Fotogrammetric development in Cuba

Guido Gómez Gallo, Sandra Haydeé Gonzíalez García

Ibis Alonso Suarez

GEOCUBA La Habana Enterprise. Photogrammetric Agency Loma y 39, Nuevo Vedado, Ciudad de La Habana,

Cuba, CP 10600; Telef (537) 816942, Fax: (537) 815879,

Email geohab@geohab.get.cma.net

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ABSTRACT.

In this work we are exposed the experiences and benefits obtained by GEOCUBA La Habana Enterprise with the creation of new products and photogrammetric services of high accuracy during the last five years period.

Up to the middle of the 90´s, we had an office with old analog equipment like Wild A-8 and Wild A-7 in a perfect technical status even though they worked with an old fashioned analog technology, in that first stage computing devices as well as data adquisition systems were coupled to them in order to change that process from analog to analog digital. It allowed to revival every mechanism and source of our production so it could become more active, rational and useful and that way we signed several contracts for different clients and enterprises all around the world.

All this process has permitted us to modernize our equipments and devices.

Nowadays, the photogrammetric recovering is done with digital photogrammetric stations (DELTA) carrying out cartographic tasks for different companies of the world.

Recovering works and creation of altimetric models of the ground conform a documental graphic base of a very high interest and satisfy every exigency of the clients. This conforming is used as a graphic basement to handle the GIS/LIS, for 3D model of towns and cities and also to produce digital ortophotos. Graphic representation of frontal views from buildings and monuments get higher quality by using those technological advances.

Thanks to our experience we started in 1998 the digital photogrammetric mapping of the Republic of Cuba on the 1:2000 scale.

Our activities include researches in order to get deeper knowledgements and to develop the most modern technologies of the world, as well as to adecuate every task; with different complex stage and treatments of the contents which has driven us to improve the types of the products that we offer.

I. Introduction.

Presently work will try on the current development of the digital mapification in Cuba, its improvement and perspectives, as well as the application range that it has.

For it is necessary to carry out a historical review of the topo geodesical works in Cuba, which begin from the colonial time in the year 1824, with the most important cartographic production in this stage, the geographo-topographical chart of the Island of Cuba or Map of you Live like it is known.

With the emergence of the seudorrepublic the topogeodesic production is restarted with limited development possibilities that responded to the interests of the North American army as they were the gravimetric map 1: 50 000 and the US. Army Map Service.

In 1940 with the approval of the Constitution of the Republic the formation of the national cadaster is legalized that allowed the creation in 1943 of the Commission of Cadaster and in 1947 the Geodesic Commission of Cuba. Already in 1955 it begins their works the Cuban Institute of Geodesy and Cadaster.

From 1959 with the Victory of the Revolution began their activities the Cuban Institute of Geodesy and Cadaster whose functions were to execute all the works of geographical and geodesic character of national interest, for that which was necessary to develop all the branches you tune to be able to elevate the production and their quality.

Being developed among them photogrammetry, with the acquisition of the necessary equipment among which were the analogical instruments Wild A-8 and A-7, later on SPR-3M SC-1 arrived, dedicated to the compilation and bring up to date of topographical maps, also for the construction of photogrametry space nets.

Works of analytic space phototriangulation began. The works of terrestrial photogrametry began in the restitution of facades and monuments for the conservation and restoration of the same ones.

The productive activity that is carried out inside the organism requires of a high specialization degree, being demanded for it a constant overcoming, on the technological advances at world level, carrying out a detailed study of the modern methods of production in the creation of maps, the rational analysis with the objective of adapting the methods to our possibilities, as well as the deep analysis with regard to the necessary investments to carry out; they will allow to come closer to modern work methods of more productivity that will assure:

- · the assimilation and the use of the technologies and advances achieved by other countries;
- · the quick introduction and with economic approach of the results of the investigation to the production;
- · the progressive invigoration of the scientific technician-potential by means of the development of the material and human resources

With the intention of to improve the quality of our productions and to achieve a pattern that allows to be marketed at world level; in the face of the imperious necessity of elevating the productivity and the strange interest to exploit the capacities in hours teams in our company, a work group is believed, to develop design activities and analysis of feasibility for the introduction of new technologies, this derives in the creation of an investigation group that among its main tasks was to give an answer to the creation of production volumes starting from new technologies and software generation that work of interfaz, to give place to a new type of map.

Our activity of course has been affected by the period of economic decadence by which has crossed our country, it is of recognising that in spite of not being directly a leaning activity for the state,

The creation in 1995 of the Managerial Group of Geocuba starting from the coalition of the Cuban Institute of Hydrography with the Cuban Institute of Geodesy and Cartography has given a sensitive push to photogrametry, like one of the activities with more interest to support; motivated by the social, logistical, cultural and historical benefit that contributes.

