COMPARATIVE ANALYSIS OF GRAVIMETRIC STUDIES IN BOZDAG-GOBU MUD VOLCANO AND SURROUNDING AREAS

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Carrying out frequent measurements of non-tidal variations of relative gravity force according to relief in the area for construction of electric station in the Bozdagh-Gobu volcano and adjacent areas have been implemented by the use of the GC-5 Autograv device (Fig.1) according to 17 profiles, which include120 observation points. The geological structure of the site, the location of the tectonic faults, dimensions of the mass which may be dynamics of activity, depth of the faults and contours of probable potential hazard zones are determined based on the information obtained during the selection of gravimetric profiles. Additional frequent measurements have been carried out with gravimetry method absolutely in the10 profiles that length up to 3 km from the main construction site to volcanoes and in the volcano area in 3 and 5 profiles, in addition to covering the ES and the substation area which to be built. The distance between the project profiles and observation points are 100 meter and the researches have been done at each point taking 4 dimension value one in 60 seconds. The measurements are repeated with the condition of return to the back/support point after the accomplishment of the measurements for the each profile.

Figure 1. The view of the CG-5 AutoGrav gravimetry produced by Canada which the research works carrying out

Gravimetric researches have been conducted in the Bozdagh-Gobu volcano and adjacent areas on the designed profiles (Fig. 2.) and these researches have been implemented on the observation of the emergency differences in the gravitational acceleration between the two points. This method allows to improve the accuracy of the measurements and it is one of the leading methods for detecting depth fault, gradient zones, displacement, deformation of the gravity force in the inner structure of the earth. This enables us to evaluate the geological processes in the deeper layers of the crust in the research area and it provides to analyze complexly the direct relationship between geological processes and seismic activity.

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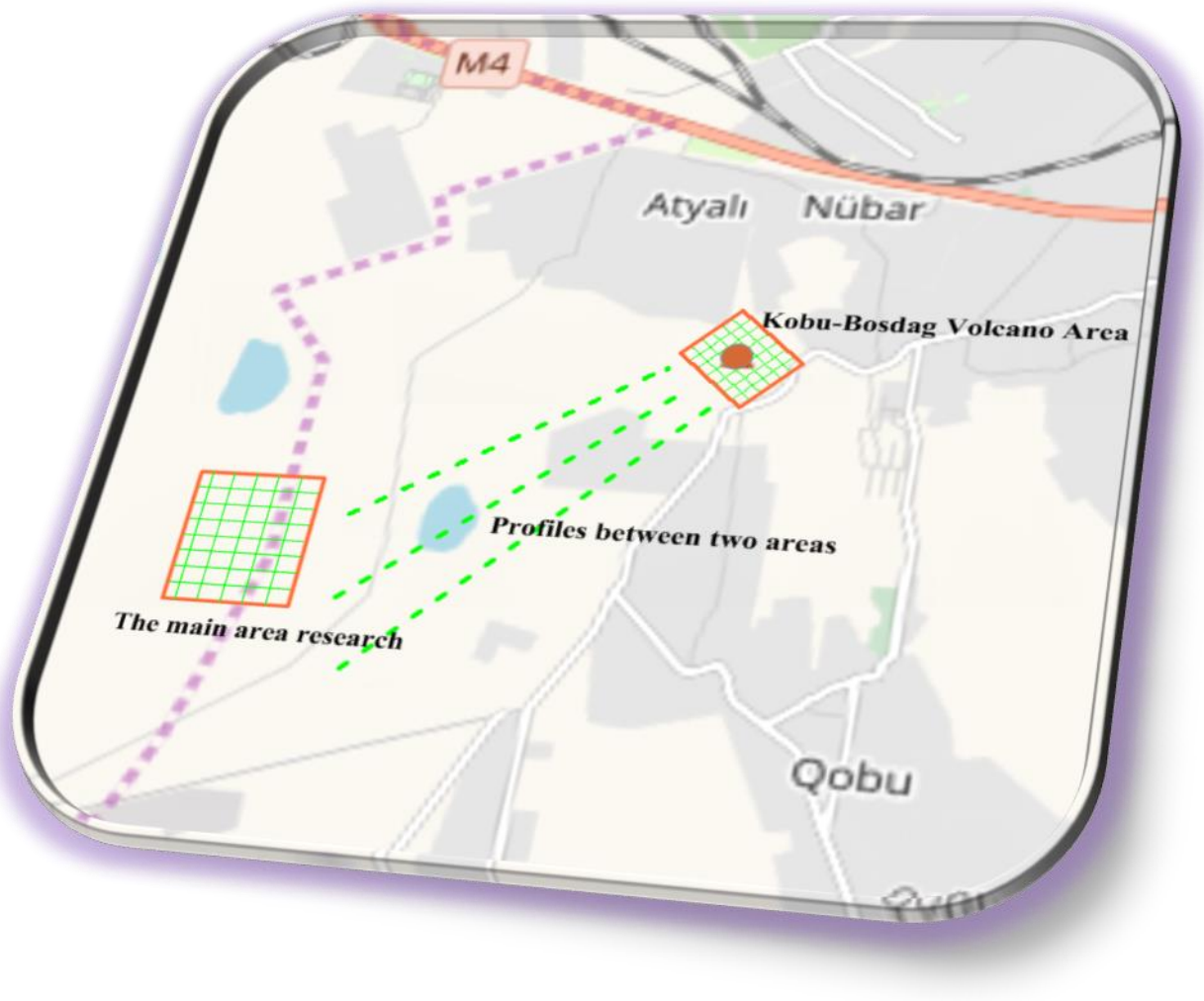


