Aspects regarding the use of GIS and ROMPOS environmental projects

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Abstract: Use of the Romanian position determination (ROMPOS), a new option for a new generation of information systems using geo-spatial information. Data provided by the Romanian position determination system (ROMPOS) could be used in various applications such as positioning and monitoring of still or moving objects, in navigation, measurement of surface irrigation, environmental protection, transportation, etc. This new approach introduces the concept of handling the problem of GIS support decision making involving handling of satellite images in order to facilitate access to decision makers to discover, access and integrate geospatial information in decision making, many fields and research. A very useful application is to manage environmental risks and pollution factors with different substances, soil, air, water and other factors, but also for competitive management for decision makers at central and local levels in various problems that are encountered in many environmental projects in our country.

KEYWORDS: ROMPOS, GNSS, GIS, ANCPI, Acquisition of time, environmental protection.

1 Introduction

The Romanian position determination (ROMPOS) opens a new option for information systems using geospatial information. Data obtained through the Romanian position determination (ROMPOS) could be used in various applications such as positioning and monitoring of still or moving objects, project management and naval aviation, surface measured, irrigation, protection environment, transport, etc.

New approach to current problems can introduces the concept of handling GIS support decision-making, including a geo-spatial image manipulation to facilitate access to decision makers purchase, access and integration of geospatial information in scenarios involving decision making knowledgeable in many areas of research and activity at local and central level, European or global. A very useful application is the management of the risks involving environmental factors and pollution of various substances that affect the soil, air, water and other factors, but also made in terms of management competitive for making bodies of decisions at local and central level on various issues that are encountered in many environmental projects and project management in our country, but in Europe and elsewhere.

Aspects of position determination system ROMANIAN (ROMPOS).

Recently, the National Agency for Cadastre and Land Registration (ANCPI) included among its projects to modernize national geodetic GPS network, a position determination Romanian (ROMPOS). Because currently, I-surătorile are using modern services position determination, and it is based on satellite positioning technologies, GNSS (Global Navigation Satellite System), National Agency for Cadastre and Land Registration (ANCPI) through the Department of Geodesy and Cartography, bought and installed a set of such devices, forming a network of permanent geodetic measuring stations, also known as permanent GNSS stations (GPS). The permanent stations are equipped with antennas GNSS receivers that are capable of receiving GNSS signals, including, in particular, NAVSTAR-GPS (USA) and GLONASS (Russia), and in the future will include also the positioning system and European Galileo and global positioning system in China, COMPAS, etc. [2].

In a first stage, between 2004 and 2008, these positions were only used for placing and maintaining the European reference system (ETRS89) using the GRS-80 ellipsoid, which became official in Romania, in 2009, in addition to the old coordinate system S-42, using the ellipsoid Krasowski, and applications for determining the position of the post-processing mode. Based on the National Network GNSS Permanent Stations (RN-SGP) - Class [12]

During a second phase of development of RN-SGP, after September 2008, the system went from providing data for post-processing positioning positioning in real time. The integration of post-processing and real-time positioning systems, ANCPI completed determination Romanian positioning system called ROMPOS.

2.System features Romanian position determination ROMPOS

Characteristics Romanian position determination system, generically called ROMPOS.

ROMPOS system relies on a national network of permanent GNSS stations (GPS + GLONASS), installed by the National Agency for Cadastre and Land Registration. Base stations operate all the time, 24 hours out of 24, and provides real-time data and also the data were collected at predetermined intervals (1 hour, 24 hours) [12].

♦ reference stations are interconnected, including the borders of neighboring countries that have national GNSS networks[25] [26] [27] [28] [28].

