise, which lead to better results and lower costs in production. The integration of generalization capability in desktop GIS is underway with the priority on large to medium scale applications and requirements. Some prototyping is being done and new development has been planned for the next major release of ArcGIS. Our ultimate goal is to provide the users with powerful and flexible generalization tools that help them to derive datasets and produce maps timely and efficiently from a unified and scalable geodatabase.

I am looking forward to an interesting session in Montreal and a great conference.



"You promised you wouldn't bring work home from the office any more..."

David Broscoe
Algonquin College

More on Certification:

The ISO/TC211 Geographic Information/Geomatics Initiative

In Cartouche 40, I mentioned the The ISO/TC 211 Geographic Information/Geomatics Initiative in connection with the CIG certification proposal. In this issue I want to explain the ISO/TC211 initiative more fully. Why discuss certification? Certification initiatives, from whatever organization, will have an impact on all of us, whether we are practitioners, teachers, researchers or students. Proponents claim that certification will benefit Geomatics as a whole, but it may privilege certain disciplines within Geomatics over others. By imposing certain guidelines, it may make Geomatics less flexible and less able to change in a changing world. Certification initiatives have been proposed by a number of different organizations national and international, so the initiatives may complement or contradict each other.

The ISO

The International Organization for Standardization (ISO) is a 'worldwide federation of national standards bodies from 130 countries, one from each country....The role of ISO is to develop voluntary international standards covering all technical fields except electrical and electronic engineering' (Kemp). The ISO Geographic Information/Geomatics Initiative is one of many. This article will focus on one proposal within the Geomatics initiative, the Geographic Information/Geomatics - Qualifications and Certification of Personnel project spearheaded by Dr. Robert Maher. First, some background on the initiative as a whole.

The ISO/TC211 Geographic Information/Geomatics Initiative

The aim of the ISO Geographic Information/Geomatics Initiative is standardization in the field of digital geographic information. This work aims to establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth.

> These standards may specify, for geographic information, methods, tools and services for data management (including definition and description), acquiring, processing, analyzing, accessing, presenting and transferring such data in digital/electronic form between different users, systems and locations.
>
> The work shall link to appropriate standards for information technology and data where possible, and provide a framework for the development of sector-specific applications using geographic data.

The initiative is made up of some twenty-eight projects. Cartography as such gets no mention,

although there is a 'Portrayal' project. A list of the project titles is given at the end of the article. More information about the initiative can be had at the

> http://www.statkart.no/isotc211/organizn.htm#19122 and
> http://www.statkart.no/isotc211/scope.htm#scope

The Geographic Information/Geomatics Certification Project

Project *19122 Geographic Information/Geomatics - Qualifications and Certification of Personnel* is chaired by Dr. Robert Maher, now at COGS. Details are taken from document ISO/TC 211 N 573, available in PDF format at:

http://www.ncgia.ucsb.edu/other/ucgis/certification/211n573.pdf

The scope of the Certification of Personnel project is as follows:

- To define the boundaries between Geographic Information Science/ Geomatics and other related disciplines and professions.
- To specify the technologies and tasks pertaining to Geographic Information Science / Geomatics.
- To establish skill sets and competency levels for technologists, professional staff and management in the field.
- To research the relationship between this initiative and other similar certification processes performed by existing professional associations.
- To develop a plan for the accreditation of candidate institutions and programs, for the certification of individuals in the workforce, and for collaboration with other professional bodies. (Professional organizations mentioned: CIG, URISA, AGI, ACSM, ASPRS, UCGIS)Within the proposal, individual practitioners are classified into one of three broad categories as follows:
  - GIS/Geomatics technologist (group 1)
  - GI Scientist/Geomatics Engineer (group 2)
  - GIS/Geomatics manager (group 3)

  (Section 8 Grouping of Competence)

Certification of individuals would be administered by national, not international organizations:

> The certifying body may be a non-profit organization

which has no direct involvement in the training and education of GIS/Geomatics personnel and which has been recognized by the ISO member body of the country concerned. (Section 9.2 Certifying Body)

Individuals seeking certification would have to meet educational and experience criteria. Details are sketchy in the document. The following is excerpted from the Educational Accreditation section of the document:

> To enter the Geographic Information Science / Geomatics profession, employees will require either a community college diploma or a university degree. The challenge will be to establish criteria for inclusion in a database of accredited institutions. An independent body would undertake the following tasks:
>
> a) define learner outcomes;
>
> b) assess the core courses in the program;) identify the availability of professional development courses
>
> Each learner would be required to demonstrate a balance between formal study and practical work experience. The independent body would set the criteria for the evaluation of individual courses and also complete programs.

The proposal was put to a vote in 1999. Only twelve out of the thirty voting member nations approved it. Canada was one of the twelve . Nine countries opposed the initiative, including the UK and the US, and eleven countries did not vote. Kemp summarizes the dissenting views:

> On the grounds that it is inappropriate for a technical standards organization to determine professional credentials, the US voted against the proposal and did not offer to participate since to do so would have provided additional grounds for approval of the project. Most of the other countries in opposition provided similar grounds for rejection. As well, objections were raised on the basis of the excellent performance of existing formal education systems, the possibility that development of professional standards would restrict the broad adoption of GIS and the problem of defining the bounds of a relatively immature profession.

The final report is due September of this year. Clearly there is opposition to the proposal, and other certification initiatives in various stages of implementation. The ASPRS has a program in place already. Details of it may be found at: *http://www.asprs.org/asprs/membership/certification.html*

The NCGIA certification home page at *http://www.ncgia.ucsb.edu/other/ucgis/certification* contains a range of resources, most from an American perspective, on Geomatics certification.

Karen Kemp's paper, referenced in the text, is available at *http://geoinfo.cslm.hu/eugises/papers_pdf/kemp.pdf*

My purpose in writing this column is to lay out the facts, as I see them, behind this very ambitious proposal. As with the CIG Certification proposal I have outlined previously, the ISO proposal could have a major impact on the CCA as an organization and on all CCA members, whatever professional hat one happens to be wearing. The push for certification is not going to disappear. It is important that we all contribute to the debate on certification at whatever level so that the implementation is shaped by our input.

Projects within the ISO/TC211 Geographic Information/ Geomatics Initiative

19101 (15046-1): Geographic information - Reference model
19102 (15046-2): Geographic information - Overview
19103 (15046-3): Geographic information - Conceptual schema language
19104 (15046-4): Geographic information - Terminology
19105 (15046-5): Geographic information - Conformance and testing
19106 (15046-6): Geographic information - Profiles
19107 (15046-7): Geographic information - Spatial schema
19108 (15046-8): Geographic information - Temporal schema
19109 (15046-9): Geographic information - Rules for application schema
19110 (15046-10): Geographic information - Feature cataloguing methodology
19111 (15046-11): Geographic information - Spatial referencing by coordinates
19112 (15046-12): Geographic information - Spatial referencing by geographic identifiers
19113 (15046-13): Geographic information - Quality principles
19114 (15046-14): Geographic information - Quality evaluation procedures
19115 (15046-15): Geographic information - Metadata
19116 (15046-16): Geographic information - Positioning services
19117 (15046-17): Geographic information - Portrayal
19118 (15046-18): Geographic information - Encoding
19119 (15046-19): Geographic information - Services
19120 (15854): Geographic information - Functional standards
19120/Amendment 1: Geographic information - Functional standards - Amendment 1
19121 (16569): Geographic information - Imagery and gridded data
19122 (16822): Geographic information/Geomatics - Qualifications and Certification of Personnel
19123 (17753): Geographic information - Schema for coverage geometry and functions
19124 (17754): Geographic information - Imagery and gridded data components
19125-1: Geographic information - Simple feature access - Part 1: Common architecture and
19125-2: Geographic information - Simple feature access - Part 2: SQL option
19126: Geographic information - Profile - FACC Data Dictionary
19127: Geographic information - Geodetic codes and parameters
19128: Geographic information - Web Map server interface

Joe Piwowar
Spatial Information Systems

Getting Your Imagery at the Right Level

Have you ever had the fun experience of trying to order some satellite data only to be confused over all the "Raw", "Level 1B", and "Path-Oriented Plus" techno-babble? In spite of some concerted efforts made by most of the image distribution agencies around the world to standardize their use of these terms, ambiguities still abound. In this month's column I hope to level the playing field so you can order your data with confidence.

All of these terms refer to the amount of processing which is done to your imagery between the time it is received on the ground and the time you load it into your computer. Since most remotely sensed data require similar amounts of basic processing before they are usable, image distribution agencies have adopted a common set of processing "levels" to describe the types of processing done to their images before they send them out the door. As you will see from the descriptions below the processing levels are hierarchical; that is Level 2 data start with the processing included in Level 1 imagery and add more features to it.