II. -Digital Analog Photogrametry

Given the necessity to take advantage of the equipment of high precision of similar restitution WILD A-8 and WILD A-7, the one was developed it couples with microcomputers to take out profit, enlarging this way the possibilities of the same ones with the application of modern Systems of analog-digital restitution that allows the delivery of the product in format digital interacting with a program that she/he allows to obtain the results in digital format, eliminating this way the use of the coordinatograph.

In essence it is required of an electronic registration coupled to the cranks and pedal which transform the mechanical movements of the axes X,Y,Z into electric impulses that are coded and correspondents to the computer that will process the information.

The processes of interior orientation and relative orientation are carried out in a traditional way, alone in the external orientation she/he is solved in an analytic way for the pattern created in the microcomputer through a sweeping of the control points which allows to establish the space mathematical pattern of the area to restore.

All this facilitates it the use of modern systems of analog-digital restitution as for example:

- · DIGI
- · VMAP

- · ECHART

The system acquired by our agency is the denominated ECHART, created by the signature LEICA, the current one supplying of the grateful systems WILD.

The ECHART was designed to work in a graphic atmosphere where the user interact with the program by means of menus and boxes of dialogues.

Characteristic of the equipment to use.

For an efficient acting of the program it is recommended to use a computer with the following ones of minimum characteristic:

- · Processor 80486, of 66 MHz or bigger.
- · integrated mathematical Coprocessor or 804875X.
- · Memory RAM of 8 Mb.
- · hard disk of 200 Mb.
- · A port series (25232) free.
- · Monitor to colour 15 inches.
- · Mouse Microsoft or compatible.
- Operating system · MSDOS.

Work procedures.

1. Preparation of the work

Reception of all the materials and necessary data. Creation of the outlines for the organization of the production.

2. Creation of the file structures necessary

- Definition of the project SEED.CHT in the work directory; with the specification of the levels and representation attributes; definition of the limits of the project; code of the mapificación scale.

- Creation of the files with the control points.

- Creation of new file in the work directory:

3. Realization of the orientation.

The interior and relative orientation is carried out in the traditional way in the photogrametry teams. The absolute one already differs automatically starting from the previous selection of the points that you/they intervene in it, it will emit the diagnosis and corresponding report.

4. Restitution.

The restitution will be carried out in the accustomed form deciphering all the elements of the land, keeping in mind the following procedure:

- · Creation of the limits of the pattern.
- · Surveying the planimetric elements.
- · Surveying of the altimetry by means of the layout in a continuous way or automatic way keeping in mind the plasticity of the curve and their harmonization with the bench marks and the connection with the adjacent models.
- · to carry out the connection with the reference files that they overlap.

Concluded the restitution of all the contours and details become necessary to unite the models to form their corresponding sheets and for it come forth it the necessity of the edition that substitutes the drawing stage in the similar method.

5. Edition

The initial edition is carried out from the own system ECHART the possibilities that has taking advantage defined for it; also that it allows to generate files plotting that

condition the revision and confrontation with the estereoscopic image in order to detect errors or omissions of the operator. The finish stage or termination is carried out on the system CAD MICROSTATION; of wide possibilities for the graphic work and of linking of the designs with informative systems.

The edition process is divided in three fundamental stages:

- Preparation of the sheet for the edition.

The files CHT is not compatible with the system MICROSTATION for it is necessary initially to carry out the transformation from CHT to DXF by means of a module of the own system ECHART.

The final product is in format DGN (MICROSTATION) it is necessary to adapt all the collected data from the DXF to the characteristics of the DXF of MICROSTATION. Between the restitution system and that of edition it exists such differences as:

Systems	Palette of colours	Styles of lines	Levels
ECHART	16	8 characteristic of the system	255
MICROSTATION	256 Interchangeable	8 characteristic of the system , and you can create how many you desire	63

To file this incongruity they are applied a program of exchange call it REPAIRS, which converts the line styles, colours, type of cells and the levels that should be the elements in the Microstation.

They are also applied him utilities of the Microstation that speed up the editor's work and they give bigger versatility to the result as they are: GEOGRAFIC; TERRAMODEL; MAPEDITOR; CHEKDGN among others.

- Edition of the sheets.

During this process is given termination to the work mending any error of lack of agreement of the hydrography; the enclosed one with the relief; that they are not open elements; maintenance of the analytic continuity; it is revised that the bench marks are not above the planimetry elements; the relief is harmonized; she/he is carried out the labeled point of the index curves as of the geographical names of the area; the conventional symbols are inserted.

The view is also revised of having run off with important in the works of 3D to check that the curves have its corresponding value and she/he is carried out the connections with all the adjacent sheets.

