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The New Basic Gravity Network of Serbia

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1. Introduction

The main goal of the Project "The New Basic Gravity Network of Serbia" is to renew the previous gravity network established many years ago (during 1960-ties of the last century). For the Geodetic purposes, it is necessary to establish: a) active geodetic referent bases of Serbia, and b) geoid of high resolution for territory of Serbia.

To solve this complex problem, it is necessary to separate the whole work into several groups:

- establishing of absolute referent gravity network by measuring of absolute gravity at several places in Serbia;

- performing gravity network by:

> establishing new basic gravity network,

> leveling of high precision,

> regional gravity survey,

> vertical deflection by astrogeodetic measuring,

> creating of digital terrain model.

2. History

2.1. Gravity Network of First Order

During 1952/53 on territory of former Yugoslavia, it was established a Gravity Network of First Order on 15 stations, by using of Worden gravity meter. In the next table, there are presented some of relevant data related to Gravity Network of First Order.

2.2. Gravity Network of Second Order

Number of stations	15
Number of triangles	14
max number of measuring of the same line	7
min number of measuring of the same line	4
max positive error	+0.14 mGal
max negative error	- 0.10 mGal
mean error	0.056 mGal

Gravity Network of Second Order is developed within the stations of first order at mean distance of about 10 km and error estimation that is not great of $0.05\sqrt{n}$, where n is number of stations in polygon. The analyses show that these measuring were made with high quality, but they were not performed continuously and without planning for whole territory of Serbia.

2.3. Basic Gravity Network

The field works on Basic Gravity Network were finished in period of 1964-1967. In the next table are presented some relevant data on Fundamental Gravity Network of Yugoslavia.

number of polygons	55
mean extent of polygons	370 km
min number of lines in polygon	5
total number of stations in network	1500
mean distance between stations in network	10 km
total length of network	12000 km
estimation of standard deviation	0.026 mGal

2.4. Connecting to IGSN 71

Four stations from Gravity Network of First Order (three in Belgrade and one in Zagreb) are included into network IGSN 71 in 1951, by J.Martin (according to Bilibajkic, P. at all., 1979). After analysis of the results, it was concluded that our network is about 15 mGal higher than IGSN 71.

3. New Fundamental Gravity Network

The main reason for establishing of New Basic Gravity Network is adequate maintenance of network and monitoring by government institutions, that was no practiced

with previous works.

The work on the Network will be performed by measuring of gravity differences by SCINTREX CG-5 Gravity Meter on 55 polygons in 126 directions and 89 duplicate measurements.

References

Bilibajkic, P. at all., 1979: Explanation for the Gravity Map of Yugoslavia - Bouguer Anomalies - 1:500000, Prepared by: Enterprise for Applied Geophysics "Geofizika" Zagreb and Institute for Geological and Geophysical Research Belgrade, Belgrade, p. 67.

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