Level 0

Level 0 imagery is raw instrument data, just as they were collected at the sensor. Since there are some fundamental corrections that should be applied to the data before they are usable (these corrections are applied at Level 1), most agencies will not distribute Level 0 imagery. Unless you are a real hard-core remote sensing type who is specifically studying the sensing device and not necessarily the earth features being sensed, you don't want Level 0 data.

Level 1A

The next step up from Level 0 is Level 1A. Level 1A data have been corrected for detector variations within the sensor. To understand what this means, imagine that you were doing an illumination experiment and lined up ten 60 watt light bulbs all in a row. Now as part of your experiment, you needed to be sure that each light bulb is emitting *exactly* the same amount of light. Even though they may look like they have the same brightness, if you measured the light output from each bulb using a precision photometer you would notice some slight variations in the lumens produced by each bulb. The same principle applies to a remote sensing instrument, except that instead of having light *emitting* devices, a typical remote sensor has many light (i.e. electromagnetic radiation)*detecting* devices, or detectors. The number of detectors depends on the instrument design and can vary from 16 for the Landsat Thematic Mapper to 6000 for the SPOT HRV. Since much of remote sensing image interpretation depends on looking for small changes in pixel values, it is imperative that the brightnesses measured by each detector on a sensor is recorded uniformly across the scene. Satellite operators try to equalize the detector responses through a series of data calibrations involving pre-launch values and in-flight measurements. The in-flight readings come from pointing the sensor at targets with known brightness levels: an on-board calibration lamp, the blackness of deep space, and/or the brightness of the sun.

Thus Level 1A processing involves applying inter-detector equalization s and is sometimes referred to as *radiometric correction*. This is highly desirable if you wish to do any sort of classifications with your imagery. Also, absolute calibration coefficients are posted in the ancillary data and can be used to convert the pixel values into real irradiance measurements.

Level 1B

Another type of systematic error inherent in space-borne data involves the geometry of the image product. Consider, for a moment, some of the things that are happening as a sensor is acquiring an image: it is moving in orbit above the Earth's surface; the Earth itself is rotating beneath the satellite; and the sensor's view of the surface can be considerably more oblique towards the edges of the scene than it is directly below. All of these variations (and a few more) create distortions in the geometry of the imagery such as mis-aligned scan lines and non-uniform pixel sizes. Since all of these distortions are predictable and measurable systematic corrections can be applied to the imagery to improve its geometric qualities. This is the operation of Level 1B processing and is also highly desirable. The systematic modelling is not precise, however, so the position accuracy of Level 1B data is still in excess of 100 m. RADARSAT International refers to Level 1B processing as a *Path-Oriented* product.

Level 2A

Following along the processing hierarchy, Level 2A images are an "improvement" to Level 1B images. Level 2A images have been systematically mapped into a standard cartographic map projection based on a prediction of where the satellite was when the image was acquired. Since we are still dealing with systematic geometry correction approximations, however, these images still have expected location errors of more than 100 m. RADARSAT International refers to Level 2A processing as a *Map-Image* product.

Level 2A images are frequently labelled as "geo-referenced" which I find misleading when you consider their poor location accuracies. While it is true that you can input a Level 2A image directly into a GIS using the supplied projection information, I question how much spatial analysis you can really do given its poor positioning accuracy.

Level 2B

If you really want accurate spatial positioning on remotely sensed imagery, you need to have your images processed to at least Level 2B (RADARSAT: *Precision Map Image*). Prior to this Level, the bulk of the processing can be done in an automated fashion. In order to create a precision geo-referenced product, however, considerable user input is required. Through a process called *geometric correction* or *image rectification*, the image analyst "registers" the image to an existing base map by selecting pairs of well-defined points (known as *ground control points*) from both the image and the map. When a sufficient number of ground control points have been accurately identified the image can be geo-referenced so that its geometry will match that of the base map to which it was registered. The position accuracy of Level 2B images generally matches the spatial resolution of the original data (e.g. 30 m for Landsat Thematic Mapper; 10 m for SPOT panchromatic), except in areas of high local relief.

Level 3A

If the region you are trying to map is quite mountainous you will need to account for relief displacement in order to obtain consistently high position accuracies. In addition to manually locating ground control points (as in Level 2B), a digital elevation model (DEM) must be supplied to the procedure so that the relief displacement at differing elevations can be accounted for. This process is generically called *ortho-rectification*. The position accuracy of Level 3A images generally matches the spatial resolution of the original data, including areas of high local relief.

Level 3B

If your region of interest is really big and you need several scenes to be mosaicked together, then Level 3B is for you. These images have all the same attributes as Level 3A scenes, but cover a larger area.

Tidbits of note

Interestingly, Landsat and SPOT processing systems reverse the roles of Levels 1A and 1B (Landsat corrects geometry in Level 1A and applies detector equalizations in 1B while SPOT does it the other way around). This does not matter when ordering Level 1B imagery, however, since at this Level both corrections have been applied and the order of application is inconsequential.

Although each Level increment produces a more map-like product, this is at the expense of radiometric detail (not to be confused with spatial detail). This means that more and more of the subtle variations in pixel values will be averaged out of the imagery at higher processing levels. While this might not be important if all you want is a background picture for your other spatial data layers, it may inhibit the ability to achieve detailed land-cover discriminations during classifications.

There is also the cost factor to consider. Data from any of the automated processing levels (Level 0 - Level 2A) generally costs the same price, since the extra computer time required between increments is insignificant. When the processing begins to require analyst intervention, however, the prices begin to jump. Expect about a 25% premium between Levels 2A and 2B, and an additional 25% increase when going from Level 2B to 3A.

So, what will it be?
What is the right level for you?

If you have some image experience and access to a remote sensing image analysis system or robust GIS with geometric correction capabilities, then Level 1B data are for you. Level 1B imagery has had both inter-detector equalizations and systematic geometry corrections applied. It forms a good base for most remote sensing applications. You can't just plunk these images into your GIS, however, since they lack geo-referencing. But, image rectification procedures are not hard to use on most systems and (with some initial guidance) even a novice can create their own Level 2B geo-referenced imagery in half a day.

If you don't have the necessary software and/or time to process the imagery, then you should consider purchasing your data at Level 2B or 3A, depending on the amount of relief in your area. These images will import directly into a GIS and be ready for use. Be aware, however, that detailed land-cover classifications may not be possible at these Levels.

Now that you know what *I* think, let me know what *you* think! E-mail me at piwowar@uwaterloo.ca.

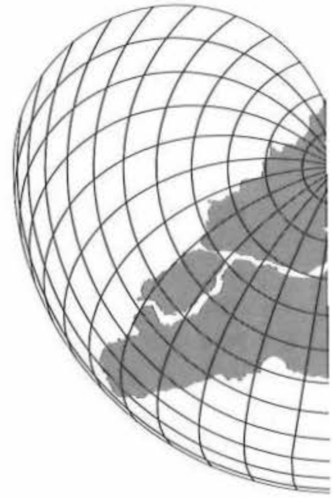
Postscript

I recently came across an interesting offer for colleges and universities from SPOT Image Corporation. For only US$200 (regularly US$1500), you can purchase a recent (1999 or newer) SPOT image (PAN or Multispectral) of your campus. Called the "Campus Scene" offer, it is only supposed to be available in the Continental U.S., but they will consider requests for Canadian campuses if they have the imagery. Check out *http://www.spot.com/HOME/NEWS/campusscene.htm* for details.

CARTO 2001

Cartography, Professions and Perspectives

May 30 - June 2, 2001



University of Quebec at Montreal
Montréal, Quebéc

A JOINT CONFERENCE OF:
The Canadian Cartographic Association (CCA) and the
Association of Canadian Map Libraries and Archives (ACMLA)
in collaboration with the geography departments of the University of Quebec
at Montréal and the University of Montreal.

The Canadian Association of Geographers (CAG) will be meeting concurrently in Montreal (May 29 - June 3). ***Registrants at either conference will be able to participate in both*, without additional registration charges**. This unique opportunity enables members of all these associations to interact and exchange ideas.

Program Summary

Wednesday, May 30, 2001
- CCA Executive meeting
- ACMLA Executive meeting

Thursday, May 31, 2001
- Welcome
- Sessions:
  - History and Cartographic Education
  - Data Acquisition and Diffusion
- Workshop: "Meta Data and Data Portals"
- Panel: "Forging Municipal Partnerships for Data Acquisition"
- Icebreaker at the *Biblioteque Nationale du Québec*

Friday, June 1, 2001
- Sessions:
  - Research and Cartography
  - Technology, The Future and the Stakes
- Banquet

Saturday, June 2, 2001
- Technical Visits:
  - National Archives of Québec, Montréal Section
  - National Library of Québec, Conservation Section

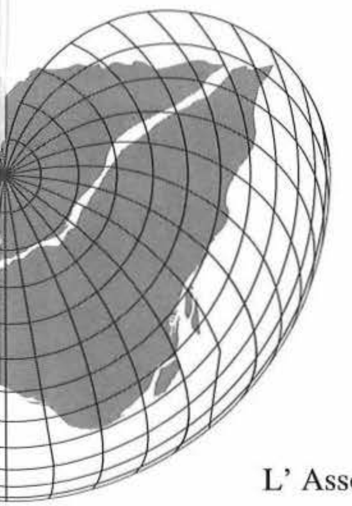
Sunday, June 3, 2001
- Field Trip - A guided walking tour of *Vieux-Montréal* is planned and will end at the *Pointe-a-Calliere* Museum.