Figure 2. Scheme of the research field

The main purpose of the research is to study the fault-block structure of the Earth's crust due to non-tidal variations in the gravitational field for the construction works near the Bozdagh-Gobu volcano and is the assesment of geodynamic condition during the formation of structures involving a complex geophysical data in that area.

Observable values about the variation character according to time of the gravity force among the observation points have been processed considering all of the adjustments.The following results of the relative gravity force, the obtained results according to the all research field have been described visually in the form of A map, three-dimensional model and transects (Fig.3-7).

Zones monitored with Δg, profiles, observation points and the risk areas for have been clearly covered by the isoanomal maps of the gravitational field construction (Fig. 3,8,9,10). Now, let's try to analyze the isoanomal maps of the gravitational field.

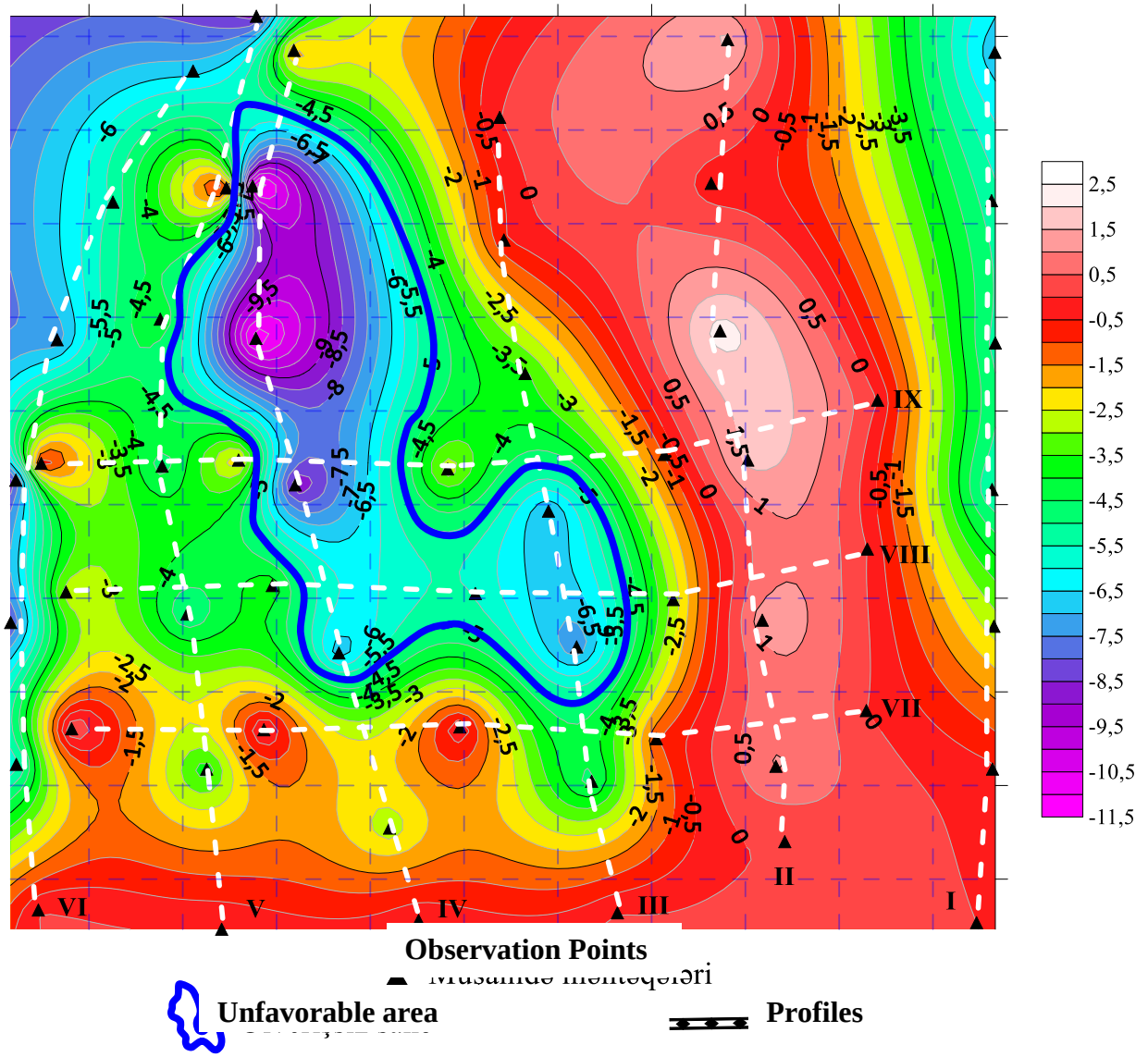


Figure 3. Isoanomal maps of the gravitational field.