♦ location of reference stations were chosen so as to ensure long-term stability for GNSS antennas and signal reception. Location and receivers are chosen to provide "visibility" of the horizon, free from obstacles where possible, to avoid potential sources of interference and multipath effects. Using properly calibrated antennas can reduce multipath effects, the new generation antennas, which were purchased by ANCPI in 2008 were calibrated using the best techniques available worldwide (individual absolute calibration for each antenna), [18];

♦ reference stations using only receivers and antennas with dual-frequency, geodetic class;

♦ stations continuously receive data from satellites NAVSTAR-GPS (all channels) and the Russian GLONASS satellites (over 36 stations). Once Galileo is operational, it will be mandatory for all permanent positions using data from satellites of the system and the only optional NAVSTAR GPS and GLONASS satellites;

♦ permanent station coordinates are determined with high accuracy (less than 1 cm) in ETRS-89 reference system (European Terrestrial Reference System 1989), by increasing the density of GNSS stations (Bucharest, Bacau, Baia Mare, Constanta Deva), embedded in the European Network of Reference (EUREF), [5].

♦ Positions antennas reference stations are checked periodically to detect any possible changes due to tectonic movements and from other factors;

♦ A quality management system will be implemented in order to help users to achieve the expected results in accordance with the requirements for accuracy, integrity, and availability of the system. A minimum of 99% availability and integrity will be guaranteed. Cases of failures, interruptions and low quality will be identified automatically in real time and treated as soon as possible [5].

♦ national reference stations are compatible with most other GNSS systems type. The national system will ensure that it is interoperable with the European System EUPOS similar.

The Romanian position determination (ROMPOS) ANCPI is provided for all users, through the National Center for Services ROMPOS.

National Center ROMPOS Services was established in the Department of Geodesy and Cartography - Service for Geodesy and replaced RN-SGP Monitoring and Control Center. RN-SGP Monitoring and Control Center was designed to monitor and control the activity of RN-SGP for the automatic transfer of data recorded at stations to a central database server. The data consisted of records transferred from NAVSTAR-GPS and GLONASS satellites with different rates (1S, 5S, 30 seconds), and were used to determine the positions of post-processing mode, and now the service ROMPOS real time [7] [8] [9] [10].

This service is extremely necessary for projects related to project management, sustainable development and environmental protection.

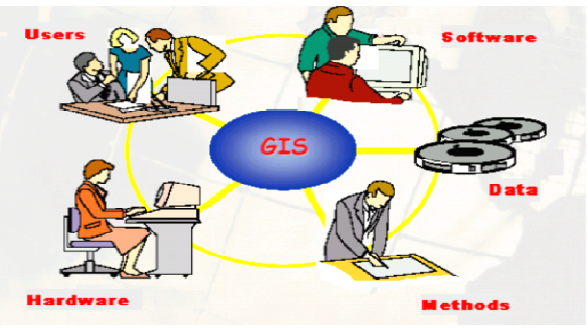

Figure 1. Geographical information system components

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Data obtained through this service is useful and can be integrated into a geographic information system (GIS) data with remote sensing, photogrammetry and classical data are acquired with total stations[12], [13], [14], [15],], [19].

3. Environmental protection and sustainable development projects in urban areas.

General issues on environmental protection and sustainable development projects in urban areas.
In urban areas, environmental protection and sustainable development projects must be managed properly because resources are limited. These issues cause a number of issues such as:
• urban authorities should know that land is available for development, the legal aspect to occupy a piece of land, and what are the conditions and rights to do so.
• urban authorities need to know how to use the land, you must know the location, type and sources of income.
• urban authorities need to know the exact location, use, condition and value of the buildings, and also, they need to know where and what land is available for expansion in the near future.
• Lack of accurate information on land, buildings, natural resources and result in increased revenue unplanned settlements, poor quality of service to citizens, low income and poverty for local citizens. [9]
The duty of a working group to discuss the draft environmental and sustainable development projects, research and formulation of projects and action plans to solve a specific problem. In order to collect, organize and use a lot of information necessary for the planning and implementation of environmental issues, a GIS is an obvious tool to be used in the central and local decision-making [8] .
Environment and better conditions of life of the people in the cities and the immediate objective of any project is that as soon as possible, cities and towns will be able to identify and prioritize issues and to formulate and implement policies for sustainable development in partnership with other parts of the public sector, private sector and the wider community.
Information in any city is crucial to planning and its management. Issues include the following information:
 how to determine which data and information are needed for the desired purpose,
 How to get the data, if any, or how to collect and how to store, so they are easily accessible, how to interpret data and resolve the underlying issues such as quality, contradictions and incomplete data.
Other problems are: to determine what information is needed, when and in what form, and how to disseminate what is necessary.

