



**EXPLANATION OF MAP SYMBOLS**

Free-air gravity contours; interval 10 mgal

Area of decreasing gravity

Ship trackline

**INTRODUCTION**

This map is one of two in a series presenting marine gravity data in the western Caribbean Sea (Folger and others, 1980) and off the coasts of Venezuela and Trinidad-and-Tobago (fig. 1). The data, collected by the U. S. Geological Survey (USGS) in response to a request from the Defense Mapping Agency, are intended to improve gravity coverage where it has been insufficient or inadequate. The information shown on this map represents approximately 16,600 line kilometers of marine gravity data collected around Trinidad-and-Tobago and along the coast of Venezuela from December 4, 1987 to January 27, 1988.

**METHODS**

Data were collected aboard the Research Vessel (RV) *Starzila*, a converted 73-m stern trawler owned and operated by J. Merr and Sons of Hull, England, under contract to the USGS. Nominal survey speed was 10 knots (18.5 km/hr). Two LaCoste and Romberg (L&R) Air-Sea Gravity Meters (S-26 and S-41) were operated continuously during the surveys. The dual metering provided immediate, or real-time, checks on meter performance and quality control on data collected. Both gravity meters were of standard beam-type configuration that included capacitance readouts, Loh-6020A analog-to-digital converter boxes, and USGS computer processing and recording systems. Ten-second samples of L&R raw spring tension, average beam, and cross-coupling signals were logged and used to compute the raw digital gravity values. The raw digital gravity readings were filtered by three stages of lag-20-s resistive capacitance (RC) filtering in the instrument plus three stages of lead-20-s RC digital filtering. A 5-min symmetrical digital filter was applied in the computer processing. The standard auto-reader analog gravity readings provided a graphic check on the digital computations. All land gravity stations were on the International Gravity Standardization Net (IGSN) 1971 datum. Land gravity values were calibrated to the shipboard values at dockside using a L&R Model C Geodetic Gravity Meter (G-170).

All positions were computed in the World Gravity System (WGS)-84 datum and filtered in exactly the same manner as were the gravity signals. The primary navigation system used during the cruise was a General Electric CVL-12 Correlation Sonar/Sperry Mk-29 MOD 3 Gyrocompass interfaced to a USGS computer system that calculated dead reckoning (DR) positions every 10 s (McCullough and others, 1988). Global Positioning System (GPS) and Transit Satellite fixes were used for updating and control. Elements of a Magnavox S-5000 integrated navigation system were used to convey positioning information to the ship's bridge. The DR system provided precision to about 0.5 percent, or about 5 m/25 km root mean square (RMS), after linear drifts between satellite fixes were removed.

Data were recorded digitally on hard disk every 10 s and periodically were transferred to tape. Real-time 10-s digital plots of various system parameters were continuously logged. Plotted variables included time, DR and GPS latitudes and longitudes, and their differences; Eotvos correction calculated from DR and GPS; raw and filtered gravity from both meters, and their differences; Eotvos-corrected gravity; ship's speed and direction; and gravity-platform heave and sway acceleration, which was needed to monitor sea-state effects on the gravity meters.

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Figure 1. - Map areas of the two published marine gravity surveys in this series.

Coastline from World Data Bank II, Tape 2, South America, National Technical Information Service no. CA/DB-77/002  
Political boundaries are not necessarily authoritative  
Lambert Azimuthal Equal Area projection  
Central meridian 65° W  
Latitude of central point 11° N



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**MAP SHOWING FREE-AIR GRAVITY ANOMALIES OFF THE COASTS OF VENEZUELA AND TRINIDAD- AND-TOBAGO**

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