As shown in the isoanomal map (3. map) of the gravitational field, the anomalous zones have been observed with the variable characteristic of the relative gravity force values have been precisely covered. Composition of the rocks in the research field have been sharply differentiated by their density. This is due to the fact that it has been covered by sand, clay sand,volcanic breccia of mud volcano and etc.. The differentiation of such density take mosaic shaping of gravity force propagation forward. However, a regularity is recorded in the map. Thus, the relative gravity force (density of rocks) increases from the western part of the research areas to the eastern part from 11.5 mQal to 2.5 mQal.

Most porous rocks are in the western part of the field. It is clear that, the area which we are investigate is not stable from the point of geology.Basically, there are anomalous zones and sediment in the probable lower layer in the center of profiles III, IV, V.

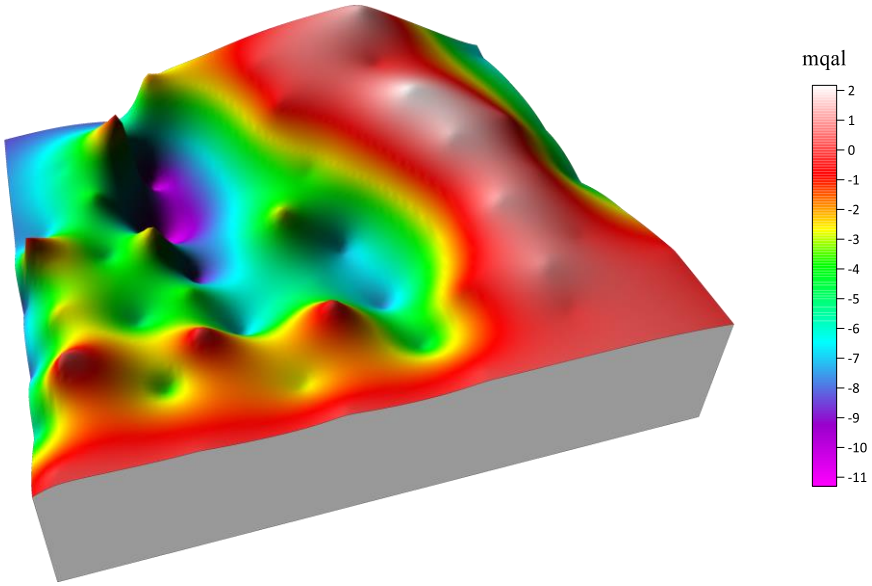


Figure 4. 3D model of the gravitational field corresponding to the isoanomal maps