4. Environmental management, environmental protection and sustainable development information system in urban areas

Environmental management, environmental protection and sustainable development information system in urban areas is the formal measures to capture specific information and fixed procedures to retrieve this information. This refers to the collection of all information relevant to environmental planning and management process, environmental protection and sustainable development in urban areas [1].
Information system for sustainable development in urban areas include gathering information about various environmental issues with a city or town is facing in the context of Romania's accession to the EU and supports sustainable development and environmental process continues to support strategy formulation and action planning, including mapping and data acquisition conventional total stations, photogrammetry, and remote sensing using GNSS technology and, not least, refers to the collection of information necessary to institutionalize this process [7] .
Important tips and advice on the implementation of environmental management, environmental protection and sustainable development information system in urban areas.
 Appointment of a consultant based GIS. It is clear from the activities of more than a GIS consultant and a contractor involved in the development of GIS. Consultants and contractors are required in financial management, human resources development, training, data acquisition, public opinion, planning, project development, etc. in order to maintain a systematic approach and coordination, a municipality needs a general consultant, to bring together and solve all problems to come. [9]
 Prepare a strategy sufficiently developed information system will be a component of geographic information systems in cities, towns,

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villages and in decision-making. An information strategy is required to lead the development and implementation of information systems for different types [9].

 The strategy will establish a framework to judge the investment in infrastructure systems that exist and are proposed, and establish a framework for setting priorities. It also identifies the systems and resources to support and investment in the medium term major technical and management policies that determine the basic means and the rules by which information systems will be developed and managed are identified [10].

 failure of information technology providers to respond quickly to changing needs, because there is no medium and long term to see what is needed.

 Inability of users to share data due to inconsistent data definitions.

 difficulties in maintaining and preserving adequate basic skills to plan and introduce new systems.

 Develop new business opportunities and policies, making the introduction of new ways of business processes possible, while proving access to new and timely information.

 Better management of information resources sharing data, changing data standards and data definitions.

 better allocation of human, financial and technical, in accordance with the objectives and policies of the business.

 Efficient use of limited resources by coordinating approach to development is done in a logical order, using a standardized approach.

 Reducing the cost of emergency planning and fewer opportunities that did not hit their target.

5 Conclusions

Strategy implementation of environmental management, environmental protection and sustainable development information system in urban areas, will manage to correct many problems in terms of implementation and to create support and request information from the central and local . Internal and external collaboration is very good and necessary for the implementation strategy of environmental management. This is possible through a local consultant and well-organized central coordinates the GIS, GNSS, and technology ROMPOS. There are still many challenges ahead, but the collaboration of all stakeholders and the public-private partnership should be maintained and should coexist on these environmental projects.

References:

[1] Badea Ana-Cornelia, Badea Gheorghe, Didulescu Caius, Bădescu Gabriel, Savu Adrian, Some Features of Project Management Using Dedicated Software in the Land Surveying Works - Mathematics and Computers in Biology, Business and Acoustics, ISBN 978-960-474-293-6, pag. 76-81, Brasov 2011.

[2] Bădescu Gabriel. Unele contribuţii la utilizarea tehnologiei GPS în ridicările cadastrale. Universitatea Tehnică de Construcţii Bucureşti -Teză de doctorat(2005), 8 Iunie, Bucuresti, Romania .