When being concluded carries out a control drawing to make the autocorrection.

- Control of the quality.

a. The performer's autocorrection.

It consists on the conscious revision of the performer validating each element and the attributes against the seed in order to detect some error, correcting it immediately.

b. The technology specialist's revision

Carries out this revision to 100% of the production and in two subetapas:

1. Revision in paper: where one keeps fundamentally in mind the agreement of the planimetric and altimetric elements in the drawing as well as the stereoscopic revision to detect omissions.

2. Revision in screen: this it is made to detect errors in the attributes that are not possible to see in paper, as for example elements outside of level, errors in the view of having run off with (3D).

3.Control of the final quality of the product.

This control carries out it a specialist of the quality by means of a sampling, but never smaller to 10% of the total production, endorsing the final quality of the same one to give to the client.

Advantages of the analog-digital method.

The advantages of the similar-digital method on the similar method are the following ones:

1. the fundamental advantage is in fact the format of exit of the product, which allows to diversify its use since the conventional exit can be obtained on paper or plastic and in turn to manipulate that graphic base associated to an informative system. She/he also allows to obtain products 3D.

2. possibility to carry out a bring up to date in dynamic and interactive way of areas where have happened changes.

3. the process of external orientation is speeded up when carrying out an automatic calculation of the values of the elements of external orientation and the analysis of the statistics of the state of the points generating a file with the result of the same ones.

4. Humanisation of the work, because gives the possibility to manipulate the elements by layers. It solves the connection making call of the reference files that they overlap with the work pattern.

5. One works with different colours, styles of lines and weight that are assigned to each element in the definition of the seed, what helps to have a visualisation of that you this digitising in a differentiated way.

III. Digital Photogrametry

The main characteristics of the DPS are the following ones:

· Is a system that combines the hardware and software of the computer allowing that the photogrametric operations are carried out on digital images.

· These operations are carried out in the data of the image that it consists on elements of the frame in ways and fixed sizes. To each individual pixel she/he is assigned a value of shine that gives the value of the radiance of the field of the object that captures each individual element of the sensor of the image.

The sensor of the image can be:

- · A digital camera.
- · A pushbroom scanner or sweeping.

However, for the operation of the cartography they are often derived data of the digital image of the images of the mark of the photographic film obtained by an air camera. These images need to be transformed to digital format using scanner of high precision, for it the scanner is a vital part of the DPS.

Also a main element of the Photogrametric Digital System (DPS) constitutes it the Station of Photogrametry Digital Work (DPW) which requires photogrametric operations that are carried out to obtain data that can be introduced in:

- · Systems of digital cartography.
- · Systems CAD.

Geographical · information systems (GIS/LIS).

The final exit can take the form of:

- · Maps of vectorial line.
- · Data of the digital pattern of the land (DTM).
- · Digital Ortho-image.

Characteristic of the equipment of the DPS.

Scanners.

The digitalization of high precision of the photographic images generated by metric cameras is at the moment an essential component of the DPS until so much the digital camera is developed and be adopted by the cartographic community. This digitalization is provided by the scanners, at the moment four available technologies exist:

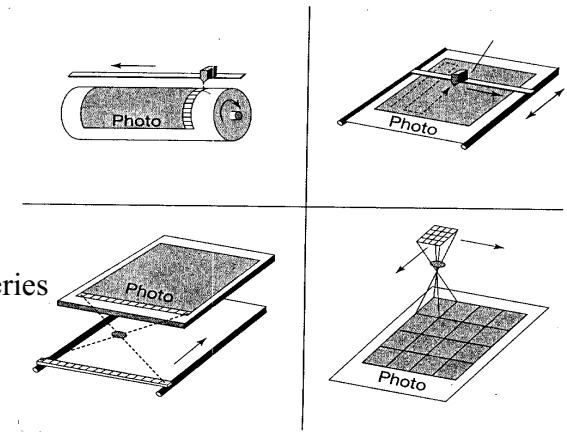
a) drum Scanner used fundamentally in the world of the graphic arts, although some can gather the requirements for the photogrametric purposes

b) Scanner flatbed equipped with a bolster detecting picture or loaded coupled detectors (CCD) lineal series that she/he examines the picture in a model raster giving a series of parallel lines. It is usually used in scanners with purposes.

c) Scanner series to line of CCD that examines the picture in a single sweeping.

d) Scanner series areal of CCD that allows to examine the image patches to patch carrying out an assembly of the patches finally in a single image..

a)Tambor



b) Flatbed

c) CCD Lineal Series

d) CCD Serie Areal

The high accuracy of the scanner is obligatory to avoid the introduction of errors in the geometry of the photographic image and in the necessity of precision which is in direct function with the scanner resolution. The photogrametric scanners requires lineal resolutions from 1 to 2 mm and accuracy s from ± 3 to 5 mm in each axis, jointly with a size of minimum pixel of 8 to 10 mm (2500 dpi). in other words, it fulfills the same requirements of accuracy that are applied a monocomparator or an analytic compiler.

