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PHYSICAL AND ADMINISTRATIVE MAP OF SOUTH AMERICA AND THE BASIS OF DATA ATTACHED TO IT

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Abstract

This paper intends to provide the necessary steps for the preparation of the Physical and Administrative Chart of South America. For the representation of this chart the Bonne pseudoconic mapping projection has been used. In order to provide more details regarding the represented area, a database was achieved to offer useful information to any person_passionate about traveling and always discovering new places. The value of the map is outlined by attaching this database, that is designed in Microsoft Access and sends out to the users text data that can not be graphically represented on the map. The connection between the database and the map has been established using the AutoCad Map program.

Key words: *map, Bonne pseudoconic projection, database.*

INTRODUCTION

Documentary information about maps show they existed even before our era. Primitive sketches, made on varied substrates like bone, tree bark, sand, wood and stone, have been discovered in the egiption, chinese, canadian, nativ american civilizations. The content of these sketches refers to small area and represents different elements of the natural environment like hydrographic network, lakes, woods or caves.

During its historical evolution, cartography proved to be a genuine "image factory" that captured, processed and transmitted, through various instrumental techniques, models and visions over nature and social relations.

Figure 1- The GA-SUR cartographic representation on a clay tablet

The elaboration of these maps requires terrestrial measurements and that leads to connection with other sciences, like geodesy (geo = Earth, daen = division), the science that deals with the study of Earth shape and dimensions, topography and mathematical sciences.

BONNE PSEUDOCONIC PROJECTION

Within the pseudoconic projections, the normal network parallels are represented by concentric circle arcs with the center on the medium (axial) meridian, that are represented by a straight line, while the other meridians are symmetrical curves to that medium.

The Bonne projection is an equivalent pseudoconic projection, meaning the projection in which the report between projection areas and areas on the represented surface is p=1.

On the parallel with φ_0 latitude, principal directions overlap with the meridians and

parallels, scales $m_{\varphi\ 0} = n_{\varphi\ 0} = 1$ and angle deformation $\omega_{\varphi\ 0} = 0$.

The same property is attributed to the medium (axial) meridian, on whose points, the principal directions overlap the meridians and parallels, the scales are $m_{\lambda 0} = n_{\lambda 0} = 1$ and angle deformation is

$\omega_{\lambda 0} = 0$.

Figure 2-Bonne projection pseudoconica

The formulas used to calculate the Bonne projection are:

- $x = q - \rho * \cos \delta$;
- $q = const. = \rho_S$;
- $y = \rho * \sin \delta$; $\delta = \frac{r}{\rho} * \lambda$;
- $r = N * \cos \varphi$;
- $\rho = C - s$;
- $p = 1$;
- $n = 1$;
- φ, λ represents the geographical coordinates – latitude and longitude;
- x,y - rectangular coordinates of the projection points;
- N - radius of curvature of the first vertical section;
- δ, ρ - plane polar coordinates;
- C - constant;
- r - the parallel radius;

After calculating the network nodes coordinates using the above formulas, the following meridians and paralles network resulted:

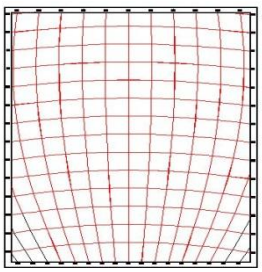

Figure 3-Network of meridians and parallels Bonne projection

MAP ELABORATION METHODOLOGY

For the elaboration of the thematic map we used a scanned map.

The basic cartographic material used for the map vectorization was procured from: Concise World Atlas - The Royal Geographical Society Editure. For start, the cartographic network of meridians and parallels was prepared as described above.

Following the preparation of the cartographic network, the raster image georeferencing was performed, through which it was brought within the coordinates of a protection system by translation, rotation, scaling.

This action was performed by means of Rubersheet command in the Image-Correlete menu of the AutoCad Raster Design program.

Georeferencing a scanned image is the process through which a raster image is brought within the coordinates of a protection system by means of mathematical operations like translation, rotation, scaling and eventually deformation.

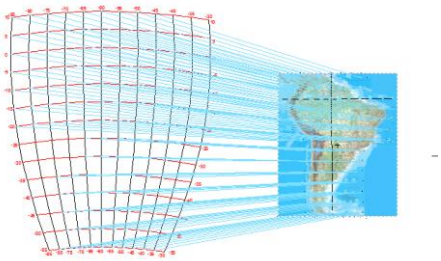

Figure 4-Georeferencing a scanned image

Following the map georeferencing, the next performed stage was its vectorization.

Vectorization is the process through which the raster image is transformed in a vector type set of entities. That process was possible by means of polylines, points and acres, using the AutoCAD program.

DATABASE PRESENTATION

Following the elaboration of the map, a database was created, containing data related

to the characteristics and touristic objectivs of the South America's countries.

The core of any database consists of one ore more tables, and the information is organized in columns and rows.

Each database entry is named „record". Records apear like rows inside a data table; each row corresponding to a record.

