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GEOPHYSICAL STUDIES IN
VICTORIA LAND, ANTARCTICA

by John G. Weihaupt

RESEARCH REPORT NO. 1 - OCTOBER, 1961

6021 South Highland Road
The Highlands
Madison 5, Wisconsin



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ABSTRACT

The geoscientific results of the Victoria Land Traverse, 1959-60 are presented with interpretations and conclusions. The major geographical discoveries, the Arctic Institute Range and the Rennick Glacier, are treated and descriptions and locations given. The presence of a vast ice thickness, which in many cases exceeds 2.0 km. is reported covering Victoria Land and is shown to conceal a major subglacial depression. Subglacial rock topography influences the relief of the ice surface of Victoria Land as seen upon comparison of seismic and altimetric results. The presence of prolonged seismic surface noise is reported and attributed to low temperature phenomena.

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INTRODUCTION

General

The objective of this paper is the presentation of the geoscientific results of the United States Antarctic Research Program (USARP) Victoria Land Traverse of 1959-60, which explored parts of interior Victoria Land, Antarctica and adjoining regions* (Fig. 1). Particular attention is devoted to ice surface relief, subglacial topography, gravity results and the geography and geology of features discovered by the scientific party.

The region under consideration is known as Victoria Land, an area of more than 500,000 sq. km. It lies immediately west of the Ross Sea, just beyond the Admiralty and Prince Albert Mountains, between 145°E and 165°E longitude and between 70°S and 80°S latitude. The mean elevation of the region is estimated to be over 2300 meters.

The treatment of the geoscientific results of the Victoria Land Traverse varies, depending upon the specific discipline being considered. The region is viewed from geographical, geophysical, and geological standpoints, with an attempt to integrate the data from these three fields in order to present as complete a picture as possible of this formerly unexplored part of the continent. Seismological and gravimetric investigations constitute the largest part of the study and compose the majority of the information presented.

Although the paper is based upon scientific results of this traverse, an effort has been made to incorporate information from adjoining areas and other parts of the continent, where such information affects the author's conclusions.

Previous Investigations

Prior to the present study, the geographical province of Victoria Land was largely unexplored. An expedition under the command of Rear Admiral Sir James Clark Ross, in attempting to locate the south magnetic pole, which lay somewhere in the interior of this region, discovered the Ross Sea in 1841 and at that time sighted and named Victoria Land. However, Ross was not equipped for polar land travel, and although he was responsible for this very important discovery, he was unable to locate the magnetic pole.

Sixty years later, during the British National Antarctic Expedition of 1901-04, Captain Robert Falcon Scott of the Royal Navy ascended the Ferrar Glacier and man-hauled his sleds onto the Victoria Land Plateau 400 km. from McMurdo Sound, becoming the first man to view the plateau proper. On this oversnow journey, Captain Scott showed that the polar plateau rises to approximately 2350 m²⁴ at ap-

* Ross Ice Shelf, Skelton Glacier and Wilkes Land.

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proximately 78°S , 147°E . This journey was responsible also for the discovery of the Beacon Sandstone which has since been shown to occur at widespread points on the continent. Scott's party covered a distance of 1170 km. on foot during their fifty-nine day trek.

In 1908 Professor Sir T. W. E. David, a member of Sir Ernest Shackleton's 1907-09 Antarctic Expedition, crossed the Prince Albert Mountains on foot with three other men, to penetrate 390 km. into Victoria Land, reaching the south magnetic pole, $72^{\circ}25'\text{S}$, $155^{\circ}16'\text{E}$ on January 16, 1909. This second effort to explore the Victoria Land Plateau was successful in collecting considerable geologic data²⁵ during the journey up the Larson Glacier. 39

Between 1911 and 1914 Sir Douglas Mawson, leader of the Australian Antarctic Expedition¹⁷, made an oversnow journey, with two ill-fated companions, from the Adelie Coast toward the northern fringe of Victoria Land and proved that the area was an extensive ice sheet similar to that observed by Scott and David on their journeys to the south. Mawson's expedition reached a point at $68^{\circ}50'\text{S}$, $151^{\circ}40'\text{E}$, and demonstrated that the Adelie Coast and Victoria Land were contiguous. His southern party, lead by R. Bage, showed the plateau to reach an elevation of approximately 1800 m at about $70^{\circ}35'\text{S}$, $148^{\circ}05'\text{E}$. This left the interior of Victoria Land yet unexplored but suggested that it was essentially a huge elevated ice-snow plateau. 38

With the commencement of the International Geophysical Year, the French announced plans to make a seismic-gravity study across northern Victoria Land. They were successful, however, in reaching only $71^{\circ}08'\text{S}$, $139^{\circ}11'\text{E}$, a point in Wilkes Land which became the turn-around-point for the Victoria Land Traverse.

The last group to explore this region was Dr. A. P. Crary's US-IGY party which ascended the Skelton Glacier in December 1958 and succeeded in reaching $78^{\circ}03'\text{S}$, $134^{\circ}43'\text{E}$ in southern Victoria Land. Seismic, gravity and magnetic observations were made, the results of which are considered in the interpretation of the present data.

The Present Study

As part of the International Geophysical Year, an Antarctic oversnow traverse program was established with the hope of obtaining detailed scientific information about the unexplored interior of the continent. The methods used were principally those of geophysics, with supporting data from other related fields. The success of the IGY operations led to the creation, at the end of IGY, of the United States Antarctic Research Program, which continued the sponsorship of the Antarctic oversnow traverses, under the auspices of the National Science Foundation. These traverses were administered during 1959-60 by the Arctic Institute of North America.

New Zealand's Scott Base in Antarctica was chosen as the site for the preparation and eventual commencement of the Victoria Land Traverse which was scheduled for departure in early November of 1959. In December, 1958, F. G. van der

11/11/59

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15 Hoeven (geophysicist and traverse leader), A. W. Stuart (glaciologist) and the author secured quarters at Scott Base to begin preparations for the journey ten months later. 90

50 For advance training, the group was flown to a position on the Ross Ice Shelf to join Dr. A. P. Crary's returning traverse for familiarization with the techniques used by his party. This one week's experience proved to be an invaluable guide in planning the operation of the following season. Upon return to Scott Base the new traverse group began preparations for the coming scientific program.

On October 16, 1959, the Victoria Land Traverse left Scott Base with three Tucker Sno-Cats, three sledges and seven scientists.* The party crossed the intervening Ross Ice Shelf 180 kilometers to the Skelton Glacier, $79^{\circ}05'S$, $162^{\circ}15'E$, thence through the Worchester and Royal Society Ranges via the Skelton Glacier to the Victoria Land Plateau (Fig. 1). From this point at $77^{\circ}60'S$, $158^{\circ}30'E$ the Traverse travelled overland to the end point of the French traverse at $71^{\circ}08'S$, $139^{\circ}11'E$ and finally to its terminal point at $72^{\circ}38'S$, $161^{\circ}32'E$ where evacuation of the group was accomplished by U. S. Navy aircraft. The party was in the field 118 days during which time it travelled a total distance of 2462 km., 75% of which was in formerly unexplored territory.

The writer's scientific duties in the field included the operation and maintenance of the seismic equipment, drilling, charging and detonating the seismic shots, operation and maintenance of the gravimeter and the investigation of geologic features, as well as routine meteorologic and altimetric observations.

Scientific Program

The traverse scientific program can be divided into five disciplines. Seismological, gravimetric, and magnetic investigations were carried out by F. G. van der Hoeven and the author. Seismic reflection shots were made at 80 km. intervals, with periodic refraction records for ice thickness when reflection results were poor because of prolonged surface noise. Gravity and magnetic observations were taken at roughly 5 km. intervals.

Glaciological studies were conducted by A. W. Stuart and A. J. Heine and included ice movement studies, glaciological pit studies and bore holes. Relative ice movement, temperatures, densities, stratigraphy and other near surface snow and ice properties were recorded.