The scanner resolution can be adapted to obtain the precision required with the minimum of escaneado and file size. It has been established that the planimetric precision is in the order of 70% of the size of the pixel (EMC) and the altimetric precision settles down for the result of the multiplication of the dimension of the pixel for the relationship focal distance (f) / photographic base (b).

The Stereo-vision is considered by most of the operators like an absolute necessity, for the mensuration of the necessary points for the absolute orientation and I like consequence for the restitution of the details for the creation of the topographical map and the summary of digital data in 3D used in an atmosphere of GIS/LIS.

It also allows the stereo super-imposed of data of the vector of the stereoscopic pattern for the checkups of accuracy and integrity.

All the DPWs offers this way stereo-vision except for one or two systems of companies that specialise mainly in the field of systems of remote perception and they seem to be less aware of the attributes of the stereo - vision.

The digital photogrametry in Cuba.

Starting from the experience in the analog-digital restitution have been accumulated experiences in this field, what has allowed to advance in the application of new programs and equipment. Recently a new technology has been acquired that consists in modern digital stations DPS coming from the company Geosystem Delta Workstation.

It figure 1: Triangulation process. Creation of the net, station Delta in explotation in the Photogrametry Agency, La Habana Cuba

The acquired systems put to our country to the vanguard of the specialty in the area, allowing to offer services of high quality and with tip technology to clients with dissimilar interests and origins.

The system Delta can work, basically in two ways:

1. In autonomous way:

This way uses an own graphic system, with injection of vectors in stereoscopy on the two images that form the stereoscopy pair.

2. In differed way:

In this way the restorer is used to adjust the pattern, and once done this, to send for a line series the coordinates of the marks with a flag that indicates the state of the pedals. The graphic system is external to the restitution system and it works in an independent way in another computer, but connected in real time. The graphic system that we have in operation is the denominated Micron in which you/they have met utilities and programmed tools in way to modulate.

Technical characteristics.

For the execution of the different programs integrated in the package she/he has gotten ready a work position with the following ones characteristic.

1) PC of the DPS:

· Personal Computer Pentium 300 Mhz, 64 Mb RAM, 3 Gb of hard disk, videotape Controller SVGA of 1024 x 768 points and 256 colors. CDROM x32. Digital monitor of 17 inches with in agreement resolution with the videotape card. Binoculars for the stereoscopic vision. Card of reception of controls (cranks and pedals) .Ratón Microsoft.

2) PC of the graphic system:

· Personal Computer Pentium 200 Mhz ,32 Mb by heart, 2,1 Gb of hard disk. Videotape controller SVGA of 1024 x 768 points and 256 colors. Digital monitor of 15 inches, Ratón Microsoft.

The system Delta allows the formation of the stereoscopic pattern through a stereo-finder to carry out the:

- · Internal Orientation of the photography
- · Relative Orientation of the pattern
- · Absolute Orientation of the pattern

Also has as advantage that allows to carry out a pyramidal zoom to manage better and quicker the reductions of image amplification, it calculates and it records inside the file image the images of the zoom from 1:2 to 1:16.

The program for the acquisition of land points starting from the stereoscopic pattern this thought to store in an orderly way a series of united points or not for vectors that represent in a vectorial way the land to restore and it allows to accumulate data digital engravings in a manual or automatic way separated by classes and visualisation in stereoscopic screen of one, several or all classes.

The obtained results can be imported/exported to format DXF, DGN, and BCN for their later edition in another system CAD.

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The data this way obtained can be published and represented in an external support, converted to formats DXF, IN4, DGN, ASCII for their later manipulation with other graphic systems.

As previously it has been exposed we use the differed way with an external graphic system to this that is the denominated Micron, restitution system created by a Spanish investigation group.

This allows the vectorial generation of files through tools programmed which are lines, curves, arches, rectangle, circles, texts, as well as other utilities that serve as help as the one of carrying out parallel, to measure distances and surface, to eliminate vertex, etc. The restitution can be carried out by means of the mouse or with coupled cranks.

The obtained results can be imported/exported to format DXF, DGN, and BCN for their later edition in another system CAD.

The export is carried out toward Microstation starting from the file ASCII MTA of Micron and they are imported in Microstation by means of a MDL programmed for it. And this way to proceed to the edition of the models and the creation of the sheets, starting from an option of the system that exports the elements created in Micron to format DGN of Microstation with the help of tables.