The detailed information constituting a single record is split into categories named „fields".

The form includes each field necessary to creat a record. By means of these forms, date can be introduces record by record.

The reports summarize and organize the data.

One possibility to launch the ACCESS SGBD is from the Start button by the installed programs: **Start > All programs > Microsoft Office > Microsoft Access.**

Figure 5-Home work program

Creating tables can be performed by means of the *Tabel* instrument.

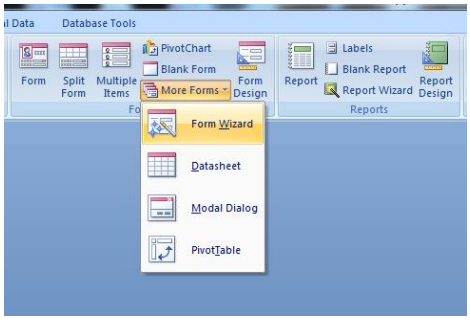

Figure 6-Create Table

After creating the table, fields are added in the View-Design View menu.

Two types of tables were created. The first type includes information regarding the general data and touristic objectives characteristic for a specific country and contains the following fields:

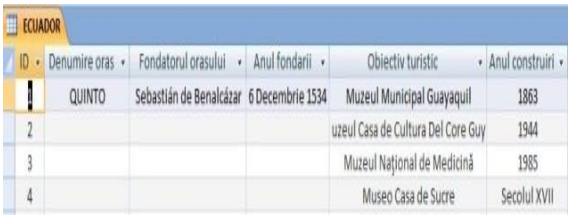

Figure 7-Country specific table fields from the database

The second type includes characteristic data for each contry in South America and contains the following fields:

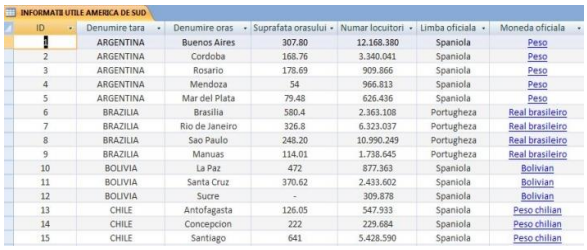

Figure 8-Description of fields in the database that contain useful information for each country

These tables were grouped in a control panel where they can be accessed in terms of a form. For each table, corresponding forms containing command buttons were created. These buttons make them more accessible for users who wants to obtain useful information in the shortest time. The form contains each field necessary to create a record. By means of these forms, data can be introduced record by record.

To open the Form Wizard expert, click on the Create-More Forms- Form Wizard items bar.

Figure 9-Steps taken to achieve this form

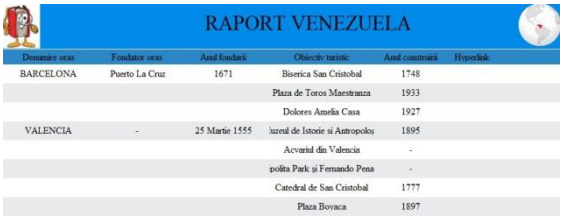

Figure 10-Example of form for Venezuela

From **DATABASE TOOLS** menu select **SWITCHBOARD MANAGER, NEW** command was used and the navigation panels was created.

Figure 11-The control panel for creating switchboard

From the command panel one can access tables having the following structure:

- Data entry - the user is allowed to introduce new data:
- Data editing - existing data can be edited or modified;
- Report - presents information in more accessible forms; the content can be visualized on a screen or printed.

Figure 12- Control panel

Figure 13-Content panel

Figure 14-View report

Figure 15-How to make button

The link between the panels was established through buttons created as below:

Reports or final statements are more accessible presentation forms for the database information; their content can be visualized on a screen, printed or a report file can be created, e.g .RTF which can be processed in Word.

The Report Wizard expert opens from the Create-Report toolbar. A tabel or a query is chosen and used in the report.

Figure 16-Create report

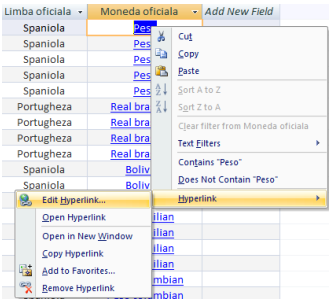

Figure 17- Edit raport

HYPERLINK command was used in order to associate different files picture, text or htm type.

Query function was used to make a selection of the searched data.

QUERY is an object that allows to view the information in one or more tables based on the selection or processing criteria specified by the user.

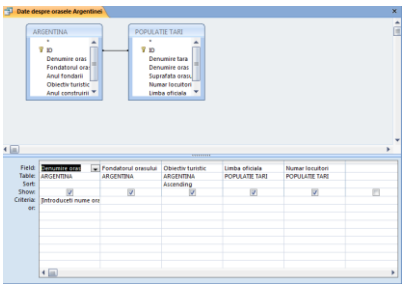

Figure 18-Parameterized query selection

In order to realise the link between the graphical part and the database the following steps must be completed:

- from the Map menu (AutoCAD Map 3D 2009 working program) choose the option: Database- Data source- Atach and attach the corresponding database, after being saved in Access 2003, with extension .mdb.

