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CONTRIBUTIONS TO THE INTEGRATION OF THE AGRICULTURAL CADASTER IN THE GENERAL CADASTRE

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Abstract
The use of the maps has gained a new level due to the latest advances in digital technologies and geographic information systems (GIS).
This study investigated a digital method as time to accomplish, errors of determination, solving the climate problem that often hinders effective field work, with the aim of making contributions to the integration of the agricultural cadastre (this time represented by the details of a fruit plantation) in the general cadastre.
The goreferencing consisted in positioning, or framing a representation, into a reference system given in a specific location. The details and points defined by arbitrary coordinates were transcended into the national reference of the stereographic projection. The basic condition was the knowledge of the position, given by the coordinates in the new location of four points in the geodetic network (detail). RTK (Real Time Kinematic) - kinematic determinations, Pentax W-822NX total station, TransDatRO version 4.04 program and AutoCad program were also used in the study.
The investigation was positive, with the use of the conditioning method with a large-scale future implementation after the verification of other aspects of the agricultural cadastre.

Keywords: agricultural cadastre, digital plan, general cadastre, georeferencing.

1. INTRODUCTION

In European Union countries cadastre is considered basic field (Nicolae, 2011). It makes a record of ownership, helps the real estate market, has a role in determining taxes and taxes, environmental protection, urban planning, transport, and is involved in almost all areas of engineering.

The recent developments in digital technology have opened new, unimaginable horizons. New opportunities have emerged for the exploitation of cartographic heritage. In particular, the georeferential, by converting old maps from purely archived documents to real geographic data.

The progress made in digital technologies and geographic information systems has facilitated the use of maps. It is no longer a pure archive, but a real geographic information (Balletti, 2006).

The investigation was done by the digital method, by studying the time of realization, the errors of determination for a detailed topographic elevation in a fruit plantation, in order to make contributions regarding the transition from the agricultural cadastre to the general one. The research made answers to the questions: can this method be used to achieve the purpose of the new problem, will it be more efficient than the classical method?, the precision will fall within the tolerance allowed by the cadastral regulations, can help this method to solve the problem of weather issues that often hinders effective work in the field?

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It has started from the idea that from the scientific point of view three major objectives are pursued: the description, explanation and highlighting of causality.
The results were positive, meaning that the use of new digital technologies in certain conditions, clear answers to the questions above.
This method can be implemented on a large scale, after checking other aspects of the agricultural cadastre.

2. MATERIALS AND METHODS

The working steps consisted of: collecting field data using modern, state-of-the-art GPS technology plus a total station and automating data processing and reporting with obvious benefits of yield and error reduction.
A field recognition of the geodetic points has been made, with the main purpose of finalizing and agreeing the project at the office with the field conditions. To carry out the recognition, the team worked on the field, a copy of the triangulation project, and copies of the topographical descriptions of the old points. With the recognition of the old points, visibility was ensured at three points in the old triangulation, for guidance, as well as at the new points established in the network project, in order to determine them. After recognizing and signaling the old geodetic points, it was the recognition and setting of the position of the new points needed for the project. The points were placed in such a way that they were kept in the best conditions.
The work consisted in determining the planimetric coordinate and of levelling of the target points. The projection system was Stereographic 1970 and the quotas were determined in the Black Sea Reference System 1975.
The working method was traverse supported combined with offshoot points (Leu et al., 2014). The traverse stations (figure 1) were located in such a way as to ensure the visibility of the visas (taking into account that part of the land had the orchard use), the conditions of direct measurement of the distances between the stations, the running length of the traverse and the length of the sides not to exceed the technical regulations and the location of the stations are to be observed in accordance with the Norms of Labor Safety Techniques (Bos et al., 2007) in Topography. The more important points of detail were checked by two-station aiming. Some "thrown" station points needed to sights in areas where traversing could not be developed have been determined by double sight.

Figure 1. Station location

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The data were entered in field notebook with the clearest sketches (figure 2). Traverse points and offshoot points were numbered in a specific order, and between the sketch and the notes in the carnet there was a complete correspondence in terms of point number.