The meteorological measurements consisted of periodic observation of cloud cover, temperature and wind direction and velocity. C. Lorus engaged in studies of albedo and of the oxygen isotope content of snow, while W. M. Smith observed and recorded the psychological aspects of small group behavior under conditions of isolated polar travel. These fields constituted the pre-planned

*The final team consisted of one Dutchman, one New Zealander, one Frenchman and five Americans.

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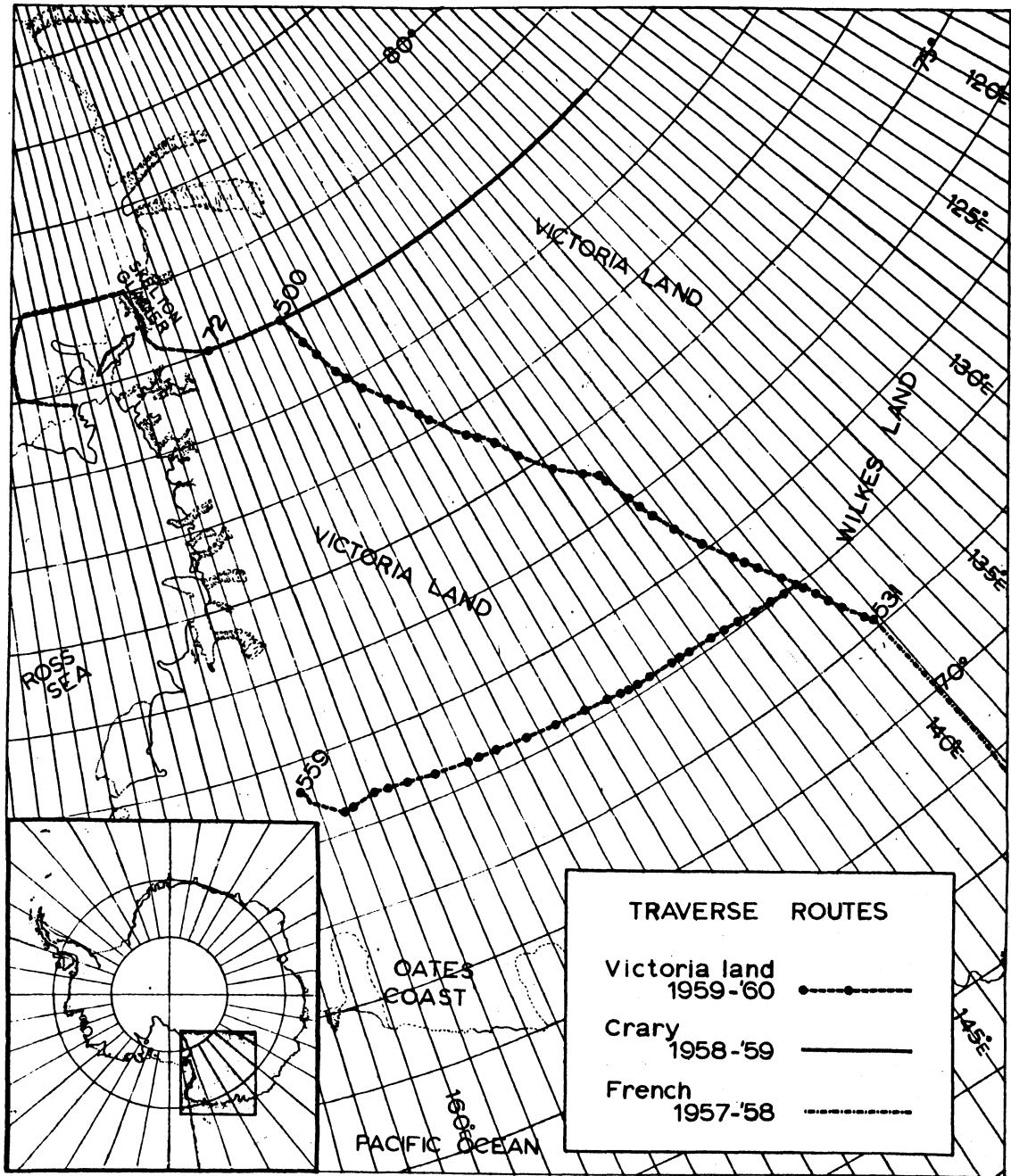


Fig. 1. Antarctic continent showing region of the present study and recent Victoria Land traverse routes.

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scientific program, whereas the disciplines of geography and geology were entirely dependent upon the discovery of unknown features and were, therefore, not included in the daily scientific program. These disciplines are both treated in this paper, however, as features of considerable scientific interest were encountered during the course of the journey.

Those disciplines dealing with glaciology, meteorology, physics and psychology are being treated separately by the respective specialists of the scientific party.

Stations, Locations, Elevations

During the initial portion of the traverse over the Ross Ice Shelf, the Skelton Glacier and the first 105 kilometers of the Victoria Land Plateau, the station numbers established by A. P. Crary in 1957-58 were used in order to avoid confusion. As the same route was taken by both traverses to a point at 78°02'S, 154°06'E, Crary's numbering system proved satisfactory. At the turn-off location (Crary's station number 84), the Victoria Land Traverse adopted an independent numbering system for identification of major stations and intermediate stops, in order to differentiate between the two traverses. Beginning with number 84 (number 500 of the new system), overnight stations were numbered consecutively from 500 to 559, the end point of the traverse. Intermediate stops which were made at hourly intervals for altimetric, gravity, magnetic and meteorologic observations were numbered alphabetically, 501 A, 501 B, 501 C, etc., following the last major station, 501, (Appendix I).

Sunshots with a Wild theodolite and dead reckoning were employed as the basis for navigation and for the location of major stations of the 500 series (Appendix I). Lack of time and occasional cloud cover prevented more accurate location in most cases. On the Ross Ice Shelf, positions were established by resection of known geographic features. Near the termination of the traverse two stations (558 and 559) were accurately located from a minimum of twelve sunshots each. Accurate positioning of these stations was desired for the triangulation and location of neighboring, formerly uncharted mountains. All intermediate stops were located by measuring the distance traversed from the previous major station by means of a meter wheel attached to the rear of one of the sledges. Two of Crary's major stations on the plateau, 72 and 84, were determined to be two miles and one mile, respectively, east of the position reported by his group a year earlier. (The error in station location is believed to be less than one mile).

Elevations of all major stations and intermediate stops were determined by two Wallace and Tiernan 0-5000 meter altimeters. A system of multiple altimetry was used in which one vehicle with an altimeter would travel one hour, stop and contact the second vehicle by radio. At this time, both would read their respective instruments. The lead vehicle crew would then mark its position with a flagged bamboo pole and move ahead for another hour, while the second vehicle advanced to the flagged position. The system was then repeated, with an accuracy estimated to be within plus or minus fifteen meters.

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Crary's station 93 ($77^{\circ}53'S$, $167^{\circ}26'E$), which was tied to coastal Scott Base by a 1957-58 overland traverse, was taken as the beginning point of the elevation profile. This point is twenty-five meters above sea level. During the ascent of the Skelton Glacier, elevation control was temporarily lost because of the necessity of travelling together in heavily crevassed areas. Control was regained, however, once the Plateau Depot (station 72, elevation 2316 meters, $78^{\circ}01'S$, $158^{\circ}35'E$) was reached; fairly accurate elevation had been established for this position a year earlier. A total discrepancy of thirteen meters was found as a result of this loss of control and was subsequently corrected by subtracting this amount from apparent elevations obtained over the uncontrolled segment. Between stations 72 and 84, a measured decrease of forty meters is in agreement with the average of two determinations (34 and 46 meters) of the previous season. Using the elevation of 2316 meters for station 72, the figure of 2513 meters, obtained later at the French Station B-61 after traversing 1071 kilometers, is in excellent agreement with the French figure of 2510 meters and lends support to the reliability of this method of elevation determination.