See the CARTO 2001 website for more details and the most up to date information about: registration, program, accommodations, travel, exhibits, etc.

CCA / ACC

Université de Montréal

www.geo.uquam/cart



CARTO 2001

Professions et perspectives de la cartographie

30 mai au 2 juin 2001

l'Université du Québec à Montréal
Montreal, Quebec

LA CONFÉRENCE CONJOINTE DE:
L' Association canadienne de cartographie (ACC) et
L' Association des cartothèques et des archives cartographiques du Canada (ACACC)
dans collaboration avec les départements de géographie de l' Université du Québec à Montréal (UQAM) et l'Université de Montréal (UdeM).

D'ailleurs, Montréal sera également, l'hôte du congrès annuel de l'Association canadienne des géographes (du 29 mai au 3 juin). ***Durant nos événements réciproques, les participants pourront circuler librement aux deux événements, sans encourir de frais supplémentaires***. Cette heureuse coïncidence sera des plus favorables pour permettre de fructueux échanges entre les membres de nos associations.

Programme Sommaire

Mercredi, le 30 mai 2001
- Réunion de l'exécutif de l' ACC
- Réunion de l'exécutif de l' ACACC

Jeudi, le 31 mai 2001
- Inscriptions
- Mots de bienvenue
- Sessions:
  - History and Cartographic Education
  - Data Acquisition and Diffusion
- Atelier: "Metadata, Data and Data Portals"
- Discussion: "Forging Municipal Partnerships for Data Acquisition"
- Cocktail à la Bibliotèque Nationale du Québec

Vendredi, le 1 juin 2001
- Inscriptions
- Sessions:
  - Recherches et applications en cartographie
  - Technologies, le Futur et enjeux
- Banquet

Samedi, le 2 juin 2001
- Visite techniques:
  - Archives nationale du Quebéc, section Montréal
  - La visite de l'édifice dédié à la conservation de la Bibliothèque nationale du Québec

Dimanche, le 3 juin 2001
- Nous vous proposons une visite guidée du Vieux-Montréa, visite qui se terminera au musée de Pointe-à-Callière.

Pour l'information la plus récente sur la conférence consultent l'internet.

o2001/carto2001.htm

UQÀM
Université du Québec à Montréal

ACMLA/ACACC

CARTO 2001 - A Partial List of Presentations*

Sam Avella (Intergraph) *Digital Cartographic Studio High quality map symbolization in a real-time, interactive topological environment*

François Bergeron (Korem) *PUSH'N'SEE 3.1 : Nouvelle version du logiciel de cartographie interactive pour usagers MAPINFO*

Claude Boudreau (Archives) *QuébecLe pouvoir de la carte ancienne*

James Boxall (Dalhousie University) *Map Libraries, Archives and "Digital Earth": Is this a good time for a "moonshot"?*

Ernie Boyko (Statistique Canada) *2001 Census Outputs: What's New and What's Not*

Rupert Brook (Atlas National du Canada) *Striving for Cartographic Excellence in an age of data infrastructure*

Jean Carrière (Université du Québec à Montréal) *Un Atlas scolaire du Québec sur Internet : interactivité et apprentissage*

François Cavayas (Université de Montréal) *Télédétection-objet cartographique / objet imagerie satellitaire*

Marc Cockburn (Archives Canada) *The appraisal of cartographic material, architecture and technical drawings, and geomatic records within the National Archives of Canada Macro-Appraisal Strategy*

Paul Corbeil (Tecsult) *Intégration de technologie dans un projet de cartographie à l'étranger*

Robert Daigle (Géomap) *GIS Amérique - La cartographie et l'Internet : L'édition en temps réel pour optimiser ses opérations*

Mark Denil (Conservation International) *Cartography as Rhetoric*

Rhian Evans (Atlas National du Canada) *Generalisation at the Atlas of Canada*

Michel Fournier (Cartologique) *Et pourtant elles vivent ! - It's alive!!!*

Majella J. Gauthier (Université du Québec à Chicoutimi) *Impacts de la réalisation d'un atlas électronique en région: cas du Saguenaylac-St-Jean*

Anne M. C. Godlewska (Queen's University) *A Web-based Atlas of Napoleonic War*

Ludovic Guerpillon (Université du Québec à Montréal) *Cartographie interactive multimédia : de nouveau enjeux pour le cartographe*

Paul Harker (Atlas National du Canada) *Midnight Plotting Natural Resources Canada Provides On-the-spot Results of the 2000 General Election*

Will C. van den Hoonaard (University of New Brunswick) *The dark side of the moon : The life and times of women in cartography*

Pierre Inkel (Université du Québec à Montréal) *Indice de Dévelopement cartographique, IDC, PVD, Afrique, Amérique latine, Asie, Moyen-Orient, cartographie, analyse, caractéristique*

Anna Jasiak (Atlas National du Canada) *Creation of the Population Ecumene for the On-line National Atlas of Canada*

Stéphane Joost (Université de Genève) *Essai de clarification au sein de la hiérarchie des méthodes d'analyse spatiale appliquées aux activités commerciales*

Jeff Labonté (Ressources naturelles Canada) *Assessment of Geospatial Data Access and Costing Policies in Canada*

Martin Lapointe (Université du Québec à Montréal) *Le polygone de Voronoïï comme unité spatiale de base d'une cartographie de l'occupation du sol en milieu urbain*

Léo Larrivée (Collège de Limoilou) *Transformations entre DATUMS et/ou PROJECTIONS*

Sylvie Laroche (Ministère des transports, Québec) *La nouvelle édition de la carte routière du Québec*

Dan Lee (ESRI Canada) *The new generation of ESRI's GIS software, ArcGIS 8.1, an object-oriented technology and data model*

Pierre Lépine (Bibliothèque nationale du Québec) *Numériser des cartes géographiques anciennes: un défi de taille à relever en méga-octets*

Barb Lush (Clover Point Cartographics) *Projecting High Resolution Imagery*

Andrew Milward (University of Waterloo) *Toward normalization of disparate data for meaningful digital change detection*

Michel Morneau (Ministère des ressources naturelles du Québec) *Le plan du cadastre du Québec maintenant accessible sur Internet*

Anita Muller (Carleton University) *Internet Based Cartographic Visualization for a Northern Region of Canada*

Sherry Olson (Université McGill) *Translating the Then and There into the Here and Now*

Rosa Orlandini (Université McGill) *Creating Metadata Using Arc catalog and Arcinfo*

Jean-Françcois Palomino (Bibliothèque nationale du Québec) *Les SIG au secours de l'histoire : cartographier le Montréal de 1880*

Margareth W. Pearce (Humboldt State University) *Encroachment by Axis, World and Tree : Local Mapping Techniques from the Colonization of New England*

Joanne M. Perry (Pennsylvania University) *Richard Edes Harrison and his techniques for producing perspective maps*

Elise Pietroniro (University of Saskatchewan) *Issues and Techniques in the Development of an interactive CD_ROM Atlas*

Brian Ray (Citizenship and Immigration) *Representation of Ethnocultural Communities in Montréal: The Atlas de l'Immigration dans la Région de Montrééal en 1996 Project*

Erin Richmond (University of Victoria) *The map in Travel Destination Marketing on the Internet*

Yann Roche (Université du Québec à Montréal) *Transects perceptuels et modèle de terrain comme base d'une cartographie ethnique dynamique et efficace. Le cas du district de Bac Ha, Vietnam*

Ruilan Shi (Université McGill) *Serving Maps on the Web using the ESRI Internet Map Server?*

Harry Steward (Clark University) *Cartography, History and Literature: The Prospects for Integrated Teaching*

Jean Tremblay (SoftMap Technologies Inc.) *La diffusion de cartes et de données géographiques au grand public : L'Internet versus le CD-ROM*

Bill Voller (Natural Resources Canada) *What is the Future of Canada's National Topographic System?*

Wendy Watkins (Carleton University) *Gone Today but Here Tomorrow? The Quest for a National Data Archive*

Cameron Wilson (Canadian Centre for Remote Sensing, Natural Resources Canada) Metadata, Data and Data Portals (Workshop)

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* *Note: At press time I did not have the complete program listing. I published this partial list so you could see the quality of the program being assembled by the organizing committee. My apologies to the organising committee and to any presenters who do not appear on this list. This is NOT the final program.*
Editor.