Advantages of the digital photogrametry.

The digital technology presents the following advantages on the other existent technologies:

· doesn't exist mechanical components that wear away, break and that in some cases, they are no longer manufactured more.

· There is not film in movie or glass that are deformed, mislead or mistreat.

· once a picture has been digitized, all the subsequent processes are totally digital.

· When being established the models, these will stay because there is no longer necessity to guide them, every time that requires to recover one of them.

· With the use of the modern sailing systems GPS, once an area has been worked, in the aerotriangulation aspects and digital models of the land, the only thing that we have to do is to modernize our database and to read the points of terrestrial control and photogrametric control.

· The precisions that are obtained in the digital field are in function of the pixel size that is managing and of the used software.

· working in the digital domain avoids the degradations of precision for the employment of maps in paper or film, that is to say that stays the precision along the whole process.

· Their operation easiness simplifies the realization of systematic activities, minimizing the times of training and the technicians' training that will operate the systems and, on the other hand, those in charge of the administration and planing can be devoted to these activities without having to worry about the operation of the digital systems.

· Their versatility allows the use of practically any type of image, air, satelitar, photographic, multiespectral (visible or infrared) or of radar, as well as the combined use of them.

· Allows the elaboration and/or bring up to date of maps and databases in a stereoscopic or mono way, starting from the over imposition of the existent information in vectorial format this one superimposed to the digital pattern of elevation.

· Allows the creation of databases in three dimensions that could include the orthoimage that eventually could accompany to the maps or traditional planes.

Works carried out in Cuba starting from the introduction of the different technologies.

Digital Analog method.

- · Rural Cadaster, Provincia Rosario, Argentina.
- · Urban Cadaster, Provincia Rosario Argentina.
- · DTM, Portugal
- · Plane to scale 1: 1000, Maiquetía, Venezuela.
- · Restitution of planes scale 1:1000. Project Ríos, Arlanza, Arlanzón, Esgueva, Auxiliary Channel. Spain.

Digital method.

- · Mapification to scale 1:1000, for the Telefónica Argentina, Project APPRAISES, 17 towns.
- · Mapificación 1: 25000 for Spain
- · Urban Cadaster, Madrid, scale 1:1000
- · Mapification scale 1:5000 Aragon, Spain.
- · Mapification 1:10000, Soria, Spain.

Among the main developed tasks we can mention:

1. Investigation and development of the methodology to develop the mapificación of the insular platform for photogrametric methods.

2. Development of the digital mapificación scale 1: 2 000 and 1: 10 000, with interests for the sugar cane agriculture and others. Densification of the soils for the realisation of the parcel drainage by photogrametric methods.

3. digital similar restitution for the creation of the cartographic base of towns and cities in Argentina with the interest of to control and to plan the urban development.

4. Mapificación for the creation of a fiscal cadaster in Rosario, Argentina with tax character for the control of the consumption of water and projection of hydraulic systems that you/they will rationalize and they will make more efficient this service to the population.

5. creation of the cartographic bases in having formed digital of projects with social and economic interests as:

a. Surveying of the phone net of communications of Toledo, Spain.
b. Surveying of the archaeological area of Cantona in Mexico.

c. Surveying for projection of optic fibre in Maravatio - Atlacomulco in Mexico

d. Restitution of facades and harmonisation with the architectural surveying, for the reconstruction and rehabilitation of monuments and places of high cultural historical interest. This activity receives the support of the office of the historian of the city.

e. Formation of digital models of the land in areas of Portugal for the geogolical mining investigation . With location interest and calculation of the existent potentials in the underground and open sky.

f. Creation of thematic maps of protected areas.

6. Development of the methodology to carry out the digital mapification scale 1: 2 000 under specific conditions.

7. Linking with the engineer geodesy , the methodologies are developed for the analysis of the deformations in sugar mills stations, constructions, travelling cranes, etc.

Creation of the first digital stereophotogrametrical digital map in the Republic of Cuba.

As a result of the experience accumulated with the different clients that we have worked, as well as in the different projects in that we have participated, they allowed us of mutual agreement with national organisms, to project the creation of the first stereophotogrmetrical map obtained by digital methods, of a town of our country. Independently of how beautiful and interesting was to have worked in this work, where wen created all symbols that traditionally were used in the cartography, in a digital way as well as, all the styles of lines.

Possessing a material so valuable in a digital way gave us the possibility to begin to explore other fields, because the variety of data with those that we are allowed to think of superior stages. The developed project allowed us to create a polygon of tests for the modeling of the area, it shows more representative and more complete of the whole carried out work, because it puts at your disposal never before a material valued, being at the level of the most advanced of the world, because allows to make an exacte valuation of the land and integration to a GIS.