The final station occupied by the party was calculated to be 1770 meters above sea level as compared to the figure of 1667 meters determined from aircraft altimetry at the time of evacuation. The discrepancy is believed to be due to the lesser accuracy of the aircraft method caused by the relatively great distance between the aircraft altimeter and its reference base at McMurdo Sound. Correction for wind and outside temperature was applied throughout the elevation profile, according to the method outlined by Bentley and Ostenso³.

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GEOGRAPHICAL RESULTS OF PROGRAM

General

The first major geographical feature encountered was the already known and explored Ross Ice Shelf which provided a route for the three oversnow vehicles to the Worchester and Royal Society Mountains. The route over the Ice Shelf roughly paralleled the mountains to the west at an average distance of 50 km. No new feature was discovered in this area.

The second already explored feature was the Skelton Glacier, 70 kilometers long and lying between the Worchester and Royal Society Ranges. This glacier was used as an access route by Crary the year before and prior to that by the British Trans-Antarctic-Expedition under Sir Vivian Fuchs and Sir Edmund Hillary¹². The glacier is sixteen kilometers wide at its foot, from which it rises more than 2200 meters to the Victoria Land Plateau, the third major feature, the interior of which had not yet been explored. The exploration of Victoria Land began, in effect, at 78°02'S, 154°06'E where the party began its northwesterly crossing to B-61, end station of the French Traverse at 71°08'S, 139°11'E. A distance of 967 kilometers was traversed between these points with a maximum change in ice surface elevation of 316 meters, (Appendix I), showing the region to be one of very low relief.

Countless waves of hard sastrugi persisted along this part of the route, measuring up to two meters vertically from trough to peak, and often extending 50 or more meters horizontally. No geographical features, other than the high plateau proper, were found on this portion of the journey. Crevasses were not found in this region.

Local Ice Surface Relief (71°30'S, 141°30'E)

From the traverse turn-around point at 71°08'S, 139°11'E, the field party detoured south over the old trail rather than toward the Tucker Glacier, because of a reported area of crevasses immediately ahead on the proposed traverse route. The following description was received by radio from a resupply plane which flew the proposed route two days earlier:

"P2V on drop of 23 December flew track zero-six-seven degrees to four-seven from Hallet Station to your position (71°08'S, 139°11'E). Reconnaissance of terrain enroute. Pilots and navigator report zone of crevasses on their course between 141 and 142 degrees east at 71°40'S. Consists of series of numerous crevasses or rifts perpendicular across track and extending out of sight to true south. A crevasse field parallel with course to true north dropped away out of sight. Rifts described as one (and) three quarters to mile and half wide (apart?). Rifts appeared to be one hundred to three hundred feet wide with sheer walls perhaps thirty to forty feet high. Plane radar got good returns at twenty miles. Some crevasses to true north bridged, some not. Suggest that attempt to by pass rifts be made to true south---."

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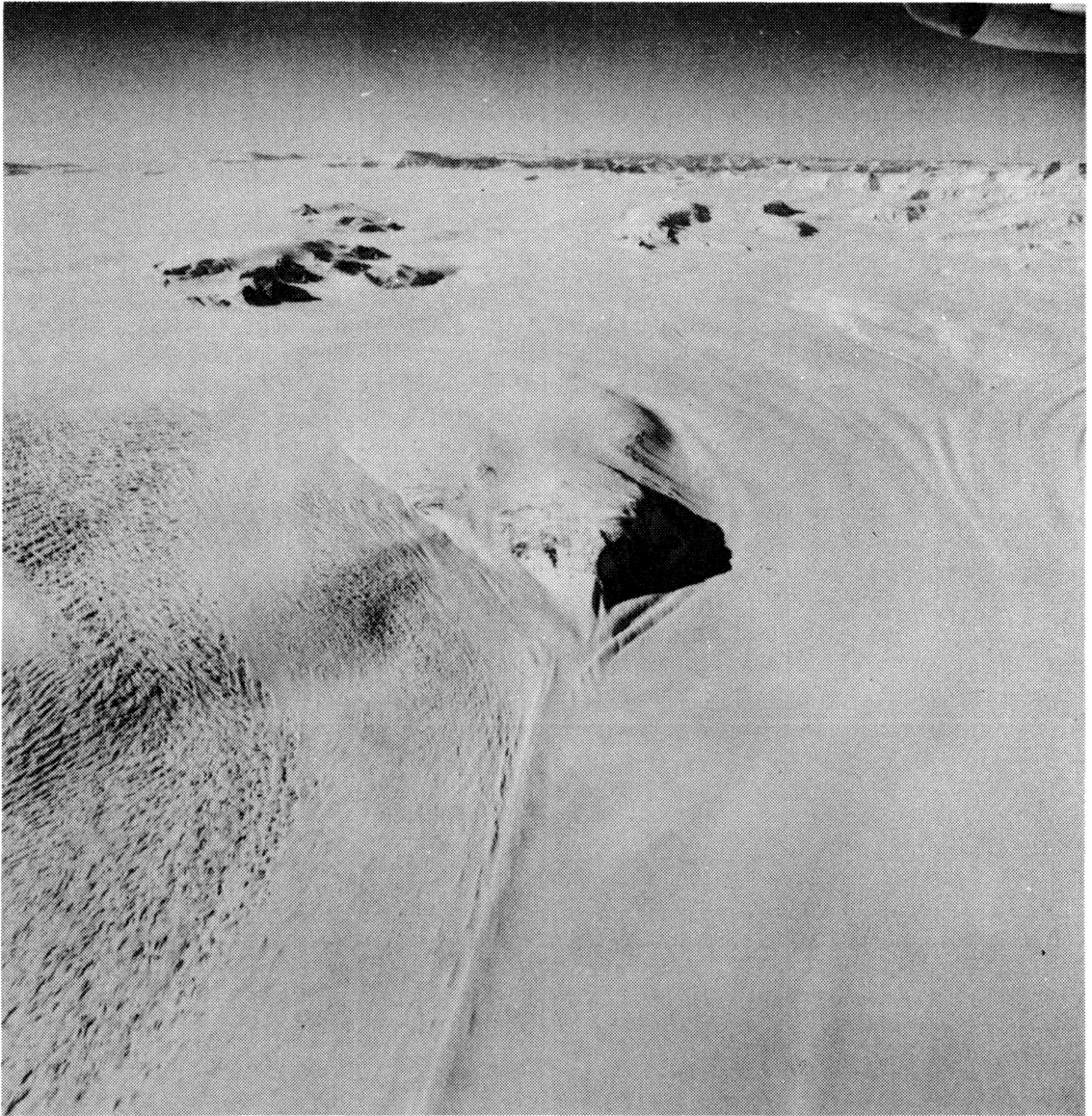


Plate 1. Upper Skelton Glacier; Victoria Land Plateau beyond mountains in background, looking north. Clinker Bluff center.

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The route was altered to 93° true, therefore, to return to $72^{\circ}03'S$, $140^{\circ}36'E$ whence a course was set to $72^{\circ}23'S$, $158^{\circ}45'E$, an overland distance of 650 kilometers. By rerouting the track south, the traverse party avoided the crevassed area reported above. The low relief encountered on the previous leg of the journey persisted over this portion of the route with the exception of a zone of undulating troughs and basins which was crossed just south of the crevassed area reported by the aircraft. This topographic change is treated in greater detail under Discussion and Conclusions.

Smooth Plateau Surface ($71^{\circ}10'S$, $149^{\circ}40'E$)

The rough surface which typified the plateau during most of the journey changed radically at $72^{\circ}10'S$, $149^{\circ}40'E$ from high, irregular, hard waves of sastreugi to a very flat level surface. At this point the wind direction changed from the usual 180° or 170° in the morning, to 93° by evening. This shift in wind direction is the only evidence observed which seems to account for the radical change in the surface.

