

**The Profiles**

The profiles presented show free air gravity anomaly (G), total field magnetic anomaly (no symbol), total field magnetometer record at the observatory at Barrow or College, Alaska (\*), and the filtered difference between the total field magnetic anomaly measured on the ship and the total field measured at the observatory (\*).

The vertical scale varies from profile to profile. Note that the vertical scale used for the filtered magnetic values (\*) often differs from that used for the other two magnetic values. Arbitrary constants have been added to two of the records to keep them on scale.

The horizontal scale is essentially the same as that used in presenting seismic reflection profiles in Part 1 of this report.

**Collection and reduction of gravity values**

Gravity was measured by LaCoste Romberg sea gravity meter S-53, incorporating a Nova computer which applied a ten-minute averaging filter with a five-minute delay. This delay has not been removed from the data. Some corrections were computed using unsmoothed linearly interpolated fixes from a satellite doppler navigation system. Poor fixes were not used in computing the track. Anomalous Eötvös values and the associated gravity points were removed.

Particularly on parts of profiles obtained near the ice pack, erratic gravity values appear as a result of sudden ship movement produced by striking ice or by maneuvering to avoid ice. The records have been edited to remove the more obvious of these erratic values.

The base value for absolute gravity was computed from a single land tie at Long Beach, which was occupied prior to the survey on June 27, 1972, and after the survey on October 20, 1972. No instrument drift was detected. No adjustments have been made at line crossings.

The gravity meter computer produced data tapes containing information every ten seconds. Values for plotting were extracted from the tapes, without additional filtering, at five-minute intervals.

**Collection and reduction of magnetic field values**

The total magnetic field was measured at four-second intervals with a Geometrics proton precession magnetometer. The sensor was towed about 150 meters behind the ship.

Magnetometer readings were recorded on a 10-inch analog strip chart. Portions of the record were affected by noise, probably caused by the proximity of the magnetometer head to the seismic streamers. The amplitude of the noise ranged from 5 to 50 gammas and had a period between three seconds and three minutes. The noise signal was quite easily distinguished from the measured field; hence smoothing by eye yielded a profile which represents the magnetic field with a probable error of five gammas or less. Noise may have obscured occasional short-period (less than three-minute) anomalies. On most of the records, however, detail was preserved with a resolution of about one-half minute by digitally approximating the profile with straight-line segments. The digitization error is five gammas or less. The resulting magnetic field values, at unequally spaced intervals of time, were punched onto cards.

Corrections were made on a small portion of the records to remove the effect of the ship's direct current hull-degaussing equipment. These corrections, which amounted to 20 to 25 gammas, were accurately determined by observing the behavior of the analogue record each time the degaussing equipment was turned on or off.

Regional magnetic field values were computed at all navigational times using the 1965 International Geomagnetic Reference Field updated to 1972 (Babcock, E. B., and Politis, N. H., Grid Values of Total Magnetic Intensity, IGP-1965, 1969, Environmental Sciences Services Administration technical report, Coast and Geodetic Survey, 38, 55 p. incl. computer program). Interpolated values of the regional field were subtracted from all magnetic readings. The values thus computed are plotted as the total field anomaly  $T$ .

Moderate to severe magnetic storms occurred during much of the cruise. To remove time variations from the data, vertical field magnetograms from observations at Barrow or College, Alaska, were digitized on a mechanical digitizer. Vertical field was converted to approximate total field by dividing by the sine of the average inclination at the respective observatories. The total field magnetogram record thus obtained is presented as "plotted magnetogram" on the profiles. The difference between the total field anomaly  $T$  and the magnetogram record was filtered with a 25-minute wide triangular filter in order to remove short wavelength discrepancies between the magnetogram and the total field anomaly records. The filtered difference is presented as the heavy asterisk line in the profiles.

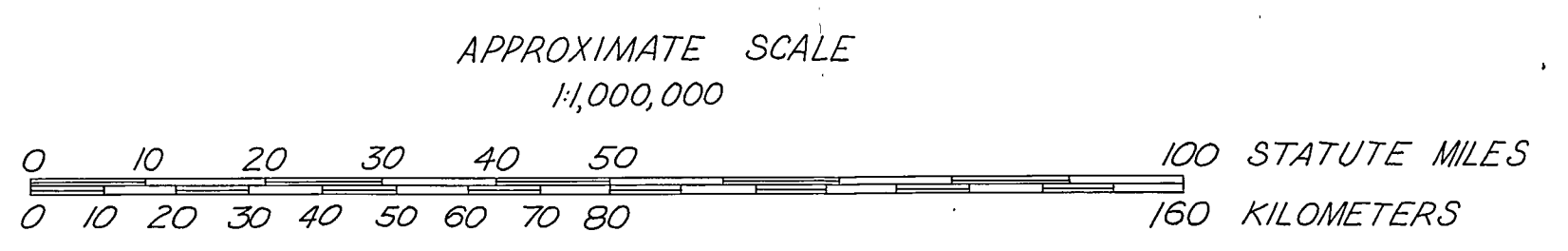
Apparent magnetic anomalies occurring on storm days should be viewed with caution because magnetic storm events occur at somewhat different times at College, at Barrow, and on the ship. The unfiltered total field anomaly profile  $T$  provides the best representation of short wavelength anomalies, particularly on magnetically quiet days. The filtered anomaly profile provides the best representation of long wavelength anomalies on moderately stormy days. Please note that during the stormier intervals the filtered anomaly profile is denoted by the heavy asterisk line in the profiles.

SEISMIC, MAGNETIC AND GRAVITY PROFILES  
CHUKCHI SEA AND ADJACENT ARCTIC OCEAN, 1972  
PART 2. MAGNETIC AND GRAVITY PROFILES by J.W. CADY,  
B.D. RUPPEL, A.G. McHENDRIE AND H.S. DEAS

Location map of magnetic and gravity profiles obtained by U.S. Geological Survey from the U.S. Coast Guard Cutter BURTON ISLAND, August 25 - September 20, 1972.

Position of profile track lines determined by navigation satellite. Hourly positions along track lines are indicated by ticks; half-hourly positions by dots. Hourly positions are generally numbered every six hours (00, 06, 12, 18) to facilitate locating magnetic and gravity features from the accompanying profiles. Track lines are dashed where their location is not well controlled by navigation satellite.

Individual profile track lines (for example, 218-219 and G3-G4) are designated by numerals at their end points. Northernmost limits of track lines determined by position of the Arctic ice pack. Magnetic data are total intensity, recorded with a proton magnetometer polarized every four seconds. Gravity data recorded by a LaCoste-Romberg marine gravity system.



Note: Location of Chukchi Sea seismic and magnetic profiles recorded by U.S. Geological Survey in 1969-1971 and of Chukchi Sea and adjacent Arctic Ocean seismic profiles recorded in 1972 are shown on index map, sheet 2, of this report.