Michel Fournier
Cartologique, Montréal

Conférences de Montréal CARTO 2001

L'Organisation des conférences bat son plein. Comme vous l'aurai sans doute constaté, si vous avez eu l'occasion de consulter le site internet de l'événement (*http://geo.uqam.ca/carto2001/carto2001.htm*), nous avons surtout axé nos énergies sur le contenu des conférences. Le programme offert par l'équipe de Montréal est très audacieux, au-delà d'une cinquantaine de conférence sur deux jours. Des conférences qui touchent tant l'histoire, la recherche, les applications que les enjeux de la cartographie dans toutes ses formes.

Les conférences sont accompagnées d'un volet exposition commerciale qui comptera notamment sur la présence de la Photocartothèque ; du ministère des Ressources naturelles, la direction générale du foncier ; de GéoAccès ; l'Agence spatiale canadienne et de Brault & Boutiller.

En complément de programme, il y aura les visites techniques durant la journée du samedi, à la Bibliothèque Nationale du Québec, aux Archives du Québec et chez Trigonix. Le dimanche, nous vous invitons à entrer au cœur de l'histoire de la Nouvelle-France avec une super visite pédestre guidée du Vieux-Montréal et du Musée de la Pointe-à-Callière.

Nous aurons l'occasion d'échanger avec nos collègues des cartothèques et des archives cartographiques avec qui nous partageons l'organisation de l'événement et nous aurons également la possibilité de rencontrer nos collèques de l'Association canadienne des géographes (ACG) qui se réunissent à l'Université McGill, durant notre événement.

En ce qui a trait à l'hébergement, nous avons réservé un bloc de 60 chambres à la résidence de l'UQAM. Ceux qui le désirent, pourrons goûter à la chaleur pittoresque des Café & Couette du secteur ou encore, ils pourront se loger dans l'un des hôtels du Quartier latin, pour ce, la liste des lieux d'hébergement vous permettra sûrement de trouver un gîte qui vous conviendra.

Un mot sur notre site Internet, fruit du travail d'André Parent, le technicien en cartographie de l'UQAM : il a fait un travail remarquable et ce n'est certes pas terminé puisqu'il y aura des mises-à-jour régulières jusqu'à la consolidation du programme et des volets commandites et exposants. Il vous faudra donc y jeter régulièrement un coup d'œil pour être au fait des derniers déroulements de l'événement.

À n'en point douter, les conférences de 2001 seront un moment inoubliable dans les annales de l'Association canadienne de cartographie et donneront un avant-goût de ce que nous réserve le nouveau millénaire.

The organization of CARTO 2001 is in full swing. As you shall no doubt have noticed if you have had a chance to consult the web site (*http://www.geo.uqam.ca/carto2001/carto2001e.htm*) the organizing committee has put a lot of energy into developing the program. We have assembled about fifty papers, workshops and panels to be given over two days. These presentations cover a wide range of topics from history, cartographic research and technical applications, to what the future holds for all the aspects of our discipline.

There will also be a section for commercial exhibits. Most notably it will have exhibits by *Photocartothéque*, the Ministry of Natural Resources, GeoAcess, Canadian Space Agency and Brault and Boutiller.

To complement the paper sessions technical visits to the National Library of Quebec, the Archive of Quebec and to Trigonix, have been planned for Saturday. On the field trip planed for Sunday we invite you to go back in time with a walking tour of *Vieux-Montréal* ending at the Pointe-à-Callière Museum.

This joint conference with the Association of Map Libraries and Archives (ACMLA) will again give both our associations the opportunity to meet and exchange ideas. We shall also have the opportunity of meeting our colleagues of the Canadian Association of the Geographers (CAG) who will be meeting at the University McGill at the same time as our conference.

Reservations have been made for 60 rooms in the UQAM Student's Residence on Campus; the units are equipped with kitchen facilities and double bed. Register directly at the Residence (*Résidences universitaires de l'UQAM*) by email, fax or phone ; indicate your affiliation with Carto 2001 and take advantage of the special low prices; but you must register before April 20th to make sure that room is still available. Montréal has a great range of hotels. For those who wish they may find accommodation in one of the hotels in the Latin Quarter or chose from a wide variety of convenience locations.

A word on the Web site, created by André Parent, the cartographer at UQAM. He has done a very fine job and developed a very professional looking site. The web site is continually being updated. Changes will be added every day to keep you up to date. Be sure to check the site regularly for the most up to date information.

There is not doubt that CARTO 2001 will be an unforgettable event in the annals of the Canadian Cartographic Association. It will be but just a taste what the new millennium holds for the future.

Mike Shasko
Clover Point Cartographics Ltd.

Map Production Technology
Technologie de production cartogarphie

Projecting One - Metre Imagery

Introduction

Imagery analysis within a GIS is not a new phenomena. Recently, however, the quality and resolution of imagery has improved such that we take for granted that the various GIS tools we use to project small scale images (25+ metres) will give us the same results for larger scaled imagery.

In British Columbia, at least, the GIS community is plagued with the UTM / Albers projection quandary. No sooner is data compiled in one then another agency wants it in the other format. GIS data flies back and forth without too much concern about its origin or state. While vector information can tolerate repetitive re-projections (assuming double precision), do images retain their 'composure' moving between projections?

A detailed study of a one-metre image was undertaken to determine what happens within the image using only GIS tools to project to and from two common projection formats.

Observations

Mainstream geo-referenced images are typically either 8-bit 256 grayscale or 24-bit colour. File formats aside, in their raw state, every cell in the image consists of 1 or 3 bytes of colour information respectively. An image in this 'grid-cell' structure has that colour assigned to an x,y value representing the centre of the cell. In a grayscale image with a 100 metre pixel resolution, the image values at x=50m and y=50m would be represented by 1 byte. Similarly, 1 metre data is represented at half metre offsets. Upon first glance, it would appear that only the scale is the real issue and that projecting an image 10 or 100 times bigger shouldn't be a problem.

Image software (such as ENVI) will keep imagery in internal/propriety formats. Conversion of the data to common image formats (such as TIFF) introduce re-sampling errors as the image cells are converted to orthogonal cells (squared to the baseline of the image). Subsequent GIS processing simply cumulates the error.

Projection of images results in two significant alterations of the pixel characteristics. The first is a rotation of the entire image to fit the geographic space of the new projection. Between UTM and Albers, a rotation of 2.5 degrees or more would be typical. The resulting image is still the same resolution, it simply occupies more space, and introduces a set of four 'null' spaces surrounding the main image. The individual pixels are still the same size but, more importantly, they are not oriented to the rotation of the image; they remain square to the projection framework. This results in the second alteration of the image: re-sampling. If the individual pixels could be rotated within the image there would not be an issue. Since the new square pixel is now in a new location, and covers a new piece of land area, its colour value changes. New values are determined by some form of re-sampling technique, optimizing the new colour value based on surrounding pixels. For the most part, an 'averaged' value is assigned to the new pixel.

So unlike vector data where a project vertex has a reciprocal mathematical function to return it to the exact point upon re-projection, the image cell loses both its exact position and its original value.

Experiments

A 1 metre urban image (8-bit thermal) was projected between UTM and Albers repetitively. A 4x4-pixel area was compared at each of 5 iterations. The cell values in Figure 1 show the change to the original image values (bolded). In the first projection into Albers, about 35 percent of the cells changed value.

UTM Original				Albers (First pass)				UTM (Fifth pass)			
82	76	72	76	**81**	76	**74**	**78**	**71**	**89**	**89**	**87**
88	88	81	79	88	88	**82**	**80**	**100**	**98**	**93**	**91**
99	108	98	83	**100**	108	98	83	**106**	**103**	**97**	**94**
109	117	104	89	109	117	104	89	**94**	**107**	**104**	**101**
Average = 104.60 s.d.=38.40				Average = 104.60 s.d.=38.20				Average = 104.60 s.d.=36.41			

Figure 1

Returning to the UTM projection after 5 iterations, the image is considerably less sharp than the original (see Figure 2). The abrupt boundaries between buildings and foliage have disappeared. While the range of gray shades and the average pixel values remained unchanged by the projection, the standard deviation of the values decreases indicating a 'flattening' of the pixel values. In other words, more pixel values changed towards the mean value as a result of the re-sampling.

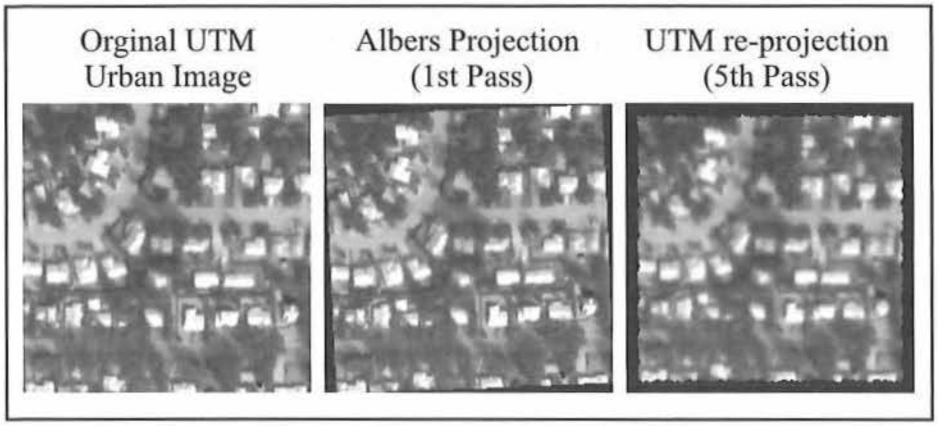

Figure 2

Ramifications

It might be obvious to some that the alteration of the image is normal and expected especially if image processing is a main component of one's job activities. Other GIS users, however, could easily assume that the projection output would be as accurate as projected vector data.

