

GRAVITY IN THE SOUTHERN CENTRAL ANDES, 38°-40° S

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INTRODUCTION

We present the recent data base of Bouguer Anomaly together with a preliminary interpretation of the local gravity anomalies in the regions of Traiguén-Victoria, Loncoche and Valdivia.

The gravity information was obtained during December 1995 and January 1996 introducing more than 1.000 new data points, which have been normalized and merged with the southern Chilean data base. Additionally, for the elaboration of the Bouguer anomaly map, we collaborated with the National Oil Company (ENAP) who facilitated their data base to us. The gravity map of the region, which extends from 38° to 42°S contains more than 3000 gravity stations.

The gravity survey of this study corresponds to the investigation entitled "Integrated geophysical study of the seismic risk zone of the Southern Central Andes (38°-42°S). The area under investigation belongs to one of the most active segments of the continental margin. This is manifested in a long series of devastating earthquakes (e.g. 1960, Valdivia earthquake). The investigation also considers the active volcanoes e. g. Lonquimay, Llaima, Villarrica and others, and structures related to the formation of mountain ranges, fault systems. Distribution of gravity is essentially related to all of these. The information of gravity available before this study is contained in a continental map of Bouguer anomaly between lat. 38°-42°S based on a few gravity stations and was obtained by Dragicevic (1971) long time ago. Further there exists information from ENAP which is mainly distributed in the Central Valley.

FIELD WORK

The spacing of stations is about 3 km along all passable roads. A higher station density e.g. a spacing of 0.2 km, 1 km to 2 km was used in a local area along the Liquiñe-Ofqui fault, volcano zones and geological structural zones respectively, see figure 1. All measurements were tied to the IGNS 71 gravity datum via the newly established National Chilean Gravity Net. Araneda and Avendaño (1993) with base stations in Temuco, Loncoche and Osorno.

Tidal corrections were computed. The drift control was done every day on an established point located at the Tolten river bridge. The drift of the LaCoste&Romberg instruments (model G 411) rarely exceeded 0.5 mgal/day.

The geographic coordinates determination of the stations was possible by using a GPS portable receiver. For the elevation determination at gravity stations, altimeters were used and a special procedure to improve

the quality of the barometric measurement: time-dependent drift corrections were calculated as it is usually done for gravity measurements, using as many benchmarks and repeated measurements as possible. Error estimations showed an accuracy better than 5 m. This gives an error in the Bouguer anomaly of about 1.0 mgal.

FIRST RESULTS

We present a map of the Bouguer anomaly with contour intervals of 20 mgal. Generally the gravity field decreases to a regional minimum of less than -100 mgal in the area of the western cordillera (recent volcanic arc) related to crustal thickening due to isostatic compensation. Local anomalies can be seen in the Traiguén-Victoria, Loncoche and Valdivia areas. There are also some weaker anomalies, as shown on the preliminary map. All positive residual anomalies are located in Central Valley.

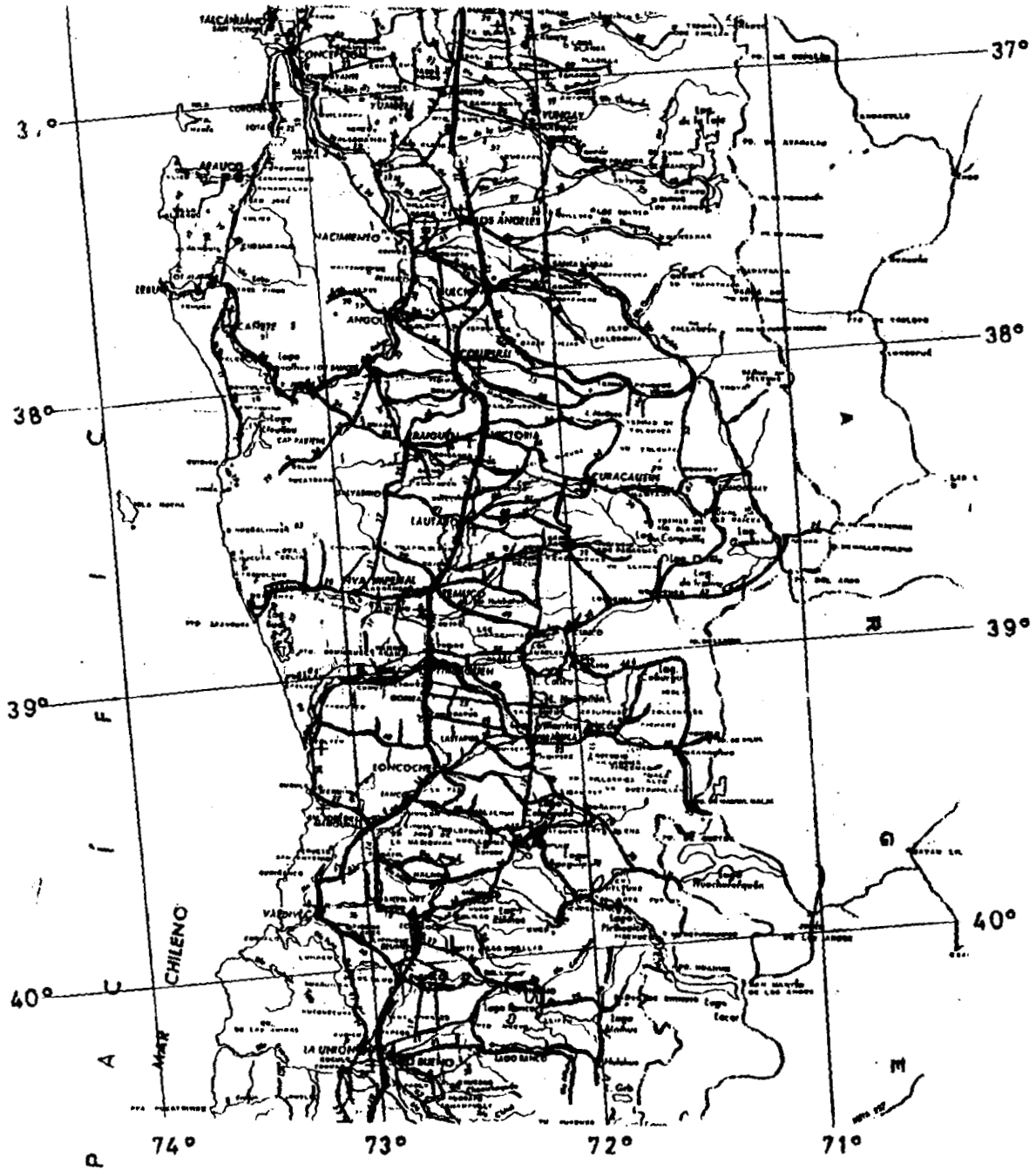
The gravity data presented in this paper correspond to preliminary results of an on going research. The aim of this work being an attempt to calculate a mass balance based on Gauss's Theorem.

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— Gravity line
FIGURE 1