[3] Bădescu, G; Stefan, O; Rădulescu, GM. Using Satellite Methods, GNSS ROMPOS In Developing The Control And Survey Network Of LIPOVA Forestry Buildings, UPV BELOTINT, ARAD County, 2nd WSEAS International Conference on Engineering Mechanics, Structures and Engineering Geology, (EMESEG '09), Pages: 262-267, (2009), Rhodes, GREECE

[4] Dr.Ayhan Ceylan, Dr. Omer Mutluoglu And C. Ozer Yigit .Cost and Accuracy Analysis of Detail Measurements by Real-Time Kinematic GPS (RTK-GPS), PS 5.1 – RTK/CORS
Shaping the Change XXIII FIG Congress (2006), Munich, Germany,

[5] G. Bădescu, O. Ştefan, R. Bădescu, Gh. Badea, A.C. Badea, C. Didulescu, Air-borne photogrammetric system used in topographic and cadastral works in Romania, Recent Advances in Remote Sensing, Proceedings of the 5th WSEAS International Conference on Remote Sensing (2009), October 17-19, Genova, Italy.

[6] Didulescu Caius, Savu Adrian, Badea Ana Cornelia, Badea Gheorghe, Bădescu Gabriel , Modeling and Visualization Objects from Point Cloud Data Surveyed With Terrestrial Laser Scanner - Recent Researches in Manufacturing Engineering, ISBN 978-960-474-294-3, pag. 193-198, Brasov 2011.

[7] Carmen Grecea. Modern Concepts of Urban Cadastre. Proceedings of the 11th WSEAS International Conference on Sustainability in Science Engineering SSE '09 (2009), Mai 27-29, Timisoara, Romania.

[8] Cosmin Constantin Musat, Sorin Ioan Herban. Geoinformation System for Interdisciplinary Planning of Landslides Areas. Proceedings of the 11th WSEAS International Conference on Sustainability in Science Engineering SSE '09 (2009), Mai 27-29, Timisoara, Romania.

[9] Dumitru Onose, Adrian Savu, Aurel Negrila. Tracking Behaviour in Time of the Bridge Over the Danube - Black Sea Channel from Cernavoda. Proceedings of the 11th WSEAS International Conference on Sustainability in Science Engineering SSE '09 (2009), Mai 27-29, Timisoara, Romania.

[10] Dumitru Onose, Constantin Cosarca, Adrian Savu, Aurel Negrila. Special Networks used for Tracking Metal Parts of the Sluice. Proceedings of the 11th WSEAS International Conference on Sustainability in Science Engineering SSE '09 (2009), Mai 27-29,

