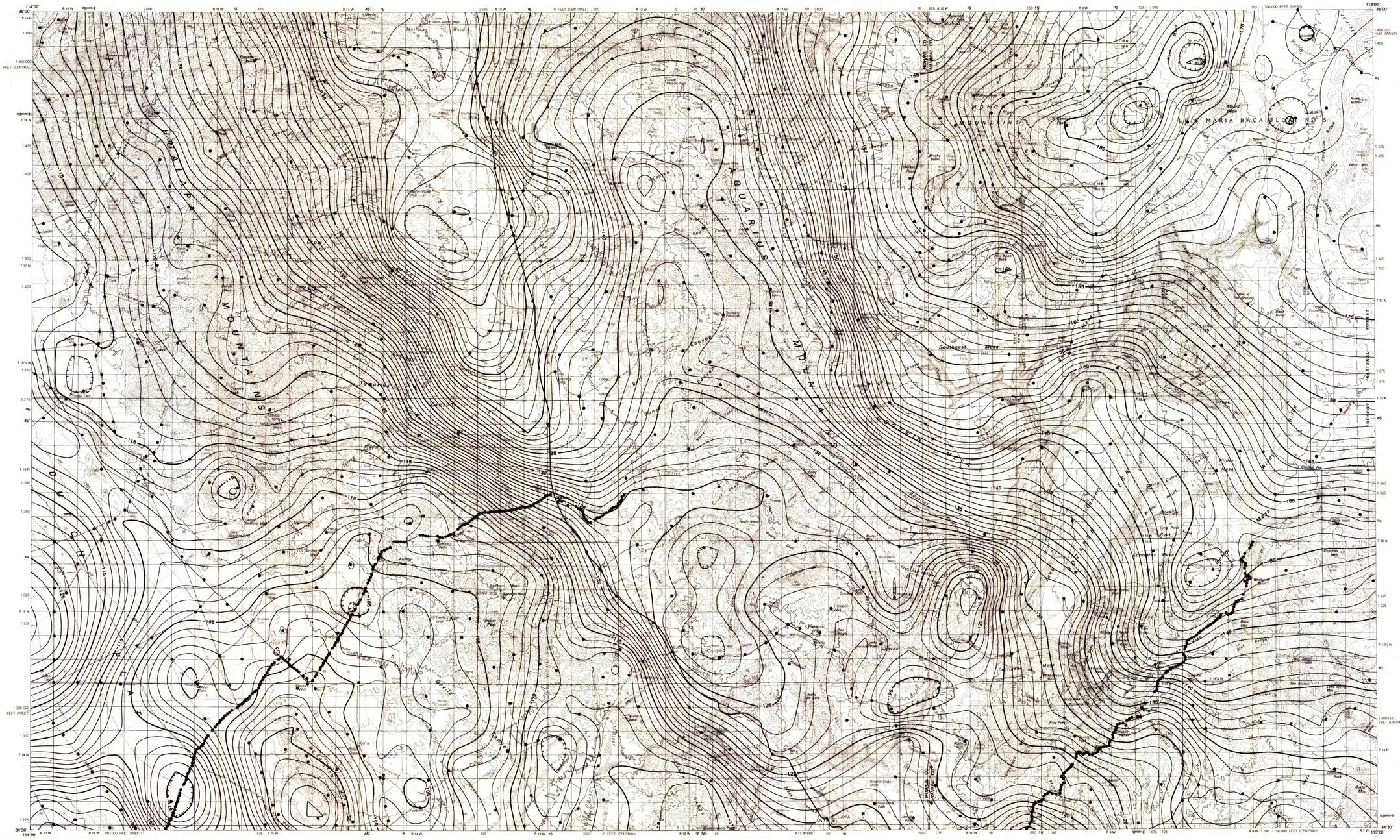
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT
91-640



Base from U.S. Geological Survey 1:100,000
Bagdad, Arizona 1979

Gravity measured 1986 - 1990

SCALE 1:100 000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ARIZONA
QUADRANGLE LOCATION

COMPLETE BOUGUER GRAVITY MAP OF THE BAGDAD 0.5° BY 1° QUADRANGLE, ARIZONA

By

J. D. Hendricks, J. B. Plescia, and A. K. Matic

1991

EXPLANATION

Bouguer gravity contour - interval 1.0 milligal. Contoured by computer with a grid interval of 1.0 km.

Bouguer gravity contour enclosing area of low gravity

Gravity station

DATA REDUCTION

All gravity readings were tied to the "World Relative Gravity Network" (ACIC 1970,1973) at Bagdad, Kingman, Prescott, and Wickenburg, Arizona through a system of six supplemental base stations using the International Gravity Standardization Network (IGSN-71) values (Morelli,1974). An assumption of a density of 2.67 g/cm^3 was made for the Bouguer and terrain corrections. Terrain corrections for each station were made to a distance of 166.7 km. The formula used for the reduction to the complete Bouguer anomaly is:

$$CBA = G_{obs} + FA + B + C + TC - G_{theor}$$

The terms being:

CBA	Complete Bouguer anomaly
G_{obs}	Observed gravity
FA	Free air correction = $h(0.30877 - 0.0013398\sigma + 0.0013553\sigma^2 - 0.0005329\sigma^3 + 0.0000911\sigma^4) - h^2(0.072\times10^{-6})$
B	Bouguer correction = $-0.1119h$
C	Earth curvature correction = $-1.4639108\times10^{-3}h + 3.532715\times10^{-7}h^2 - 4.449648\times10^{-14}h^3$
TC	Terrain correction
G_{theor}	Theoretical Gravity = $978031.843 + 15727.66\sigma - 15762.337\sigma^2 + 6083.534\sigma^3 - 1089.748\sigma^4 + 69.43\sigma^5$

where:

h = elevation (in meters)
$\sigma = 0.0001\phi^2$
ϕ = latitude in degrees

ACCURACY OF ANOMALY VALUES

Gravity measurements were made on points of known elevation (bench marks, spot elevations, section markers, etc.) as published on the U.S. Geological Survey 7 1/2' quadrangles in the area. Bench marks, section corners, and checked spot elevations have a vertical accuracy better than 1.3 m in the Bagdad 1/2° by 1° quadrangle. Unchecked spot elevations are within 6.5 m of the true elevation. Geographic positions were determined manually from the 7 1/2' quadrangles and are correct to within 0.02 minutes of latitude and longitude. Horizontal and vertical control for the closely spaced stations in the southwest and southeast parts of the quadrangle were obtained by leveling conducted as part of a COCORP seismic survey that crossed the area (Hauser and others, 1987), these elevations are within 0.3 m of true and horizontal position is within 0.01 minute. Terrain corrections were calculated for all stations and involved a three-step process: (1) terrain differences within 17 m of a station were estimated from observations made in the field at the time the reading was made; (2) terrain differences from 17 m to 1530 m of the station were estimated from topographic maps and the corrections for (1) and (2) were made using the method described by Hammer (1939) and ; (3) terrain differences and corrections from 1530 m to 166.7 km were made using digital terrain and the method described by Plouff (1977). Theoretical gravity at sea level was calculated using the Geodetic Reference System 1967 reference sphereoid (International Association of Geodesy, 1971).

Observed gravity values have been corrected for instrument drift and diurnal gravity changes. From repeat measurements we believe the observed values to be within 0.1 milligals. Errors in the computed anomaly arising from the calculation of terrain corrections are difficult to evaluate but we feel that they are within 0.5 milligal. Total accuracy of the individual complete Bouguer anomaly values presented on this map are, therefore, better than 2.0 milligals and for the majority of stations are better than 0.5 milligal.

REFERENCES

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