REGISTRATION OF MINUTE VARIATIONS OF THE GRAVITATIONAL POTENTIAL FIRST DERIVATIVE

(Letter to the Editor)

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Abstract. Results of experimental registration of minute variations of the gravitational potential first derivative by means of the Scintrex CG-3 gravitometer are presented.

Theoretical estimations of maximal admissible number of small black holes (SBH) near the Earth surface (Trofimenko, 1990, 1991a) indicate that several SBH are to appear dayly in the registration region for an observer in arbitrary point of the Earth surface. That means that gravimetric devices with necessary sensitivity are to detect minute variations of the gravitational potential derivatives several times for a day (Trofimenko, 1991b).

In the Obninsk geophysical observatory of Earth Physics Institute in June 1991 several variations of the gravitational potential second derivative by means of E-60 variometre (Trofimenko, 1992). They can be explained by moving SBH (Trofimenko, 1991a,b).

For the justification of this fact of SBH discovery experiments on detection of short-time variations of the gravitational potential first derivative (GPFD) would be purposeful. 29 October 1991 the author performed the experiment on the detection of GPFD variations in Institute of Geology and Fuel Minerals Exploitation (IGIRGI, Moscow). Two independent gravimeters by the type of Scintrex CG-3 (Autograv-Automatig Gravity Meter) were used. They were located in the same underground room. Values of GPFD were recorded every minute. The two gravimeters detect the three synchronous GPFD variations with very big amplitudes (Figure 1) and a number of GPFD with small amplitudes.

The duration of GPFD variations corresponds to the theory of otonic gravitoimpulses (GI) (Trofimenko, 1991b). There are no doubts also magnitudes of GPFD since it can be arbitrary (in Figure 1 it attains tens of mGal). Although it should be noticed that the more amplitudes of GI the less its probability. However, the appearance of the three GI for the short time with no GI with intermediate amplitudes (Figures 1 and 2) calls the question in the gravitational nature of these variations: a combination of these events is little probable.

There are problems to explain these GPFD variations by apparatus errors since.

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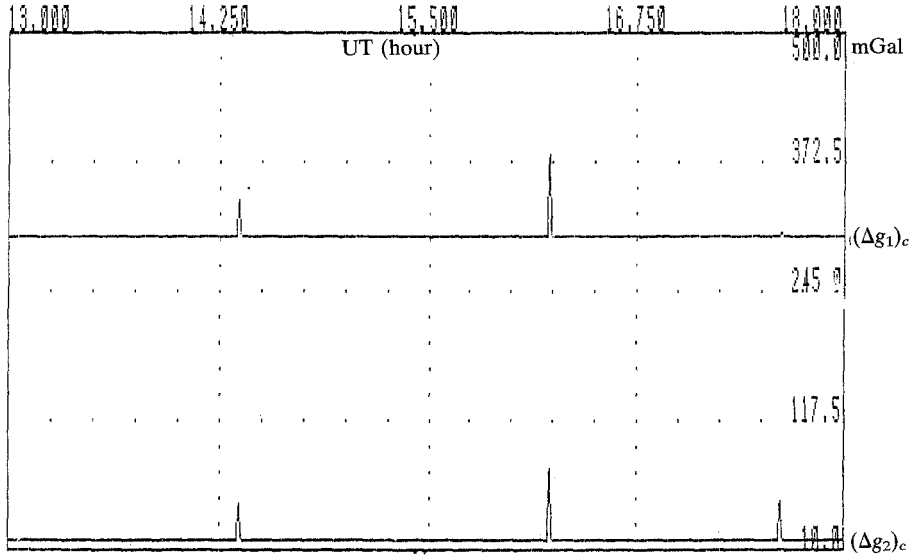
13.000
14.250
15.500
16.750
18.000
UT (hour)
500.0
mGal
372.5
$(\Delta g_1)_c$
245.0
117.5
10.0
$(\Delta g_2)_c$
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Fig. 1.

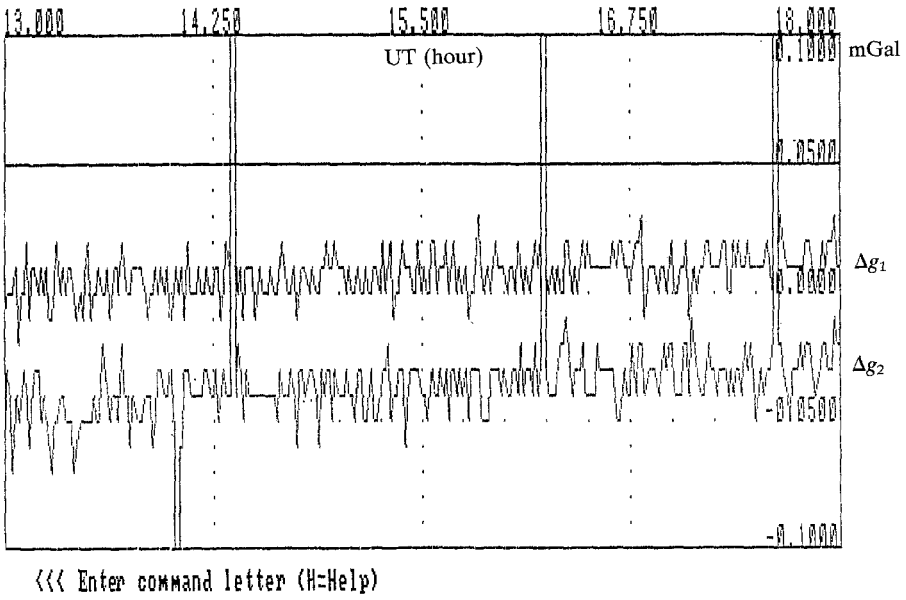
13.000
14.250
15.500
16.750
18.000
UT (hour)
0.1000
mGal
0.0500
Δg_1
0.0000
Δg_2
-0.0500
-0.1000
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Fig. 2.

GI were registered synchronously by the two independent gravimeters. Because of the location of these devices in the same room it can attempt to explain these sharp synchronous variations in gravimeter recording by local technogeneous causes of the mechanical, electrical, etc. nature. It is necessary to separate gravimeters enough far from one another in order to exclude such local influence upon experimental results.

There are a number of GPFD variations with small amplitudes (of the order of 0.05 mGal) which are correlated with one another (Figure 2). These correlations (for example, "a" and "b") likely, are not random, and GPFD variation have the general gravitational nature.

The parameters of GPFD variations which were detected by the two gravimeters synchronously correspond to the theory of otonic GI, and hence, it can be considered, that GI from moving SBH were discovered (if an opposite is not proved).

The above does not exclude the necessity to further projection of experiments to remove effects of non-gravitational factors upon the results.

In the future experiments one plans the usage of different types of gravimeters and variometers separated by different distances, taking into account the seismic control, etc.

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