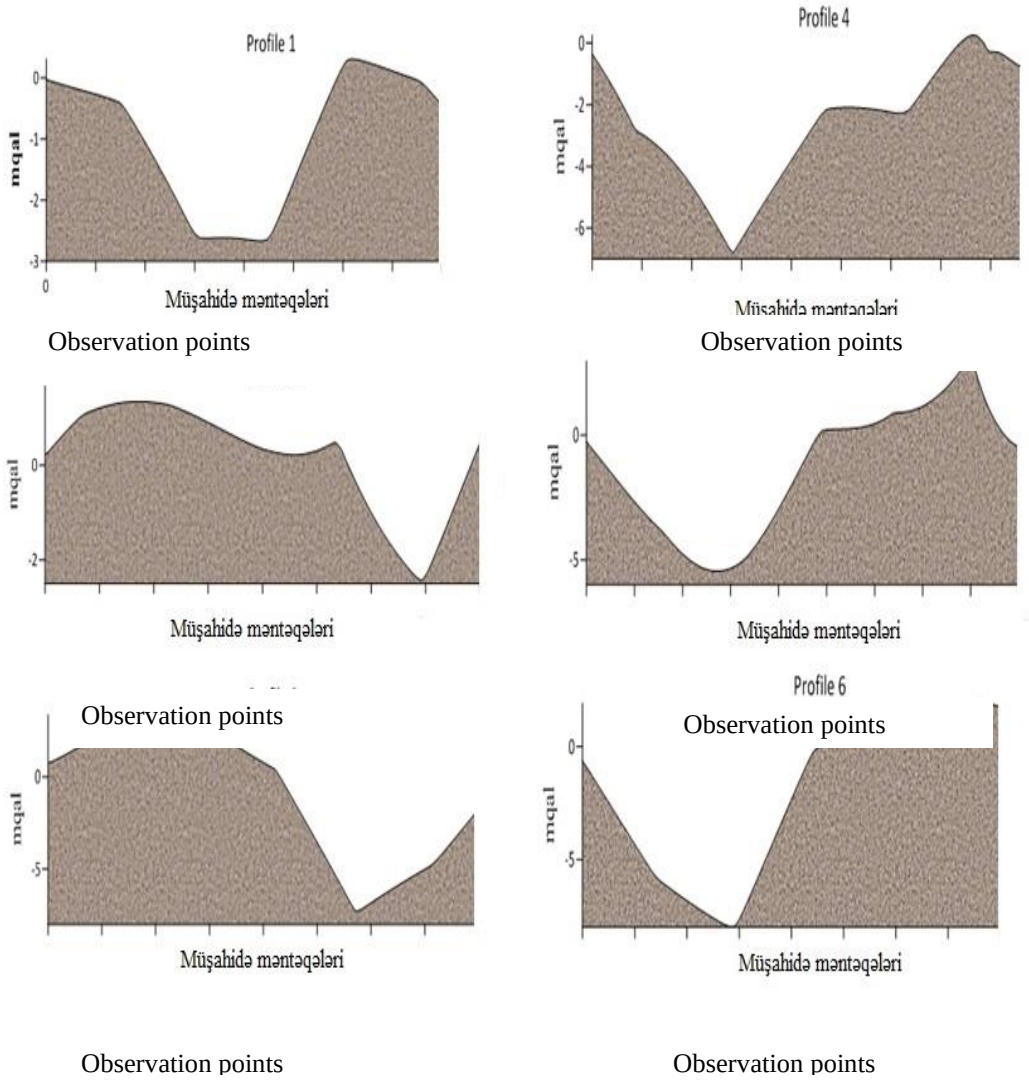


Figure 5. Transects on profiles according to the isoanomal maps of the gravitatioal field.

Accordingly, 3D model of gravitational field (Fig. 4), transects on profiles according to isoanomal maps (Fig.5),diagram (Fig.6) and graphs (Fig.7) have been created. It is clear that form the transects on profiles, model diagram and graphs.

