I. Geodesy and Cartography

Octavian Badescu, Paul Daniel Dumitru, Alexandru Calin, Lavinia Calin, Dan Alin Nedelcu, Marcel Popescu: ***AGEO - a project for increasing the efficiency and accuracy of the vertical deviation determination by astro-geodetic measurements***

In 2013, in a collaboration between Bucharest Technical University of Civil Engineering, Faculty of Geodesy, Astronomical Institute of the Romanian Academy and Geogis Project s.r.l. began a project on increasing the efficiency and accuracy of vertical deviation determinations by astro-geodetic measurements. The project, with a duration of two years, consisted in design and implementation of a technical solution as well as a new procedure to improve classical methods. Premises from which we started were using modern geodetic instruments, CCD technology, achieving vertical deviation directly in terrain in real time at acceptable costs, shortening as much as is possible the duration of observations and automating the procedure. This paper presents several technical issues and some results obtained inside of the project.

1. **Paul Daniel Dumitru, Alexandru Calin, Octavian Badescu, Doina Vasilca, Dragos Badea:** ***On the use of vertical deviation in geoid modeling***

Nowadays the use of the vertical deviation in geoid modeling reappeared as a necessity for the validation of geoid models, even they were determined by satellite or ground measurements. Additionally, the vertical deviation measurements by astro-geodetic methods can be used for new geoid modeling approaches. In this paper they were presented a comparative study regarding the use of vertical deviations values from the Romanian historical astro-geodetic network to compare with the values interpolated in several global models (EGM2008 and GOCE).

2. **Alexandru Calin, Paul Daniel Dumitru, Octavian Badescu, Iuliana Armas, Mihaela Gheorghe:** ***In - SAR data validation using GNSS technology***

Nowadays, the use of the In-SAR data for the deformation monitoring represents a real interest among specialists. The data of the radar interferometry acuired with TerraSAR-X (TSX-1) and TanDEM-X (TDX-1) satellite missions could be used together with on ground measurements to obtain veridical results. More over the GNSS data can be a solution for the In-SAR processed data validation. Between 2013 and 2015 was performed monthly GNSS campaigns for In-SAR data validation on the Bucharest area. The designed GNSS network consisted in 20 appropriate ground materialised points, 4 points used as references and 16 points used for monitoring. In this paper are presented the methodology, the results and the displacements diagrams of 14 GNSS campaigns.

3. Sorin Nistor, Aurelian Stelian Buda: *Modelling the noise in GPS coordinate time series*

By investigating the velocity uncertainties in GPS coordinate time series we have to be aware of the fact that we also need good knowledge of the models that best describe the presents of the noise in the GPS time series coordinates. For a proper noise mode we have to take into account all the stochastic effects and to be able to classify the types of the noise source that will affect our results like: white noise, flicker noise, and random walk. The paper is presenting a case study in which we have used spectral analysis and Maximum Likelihood Estimation to best describe the presence of the noise. In the study we have estimated both annual and semiannual signals and also the GPS draconitic period harmonics which capture the unmodelled periodic effect.

4. Ana-Maria Loghin, Ajin.R.S, Valeria Ersilia Oniga:
The three-dimensional geodetic networks adjustement automation using matlab

A three-dimensional geodetic network is composed by a system of points located on the earth's surface, on an engineering work territory, points which have a known position in an unitary reference coordinate system. Geodetic networks play a significant role in the attainable accuracy of surveying and mapping applications. This paper presents a three-dimensional geodetic network in form of a closed-loop traverse, which begins and ends at the same point station. In order to determine the traverse station points coordinates, the least squares method of indirect observations was used. The primary objective of this paper is writing a Matlab program with procedures and functions, which automatically calculates the unknown points coordinates, respectively their accuracy, thus streamlining the measurements processing.

5. Vasile Chiriac, Ana Vlasenco: *The study of oblique Mercator projection for large scale mapping of the territory of the Republic of Moldova*

Sometimes the shape, direction and size of the country territory leads to use a single zone for certain map projections, where the central axe have to coincide with direction of the largest expanse of territory angularly to the axial meridian. Taking in account that the territory of Republic of Moldova is expensed from South-East to North-West it was proposed to use as original meridian the central line along the country that ensure fitting of the territory in the 2,5 degree zone. This paper presents the results of comparative study between TMM (Transverse Mercator for Moldova) map projection, currently used for large scale mapping in our country, and the possibilities of applying of Oblique Mercator map projection to reduce deformations on the margin of the zone from 16 cm/km to 8 cm/km.

6. Maria Tsakiri, Vasilios Pagounis, Vagelis Zacharis: *Procedure for GNSS equipment verification in static surveying*

GNSS static positioning is the premier method for numerous surveying applications requiring high precision. Many countries have developed national guidelines to specify the minimum requirements for the best practise and statistical evaluation for static GNSS surveying, but there is still missing a uniform standard that can be adopted by the surveyors to assess their equipment prior to any surveying task. This paper aims to describe a guideline that promotes uniform procedures for equipment verification and data assessment in order to

achieve the highest level of integrity for routine surveying applications. The guideline refers to field practise and statistical evaluation of the measured data using the local and the global tests. The former is an evaluation procedure performed on individual survey measurements, e.g. baseline, in order to assess the quality of a measurement and its assumed uncertainty at a statistical level. The latter is an evaluation procedure performed to assess the quality of the survey, such as a network, as a whole. Results from a number of field tests are given using different types of geodetic receivers.

7. Georgian-Alexandru Nita, Alexandru Calin: ***Representation of 3D objects by using spatial modeling***

A 3D model contains objects, materials and layers that construct a complex structure. Within it we can remark the separate parts or all of the components together. The objects and materials have properties easy to highllight, called visual properties, such as color, reflection of light, contrast. As a final product we can obtain buildings facades, roofs or even 3D terrain.