The restitution of all the elements was carried out maintaining the fidelity in the capture of its true Z, starting from it as work methodology the creation of a surface settles down and can be tested all the elements like rupture lines or characteristic points can be treated. All should be treated that influence in the characteristics of the land as well as those that denote inflections or abrupt changes for the creation of a DTM (Digital Terrain Model) by means of pickets all the points of the piquetaje would be used as well as the rupture lines; in our case in the moment of the restitution we capture the level curves therefore we consider:

Curves · of level indexes.

- Curves · of main level .
- Curves · of ordinary level.
- · Spot height .

like rupture lines:

- · Roads and highways.
- · Rivers, streams, water-courses.
- · Slopes.

Once included the data, in the parameters of the surface you proceeds to the triangulation of the area. In this stage they take all the data of the suitable elements and a mesh of triangles

keeping in mind the heights of all the elements that intervene in the surface.

The triangulation in dependence of the work range that is assigned a mooring of all the points that are considered inside the surface ago. If we have obtained data DEM, this it would allow us the generation of the level curves for interpolation, in function of the data of the triangulation.

If the objective was to work on the visualisation of the land giving it scale model treatment, spends to shadow the pattern, looking for the form of giving a range of colours that it allows a differentiated visual interpretation of the area. Of equal it forms she/he is given treatment to the constructions, which are defined their depth toward the land passing to conform a box of the same ones when being restored by the roof.

It also allows the generation of profiles of certain elements of the land.

As a result we obtained a product that facilitates a better study of the land in three dimensions and consequently she/he brings as advantages that:

- It speeds up the analysis of the land for projections and later studies.

- Gives the possibility to work all the elements in 3D what would allow a better representation of the characteristics of the relief as well as the determination of the intervisibility among points of the land.

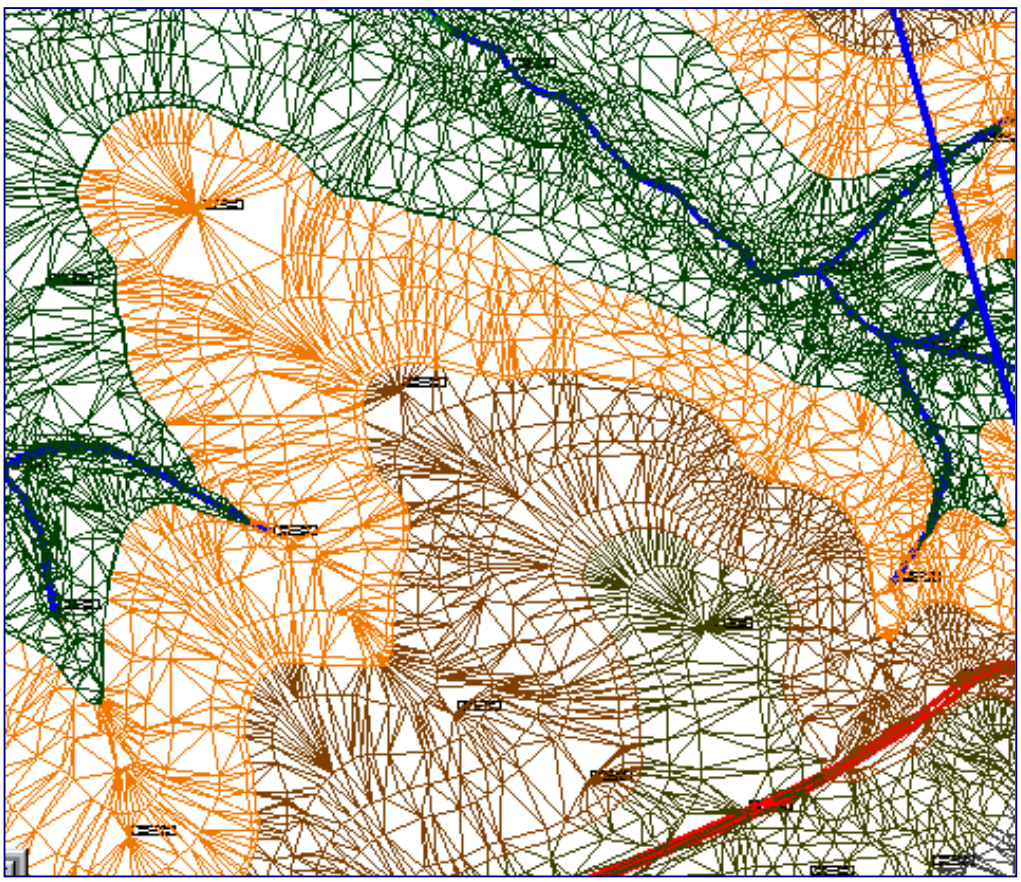
- Allows to move on the pattern, visualising the coordinates at the same time (real) corresponding in the land.