Arctic Institute Range*

On January 30, 1960, from a position at $72^{\circ}23'S$, $158^{\circ}45'E$ the party sighted a mountain peak ahead, 20° right of its 93° true heading. The mountain, tentatively named Flattop Mountain, appeared mesa-like in form and dipped slightly to the east. Cloud cover soon obscured the mountain, but on January 31st from the same position a clear sky revealed four peaks on the horizon. The following day, as the party advanced to $72^{\circ}16'S$, $159^{\circ}49'E$, an entire mountain range came into view, trending very nearly north-south. As the nearest peaks were approached, the ice surface became undulated with a maximum estimated relief of 50 to 100 meters. Crevasses were visible on the crests of the "ice swells" where they were in close proximity to the flanks of mountains.

Ten days of investigation and survey from ground and air revealed an extensive range extending from the Oates Coast in the area of Rennick Bay to at least $73^{\circ}30'S$ latitude and limited in its westerly extent to about $160^{\circ}E$ longitude. No limit was observed to the east. Mountain peaks were visible for a minimum of forty miles in that direction and were seen to extend to the Ross Sea in the area of Wood Bay and Mount Monteagle, indicating that the range occupies an area 260 km. by 130 km. Positions of peaks in the vicinity of the parties' last station, $72^{\circ}38.0'S$, $161^{\circ}31.8'E$, were intersected and elevations calculated** (Appendix V). Of twenty-two intersections, the maximum elevation measured is 2965 meters for Flattop Mountain, $72^{\circ}39.3'S$, $160^{\circ}04.9'E$; the average elevation of the twenty-two peaks is 2398 meters. The maximum local relief is 1236 but is found in most cases to be 300 to 600 meters.

* Suggested name, not yet approved by the Board on Geographic Names.

** By L. J. Roberts, U. S. Geological Survey.

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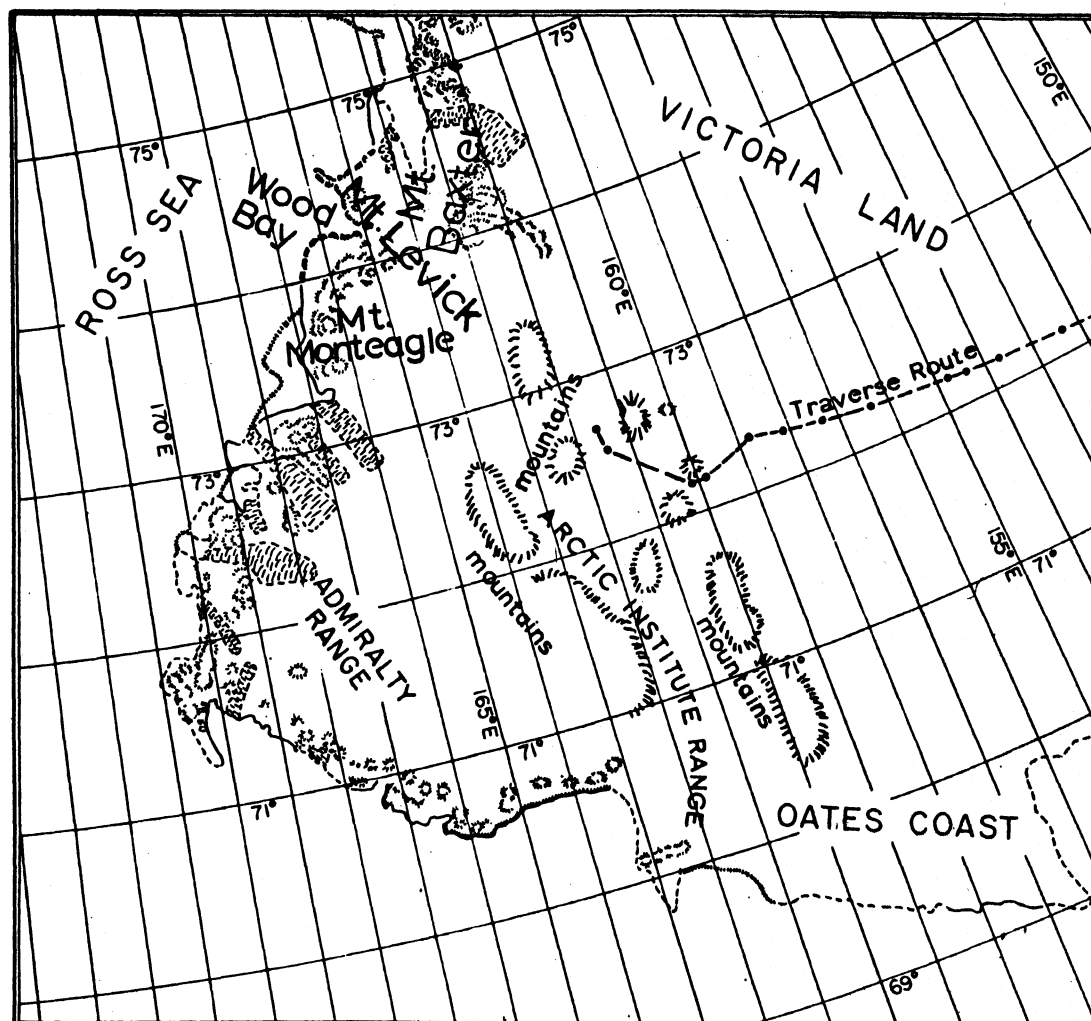


Fig. 2. Victoria Land, showing terminal end of Victoria Land Traverse and location of the Arctic Institute Range. Sketched mountains are approximately correct.

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Rennick Glacier

During aerial evacuation of the traverse group, an aerial photo reconnaissance was made to Rennick Bay. During the reconnaissance a new and sizeable glacier was discovered, which finds its terminus in the vicinity of Rennick Bay. This glacier has been tentatively named Rennick Glacier (Plate 2). The head of Rennick Glacier is believed to be located slightly south of the last station occupied by the Victoria Land ground party at $72^{\circ}38.0'S$, $161^{\circ}31.8'E$. Although the party was unable to continue south of this point, because of the lateness of the season, the glacier valley appeared to continue at least fifty kilometers in that direction, indicating a minimum length of 260 kilometers (Fig. 3). Many tributary glaciers were noted, the more distinguishable ones entering the main valley from high, well defined mountains to the east. The most prominent of these enters from the southeast in the area of $72^{\circ}00'S$, $162^{\circ}30'E$ and is perhaps eight kilometers in width. The width of the main glacier varies from 50 to 80 kilometers, the broadest area occurring at latitude $72^{\circ}00'S$ where the glacier assumes the appearance of a broad, relatively flat, ice filled valley.

On the west, the glacier is bounded by comparatively low lying and sporadically spaced mountains and nunataks (Plate 3) which separate it from the Victoria Land Plateau proper, thereby defining an irregular limit on that side of the glacier. These mountains appear to be geologically different from those found on the eastern side (Plate 4) where the glacier is sharply delineated in a comparatively straight north-south line. The mountains there are higher, rising directly out of the glacial valley, and occupy a large region east of the glacier, whereas the western line of mountains is interspersed with broader tributary glaciers. In the area of $71^{\circ}50'S$ a large nunatak temporarily divides the glacier as it flows north.

A prominent elevation drop takes place at $71^{\circ}40'S$ as the glacier moves toward the coast (Fig. 4). Between $72^{\circ}00'S$ and $71^{\circ}30'S$, a distance of 50 kilometers, the elevation decreases 1150 meters as indicated by aircraft altimetry. Since this type of measurement is subject to some error, the true figure may be less, but there is no doubt that a major elevation change takes place. The maximum elevation of the glacier is probably in the range of 1500 to 2000 meters, except near its western limits where it fuses with the Victoria Land Plateau at an elevation of more than 2300 meters. Near $71^{\circ}20'S$ the glacier approaches sea level and maintains this general elevation to the coast.

