

DIGITAL CARTOGRAPHIC'S BASE 1:250 000. REPUBLIC OF CUBA

Eng. Julio Cabrera Quiñones  
Eng. Pedro Martínez Fernández  
Eng. Maribel Páez Moro  
Eng. Maristaidis Prieto Puentes  
Eng. Silvio Rodríguez Hernández

Research, Development and Consultory Center, GEOCUBA. La Habana. CUBA

Abstract

During the period 1986-1990 the Cuban Institute of Geodesy and Cartography developed Cartography assisted by computers and made the cadastral map 1:10 000 rustical territories, also the topographic survey in large scales maps. However the results were not the expected, because of difficulties in the procedure, according to low levels in automatization.

From this experience we made a work conception that in an integral form in 1991-1995 period, allowed create the base of technology for the development of Digital Cartography in our country, and paralelly the methodology base for the introduction of SIG techniques in the principal branches of our economy.

As part of this estrategy in 1992-1994 period were created the digital cartographic's base of the map 1:250 000 of Cuba following all rules for the creation of this kind of map in the world. It was necessary to create a tecnology in order to convert maps to a digital format which is very flexible its application in any specialized institution.

The base of cartographic data as a manner of opinion are supplies in DXF format which assure its compability in most of the commercial software. However there are certains conditions to supply information in others format.

## 1 Introduction

The automatization work in cartography began in our country in 1983 according to the agreements of the Geodetic Service of several countries from the late socialist field, in which their Investigation Center formed the first specialists. In 1986 The Cuban Institute of Geodesic and Cartography realized the first investment to initiate an important develop of this kind of work.

According to the existence international level in this decade, the first results were classified as a process of cartography assisted by computers and the most important of this, was the system SISGRAF independent mode ensemble that automatized the process in create the cadastral map 1:10 000, large topographic maps, ground photogrammetry and profile.

At the end of 1989 began according the contents of the scientific objective for a period 1991-95 the integral automatization of cartography with the creation of the technological base for the introduction of the GIS. However, in the period 1990\_92 mistakes were made and the principal of these mistakes was not to give the necessary priority to the creation of a digital cartographic technology.

In July 1992 were corrected all these mistakes beginning with the creation of the technology in order to convert maps into digital format, paralelly we startad to create the digital cartographic base 1:250 000 of the national territory finished last year.

The digital cartographic base 1:250 000 of the territory of Cuba is established according the international rules. This advance and its complement in the digital photogrammetry and Geographic Engineer is the starting point for the modernization of the productive activities of our institution, making possible the development of the GIS application.

## 2 Selection of the scale

The decision of use the 1:250 000 scale maps was the result of the analysis that last six month, which defined the strategy of the work.

It was based according the following considerations:

- Our economy can't resist a complicate digital cartography.
- The period for make this kind of work was fixed in two years.
- The topographic map 1:250 000 was put update recently.
- This scale is use in the world in the digital cartography.

As a complement of this decision was created another alternative in order to develop digital cartographical work in larger scales.

In a second period the strategical objective of this work lead to the creation of a digital topographical map in a larger scale, matter that is being analyze now.

## 3 Characteristic of a topographical map 1:250 000

- . Planimetrical precision: 110m
- . Altimetrical precision: 12m
- . Printer colors: 6
- . Sheets: 23
- . Geographic limits: 1 latitude  
1 30" longitude

Over this base were established the following elements:

- . relief
- . hidrography
- . vegetation
- . routes
- . line of shores
- . towns

All these elements have literal information about geographical names.

#### 4 Description of the thecnology

To convert these maps into a digital format was created a thecnology that can be resume as folow:

- Selection of the initial material.
- Obtention of the initial digital information.
- Initial information process.
- Conversion of a raster file to vector.
- Transformation of the coordinate.
- Testing and checking of the results.

In this case we work on positive of the originals which made it an exactly digital map.

The obtention of this information was made in four parts: digitalization of town, routes,etc, digitalization of literal information, create of data base of the geographical names and the scanning of other originals. Over this was developed the process of the information, was transformed raster file to vector, the files of the geographical name were macthed with other elements and finally was made reference according to the system of coordinate and field comprobation.

#### 5 Creation of digital cartographical base

From files .DXF by informative layer was created data base with a memory of 400 MB. From these files was created a version in an optimum format developed in our institution that occupied 40 MB, that is very effective for the develop of application that require the digital cartographic base in a real time.

Over this base we have develop different version of data structure, being available the folow:

This possibilities of structure exits in optimum format and could obtain copies of the informative layers that require particular form for each users of the map.

#### 6 Some considerations about the digital cartography 1:250 000 with reference to GIS

Was defined a work strategy that unificated under the same thecnological principles with the obtention methods of information for the GIS and the methodological criteria for the design of its application.

The introduction of a GIS system requires more attention to the thecnical and methodological aspects without them we only have the intention, the software and hardware and this isn't the problem at all.

We consider first the creation of thecnologic capacity in order to create the digital cartography, aspect

We consider first the creation of the technological capacity in order to create the digital cartography, aspect that spend no less of 50% of the all investment of the GIS project.

The creation of the digital cartographic base 1:250 000 of the national territory created the conditions in order to develop a great number of GIS application, matter that we are solving in practice.

### Conclusions

The sposed work has a relevant result of our cartography because we have defined a technological trustworthy line in order to create the digital cartography.

This result has resumed the work of its authors which had their combine the existence of a few software and hardware with there on solution. Anyway must be consider that when we create technological capacity and the proper existence of the digital cartographical base 1:250 000 made the condition to face in short period an integral modernization of our cartography and gradually introduce the GIS in several branches of the economy.

### References

- Algunos criterios tecnológicos sobre la digitalización masiva de planos y mapas. M. Páez, P. Martínez, E. García, I. Alvarez, J. Cabrera. (1993).
- Estructura y misiones del Instituto Geográfico Nacional de España (1990).
- Sistemas de Información Geográfica. J. Bosque Sendra (1992).