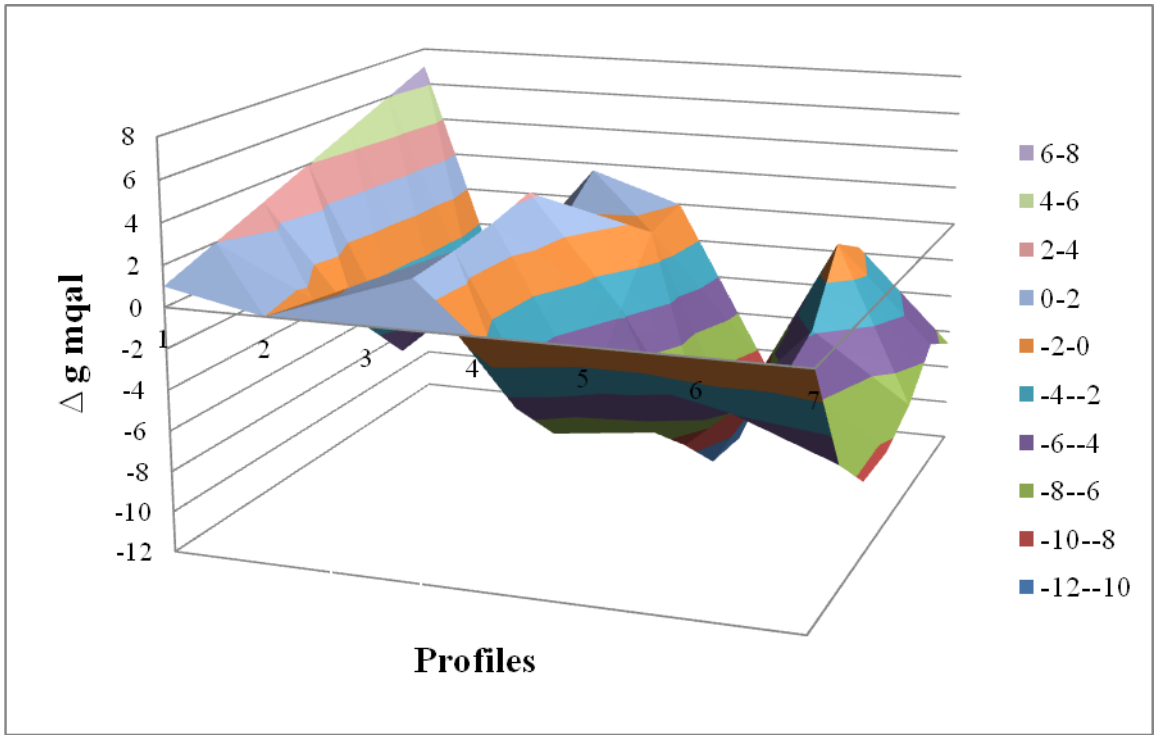


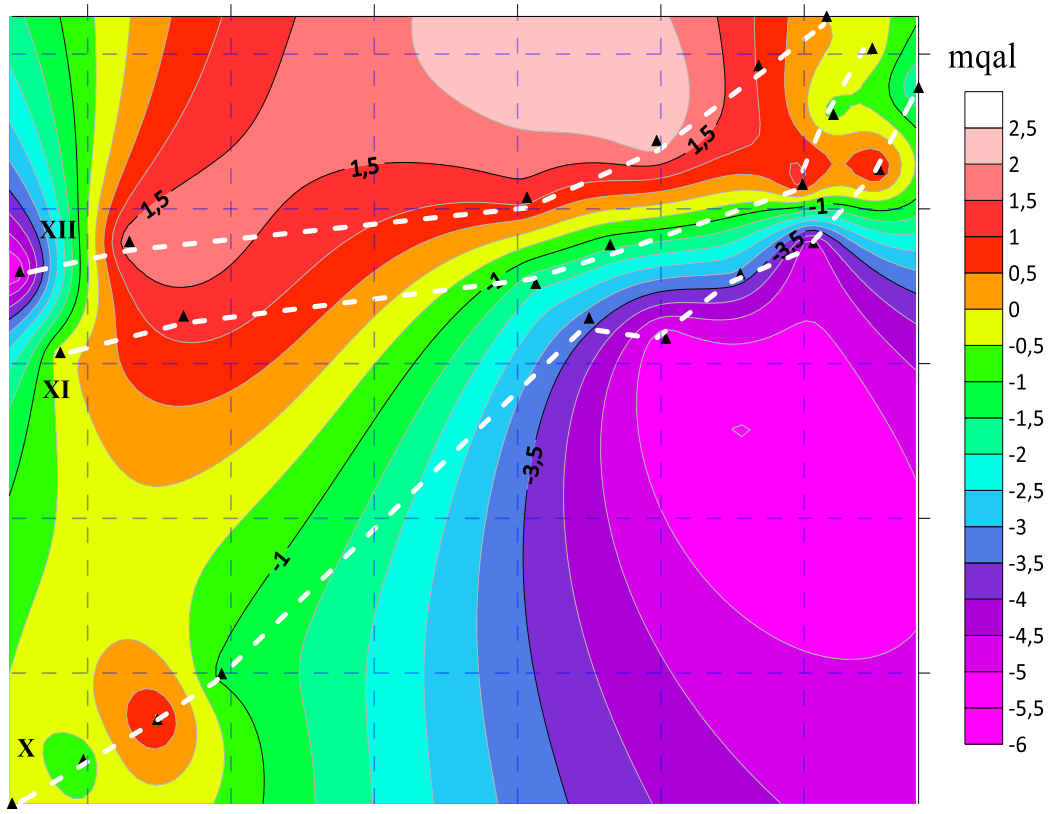
Figure 6. Model diagram on profiles according to the isoanomal maps of gravitational field