The comparative volumes of ice contributed by either side could not be accurately estimated at the time of the reconnaissance; however, that contributed from the western side is in the form of broader, less distinct glaciers, suggesting a greater supply from the Victoria Land Plateau.

At the coast the plot of the aircraft flight line did not coincide with the center of Rennick Bay or Bower's Hills (Plate 5) as plotted on existing maps, although the aircraft was over the center of the bay. Figure 3 shows the configuration and location of Rennick Glacier and its terminus in Rennick Bay, indicating that the mouth is substantially larger than was previously thought. It is important here to point out that the lateral limits of the glacier, including tributary glaciers, as indicated on the map (Fig. 3) are the result of sketches



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Plate 2. Rennick Glacier with western line of bordering Arctic Institute Mountains background, (Photo from 900 meters above terrain) looking northwest. Note heavy crevassing foreground.

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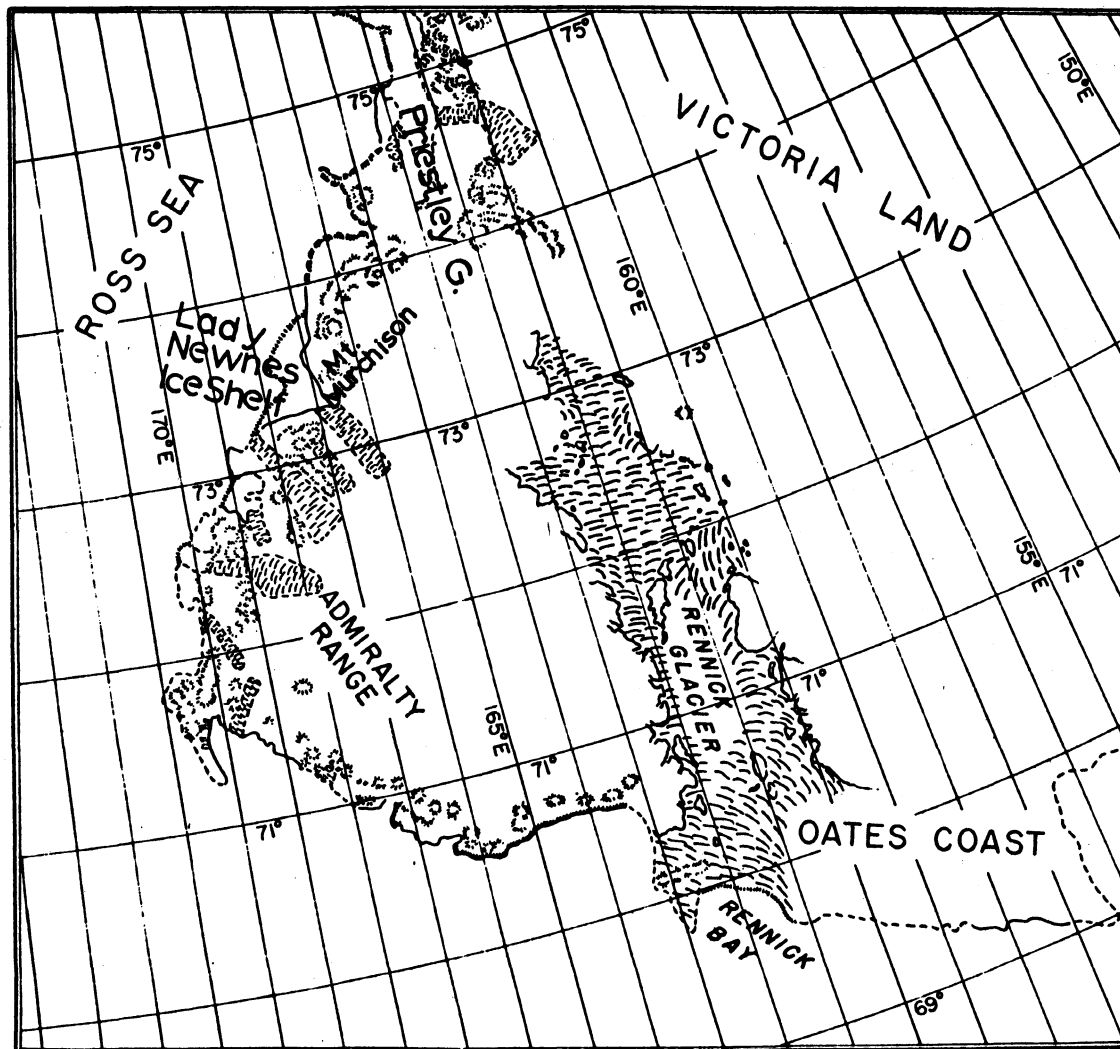


Fig. 3. Victoria Land showing limits and configuration of Rennick Glacier, from sketch material and fifty-eight overlapping aerial photos.

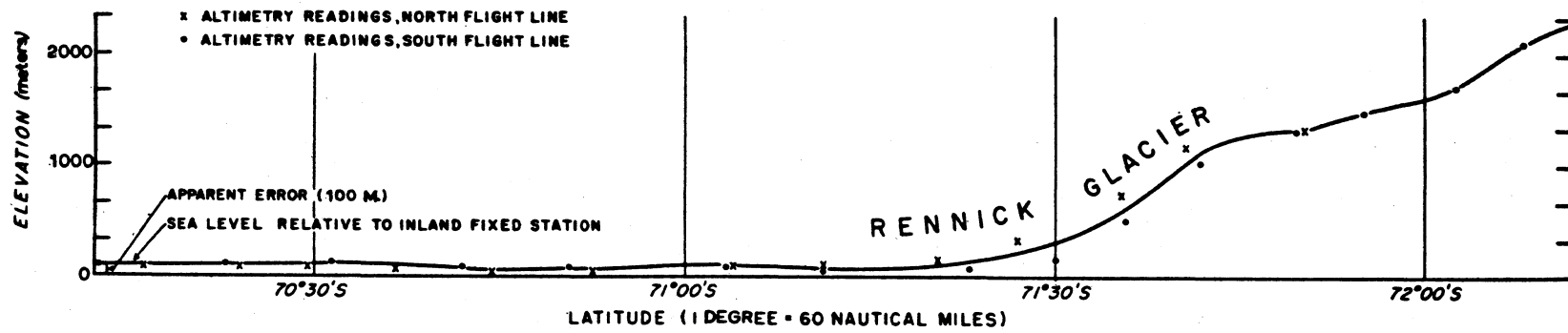


Fig. 4. Cross section of Rennick Glacier, looking east. Note prominent elevation change near $71^{\circ}40'S$. Elevations determined by aircraft altimetry and radar.



Plate 3. Western margin of Rennick Glacier showing sporadically spaced mountains of the Arctic Institute Range. Looking west. (Photo from 1500 meters above terrain)



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Plate 4. Arctic Institute Mountains along eastern edge of Rennick Glacier. Looking east. (Photo from 1830 meters above terrain)



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Plate 5. Bowers Hills on eastern side of mouth of Rennick Bay, looking east. Sea ice and South Pacific Ocean background. (Photo from 1800 meters above terrain)

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made during the reconnaissance flight, which have been used in conjunction with fifty-eight overlapping, oblique aerial photographs. The result is that the outline and position of these features are approximate, although the scale and general outline are believed to be reasonably close. Since the flight originated over a position fixed by solar observation, it is believed that this plot for the seaward end of Rennick Glacier is more nearly correct than implied by existing maps.

Lady Newnes Glacier*

Lady Newnes Glacier, although reasonably well fixed, is not as well defined as the Rennick Glacier and is smaller in extent. It was seen only briefly and neither sketches nor usable photographs are available. Its origin is believed to be in the area of $73^{\circ}S$, $163^{\circ}E$ from which it flows to a point around $73^{\circ}21'S$, $165^{\circ}00'E$, then into the Lady Newnes Ice Shelf, its lower limits passing between Mount Murchison and Mount Monteagle. Its total length is estimated to be 115 kilometers.