- Easiness and speed in the determination of profiles.

- It facilitates a bigger agility in the bring up to date from the land when allowing to project elements (you work) on the surface knowing only the exact coordinates of the same ones.

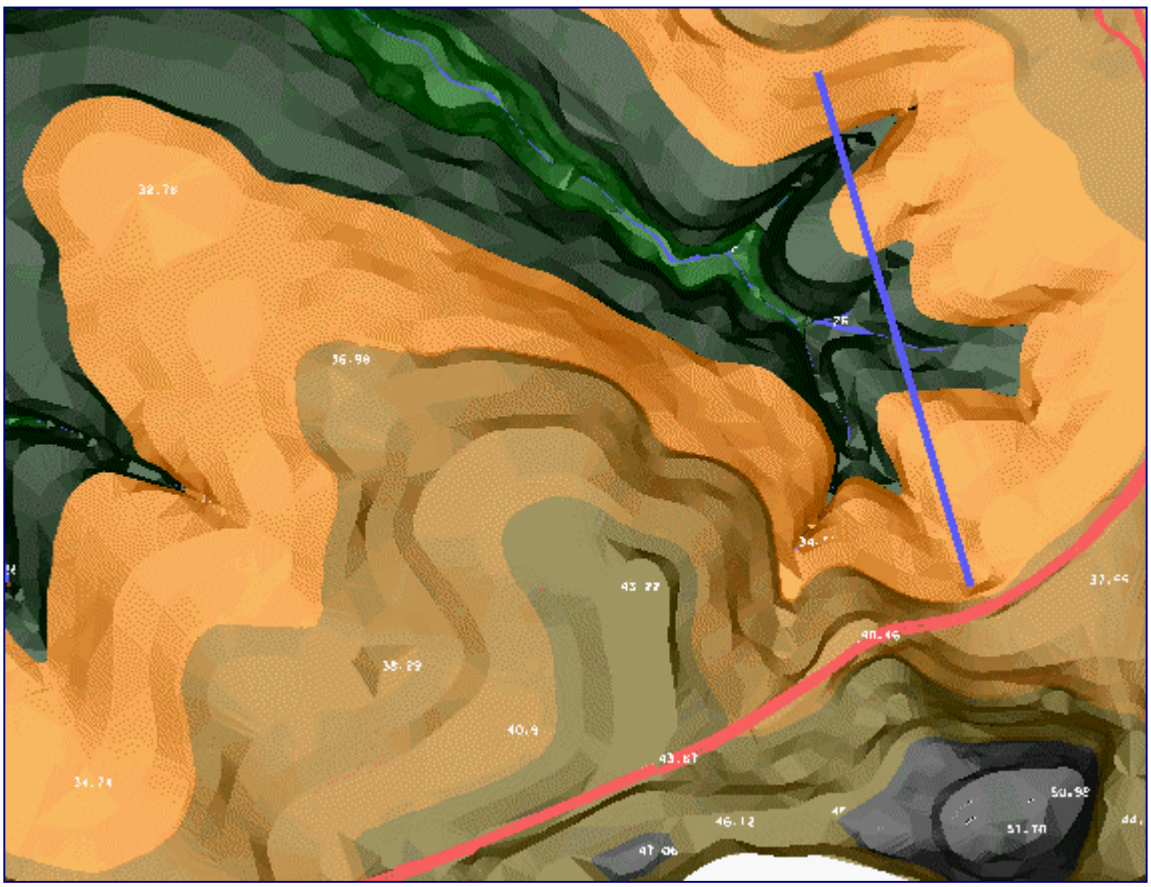
Creation of the grid En the figures 1, 2, 3 and 4 are shown the results of the carried out processes graphically.

It figures 1: Triangulation process.



It figures 2.

Shady of the mesh obtained in the triangulation process. Using a scale of colors matter that demonstrates the variation of the relief