100 metre Landsat data covering both urban and non-urban landscapes have average gray scale values of about 70 with standard deviations of 20 to 40. This represents images with lower tonal values with less 'bright' areas, and smoother transitions across the image. Urban images tend to have a greater variation in the gray range and sharper tone boundaries. Our observations made of different images suggest that users of urban imagery (in common image formats) need to be aware of the data value changes especially if an analysis function is to follow the projection

With the urban images, we conclude that the effects of projection and the resulting re-sampling are more pronounced on high-resolution urban images than they are on 'landscape' imagery. Permanent alterations in the data values do occur in the projection of images and these errors are cumulative with each subsequent projection of the image.

Suggested work-arounds:

Use image software that properly projects a geo-referenced image and retains the actual image values and orientation of the pixels.

After projecting an image in a GIS, avoid re-projecting it again back to its original format or to an alternative projection - the data will not be the same as the original set or always project from the original data.

Research the re-sampling options within the GIS to best minimize the image loss.

Determine from your image supplier the projection history of your imagery....there may be an image already in your desired projection.

Acknowledgements

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Harry Stewart
Clark University

Cartography: An Un-Conventional View

Recently, when teaching a History of Cartography class, I had cause to remark upon a map, in which the Red Sea was actually colored red.[1] This led into some side comments on cartographic conventions; in particular the one of water as blue and why this should be so, et cetera. A topic, incidentally, that I have never seen given any *really* thorough treatment, and one ripe with possibilities for both commentary and illustration. The recent discussion on the MapHist line about whether Grecian seas were, a lá Homer, actually wine-dark, reminding me of this (to me) over-long omission.

It is also touched off a memory of being at the University of Toronto back in the 1960's, when the superb *Economic Atlas of Ontario* was being prepared under the supervision of Bill Dean and Geoffrey Matthews. I used to drift down to the compilation room and nose around. Upon seeing a map being prepared in which the water was pink, I made the surprised (and inane) comment, "Why is it pink?" and the answer from the draftswoman involved was, " Why not?"[2]. Exit flattened junior instructor – not exactly a golden moment, but a useful message that, in judging creative cartographic design, it might be a good idea to loosen up a bit.

However, I discovered a few years later that, as far as knee-jerk reactions were concerned, I was in august company. O. M. ("Mait") Miller, my distinguished predecessor at the AGS, who was an inveterate story-teller and a great skeptic/derider of the reputations and abilities of geographical heavies, (especially explorers), liked to tell the story of his encounter with the distinguished aviator, Charles Lindbergh.

Miller had just completed a new air-navigation map, which was designed for use on night journeys, in concert with so-called "cockpit verification of landmarks" (i.e. looking out of the window).[3] An emphasis was given to linear features as being clearly distinguishable, recognizable and, therefore, useful, as orientation marks to the aviator. Miller, thinking of the map being used in restricted space under dim illumination, made the drainage white against a dark background. As Miller related it, Lindbergh, on seeing this, said, "You can't do that, water is blue". And then, realizing what he had said, followed it up with, "Well, at least, it's *supposed* to be blue".

Miller got a lot of yardage out of this exchange, by giving Lindbergh a mini-lecture on the whys and wherefores of color-conventions on maps. Admittedly, this was a bit unfair. It is true that conventions are usually defined as "generally agreed and/or understood practices", and not as rules. However, some are so couched in historical practices or precedents, reified in early- modern times, that they sometimes seem as if they have been handed down with the Ten Commandments.

> *Upon seeing a map being prepared in which the water was pink, I made the surprised (and inane) comment, "Why is it pink?" and the answer from the draftswoman involved was, " Why not?"*

For example, the sexagesimal system: try asking a cartographic class why there are 90°, and not 100°, in a right angle.[4] It frequently produces bafflement that it could have ever been otherwise. Or north orientation: try using one of a number of those Australian "corrective maps, that have appeared recently. You might get the student response that I did: "I don't care, Florida looks *wrong* on that side"[5]. And there are those other symbols that are visually, or mentally, or sense, invoking. Thus, green for vegetation, the railroad line symbol with its one (? one) linear track and cross-ties, and so on. Their familiarity presents them as obvious best solutions. They may well be, from the point of view of experience, consensus and reductionism. But their ubiquitousness makes them seem more like *rules*.

Miller, however, for all his delight in tweaking establishment noses, had devoted some serious thinking to this subject. In a long-forgotten article with Robert Voskuil, in *The Geographical Review*, he made a useful distinction between *rules* and *precepts*.[6] The article itself, albeit dated, is a useful entry in the history of conceptual thought in cartography. Thus, the concern, in the last couple of decades, with rule formation in G.I.S., has some fascinating antecedents in cartography, which date back over 200 years.

Miller, also, made one other foray in the water-is-blue field. He designed a globe, in which he reversed the usual tone sequence in water. That is, shallow water was depicted as darker than deeper water – the deepest, therefore, being the lightest. He got the idea, he said, from observing a primary school class in which the children designed imaginary maps of islands and made the coasts stand out, by outlining them with a heavy blue border. A process, in fact, somewhat similar to the coastal vignetting, which appears on some aeronautical charts.

And as for eyeballing linear landmarks being overtaken by instrumentation, not only do I clearly remember a Canadian bush-pilot telling me about the navigational virtues of following railroad lines, I once asked a military helicopter pilot, whether he used specially compiled maps for his trips down the California coast. "Of course not", he replied. "I follow the road and navigate by the MacDonalds arches on the highway.

Footnotes:

1. Leardo, Giovanni, (1452-53), *The Leardo Map*, This is featured as slide #39 in the *History of Cartography* collection, Harper and Row, New York, originally assembled by George Kish, in 1973 and reissued later. The original is in the American Geographical Society, Milwaukee, Wisconsin. There are, of course, many other red Red Sea examples.
2. *Economic Atlas of Ontario*, (1969), Production director: W.G. Dean. Cartographer: Geoffrey Matthews, University of Toronto Press. See the rose/pink water depiction on plate 84.
3. *Experimental Air Navigation Map of Pittsburgh-Cleveland Area*, (1932), American Geographical Society, New York, 1:500,000 with inset map at 1:7,500,000.
4. For "students, one could easily, substitute "map-makers'. How many have any knowledge of the "grad" system, which could have replaced our familiar degrees, and created a "metric graticule system" ?
5. S. MacArthur, *MacArthur's Universal Corrective Map of the World*, distributed by Rex Publications, Artarmon, Australia. Undated and no scale given (approx. 1:50,00,000). Also, for a south-oriented Americas, see, Jesse Levine's so-called, "Turnabout Map", *A New World of Understanding*, (1982), Laguna Sales, San Jose, California. No scale given.
6. Miller, O.M., and Voskuil, Robert, J., (1964), "Thematic Map Generalization", *The Geographical Review*, 54, 1, January, pp.13-19. A slightly revised version of the article originally published in, *Nachrichten aus dem Karten- und Vermessungswesen*, Reihe V, 4, 1963, pp. 113-117.

Two Worlds, Two Maps

Comparing the Functions of Two Maps

Ute Dymon
Kent State University

During a recent trip to the CCA executive meeting in Montreal, I stayed in a small bed and breakfast. Before I left Kent State University, I went to my computer and downloaded a map of the local vicinity in which I was going to stay. The map was relatively uncluttered with all major streets shown and detailed directions to the place. Arriving in the middle of the night, the directions got me directly to the bed and breakfast without any problems. The map was probably prepared by the owner of the B &B, a simple but functional map which served its purpose of directing visitors to the business.

Shortly after my visit to Montreal, a colleague from the Kent Anthropology Department asked me to look at a map which he had brought back from the Solomon Islands. The map was of Anuta, a small remote island that is part of the Solomon Island chain, that is so isolated by distance and rough seas that it has minimal contact with outside cultures and forces. Even by the beginning of the twenty-first century, Anuta remains one of the most traditional and isolated islands in the Solomons.

Anutans are Polynesians who practice the self-supportive agriculture, hunting and fishing of their forefathers. Few Anutans have left this tiny island which is about a half mile in diameter and has a population of around 340 inhabitants. The closest neighbouring island is about 75 miles away, and other islands in the vicinity are 125 or more miles away from Anuta. These distances keep Anutans isolated from the outside world and help to maintain the traditional life style of this island.

