CARTOGRAPHY AND MAPPING

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Abstract

"A map may lie, but it never jokes'' for example, when a hand-drawn map sketched on a piece of paper fails to indicate the correct exit ramp to your intended destination, it is not a laughing matter. We have come to expect all maps to be truthful and to reflect reality. But the fact is that not all are truthful, nor reflect reality. We might not be aware enough of the prejudice in government circles and enterprises caused by the absence or partial lack of maps, a matter, which can cause error, delay or even project cancellation.

This is where the role of the cartographer becomes very significant. Map types and methods of mapping are considered. To enable the cartographer *perform* this crucial role with speed, accuracy and economy, the assistance of the computer became imperative. The lubricating influence of automation in cerography is discussed here also.

Introduction

Maps arc basic to knowledge of geography, which in itself is essential to understanding the world around us. They generally mean a proportional representation of three dimensional objects on a plane surface for the purpose of recording and transferring a set of ideas or information about an area (Adinna, 1999).In practical terms maps mean more than a representation on a plane surface to include representation of ideas or plans of actions designed to obviate forgetfulness that retract one from achieving one's objectives for a definite period or obviate muddling up action. Maps are therefore diaries or reference point which, include not only diagrams, but also pictures, literary records, outlines unintended or executed actions. They also include views or images. Maps are therefore used to express perceptions, give validity to ideas and express spatial relationship (Whynne-Hammond, 1979). In the light of the above, maps have one common quality of being a purposeful venture. Hence no map is drawn for fun. Maps are maps only when they are useful and useable. Clearly, there is much more involved in map-making than many people realize. The more knowledge there is of the earth, the more accurate maps can be. For instance, when a cartographer wants to reflect reality, creating a map on a flat surface presents a problem. This is because drawing the surface of a sphere on a flat plane results in distortion (Awake, 1998).

A Chronicle of Mapmaking

Map making is one of the most ancient and extraordinary forms of communication. Maps have been carved on stone and wood: drawn on sand, paper, and parchment; painted on skins and cloth; and even hand shaped on snow (Awake, 1998).

The World Book encyclopedia (Awake, 1998) dates the oldest known map from about 2300 B.C.E., describing it as "a small clay tablet from Babylonia that probably shows an estate in a mountain-lined valley". The Babylonians used similar day drawings of city walls in an early effort at community development.

The Greek geographer Ptolemy of Alexandria of the second century knew that the earth was round. According to the magazine *Equinox,* Ptolemy's drawings are "among the first recorded attempts at cosmography - the mapping of the shape of known world". (Awake, 1998).

Few knew about Ptolemy's maps until they were printed in atlas in the late 1400s. Thereafter, they became the source of geographic data for such navigators as Columbus, Cabot, Magellan. Drake, and Vespucci. Even today, Ptolemy's globelike map of the world resembles modern maps. Voyages that followed during the age of discovery, between about 1500 and 1700, equipped cartographers with more accurate information. Their charts or maps, became strategic documents and have been identified as "instruments of state power" and "weapons of war" (Awake, 1998).

As new lands were discovered, old boundaries needed to be redefined. Flemish geographer Gerandus Mercator (1512 - 1 594) responded by drawing the first scientific book of maps. In his book, Mercator used the figure of the mythological giant Atlas the Titan, and since then the word "atlas" has come to be applied to a collection of maps.

Modern Cartography

As geographic knowledge grew, the quality of maps improved. New mapping techniques played a major role in this development.

The choice of appropriate projection is guided by the desire to approximate the ideal condition by retaining as many desired qualities as possible when transferring points from the datum surface to the map plane (Jupe. 1987). Mapmaking literally got off the ground in the 20^{lh} century. Airplanes mounted with cameras began taking aerial photographs. Then, orbiting satellites of the 1950s propelled map-making into the space age.

Today, Cartographers draw with the aid of electronics. They update their maps by using instruments that have been placed in orbit, complemented by specialized software programmes allows map makers to store trillions of pieces of information cartographic and otherwise. Thus, a custom made map can be produced within minutes without time - consuming hand scribing. With a Geographic Information System (GIS), almost any information can be superimposed on a map (Jupe, 1987).