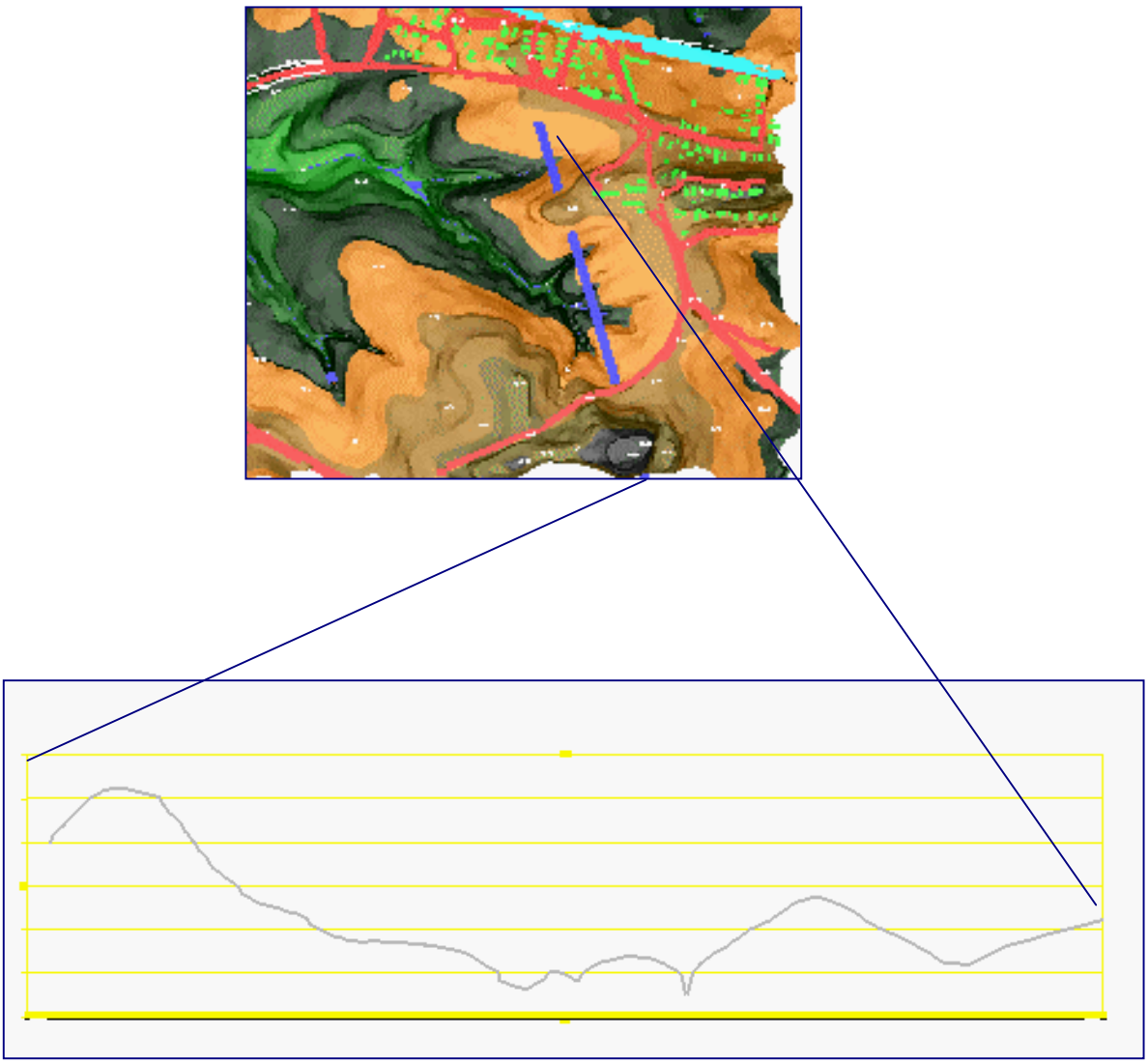


It figures 3.

Shady of the isometric view. Modelling the land and the constructions.

It figures 4.

It shows from the carried out profile in an automated way to the modelled trapeze. The cut is indicated in the trapeze



Conclusions

In Cuba the development of geodesic sciences have been passed though three stages; the colonial not too developed, the neo-colonial that started with the intervention of the U.S.A. that significate a great step of advance, although their task was to define the geographical location of natural resources in order to its expropriation, besides the military possibilities that offered our country because of its position in the Caribbean Sea.

The third stage began with the triumph of the Revolution, where in way conscious and planning way took a new bound in the development of this science in Cuba.

Today Geocuba has a group of units when their structures are dedicated to investigation and develop of their own activities that allow the improvement of technology and completion that demands our country.

According the actual develop reached in the productive sphere, the necessities of different organisations so as the interest that our services could have in the international market, Photogrametry reveals as an activity that solves the necessity of men to represent the earth with all its elements by maps and planes that are used in all activities in human life, with promptly accurate.

Its influence in several technical disciplines and in the economy as well as in the projection of engineer works, the studies of the geographical environment, the implementation of the informative systems with its graphic basic make photogrametry like an speciality of great importance for the development of our country, so that the desire of economical development has to be with control, plannification and information that only the geodesic sciences offers with precision.

Starting the year 1993 our Agency began to work with different clients of others countries, in every cases those works were done in digital format because that is the technology that rules in the world at the present time in the world.

Those works required of skirly abilities so as the study of systems that were us arriving in order to locate them in a logical way among the methodology to be develop.