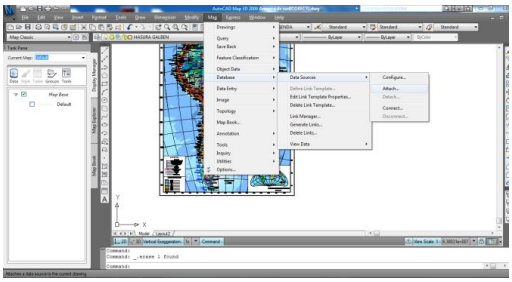

Figure 19-Attaching a database in AutoCad

- after attaching the database define the Map-Define Link Templates link.

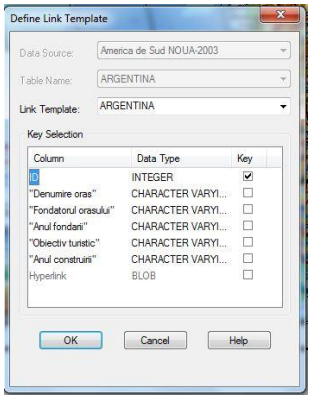

Figure 20-Define Link Templates

- only the layer of interest is left opened
- choose the desired table and name the link.
- open the linked table: Map-Database-View Data- View Linked Table

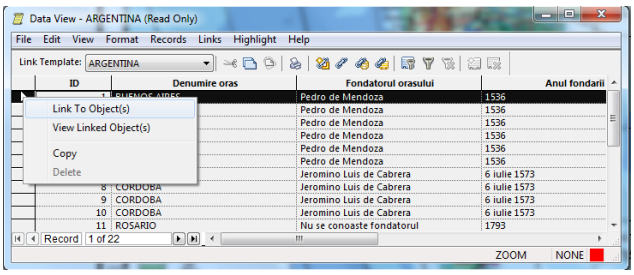

Figure 21-Defining link to an entity on the map

Checking the application is performed as follows:

- option View Linked Table in Data View is used to view the graphical part if the attributes of interest have been previously selected (through this command the desired graphic object can be visualised)
- following the path: Hightliht-Hightliht Records-Select Objects, one can select any entity inside the drawing which, after pressing Enter, must be found in the line where it is recorded (the entire line appears in a color that can be selected by the user).

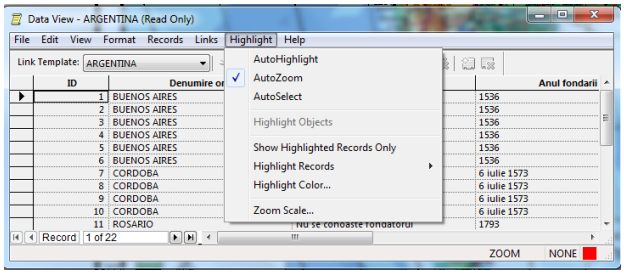

Figure 22-Checking the data connection between textual and graphical data

CONCLUSIONS

Cartography is the science of accurate scientific representation of the Earth surface, phenomena and elements, with the purpose of creating, editing, studying and using the geographical maps and other cartographic products.

The map is a plan, conventional, accurate and general representation of the terrestrial surface. This action is performed following accurate mathematic rules, trying to prevent

the distortion of the real image by this terrestrial surface shrinkage.

However, nobody could fly high enough to map all the lands and, even so, nobody could see beneath the glaciers.

Due to the interesting form of the Bonne projection we decided to make it the study object of the present paper.

Even if a map preparation requires a considerable amount of work, the final result is a worthy one, that can enchant any viewer.

The value of the map is outlined by attaching the database.

REFERENCES

Gabriel Popescu – Synthesis course cartographic projections;

Javier Urutia- Curso de Cartografia y Orientacion;

Cezar C.Gherasim, Nicu I.Aur, Dan Eremia- America's geography, Tomorrow's Romania Foundation Publishing;

Lecture notes: Doina Vasilca-Mathematical cartography, lecture notes; C.Moldoveanu-Mathemathical geodesy, lecture notes;

Anton Năastase, Gabriela Osaci-Costache- Topography and Cartography, Tomorrow's Romania Foundation Publishing;

Sherry Kinkoph, Jennifer Fulton- Microsoft Office in images, Teora Publishing;

L.Segal, G.Ciobănașu- Engineering graphic with AutoCAD (didactical use);

Ioan Doroș- Databases, Cybernetic Publishing MC Bucharest 2010.

C.Moldoveanu- Geodesy (Concepts of Physical and ellipsoidal geodesy, positioning), Matrix Rom Publishing.

Online documentation:

[http://ro.scribd.com/doc/79032965/Cartografie-2012];

[http://en.wikipedia.org/wiki/World_Geodetic_System]

[http://www.atractii-turistice.com];

[www.wikipedia.pt];

[http://www.southamericaoverland.com];