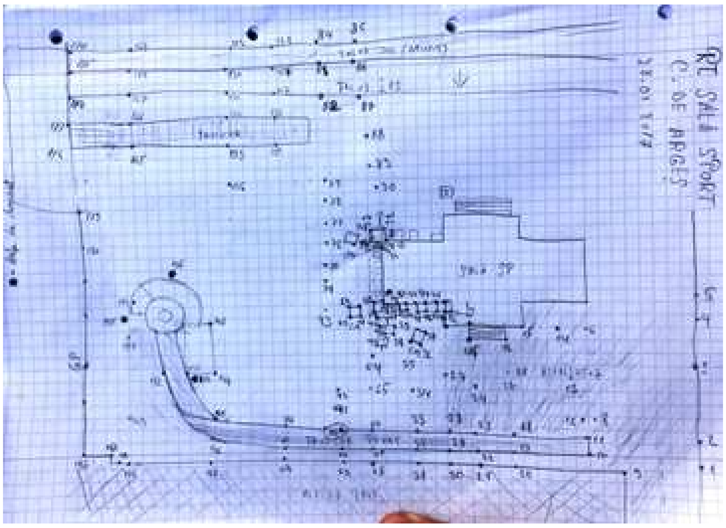

Figure 2. Sketch in the terrain

Permanent details (boundary limits, roads, etc.) were lifted by sights from the main traverse, with directly measured distances.
The RTK method - kinematic determinations was used in the topo-cadastral operations: GNSS South S82-2013 (figure 3) and Pentax W-822NX Total Station (figure 4).

Figure 3. GNSS South S82-2013S system

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Figure 4. Pentax W-822NX Total Station

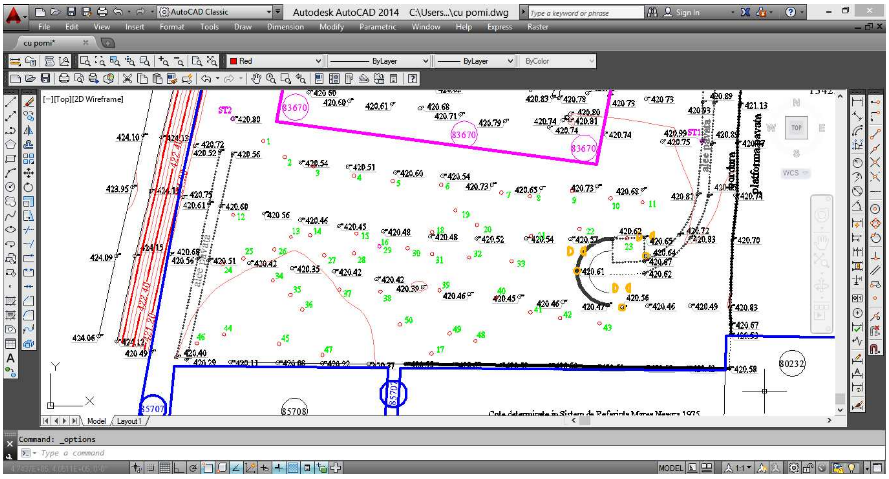

Figure 5. Extract from the AutoCad program, reporting the collected points

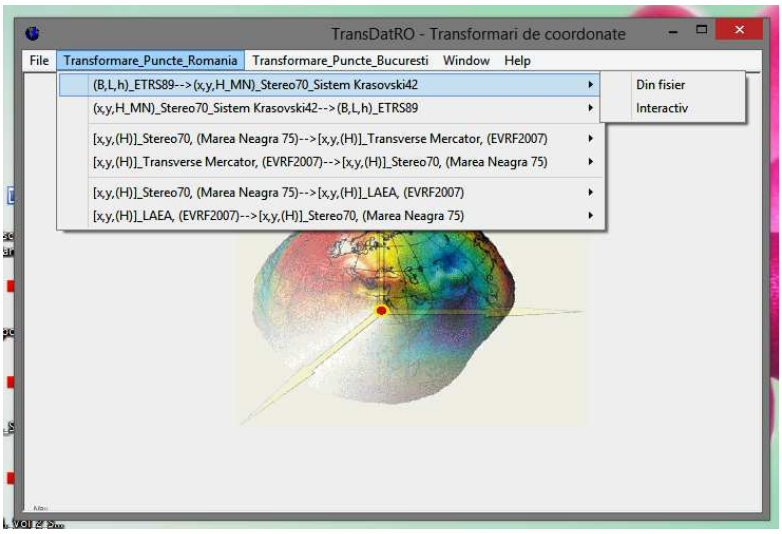

Figure 6. Coordinated transformation program

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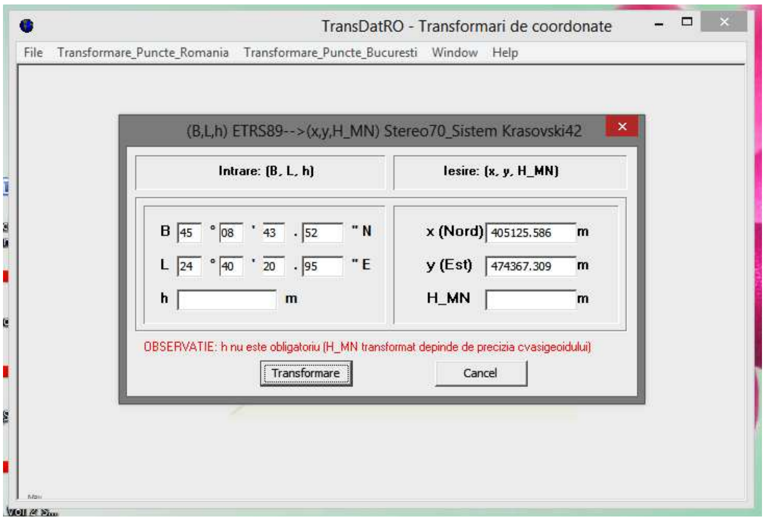

Figure 7. Extract from Transformation of Coordinates with TransDatRO

The user name was entered in the ROMPOS database.