Figure 7. Comparative graphs on profiles according to the isoanomal maps of gravitational field

Gravimetric researches have been carried out in the area over the salt lake, up to the volcano in ≈ 3 km distance on 3 profiles (Fig.8) and on 5 profiles (Fig. 9) on the volcano crater considering

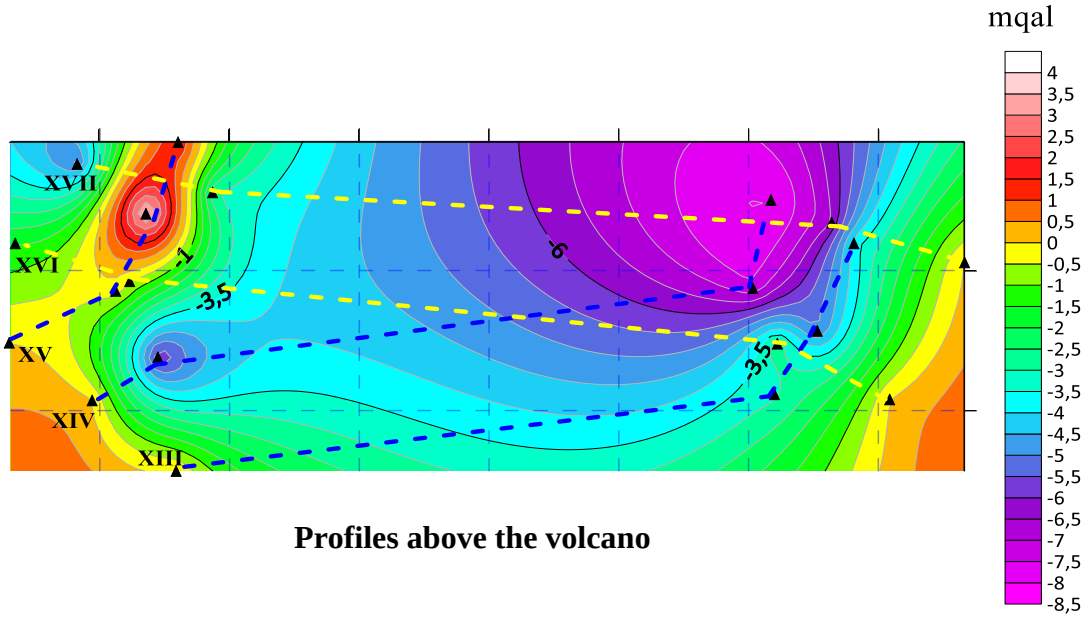
the importance and expedient of studying the impact of the Bozdagh-Gobu volcano located in the north-eastern part of "Gobu" substation area with 330/220/110 kV and

Gobu Electric Station with 385 MVt will be built in "Gobu" area after studying the main research field.