Automated Cartography

The purpose of an automated system for cartography is to store data (by scanning or reading map) that is compiled for the making of a map on magnetic tape (digitizing) or punched cards, so that by selecting the stored information, a cartographer can automatically "draw" a map with contours, symbols, names, heights and other details on film for black and white etc reproduction. This operation can be done any number of times and at many times the speed of manual drawing and without the skill necessary for such draftsmanship. (Jupe, 1987).

Maps and Map Types

A number of map types include: (Adinna, 1999):

(i) Physical maps, which depict rock types, terrain configuration, vegetation types, soil types and their distribution. The usefulness rests in the creation of information regarding these.

(ii) Cultural maps show the types and distribution of human activities and infrastructural facilities including the people who put these in place. Claudius Ptolemy who lived astride the first and second centuries AD (Robinson, I960) illustrated the art of mapping by representing in graphical terms the stories and activities of travelers during his time. These include what they did, saw and where these existed. Although these graphic paintings/stories, disappearing for over one or two thousand years, the Arabs preserved and reviewed his works during the Renaissance. The contribution of Ptolemy to mapping is that the making of maps became the preserve of cartographers and the gathering of information for mapping went to surveyors. These two professions are subsumed in the content of Geography. Hence, the significance of Ptolemy lay in the compartmentalization of the branch profession in Geo-Graph (Adinna, 1999).

(iii) Maps also include plans. This may be a plan of ideas mapped out or listed for remembrance or to prevent omission of intended activities or keep record for posterity.

(iv) There is also an abstract form of mapping concept, called mental mapping. This sometimes is a verbal description of a mental picture. Hence mental maps are idealized or just imaginary maps. This also then involves the description of the mental images often complemented with gestures as in the case of describing a route for a visitor. This form is called topological. Topological maps are easy to understand and analyse as irrelevances are avoided. Such maps however subdue actual distances since the use of scales are often not so important. One common property of maps is that they serve useful purpose(s) when they are prepared for the user (Adinna, 1999:2-3).

Methods of Mapping

Ground Survey Methods

This method involves classical methods of survey which include traversing, triangulation, trilatation, intersection, resection and off-set methods.

Traversing is determining the position of a point when we know the initial Bearing or the Azimuth or the co-ordinates of point A&B to get Azimuth of the line. This is the method of determining relative position of points by measuring angles and distances only.

Triangulation is a method of determining relative position by using figures forming a

triangle. It involves the division of the net work into triangles.

Trilateration is determination of positions by measuring distances only and angles are computed.

Intersection is employed where two points are fixed and known and from them the position of another point can be fixed by intersection.

Resection is a direct opposite of intersection. Measurement is made from an unknown point to two known points.

Off-set is the method of locating an unknown point by measuring distances perpendicular to the line joining two know n points.

By the Use of the Global Positioning System (GPS)

Global Positioning System (GPS) has revolutionized surveying operations since the system became operational in the mid-eighties. The system has twenty-four satellites in its constellation. These satellites, which are at about 200km altitude and in six orbital planes are positioned in such a way that at least four satellites would be simultaneously visible at any time of the day anywhere in the world. These satellites whose positions are accurately known at any point in time send out signals which are received on the earth and which can be used to determine the position of the receiver, which is also the point of interest to be coordinated or determined.

Photogram metric Methods

Photogrammetry is the science of obtaining reliable measurements by means of photography. That is the process of obtaining necessary measurements from the aerial photographs of the area in question. It is based on the projective relationship between object and image points (Onyeka, 1999).

By Remote Sensing Techniques

Remote sensing deals with the techniques used to obtain information about distant objects without making physical contact with those objects. The device for obtaining the information is called a sensor and the medium is electromagnetic energy. When electromagnetic energy strikes materials, there is an interaction between the electromagnetic energy and the material. Every material interacts with electromagnetic energy in a unique manner and this particular manner is said to be the spectral signature of that material.

Conclusion

It has been articulated here that new technologies have brought exciting opportunities as well as new challenges for today's surveyors and cartographers, consequently; maps now contain more crucial information.

The quantum of data accruing by the grace of this new technology is enormous that an efficient communication system (Cartography) is the obvious desire. To facilitate the job of the cartographers the need to automate the process of acquisition, management and presentation of data cannot be over-emphasized.

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