The values of the planimetric coordinates and of levelling, respectively X, Y, Z were recorded for each stationary point. With the help of the CAD program (figure 5), all points were reported on the cadastral map.

On the other hand, from the old, analogical map, the geographic coordinates were used, which, using the TransDatRO version 4.04 (figure 6), were transformed into Stereo coordinates '70 (figure 7), ie X, Y coordinates. Georeferencing (Bos et al., 2015) of the analogue plan was done by associating with the coordinate system.

3. RESULTS AND DISCUSSIONS

The Field book of RTK and total station were the first measured results. There were 6 points recorded with RTK and 263 points with the Pentax Total Station. Point reporting in AutoCAD (figure 8 and figure 9) was performed in a single session for both RTK and Pentax.

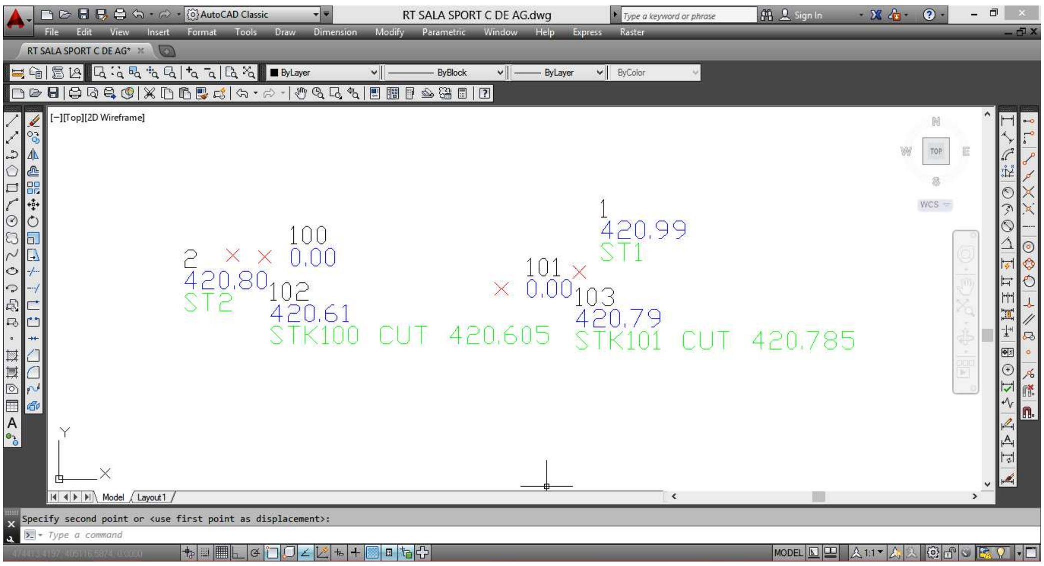

Figure 8. Reporting points in AutoCAD from RTK

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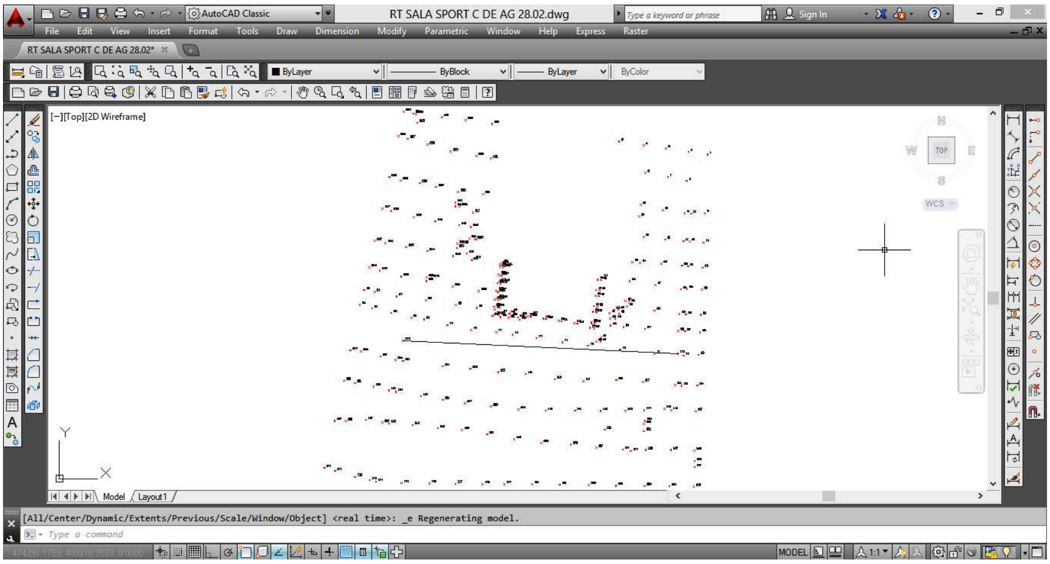