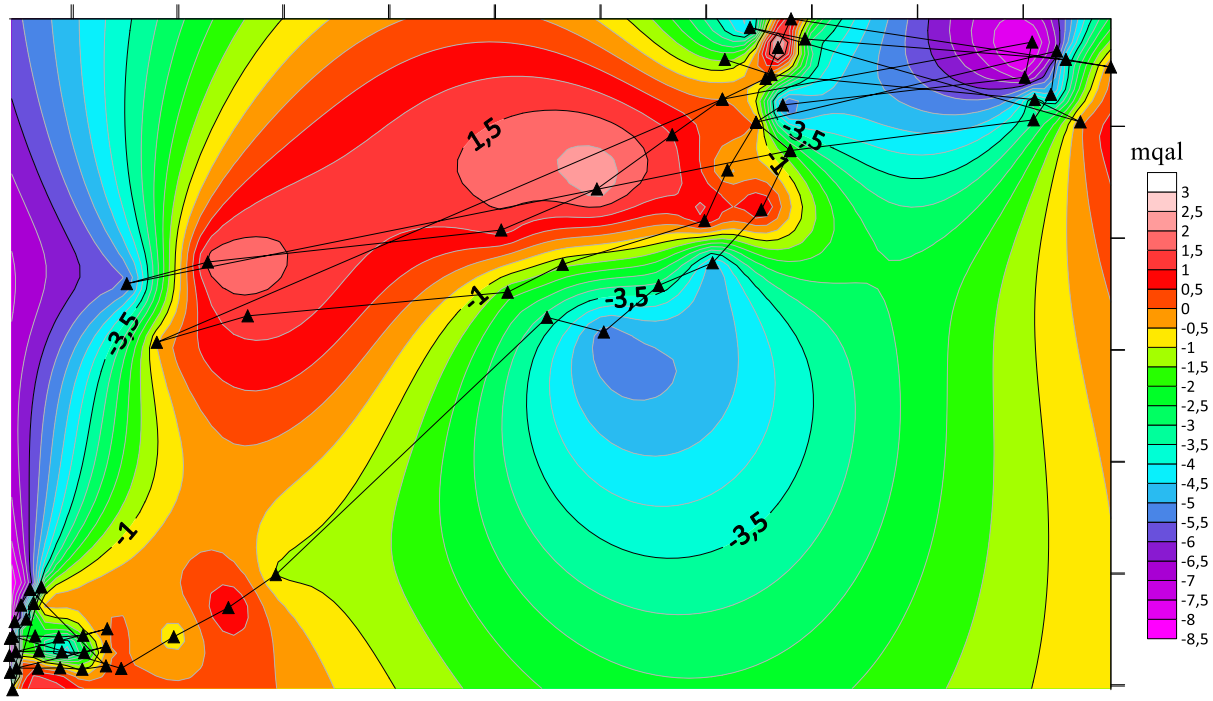
Profiles from the research area to the volcano

Figure 8. Isoanomal map of gravitational field in the area from the main research field to the Bozdagh-Gobu volcano.



Profiles above the volcano

Figure 9. Isoanomal maps of the gravitational field in the Bozdagh-Gobu volcano



Full research area

Figure 10. Isoanomal maps of gravitational field, fully covering the research area

Relative gravity force increases –6---2,5 mQal from south to north in the north direction in the area of Bozdagh-Gobu volcano,that is, concentrated in the north and porous rocks are spread in the north-east direction (Fig. 8). The relative gravity force increasing 8.5-----3.5 mQal is different in the Bozdagh-Gobu volcano (Fig. 9).Finally, the isoanomal maps of gravitational field over an area covered by 17 profiles are added to the article (Fig. 10).

Conclusions

- Anomal zones with variable characteristic value of Δg are highlighted in the isoanomal map of gravitatonal field
- The gravity force is not stable in this site and there are propably sediment, anomalous zones in the center of III, IV profiles
- 3D model of the gravitational field have been created on the basis of Transects on profiles, graphs and isoanomal map. Relative gravity force on total field varies between 11,5 ----- 2.5 mQal.
- The impact of Bozdagh-Gobu volcano to the construction site is minimum and the gravity force in this site varies between 8,5 --- 3,5 mQal.
- Unfavorable area is determined for construction in the main research area.

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