MAPPING ALONG THE GRAVITY FIELD OF THE WESTERN SIDE OF THE SHIRVAN-KAZAKH GEODYNAMIC POLYGON

E.M Baghirov[1], A.T.Ismayilova[1]

For the development of science and industry, the expansion of geophysical work is of particular importance, among which gravity exploration is one of the leading ones. It is of great importance and is used at all stages of geological, prospecting and exploration work. Gravity exploration is also mandatory for state geological mapping. At the same time, it solves the problems of tectonic and lithological-petrographic zoning and identification of areas that are promising for setting up more detailed geophysical and geological work. In addition, it finds application in geologist exploration work to identify and trace mineral deposits and structural geological forms favorable for mineral accumulations.

At the first stage of mapping on the gravitational field in the horizontal plane, the contours of rock complexes with different effective densities are identified. The first stage is relatively simple with relatively thin overburden and steeply dipping contacts. The contours of the rock mass in plan view are lines connecting points with extreme values of the horizontal field gradient Δg. In this case, the relative error in determining the contact will not exceed ¼ of the ratio of the thickness of the overburden to the horizontal size of the studied massif. The main difficulty in determining the contacts is associated with the inclined boundaries of the massifs and the density heterogeneity of the rocks composing them. Gravity surveys map well tectonic faults of the fault type. On gravity maps, such areas are usually identified by isolines of the Δg field elongated along the tectonic fault.

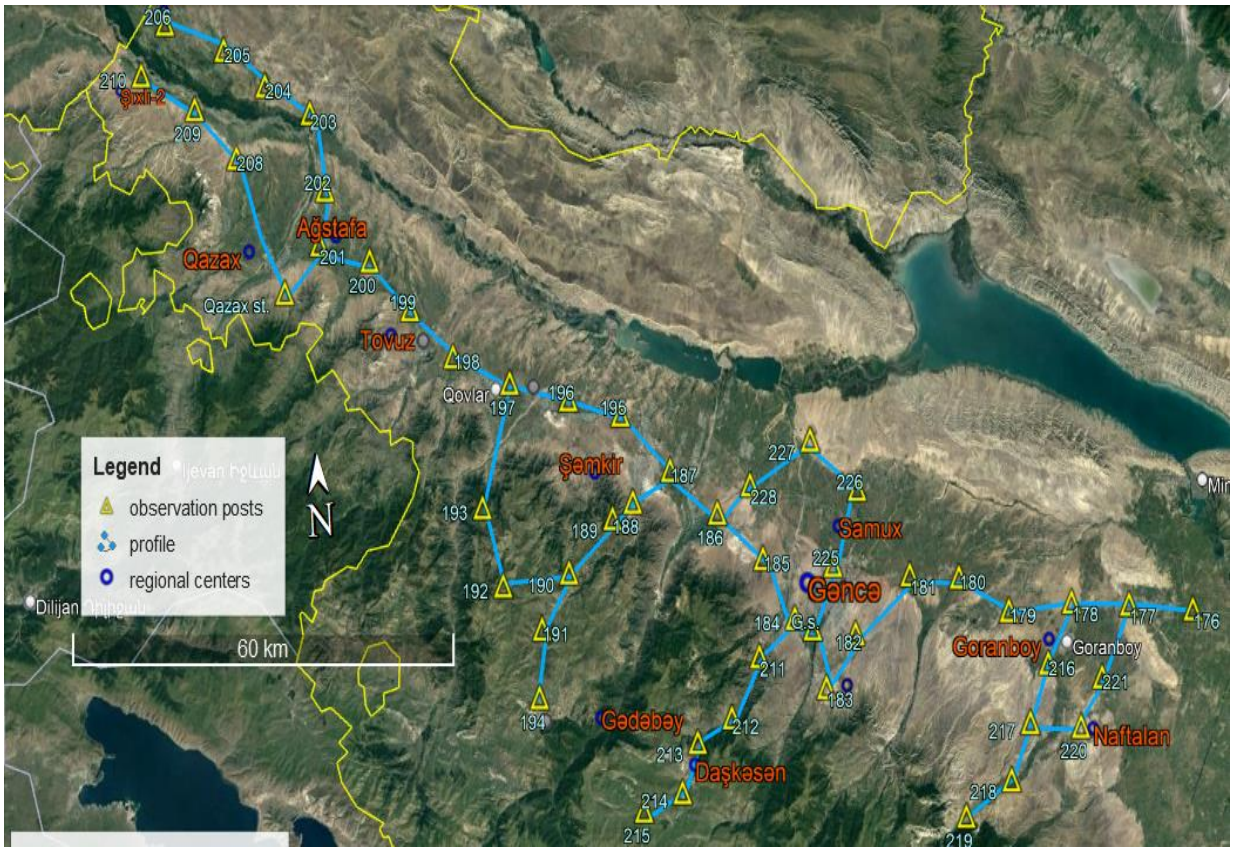

Figure 1. Scheme of the location of observation and strongholds of the western side of the Shirvan-Kazakh geodynamic polygon

[1] *Republican Seismic Survey Center of Azerbaijan National Academy of Sciences*

So let's take a look at the repeated measurements of interest for research. These studies reflect the nature of the change in gravity variations over time between observation points, i.e. throughout the range.