My colleague has studied the Anutans for many years, researching their seafaring and navigation as well as their oral language tradition. On his last visit, he brought along a small map of the island produced by Western standards and showed it to one of his Anutan friends. As the Anutan looked at the map, he shook his head and told the anthropologist that this was not how the island looked.

Perplexed over the comment, my colleague asked his Anutan friend to draw a map for him the way he thinks the island looks. With the help of two other islanders, the Anutan directed my colleague while he drew a map of the island, complete with its surrounding fishing grounds. The majority of area shown on the map was the fishing grounds which support the Anutans' sustainability.

What was drawn by use of traditional Western map standards were the mental map images of the three Anutans. It was a paper map that we with a western view can read and understand. What loomed largest on the paper map were the ocean areas around Anuta, not its land. The Anutans clearly do not need a paper map for wayfinding around their island's roads nor in the fishing waters off their shores. Their mental maps serve them well in the relatively small scale of their environment.

In contrast, moving across a much larger scale of land, a visitor to Montreal from Ohio needs precise directions and information for wayfinding. Two maps, two different cultures with different functionality of maps.

An article on the map of Anuta is in progress.

MIDNIGHT PLOTTING

NATURAL RESOURCES CANADA PROVIDES ON-THE-SPOT RESULTS OF THE NOVEMBER 27, 2000 GENERAL ELECTION

Paul Harker

GeoAccess Division, Canada Centre for Remote Sensing, Natural Resources Canada

GeoAccess Division, a part of Natural Resources Canada, creates materials for the National Atlas of Canada. For the past thirty years, GeoAccess and its antecedents have also created maps showing the results of general (or federal) elections. Prior to the 1990's, these maps could only be made by conventional (manual) mapping techniques, but in the 1990's, first digital, and then Web technology transformed the speed at which these maps could be prepared. The 1997 election results map showed it was easily possible to produce a complete, full-size coloured paper map by the morning following the election, and also to produce a fully-functioning Web site showing the results. Subsequent developments in Web development and use made it clear that GeoAccess should create one or more Web products for showing the results of future elections.

Once the date of the 2000 election became a near-certainty, GeoAccess drew up a list of feasible activities for mapping the results. One would be creating and distributing large results plots to a fairly wide range federal officials and partners for the following morning as had been done for the 1993 and 1997 elections. The other main activity was a Web site whose principal feature would be an interactive mapping tool showing the results as these were released on election night. This paper outlines the development work for the mapping tool.

Planning

Just prior to the election being called, GeoAccess met with Elections Canada to discuss data links and other forms of co-operation. The main data set GeoAccess needed quickly was the list of candidates. This list, which became available about three weeks prior to election day, would be very useful for both mapping projects. The electoral district outlines did not need to be provided as the 1996 Representation Order meant the same districts (and boundaries) used for the 1997 election would also be in effect for the 2000 election. Elections Canada's Web site (*www.elections.ca*) provided a great deal of passive help to GeoAccess, too, such as providing official names for political parties, and the name changes to ridings since the 1997 election.

GeoAccess then created an election site on its National Atlas Online site (*www.atlas.gc.ca*). Some parts of the election site noted past results, others gave links to major sites provided by the media. The main product on the site was a new mapping tool using the University of Minnesota's MapServer technology, a relatively new Web mapping software that is in the public domain, and is well-supported. MapServer offers fewer choices than the main National Atlas mapping tool, but both have major features used in Web mapping such as

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QU'EST-CE QUI S'EST TRAMÉ À RNCAN?

AFFICHAGE RAPIDE DES RÉSULTATS DES ÉLECTIONS GÉNÉRALES DU 27 NOVEMBRE 2000

Paul Harker

Division GéoAccès, Centre canadien de télédétection, Ressources naturelles Canada

La Division GéoAccès de Ressources naturelles Canada crée de l'information pour l'Atlas national du Canada. Depuis trente ans, GéoAccès et ses prédécesseurs produisent des cartes illustrant les résultats des élections générales fédérales. Avant les années 90, il fallait employer des techniques classiques, c'est-à-dire manuelles, mais les premières technologies numériques, puis la technologie du Web, ont fait fondre le temps de préparation des cartes. Les élections de 1997 ont confirmé qu'il était facile de produire pour le lendemain matin une carte papier en couleur et pleine grandeur de même qu'un site Web complet présentant les résultats. Il est vite devenu évident, à la lumière d'autres développements touchant le Web et son utilisation, que GéoAccès devait créer un ou plusieurs produits Web pour communiquer les résultats d'élections.

Quand la date des élections de 2000 est devenue à peu près certaine, GéoAccès a préparé une liste de ce qu'il était possible de faire pour en cartographier les résultats. L'une des principales activités serait la représentation sommaire des résultats sur une carte produite et livrée, le lendemain matin, à une brochette assez variée de fonctionnaires et de partenaires fédéraux, comme pour les élections de 1993 et de 1997. L'autre serait la mise sur pied d'un site Web dont la principale caractéristique, un outil cartographique interactif, montrerait les résultats publiés. Nous exposons ici les travaux de développement de cet outil cartographique.

Planification

Juste avant l'appel aux urnes, des responsables de GéoAccès se sont réunis avec leurs homologues d'Élections Canada pour parler de liaisons informatiques et d'autres formes de coopération. Le principal jeu de données dont GéoAccès avait besoin d'urgence était la liste des candidats. Disponible quelque trois semaines avant le jour du scrutin, elle serait des plus utiles pour les deux projets. Les limites des circonscriptions électorales n'étaient pas nécessaires puisque le décret de représentation de 1996, qui avait établi celles des élections de 1997, restait en vigueur. Le site d'Élections Canada (www.elections.ca) a aussi été très utile, fournissant à GéoAccès les noms officiels des partis politiques et les noms des circonscriptions qui avaient changé depuis 1997, etc.

GéoAccès s'est alors occupé de créer dans le site de l'Atlas national en ligne (www.atlas.gc.ca) un sous-site électoral contenant les résultats d'élections passées et des liens vers d'autres sites majeurs offerts par les médias. Toutefois, le principal attrait

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zooming and query capabilities. GeoAccess developed its MapServer application (henceforth called "MapServer"). Part of the development work was ensuring that MapServer could receive an Elections Canada data feed of riding-by-riding results could be used in it. On election night, this feed would ensure that each riding was displayed using the colour of the leading candidate, and also that query results for any riding would give substantial detail about its voting pattern.

About ten days before election day, Elections Canada and GeoAccess conducted tests of the feed using dummy data sets. The tests went very smoothly with the result that GeoAccess could then plan for fairly sophisticated tables of data to be available as query responses. The query box ultimately became a fairly large pop-up window of the latest available data for the selected riding. This window listed the riding's candidates in order of current vote, and also gave the name of their parties, their vote totals, and their percentage of the total vote. Importantly, the table would also show the proportion of polls reporting, so that users could see what proportion of the total vote had been counted. It was also relatively simple to add an icon to the box linking the user to Statistics Canada's 1996 Census Profile data for the same riding. The data feed also enabled another button to be created, one listing a summary for Canada of the major parties and the number of seats they were leading in.

On election night, MapServer's primary role would be to let the general public see the election results at they unfolded. The rules on releasing data to the public meant that the site could not be opened to the public until the last polls in Canada had closed (at 10:30 p.m. Eastern time). Another voting rule to ensure that polls would close more-or-less simultaneously across Canada had the consequence that once the site went on-line, the bulk of the data from all across Canada would pour in at the same time. In order to show these rapid changes, a relatively short refresh time was programmed into MapServer: every two minutes, the screen (and voting data in the tables) would refresh to incorporate new results.

Performance

On election night, MapServer was opened up on schedule, and within ten minutes, it was showing results for most of Canada. There was a lot of user interest – more than 90 000 users visited the site in the first 24 hours following the election. The crush of users at the outset was hard on similar Web sites giving election details: several sites crashed for much of the key two-hour period after results started to become available. MapServer was more robust and stayed up all night, but its rapid refresh rate made it difficult for users – it could take several minutes for a zoom or an identify request to work. However, MapServer technology made it a relatively simple task to make changes to its operating rules on the fly. After we reduced the refresh rate to once every five minutes, the site's response rate to queries improved from minutes to several seconds.

The smooth operation of the site was of vital interest to the National Atlas staff for more than just professional pride: MapServer's robustness meant it would be needed to serve as the main source of information for preparing and checking the digital files for the results plot. At a time so soon after polls had closed (four to five hours), only Web sites were a feasible source of checking riding-by-riding results. Once its query response rate improved, MapServer worked perfectly for this purpose, particularly as its use of polls reporting made it possible to confirm when (or if) results were indeed final. In previous elections, non-final results made it necessary to indicate on the map that the winning candidate could not be determined.

