(200) R290 no.82-839



### UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

A DESCRIPTION OF BOUGUER ANOMALY AND ISOSTATIC RESIDUAL COLORED GRAVITY MAPS OF THE SOUTHWESTERN CORDILLERA

by

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GEOLOGICAL SURVE RESTON, VA. NOV 0 4 1982 T 33 LIBRA

Open-File Report 82-839

1982

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A Description of Bouguer Anomaly and Isostatic Residual Colored Gravity Maps of the Southwestern Cordillera

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#### INTRODUCTION

Colored gravity maps of the Southwestern Cordillera covering California, Nevada, and portions of Utah and Arizona, have been prepared using an Applicon Color plotter. Colored xeroxes of these maps are included in this report. Standard 2" x 2" color slides of these maps are available from the U.S. Geological Survey Photo Library (Mail Stop 914, Box 25046, Denver Federal Center, Denver, CO, 80225, telephone 303/234-4004). When ordering slides from the library, refer to the open-file number of this report.

The gravity maps were prepared to aid regional studies of the Basin and Range Province and to extend the California Isostatic map (Roberts and others, 1981). An expanded abstract comparing these maps has been prepared by Oliver and others (in press).

Den-tre recort (Geological Survey (U.S.))

#### THE DATA SET

The gravity maps are based on about 100,000 gravity stations. About 64,000 observations in California (Snyder and others, 1981a, 1981b) were converted to the International Gravity Standardization Net of 1971 (Morelli, 1974) and reduced using the 1967 Geodetic Reference System formula (International Association of Geodesy, 1971). In Nevada, data from the following published 1 x 2 degree guadrangles were used: Tonopah (Healey and

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others, 1981), Goldfield (Healey and others, 1980), Caliente (Healey and others, 1981), Death Valley (Healey and others, 1980), Las Vegas (Kane and others, 1979), Reno (Erwin and Berg, 1977), Millett (Erwin and Bittleston, 1977); as well as unpublished data for the Lund, Kingman, and Walker Lake quadrangles. Data for the rest of Nevada, Utah, and Arizona are from T. G. Hildenbrand, U.S. Geological Survey, Denver, and are comprised mostly of Department of Defense (DOD) data available through the National Oceanic and Atmospheric Administration (NOAA) Data Center. (NOAA, National Geophysical and Solar Terrestrial Data Center, Boulder, CO 80302).

A FORTRAN gridding program written by Webring (1981), was used to interpolate and extrapolate the data to a 5 x 5 km grid.

The data were projected using the Albers Conic Equal-Area projection with standard parallels for the U.S. (29.5°N, 45.5°N).

## DESCRIPTION OF THE MAPS

# Bouguer Gravity Anomaly Map of the Southwestern Cordillera

The Bouguer gravity anomaly map of the southwestern Cordillera is shown in Figure 1. Bouguer anomalies were calculated using the Geodetic Reference System 1967 formula and tied to the IGSN 71 datum (references above) with a reduction density of 2.67 g/cm<sup>3</sup>. Terrain corrections have been calculated using a program by Plouff (1977). Estimated error in the Bouguer gravity value is less than  $\frac{1}{2}$  milligal (mGal). The color contours of the map range from -280 mGal to 100 mGal at an interval of 20 mgal, using blues for lows and running through the spectrum to red for highs.

# Isostatic Residual Gravity Map of the Southwestern Cordillera

The isostatic residual gravity map of the southwestern cordillera is shown in Figure 2. Isostatic corrections were computed using a FORTRAN program (Jachens and Roberts, 1981) based on the Airy-Heiskanen model of compensation (Heiskanen and Meinesz, 1958, p. 135-137) using these parameters: compensation depth of 25 km at sea level, crustal density of 2.67 g/cm<sup>3</sup> above sea level, and density contrast of 0.4 g/cm<sup>3</sup> across the Moho. The isostatic residual values range from -70 mGal to +70 mgal with a contour interval of 10 mgal. Blue colors represent lows and reds show highs.

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# BOUGUER GRAVITY ANOMALY MAP OF THE SOUTHWESTERN CORDILLERA