Whereas the Lady Newnes Glacier was observed flowing east to the Ross Sea, the upper limits of the Priestly Glacier were reported by the pilot to extend north from the Priestley's terminus to approximately $73^{\circ}30'S$, $163^{\circ}15'E$ near the origin of the Lady Newnes Glacier (Fig. 3). This suggests a common general area of origin for the Lady Newnes, the Priestley and the Rennick Glaciers.

*Suggested name for the newly discovered glacier; not yet approved by the Board on Geographic Names.

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GEOPHYSICAL PROGRAM

The traverse operation schedule was divided into three day units on the assumption that an average of 50 to 80 kilometers would be traversed in two days. The first two days were devoted to travel and the third to establishment of a seismic-glaciological station. The usual gravity and magnetic substations were established during the travel days at intervals of approximately 5 kilometers.

Seismology

The seismic program was designed to measure the thickness of the continental ice sheet of Victoria Land and thereby to determine the subglacial continental elevation in that region. Seismic control was then used to tie intermediate points of the gravity profile for more detailed subglacial topographic determination.

A Texas Instruments 7000B seismograph with a frequency range from 5 to 500 cps was used for all seismic depth determinations. A twenty-four trace system was employed in which each trace represented a single 20 cps vertical component seismometer. Four banks of six amplifiers each were used in conjunction with the standard 7000B camera oscillograph, control unit and dynamotor.

DuPont Seismograph 60% Hi-Velocity Gelatin explosives were used in all reflection work; DuPont Nitramon with Nitramon primers in one to four pound units gave the most satisfactory reflection results. A Texas Instruments shot box and DuPont electrical blasting caps were used to detonate all charges.

At each major station, a hole was drilled to a depth of sixteen meters with a SIPRE (Snow, Ice, Permafrost Research Establishment) aluminum hand auger.* A drilling time of two and three-quarters hours by two men at 3000 m elevation was found to be the absolute minimum time required for this operation although generally accomplished in three hours. Once a hole was finished, it was covered until preparations for detonating the first charge were completed. During this time a thermohm was lowered into the hole for temperature determination; ice cores were measured and weighed for densities.

In reflection shooting, a geophone spread of 732 meters in an "I" pattern with 366 meters on each leg was used for dip and depth determination; geophones were separated 30.5 meters and planted immediately beneath the snow surface. All geophones measured the vertical component of ground motion. Two geophones were placed at the collar of the hole to insure an uphole time. The observer operated the seismograph inside the vehicle, while a second man detonated the charge outside. Amplifier settings were varied, sometimes using combinations. Low cut filters were always set at 30 cps, high cut filters at 215 and 320 cps. Best results were usually obtained with a one pound Nitramon primer and a one pound charge of

* Seven centimeter diameter by 1 meter long coring head, with one meter removable rods.

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Nitramon with amplifiers set with a 30-215 cps pass band; the maximum paper speed (83 cm/sec) was used for all reflection shots. A total of 69 reflection shots was recorded at 17 stations.

Prolonged surface noise at the beginning of reflection records tended to obscure early returns. The seismic records showing particularly bad surface noise are between Station 500 and 519 where returns are often obscured. Depths at these stations were determined and subsequently compared with depth determinations at five points from the 1958-59 traverse to the south, with good agreement. This confirmation led to use of these points for adjustment of the free air gravity profile to the actual (seismic) rock surface.

A limited number of refraction seismic measurements were also made. It was found that a spread distance of seven to twelve kilometers was needed for satisfactory returns and that the critical distance was usually about eight kilometers from the shot point. In most cases an eight to ten meter hole was enlarged at the bottom by detonating one to four pounds of Nitramon. After the hole had cooled, 200-250 pounds of explosive were dropped into the cavity.

Since the time break (shot instant) is essential in refraction work, a system of CW radio communication was employed (Fig. 5). At the moment of detonation of the charge, an electrical blasting cap broke the wire connection between the sending key and the transmitter, thus interrupting the signal being recorded on the seismic record at the recording point. This signal interruption provided a time break.

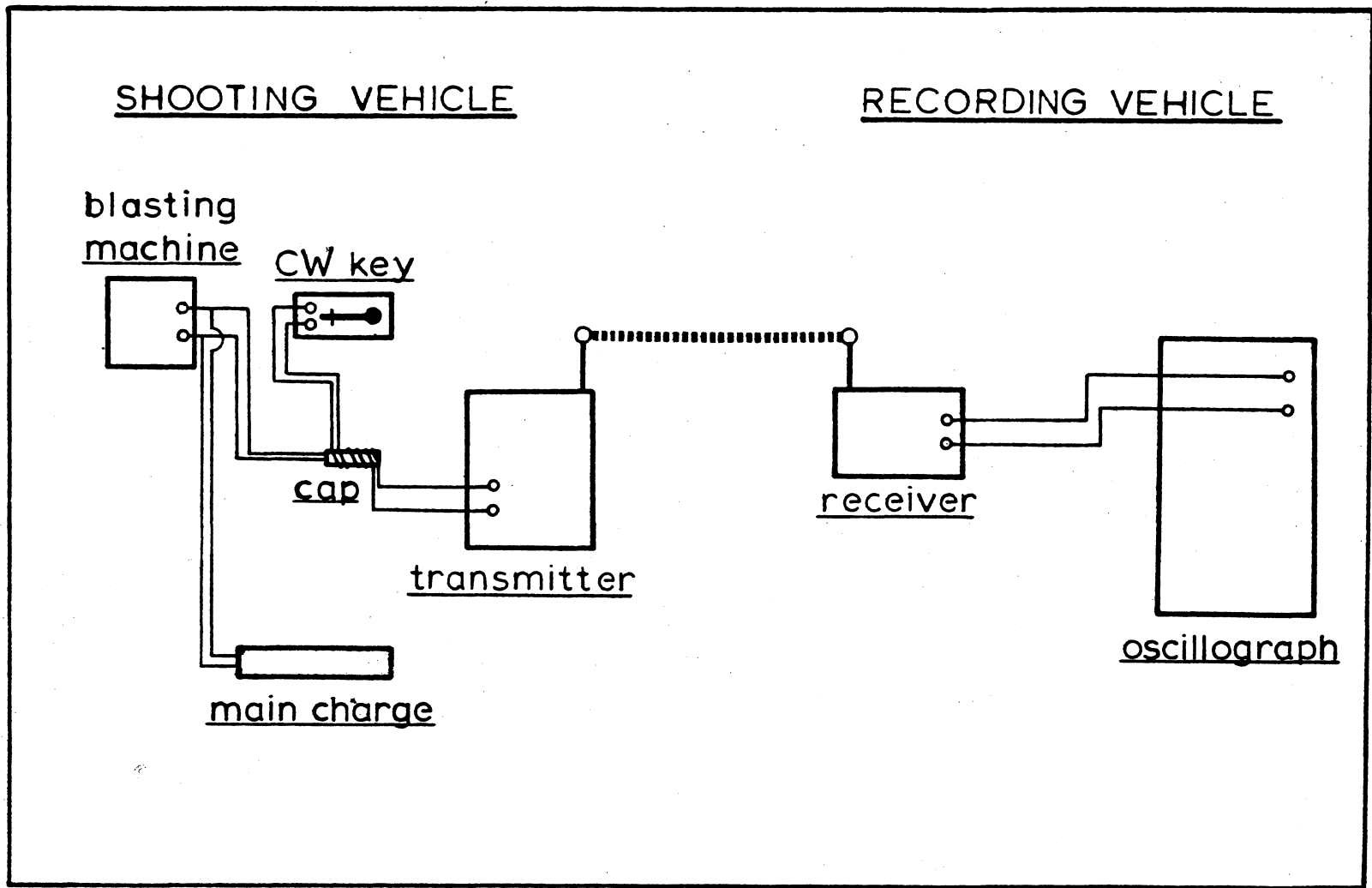
A paper speed of 17 cm/sec was used for all refraction records, with amplifiers at three levels 10 db. apart. All low cut filters were out and the high cut filters set at 92 cps. Six refraction records were taken.