Timisoara, Romania.
[11] Edwin Mugerezi. 2008. *An environmental management information system (EMIS) for IRINGA municipality, Tanzania implementation challenges*, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. XXXIV, Part 6/W6.
[12] Gökalp, E., Güngör, O. RTK (Real-Time Kinematic) The Applications Of GPS In Urban Surveying, Map And Cadastral Engineering Chamber Journal, Number 87, Page 38-47,(2001), Ankara, Turkish.
[13] İnal, C., Yildiz, F., Erdi, A. Comparison Of Detail Measurement Methods in Practical Geodesy, Map Journal, Number 114, (1995), Ankara, (in Turkish).
[14] Iulius Eduard Keller, Stefan Bilasco, Gabriel Badescu, Lenuta Ramona Kollar. Improvement of Decisions by using GIS and Hydraulic Modeling for Sewerage Systems. The Case Study of a Square from Baia Mare City, 2nd International Conference on Environmental and Geological Science and Engineering(EG 09), Transilvania Univ Brasov Brasov ROMANIA, Pages: 261-267, ISSN: 1790-2769, ISBN: 978-960-474-119-9
[15] Iulius Eduard Keller. Vasile Dohotar, Gabriel Bădescu & Stefan Bilasco - Gis In Analysis Of Water Systems For An Area From Baia, Proceedings of the 14-th International Modern Technologies, Quality and Innovation, New face of TMCR, Slanic Moldova, Included in ISI/SCI Web of Science and Web of Knowledge. pag 571-574, (2010),Slanic Moldova, Romania.
[16] Langley, R.B. RTK GPS, GPS World, Vol.9, No. 9, pp.70-76, (1998),.
[17] G. M. T. Radulescu, A. T.G. Radulescu. Kinematic Surveying A New Concept For Monitoring The Stability Of Mining Construction. Proceedings of the 11th International Multidisciplinary Scientific GeoConference SGEM, (2011), June 20-25, Albena, Bulgaria.
[18] ROMPOS. Sistemul Românesc de Determinare a Poziției, Broşura editată de ANCPI, septembrie(2008), Bucuresti, Romania.
[19] C. Radulescu, V. M.G. Radulescu. Approaches of the Management Informational Systems Regarding the Implementation of the Geographic Information Systems (GIS) in the Mining Basins of Romania. Proceedings of the 11th International Multidisciplinary Scientific GeoConference SGEM, (2011), June 20-25, Albena, Bulgaria.
[20] O. Ştefan, G. Bădescu, R. Bădescu, Gh. Badea, A.C. Badea, C. Didulescu, GIS Applications in the field of the Maramures subterranean mining exploitation, Recent Advances in Remote Sensing, Proceedings of the 5th WSEAS International Conference on Remote Sensing, Genova, Italy, ISSN 1790-2769, ISBN 978-960-474-129-8, pag. 27-33, www.wseas.org, (2009).
[21] Stefan, O; Bădescu, G; Rădulescu, GMT.. Considerations on the possibilities of monitoring the convergence of underground mining works by ordinary topographic methods, 14th International Conference on Modern Technologies, Quality and Innovation (ModTech 2010), Slanic-Moldova ROMANIA MODTECH 2010: NEW FACE OF TMCR, Proceedings Pages: 571-574, (2010),Slanic Moldova, Romania
[22] Stefan, O; Bădescu, G. Need and importance of achieving the mining cadastre from CN REMIN SA Baia Mare, 14th International Conference on Modern Technologies, Quality and Innovation (ModTech 2010), Slanic-Moldova ROMANIA, MODTECH 2010: NEW FACE OF TMCR, Proceedings Pages: 575-578, (2010),Slanic Moldova, Romania
[23] Stefan, O; Bădescu, G.. Need and importance of achieving the mining cadastre from CN REMIN SA Baia Mare, 14th International Conference on Modern Technologies, Quality and Innovation (ModTech 2010), Slanic-Moldova ROMANIA, MODTECH 2010: NEW FACE OF TMCR, Proceedings Pages: 575-578 , (2010),Slanic Moldova, Romania
[24] Ştefan Ovidiu. Bădescu Gabriel – Considerations concerning the topographical guidance of subterranean mining works in the E.M. Aurum Baia Mare, PROCEEDINGS MODTECH, (20l0),VOLUMUL I, Pag. 1041 -1044, ISSN 2069-6736, (2010),Slanic Moldova, Romania
[25] Ştefan Ovidiu. Bădescu Gabriel - Considerations concerning the proposition of using the subterranean mining sites from Dealul Crucii ore for educațional and recreațional purposes. Mathematics and Computers in Biology, Business and Acoustics, (2011), Aprilie, Pag. 260-263, Brasov, Romania
[26] Savu Adrian, Didulescu Caius, Badea Ana Cornelia, Badea Gheorghe, Bădescu Gabriel - Measurements in dynamic system of railway tunnels - Recent Researches in Manufacturing Engineering, ISBN 978-960-474-294-3, pag. 147-151, Brasov 2011.
[27] Savu Adrian. Perfecționări ale lucrărilor topografice şi geodezice în domeniul căilor de comunicații. Universitatea Tehnică de Construcții Bucureşti -Teză de doctorat(2010).
[28] Savu Adrian, Didulescu Caius, Badea Ana Cornelia, Badea Gheorghe. Laser Scanning Airborne Systems - A New Step in Engineering Surveying. Proceedings of the 11th WSEAS International Conference on Sustainability in Science Engineering SSE '09 (2009), Mai 27-29, Timisoara, Romania.