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Contact

Niedersächsische Staats- und Universitätsbibliothek Göttingen
Georg-August-Universität Göttingen
Platz der Göttinger Sieben 1
37073 Göttingen
Germany
Email: gdz@sub.uni-goettingen.de

The lake lies in the region of minimum, though the principal minimum is situated outside the plan in south-eastern direction. From S-West, North and Northeast we have the maximum zone, surrounding the lake like a ring and stretching farther.

The observed anomaly cannot be explained by corrections for isostasy and depends entirely on the geological structure of the nearest earth strata (to 10 km in thickness). Supposing we have to deal with a simple case of a contact surface, dividing less dense surface masses from deeper and more dense masses, the gravity anomaly Δg and depth h to contact surface are related by the approximate correlation:

$$\Delta g = a + bh = a + 2\pi k^2 \delta h = a + 40\gamma\delta h_{\text{km}},$$

where a is a certain adopted mark for the isogam.

Thus to explain the observed anomaly of 60γ at a difference in densities $\delta = 0.5$ we must have a depression and an uplift in the underground relief h within the limits to 3 km. With other words, we must accept that near Buskunchak we are dealing with a great dislocation of masses, capped with sediments of later deposition.

In conclusion, we would like to draw attention to the necessity of pursuing gravitational works and of widening the area, but this, of course, is connected with the problem of a general gravitational survey, which should be conducted by means of pendulums, the details to be perfected by torsion-balances.

Unfortunately the problem as to a general survey hat not yet been settled and we can only accidentally and on small areas look into the complex picture of gravity distribution, which, aside of a deep geophysical interest possesses an ever growing practical value.

Results of the General Gravity Survey in the Emba District.

By **B. Numerov.** — (With one Illustration.)

The paper contains the results of the general gravity survey executed within the area of petroliferous deposits Dossor and Iskiné, Emba District, near the northeast coast of the Caspian Sea*).

*) The gravity observations in the Emba District began since 1925. In 1925 profiles were drawn by the Geological Committee at Dossor (18 stations) and Iskiné (26 stations). In 1926, the Trust Emba-Oil carried out the investigation of an area of 325 sq. km at Novobogatinsk (541 stations) and drew 2 profiles at Karaton[1]) (249 stations) and one at Akat-Kulé (30 stations). Finally, in 1928 an area of 6 sq. km was surveyed at Bek-Bek (61 stations), about 2 sq. km at Baychoonas (22 stations) and a route survey executed between Dossor, Iskiné and Baychoonas (62 stations).

The observations were carried out by the gravimetrical party of the Trust Emba-Oil with four large variometers Bamberg-Schweydar and a Bamberg pendulum. In 1927, an area has been surveyed at Iskiné, encircling the gravity minimum. Another large minimum was investigated in 1928, near Dossor. In the same year an area of about 1.5000 sq. km between Dossor, Iskiné and Baychoonas was covered by the route survey. The first essay of a rapid route survey with stations through every 3, or even 5 km, under conditions of gravity anomaly in the Emba-District proved to be successful,

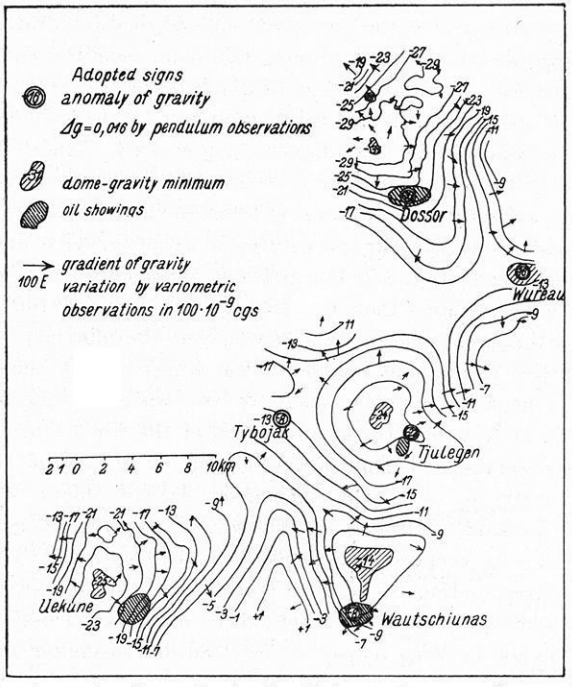

fig. 1. Anomaly of gravity in the Emba region near Dossor, 1928.

and the maximum number of stations (62) allowed to trace a series of intermediate gravity minima (domes) between the main minima at Dossor and Iskiné.