Figure 9. Reporting points in AutoCAD from Pentax

It followed the union of the points of detail and the description by conventional signs, where appropriate, of the points resulting from traverse and offshoot.
The final plan (figure 10 and figure 11) included both the planimetric and the level aspect represented by quotas on characteristic points and level curves generated automatically by the program. In the final plan, the points resulting from the georeferencing (figure 12) and the subsequent transformation of the geographic coordinates into Stereo coordinates 70 were recorded.

Figure 10. Final Plan

The most important part of the results was related to the achievement of the target, namely to link an agricultural cadastre to a general one, also using georeferencing, much faster and which proved to be within the tolerances allowed by ANCPI regulations. Small errors had the orchard points represented by numbers 16 and 29, points that were reevaluated.
The conversion of existing analogue plans into numerical representations does not increase accuracy compared to an actual measurement.

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Figure 11. Detail of Final Plan

Figure 12. Points resulting from georeferencing

The quality of the digital plan is directly related to its usefulness for a particular industry. The actual elements of appreciation were determined by the accuracy of the positioning of the topographic details, the content of the plan, the accuracy of the rendering and the presentation. The scale of representation has not played the important role here.

The content of the plan reflects, suggestively, the surface elements but also the ground relief. Basically, an abstract representation of reality appears, bearing in mind that the details of planimetry and levelment are rendered by symbols. As far as an agricultural cadastre is concerned, lifting was not complex, so it did not have many details that would require grouping in thematic layers.

Localization accuracy within georeferencing depended on image resolution, even if the mean square error was ± 2mm at plan scale.

The accuracy of the plan was expressed by the position error of the points that defined the field details. The digital format has ensured a high level of positioning at all stages.

4. CONCLUSIONS

There is a well-defined and functional institutional and organizational framework represented by ANCPI.

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Most papers are based on GPS support networks determined by the overflow of classical geodesic triangulation.

The spectacular advances in the field of computing have opened new possibilities for the realization of cadastral records.

For the use of electronic computers to make these records, gross data must be processed and converted to standard, as simple as possible formats, containing essential information on the objectives studied. From this point of view, "classical" cadastral records (eg cadastral register) are precursors of modern information systems because they were designed from the beginning to record essential information about the objectives studied.

The processing, recording, storing and rendering of cadastral records must be standardized and encoded.

The use of automated means of recording cadastral records offers a number of advantages: reducing the time allocated to routine work, introducing new data, studying existing data, releasing various extracts through the printing equipment of the system, optimizing the maintenance and updating of the information contained in the system database, increasing the amount of information that can be processed and stored (compared to manual methods), performing complex queries on property information, owners, urban networks, etc. (this information can be selected and combined in different variants according to user requirements).

Any modern state needs a functional real estate valuation system that can monitor the transaction market, support economic growth and ultimately ensure the integration of the tax system.

The specialized cadastres now presented as computerized records prove to be irreplaceable in some economic sectors, since the standard information of the general cadastre does not allow detailed knowledge of the real estates and natural conditions necessary for the organization, guidance and management of activities carried out on large areas.

The proposed method should be tried on a larger scale, given the speed and not negligible fact that it can be used on days when the conditions required for the field trip are not met from the meteorological point of view.

5. REFERENCES

Balletti, C. (2006). Georeference in the analysis of the geometric content of early maps. ePerimetron 1 (1), 32-42.

Bos, N., Iacobescu, O. (2007). Topografie modernă [Modern topography], Editura C.H. Beck, Bucureşti, pp.536-537

Bos, N., Iacobescu, O., Bos, N. C. (2015). Topografie digitală [Digital topography], Editura C.H. Beck, Bucureşti.

Leu, I.N., Marian, M.C. (2014). Măsurători terestre [Terrestrial measurements], Editura Universității din Piteşti, pp. 190-203.

Nicolae, M. (2011). Tratat de publicitate imobiliară [Real estate advertising book], Editura Universul Juridic, Bucureşti.

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