Final reduction of the seismic data was done at the University of Wisconsin. All records were timed and picked for primary and secondary reflections. Calculations of the depth of the ice-rock interface from seismic reflections were made by standard methods.

Determination of ice velocity was made from the refraction data and compared with results obtained by Crary for Victoria Land ice velocity. These values are in reasonably close agreement. (Crary: 3880 m/sec, Victoria Land Traverse: 3856 m/sec*).

An ice velocity of 3880 m/sec was used in the final calculation of reflection depths. This figure represents the velocity in ice below 150 meters. From 15 to 150 meters a near surface low velocity correction was applied to allow for the additional time required for energy to traverse the poorly compacted, low density surface firn. This correction was made assuming a constant change of velocity with depth, between the velocities at 10 meters, 20 meters, 40 meters, 80 meters, and 150 meters, (Table I) and then allowing for the depth of shot. A corrected time

* An average velocity determined by the Russians for vertically travelling waves in East Antarctica is 3750 m/sec, \pm 50 m.²⁸



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Fig. 5. Diagram of system for determining time break in refraction shooting. Blasting cap is detonated with main charge, breaking circuit between CW key and transmitter, thereby interrupting signal being recorded in oscillograph.

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was then obtained by using the formula:

$$t = t' + t_{uh} - 2f$$

where t equals the corrected reflection time, t' the reflection time as picked from the seismic record, t_{uh} * the uphole time and $2f$ the near surface low velocity correction between 15 and 150 meters depth, where $f = .04172$ (actual one way travel time, 15-150 meters) - $.03408$ (apparent one way travel time, 15-150 meters at 3880 m/sec) = $.00764$ sec (near surface correction).

Table I

Variation in near surface ice velocities due to lower density firn:⁸

<u>Depth (m)</u>	<u>Velocity (m/sec)</u>
0	1000
10	1850
20	2350
40	2950
80	3500
150	3800

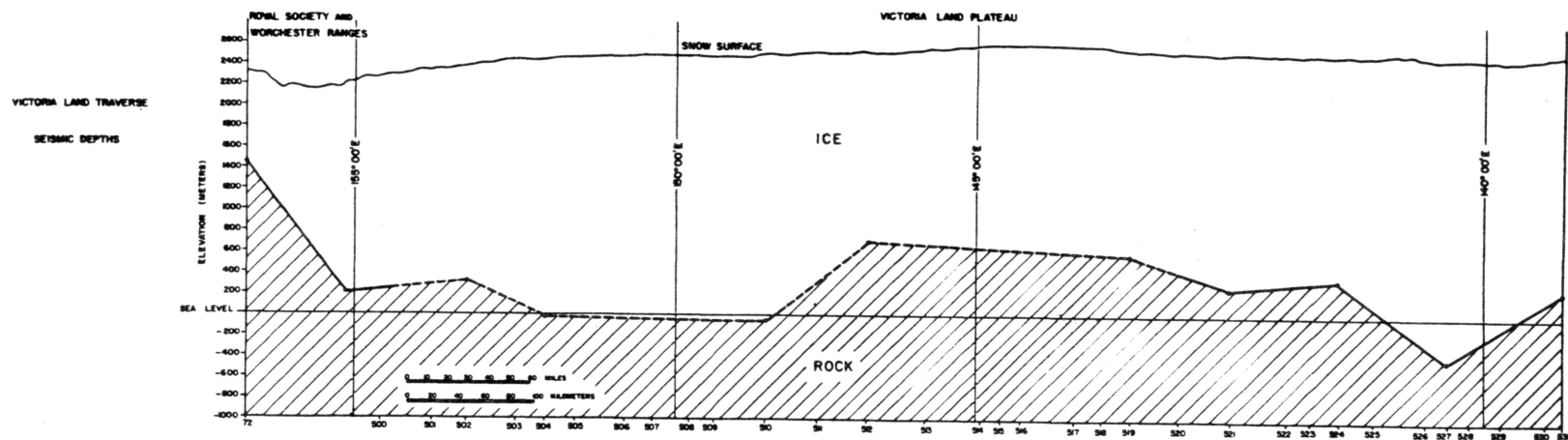
Depths and surface elevations were then plotted in cross-section (Figs. 6 and 7), from station 72 to 531 and from 531 to 559.

Analysis of the seismic results shows a pronounced drop in the elevation of the subglacial rock surface just west of the Worchester, Royal Society and Arctic Institute Mountain Ranges. The surface then gradually rises to the west, defining a trough parallel to the mountains with a lower elevation on the northern end. It appears to be 300 km. across at the widest point measured. A maximum rock surface elevation of 1720 meters was measured at the last station occupied (Station 559) which lies on the Rennick Glacier east of the plateau. A maximum ice thickness of 3254 meters was recorded at Station 536, indicating a rock surface elevation of -898 meters.

Gravimetry

A gravity program was included as part of the geophysical studies in order to chart in as much detail as possible the subglacial topography, and for the purpose of determining the elevation of the Mohorovicic discontinuity in this region. Crary's station number 72 was used as the base station for the gravity traverse, since it had been tied to the International Potsdam Datum through NAF McMurdo by the traverse of the previous year and again by E. S. Robinson's air-

* Although t_{uh} is less than the travel time over the same distance by a reflected wave, because of an explosive velocity greater than the velocity in ice, the difference is negligible.



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Fig. 6. Seismic rock depth profile of South Leg from Station 72 to 531. (Station numbers on lower scale; dashed lines connect seismic points which showed excessive background noise)

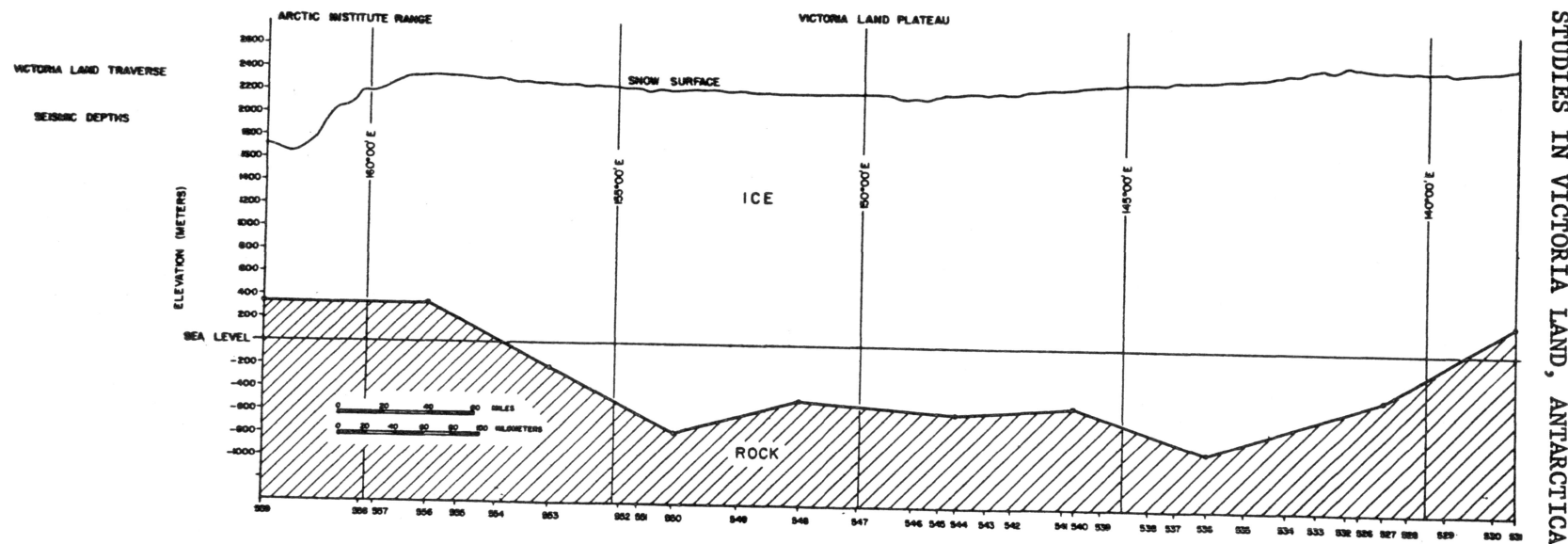


Fig. 7. Seismic rock depth profile of North Leg from Station 531 to 559. (Station numbers on lower scale)

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borne determination at the time the station was occupied by the Victoria Land Traverse 1959-60. Good seismic depth control is also available at this station.