Both the Web and paper map projects were very successful, not only in their technical achievements and overall management, but also in its buy-in from other agencies. One of these agencies was GeoConnections, the Secretariat that co-ordinates the creation of the Canadian Geospatial Data Infrastructure (see *www.cgdi.gc.ca*). Other groups within Natural Resources Canada, and at Elections Canada provided their plotters and round-the-clock plotting staff. A final compliment came when Elections Canada agreed to put its name in the title box of the map. This signalled the map reflected Elections Canada's data effectively and would be clearly viewed as being a non-partisan project.

The assistance of Andrew Murray is gratefully acknowledged. ◍

Putting it on paper

For the last three elections, GeoAccess has provided a "morning-after" paper map of unofficial results for a very limited distribution within government. Time is of the essence for these maps. With each election the production process has evolved and improved.

For the election of 2000, the map production system was restructured, mainly to take advantage of the data feed from Elections Canada to the MapServer. One decision was to produce a single, bilingual edition rather than separate English and French editions. This duplicated the list of members but the final map (54 x 31 inches (or 137 x 79 cm)) did not become excessively large.

The other restructuring came mainly into play once it was deemed that there would be essentially no more results data received on election night. At that time, about 3.00 a.m., the MapServer operator generated a list containing the winning party for each riding. Using this list, the plotting software then created the final map, as it assigned the correct party colour to the riding polygons to all relevant places on the map face. Colour went to many locations: to ridings shown on the main map, the 27 insets, and to the legend boxes. For the map legend, the software also looked up the name of the candidate of the winning party to plot opposite the riding name. By 4.15 a.m., the first plot had been printed and checked, and the postscript file was then distributed to a number of 54-inch inkjet plotters recruited from various government offices around Ottawa. Once each plot was dry, it was trimmed and couriered to its destination.

As soon as the official elections results have been compiled by Elections Canada, GeoAccess will release them in a new map "The 37th Parliament of Canada." This map will give full voting statistics for each of the main parties in all 301 ridings. This map should be available in the Spring of 2001.

P.H.

La carte papier

Lors des trois dernières élections générales, GéoAccès a préparé une carte papier des résultats non officiels, la distribuant dès le lendemain matin dans des cercles fédéraux restreints. Comme chaque minute compte dans ces circonstances, à chaque élection on a amélioré le processus.

Pour les élections de 2000, le système de production de la carte a été restructuré, surtout pour tirer parti de la liaison de données Élections Canada-MapServer. Il a été décidé de produire une seule carte bilingue au lieu d'éditions française et anglaise, ce qui a fait doubler la liste de députés; heureusement, la carte finale n'était pas devenue trop grande – 54 pouces par 31 pouces (137 cm x 79 cm).

L'autre restructuration a surtout eu lieu quand il fut établi, vers trois heures du matin, qu'on ne recevrait plus de données importantes. L'opérateur du MapServer a produit la liste des circonscriptions et du parti vainqueur dans chacune. À l'aide de cette liste, le logiciel de traçage a créé la carte finale, assignant la couleur du parti gagnant à tous les polygones de chaque circonscription. La même couleur était aussi commandée pour d'autres endroits, notamment 27 cartons intérieurs et les cases contenant les légendes. Pour celles-ci, le logiciel est aussi allé récupérer le nom du candidat ou de la candidate du parti gagnant, l'ajoutant vis-à-vis celui de la circonscription. Dès 4 h 15, le premier tracé avait été produit et vérifié, autorisant la distribution du fichier PostScript à plusieurs traceurs de 54 pouces réquisitionnés dans différents bureaux fédéraux de la région d'Ottawa. Une fois les cartes séchées, il ne restait plus qu'à les rogner aux dimensions finales et qu'à les dépêcher par messager aux destinataires.

Dès qu'Élections Canada aura réuni les résultats officiels des élections, GéoAccès publiera une nouvelle carte intitulée « Le 37e Parlement du Canada » contenant les statistiques complètes du vote pour tous les principaux partis dans les 301 circonscriptions. On devrait pouvoir se la procurer au printemps 2001.

P.H.

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était un nouvel outil cartographique basé sur la technologie MapServer de l'université du Minnesota. Du domaine public, ce logiciel relativement nouveau est bien soutenu; s'il offre moins d'options que le principal outil cartographique de l'Atlas national, les deux ont des fonctions semblables comme le zoom et l'interrogation. GéoAccès a donc monté sa propre application MapServer –ce que ce nom désigne d'ailleurs dans le reste de l'article. Parmi les travaux de développement, il fallait s'assurer de pouvoir recevoir et utiliser les résultats de chaque circonscription. Le soir des élections, ces données entraîneraient l'affichage de la couleur du candidat en avance dans chacune et donneraient des résultats significatifs sur la répartition du vote.

Dix jours avant la date fatidique, Élections Canada et GéoAccès ont testé la liaison à l'aide de données fictives. Tout s'est bien déroulé, autorisant GéoAccès à planifier la production de tableaux de données relativement complexes en réponse aux interrogations. La case d'interrogation allait bientôt prendre la forme d'une fenêtre flash assez grande contenant les toutes dernières données pour la circonscription choisie. On y trouvait les noms des candidats dans l'ordre des votes comptés, ceux de leurs partis, le nombre total de voix pour chacun et le pourcentage du vote total. Important détail, le tableau montrait aussi le nombre relatif de bureaux de scrutin dont les données avaient été comptées et reçues, procurant une indication du pourcentage des bulletins de vote comptés. Il n'a pas été difficile d'ajouter à la fenêtre un icône renvoyant aux données des profils du recensement de 1996 pour la même circonscription. La liaison données a aussi permis de créer un bouton menant à un sommaire national indiquant, pour les principaux partis, le nombre d'élus et le nombre de circonscriptions où leurs candidats étaient en avance.

La nuit des élections, la principale fonction du MapServer serait de permettre au grand public de suivre les résultats. Or, compte tenu des règles de publication des données électorales, on ne pouvait pas ouvrir le site avant que les derniers bureaux de scrutin ferment leurs portes, à 22 h 30 heure de l'est. De plus, comme tous les bureaux de scrutin du pays fermeraient à peu près au même moment, une fois le site en ligne, la plupart des données déferleraient aussi simultanément. Il a été décidé de programmer dans le MapServer une fréquence de rafraîchissement assez courte, pour montrer l'évolution rapide de la situation : aux deux minutes, tant pour l'écran que pour les tableaux de données sur le vote.

Rendement

La nuit des élections, le MapServer est entré en ligne au moment voulu et, dix minutes plus tard, il affichait des résultats pour la majeure partie du pays. L'intérêt fut vif : plus de 90 000 utilisateurs dans les 24 heures! Au début, l'énorme demande a mis à rude épreuve des sites semblables et plusieurs sont tombés en panne, restant inaccessibles pour une bonne partie de la période la plus cruciale, les deux premières heures. Le MapServer s'est montré robuste, ne souffrant d'aucune défaillance. Il s'est pourtant produit un ennui. La rapide fréquence de rafraîchissement choisie a créé un goulot pour l'utilisateur, qui devait peut-être attendre son zoom ou l'écran d'interrogation pendant plusieurs minutes. Heureusement, dans MapServer, il est relativement simple de modifier les règles de fonctionnement en temps réel. La fréquence de rafraîchissement fut donc portée de deux à cinq minutes et le temps de réponse passa vite de quelques minutes à plusieurs secondes.

Le bon fonctionnement du site était d'une extrême importance au personnel de l'Atlas national, dépassant la simple fierté professionnelle : compte tenu de sa robustesse, le MapServer serait aussi la principale source d'information pour la préparation et la vérification des fichiers numériques servant à la restitution graphique. En si peu de temps après la fermeture des bureaux, quatre ou cinq heures à peine, seul un site Web pouvait permettre une vérification des résultats circonscription par circonscription. Une fois le temps de réponse amélioré, le MapServer a très bien rempli sa fonction, les rapports par circonscription permettant de vérifier si les résultats étaient définitifs ou non. (Lors des élections précédentes, tout résultat non définitif engendrait sur la carte le message que le nom du candidat élu ne pouvait pas être établi.)

Les projets du site Web et de la carte papier sont deux grandes réussites, non seulement sur le plan technique et gestionnel, mais aussi par l'accueil qu'ils ont reçu d'autres organisations. Nous pensons entre autres à GéoConnexions, dont le secrétariat coordonne la mise sur pied de l'Infrastructure canadienne de données géospatiales (www.cgdi.gc.ca). D'autres groupes à RNCan et à Élections Canada ont aidé en fournissant des traceurs et du personnel de traçage pendant les 24 heures. Un dernier compliment nous a été fait : Élections Canada a accepté que son nom soit placé dans la case titre, signifiant que la carte reproduisait effectivement ses données et garantissant qu'elle serait considérée comme non partisane.

L'auteur tient à remercier Andrew Murray pour sa contribution à l'article.