The technique of field observations with high-precision gravimeters is determined in accordance with the requirements for identifying subjective and other factors that affect the accuracy and reliability of observations, the acceleration of free fall of non-tidal variations in time.

High-precision gravimetric observations were carried out on the western section of the Shirvan-Kazakh geodynamic polygon (Fig. 1).

Let's consider the Δg map obtained in the area of tectonic disturbance (Fig. 2.). As can be seen, the isolines are elongated almost in the meridional direction, and the field is characterized by a high horizontal gradient. The map Δg, constructed along the profile located in the cross direction of the strike of a tectonic fault, has the form of an anomaly of the type of a gravitational step. This anomaly along the profile is characterized by the following features: a maximum horizontal gradient is observed above the tectonic fault. If the density of rocks in the uplifted part of the fault is greater than in the overburden, then the field values above the uplifted parts will be greater than over the lowered one.

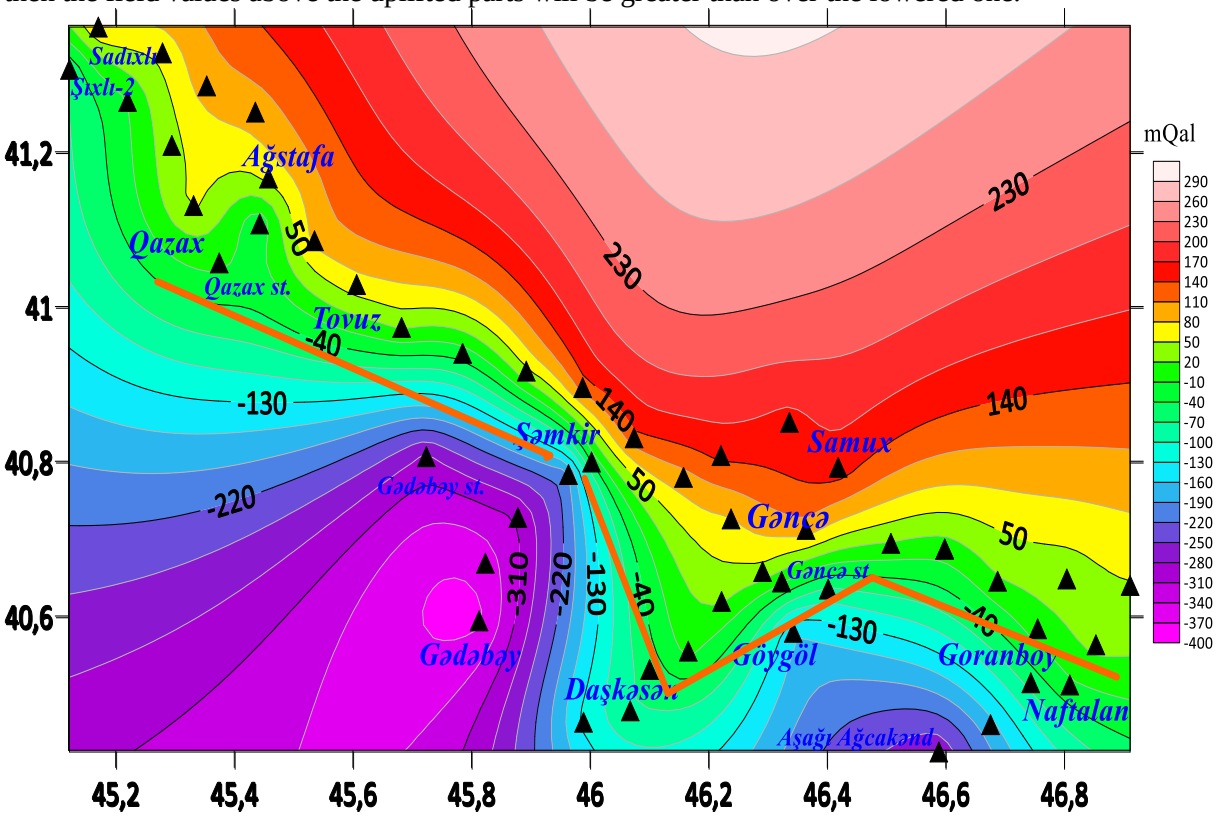

Figure 2. Map of anomalies of the gravitational field of the western side of the Shirvan-Kazakh geodynamic polygon

From the above, it can be noted with confidence that gravimetric studies make it possible to map ore-controlling faults and tectonic disturbances. Gravitational anomalies of the "fault" type include:

- linear anomalies characterizing geological formations directly within the fault;
- “gradient” anomalies caused by changes in the geological situation in the contacting blocks and their mutual displacements;
- change in the nature of the field - level, structure, direction of strike, caused by a difference in the composition of the rocks that make up the contacting blocks;
- linear zones of minima associated with zones of crushing and fragmentation.

Tectonic faults, accompanied by relatively wide crushing zones, are distinguished by linear anomalies of a reduced gravity field. Faults and uplifts with the movement of blocks of rocks of

different density along the vertical are marked by gravitational steps. Disturbances can be fixed in the gravitational field also in the presence of small intrusions in them.

CONCLUSIONS

— When mapping along the gravitational field of the western flank of the Shirvan-Kazakh geodynamic polygon, the contours of rock complexes with different effective density were identified in the horizontal plane.
— Carried out mapping of ore-controlling faults and tectonic faults.

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