On the attached map are given the summarized results of observations of 1927 and 1928, the portions of the plan near Iskiné and Dossor being taken from the detailed plans of investigations in those regions. Arrows point out to vectors of gravity variations in the horizontal plane. Isogams (lines of equal anomaly) secured by numerical integrating of gradients in the horizontal plane are drawn through 2γ*). At points marked with circlets gravity

*) $\gamma = 0.001$ cm sec^{-2}.

[1]) (10 stations.) In 1927 an area of 122 sq. km at Iskiné (455 stations), an area of 52 sq. km at Karaton.

anomalies are given, obtained by means of pendulums. Isogams are drawn in such way as to satisfy, in average, all absolute marks of gravity anomalies secured by pendulum observations at 5 points, Dossor, Bursay, Baychoonas, Tulughen and Tubuyak.

Discrepancies between gravity anomalies obtained from variometric evidence and from pendulum observations are as follows: Dossor 2γ; Bursay 0γ; Baychoonas $+2\gamma$; Tulughen 1γ; Tubuyak $+5\gamma$; or $\pm 2\gamma$ in average, which are to be entirely explained as inaccuracy of pendulum observations, or errors of numerical integrating. The region near Tubuyak, in the vicinity of pendulum station is not trustworthy from the standpoint of numerical integrating of gradients.

On the map we see the first gravity minimum near Dossor -31γ. The next minimum is near Bursay -16γ, 14 km from Dossor. This dome was so far unknown to geologists. The third minimum is near Tulughen -24γ, 15 km from Bursay; the 4th near Baychoonas -14γ, 12 km from Tulughen, and finally, the fifth one near Iskiné -25γ, 19 km from Baychoonas. The largest positive anomaly was observed between Baychoonas and Iskiné, no less than $+8\gamma$. Thus the largest discrepancies of gravity anomalies in the area investigated reach 40γ, and the gradient of variation is 5γ to 1 km.

It is worth mentioning that the gravity minimum in the Emba District corresponds to the upheaval of ancient rocks (Permotrias) which display petrolific properties throughout on one of the wings of the dome.

The largest negative anomaly seems to correspond to greatest proximity of salt. In fact, at Novobogatinsk, northwest of the town Guriev, an anomaly of -44γ was observed, whereas the salt was at the detph of 80 m. At Dossor the anomaly of -31γ corresponded to salt depth of about 400 m, and finally at Karaton, southeast of Dossor, a positive anomaly of $+20\gamma$ is being observed with cretaceous deposits over 400 m thick. The geologically known domes corresponding to gravity minima are of complicate constitution, surrounded by faulting, with a few exploitable oil fields (Dossor) in exclusive cases. Would it not be wise to pay more attention to sunken and less broken domes which cannot be discovered by a superficial geological reconnaissance, yet might be found in the result of a general gravity survey?

The periodical distribution of gravity anomalies is particularly characteristic for the northeastern coast of the Caspian Sea, or even for whole of the Caspian region as is shown by gravimetrical observations in the Lower Emba District, near Karaton and Karachungul, as well as in the North, near the Baskunchak Lake.

The results obtained permit to draw the conclusion that the general gravimetrical survey of the Caspian region must consist in: 1. a route survey with variometers through large intervals; 2. pendulum observations at discovered points of gravity minima and in order to control the numerical integrating of observations with variometer, as well as to classify the domes and, finally 3. a study of more interesting areas, from practical standpoint. Gravimetrical investigations in the Emba District ought to be carried out according to the above plan.