New Atlas Module

National Atlas of Canada on-line introduces a new module entitled, **The Territorial Evolution of Canada, 1867-1999**. It depicts the changing locations of Canadian boundaries over a 132-year period. This series of 21 maps illustrates the spatial patterns of Canada's past. A 22nd map, summarizing all the information, was created to provide a better overall perspective of the process of territorial evolution.

The module includes ample additional information to facilitate an understanding of this study. Population data are linked to the various years for each province and territory. There is also a section entitled "Teaching Resources." Finally, there is a section of photographs and historical maps from the years studied. Go to http://www-atlas.ccrs.nrcan.gc.ca/projects/atlas/v2/default.asp). From here, select the "Historical" sub-theme under "Themes." Then select the "Territorial Evolution" module to display the various years.

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***Boyle** - continued from page 9*

For real use it is necessary to load the prefixT programs onto a hard drive using the loading programs provided. These set up the directories and files in which changed data will be saved. Even in these programs, the save routines are initially protected and must be activated before use. This is done so that users can experiment before actually making recorded changes. Another feature in the prefixT routines is that zipped files are used for the bitmaps, meaning that much larger amounts of data can be used

Conclusion

Cartography is well served by the latest versions of Microsoft Excel. Programs such as edit, are powerful and fast at creating changed maps from data, particularly as the information for both is in the same program. Excel is already familiar to many PC users. The controllable command menu makes the use straightforward even for inexperienced operators and Excel symbology is easy to set up. This paper and associated CD-ROM describes new macros that make Excel useful for cartography

Acknowledgements

I would like to acknowledge the work of my assistant, Dorian Klinkenberg, now a student in Computer Science at the University of Saskatchewan, who devised many of the cleverest and most useful macro procedures.

Calendar / *calendrier*

May 29 mai - June 2 juin, 2001
Canadian Association of Geographers
Montreal, QC
(McGill, Concordia, UQAM)
Contact cag@felix.geog.mcgill.ca

May 30 mai - June 2 juin, 2001
Conference l'ACC/CCA 2001 Joint with the ACMLA
Montreal, QC
For information / *pour renseignements:*
MichealFournier,acsg_mtl@mlink.net
or any executive member.

August 6 - 10 août, 2001
ICA BEIJING 2001
For information / *pour renseignements:*
www.sbsm.gov.cn/ica2001

October 3 - 6 octobre 2001
NACIS XXI
North American Cartographic Information Society
Portland, Oregon
Doubletree Hotel
contact: jcrampto@gmu.edu

Perhaps a map for apathetic voters

ICA BUSINESS

Peter Keller
Chair, CNC for Cartography

ICC 2001 BEIJING, CHINA, AUGUST 6-10, 2001

All abstracts submitted for this conference have been vetted by the Conference's Organizing Committee. Authors have been informed of their paper status. A number of you have let me know the outcome, and whether you will be going. It would be great to know the names of all the Canadian delegates who plan to go. So if you have not contacted us already, do let me know.

If you are planning to go, do remember that visas will be required to visit China, and that you need a letter of invitation to facilitate the visa application process.

You should be able to find out more about the conference at *http://www.sbsm.gov.cn/icc2001/*. Watch out, this conference web site has been down intermittently recently.

ICA COMMISSIONS

A number of ICA Commissions will be meeting around this summer, some before or after the main Beijing conference. I have heard of the following:

Commission on Visualization and Virtual Environments: This group will be meeting in conjunction with GeoCart'2001 - Visualizing New Zealand in the New Data Environment, Wairakei Resort, NZ, 30 April - 2 May. Check out *http://www.cartography.org.nz/geocart2001/*

Commission on Maps and the Internet: This group plan to meet July 31 - Aug. 2, 2001 in Guangzhou, China. Check at *http://maps.unomaha.edu/ica/Maps%26Internet/Upcoming/Guangzhou.pdf*

Commission on Education and Training: This group plans to meet in Paris in conjunction with the International Conference EUROCARTO XIV where they will be hosting a meeting on "Methodology and Tools for Teaching GIS and Cartography", 28 May - 2 June 2001. Check out *http://gw.geogr.msu.su/cet/*

For further news on these and other commissions see the ICA web site at *http://www.icaci.org*.

CHILDREN'S MAP COMPETITION

Erin Richmond informs me that she is making good progress with the Children's Map Competition. Keep encouraging all those juniors around you to submit an entry. Remember, they can't win unless they enter the competition. Running this competition costs real money. I have placed a call for contributions. A note of thanks to Carolyn Weiss for organizing funds to help defray costs towards this competition from the Geography Division of Statistics Canada, and to the CIG and ACMLA for agreeing to help out one way or another. I am still waiting to hear from some of the other organizations.

CANADA'S NATIONAL EXHIBIT

The Canadian Map Exhibition is being organized by Claire Gosson and her team. Rumour has it that the exhibit may make its first appearance at the Annual CCA/ACMLA meeting. Excellent work – thank you.

CCA AWARDS

The Canadian Cartographic Association presents several awards each year to deserving members of the cartographic community which it serves. These awards are meant to recognize and encourage the achievements of outstanding individuals in the field.

- **President's Prize Student Competition** ($100 prizes in several categories)
- **Norman Nicholson Memorial Scholarship in Cartography** (To recognize and encourage exceptional student achievement and ability in any aspect of cartography.)
- **Awards of Distinction** (To acknowledge exceptional professional or scholarly contributions to the field of cartography or an exceptional contribution to the Association.)

For information about eligibility and how to apply or nominate individuals for these awards see the CCA web site: *www.geog.ubc.ca/cca* or contact any member of the executive.

Prix de l'ACC

L'Association canadienne de cartographie présente, à chaque année, plusieurs prix à ses menbres méritants. L'attribution de ces prix a pour but de reconnaître et d'encourager l'accomplissement exceptionnel d'individus dans le milieu cartographique.

- **Le prix du Président pour la compétition des étudiants** (Des prix de $100 pour différentes catégories.)
- **Bourse Norman Nicholson** (Bourse attribuée afin de reconnaître et d'encourager un étudiant pour son accomplissement exceptionnel et ses capacités dans tous les aspects de la cartographie.)
- **Prix de distinction** (Prix pour reconnaître les contributions professionelles ou académiques exceptionnelles dans le domaine de la cartographie ou pour une contribution exceptionnelle à l'Association.)

Pour de plus amples renseignements concernant l'éligibilité, comment postuler ou proposer un candidat pour ces prix, s'il vous plaît, veuillez visitez le site web de l'ACC à l'adresse URL suivante : *www.geog.ubc.ca/cca*, ou veuillez contacter un membre du comité exécutif.

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L'Association canadienne de cartographie
www.geog.ubc.ca/cca

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The CCA was founded in 1975 to promote interest and education in maps and cartographic data, and to provide for the exchange of ideas and information, at the regional, national, and international levels, via meetings and publications. Membership in the Canadian Cartographic Association is open to all individuals, and public and private institutions which have an interest in maps and the aims and objectives of the Association. Membership is available in the following categories at the annual rates listed below ($CND):

Regular	$80
Student	$40
Institutional	$100
Corporate	$200
Family	$95
Retired	$40
Associate	$40

To cover mailing costs US residents please add $5 CDN and Overseas residents please add $10 CND to the appliciable membership catatgory.

Members receive the quarterly journal *Cartographica*, published by the University of Toronto Press and endorsed as the journal of the CCA; four issues of *Cartouche*, the CCA newsletter and the International Cartographic Association Newsletter. The Association also provides an annual conference to promote discourse and access to a range of expertise through the interest groups and regional contacts.

For further information about membership qualifications and benefits contact the membership coordinator or any executive member or visit www.geog.ubc.ca/cca

L'ACC a été créé en 1975 pour promouvoir les intérêts et l'enseignement des cartes et de la cartographie ainsi que pour permettre l'échange d'idées, d'informations tant sur les plans régionaux que nationaux et ce via des bulletins et des conférences. L'adhésion à l'association est ouverte à tous les individus et institutions (privées et publiques) qui sont intéresés par les cartes et par les buts et objectifs de l'association. Vous pouvez adhérer dans les catégories suivantes selon les taux indiqués (cdn$) dans la liste ci-dessous :

Régulier	$80
Étudiant	$40
Institutionnel	$100
Société	$200
Famille	$95
à la retraite	$40
Associé	$40

Un montant de 5$ (cdn$) est ajouté pour couvrir les frais postaux aux membres américains (É-U) et de 10$ (cdn$) pour les membres outremers.

Les membres recoivent la monographie trimestrielle Cartographica, publiée par le University Toronto Press; 4 numéros du bulletin de nouvelle Cartouche et le bulletin de nouvelle de l'Association cartographique internationale (ACI). L'Association organise également une rencontre annuelle avec des conférences qui donne accès à l'expertise issue des groupes d'intérêts et des diverses régions du pays.

Pour plus d'information concemant l'adhésion et les bénéfices de l'association, contactez le coordonnateur des adhésions ou l'un des membres de l'exécutif ou encore, visitez notre site Intemet *www.geog.ubc.ca/cca.*

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