With station 72 as base, gravity observations were taken at approximately 5 kilometer intervals with Frost gravimeter Number C-3-65. Over the 2468 kilometer route, roughly 400 observations were made and subsequently tied to seismic control for profiling the relief of the ice-rock interface. The Frost gravimeter was operated from a 24 volt power supply and thermostatically controlled to maintain a constant 107° F temperature. The meter was essentially free from drift, showing a variation of .1 milligal upon reoccupation of three stations, and .6 milligal for the fourth reoccupied station. These stations were reoccupied at intervals of three to seven days. The overall drift is not known, however, since a direct airborne tie from the last station to NAF McMurdo was not possible because of the limited range of the gravimeter. Gravity errors caused by drift are of a lower order of magnitude than the error in gravity anomaly caused by an elevation error; consequently a drift correction was not applied.

At each gravity stop the gravimeter was read upon a tripod which protruded through a hole in the vehicle floor. As the gravity meter was read within the vehicle, it was possible to minimize the effects of outside wind and blowing snow. Gravity observations were made at all seismic reflection and refraction stations. At major stations the instrument was read at hourly intervals in order to detect possible drift or external interference. No substantial change was recorded, with one exception.

At the completion of the plateau portion of the traverse and shortly after the Arctic Institute Mountains were penetrated, the gravity meter began to behave in an unreliable manner. At station 558, after good readings the previous day, the cross hair on the instrument began to drift visibly, with the result that it was impossible to bring the instrument to an equilibrium position for a later reading. Repeated checks of instrument leveling and instrument temperature showed both to be satisfactory. The constant unidirectional drift was not resolved at that station; periodic readings were made, however, in order to plot the drift.

Upon continuation of the traverse toward station 559, the instrument resumed normal function without evidence of the earlier recorded drift. The next station, 558A, was occupied and the instrument read without difficulty. The gravity values between stations 558 and 559 are therefore not considered wholly reliable, although seismic control at stations 556 and 559 is good, giving reliable depths at this end of the traverse.

A second problem encountered in gravity observation was the limited range of the gravimeter, which was not designed to measure a change in excess of 110 milligals without resetting. Since the variations in observed gravity were much larger than this, particularly in ascending the Skelton Glacier, frequent resetting was necessary.

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Reduction of gravity data was begun by first referring all observations, in the form of dial readings, to the base station (72) and subsequently converting these results to milligals using the gravimeter's conversion constant of 0.08598 milligals per dial division.

The free air anomaly for each of the 391 stations was obtained by correcting observed gravity 0.3086 milligals per meter of elevation and comparing the result with theoretical sea level gravity for the given latitude of the station, using the International Formula (adopted in 1930) as follows:

$$G = 978.0490 (1 + 0.0052884 \sin^2 \psi - 0.0000059 \sin^2 2\psi)$$

where ψ = latitude

Actual computation was done on an IBM 650 electronic digital computer. By assuming ice and sub-ice rock densities of 0.90 gm/cc and 2.67 gm/cc respectively with a resultant density difference of 1.77 gm/cc, it is found that 1 milligal corresponds to a change of 13.5 meters in ice thickness on the basis of the gravity effect for a semi-infinite slab.

$$g_z = 2 \uparrow \pi \sigma t$$

$$1 = .04185 \times 1.77 \times t$$

$$t = \frac{1}{.04185 \times 1.77} = 13.499 \text{ meters/mgl}$$

where g_z equals the gravitational attraction in milligals, \uparrow the gravitational constant, σ the density difference between 2.67 gm/cc and 0.90 gm/cc in this case, and t the thickness of the plate.

Analysis of the unadjusted free air gravity profiles (Figs. 8 and 9) shows a marked decrease in the free air anomaly immediately west of the mountains as the Plateau is approached. This anomaly exists adjacent to the mountains in both areas where the mountain-plateau junction was crossed. Upon entering the Arctic Institute Range, 72°22.6'S, 158°45.0'E, a wide variation in gravity was observed in contrast with the generally more gradual changes observed on the plateau. In the area of 72°25'S, 142°00'E, however, a strong gravity anomaly was observed over the plateau, representing a total free air anomaly change of 147.3 milligals on the southern leg of the traverse and 142.9 milligals on the northern leg; these changes took place over distances of 77 km. and 105 km. respectively. A second anomaly was prominent at approximately 72°10'S, 149°00'E, showing a maximum free air anomaly change of 26.4 milligals over a distance of 18.5 kilometers.

In general the unadjusted free air gravity profile diverges somewhat from seismic depths on both north and south legs of the traverse, although there is broad general agreement. Treatment of adjusted gravity and both anomalous areas are covered more thoroughly under Integration of Results, Discussion and Conclusions.

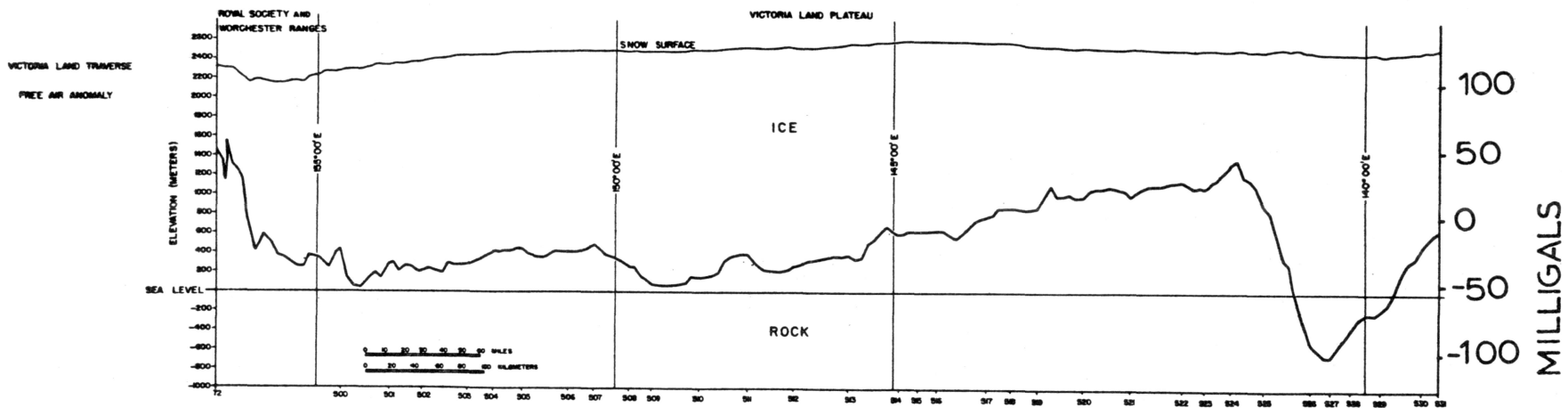


Fig. 8. Free air anomaly of South Leg (left scale converted to meters) from Station 72 to 531. (Station numbers on lower scale)

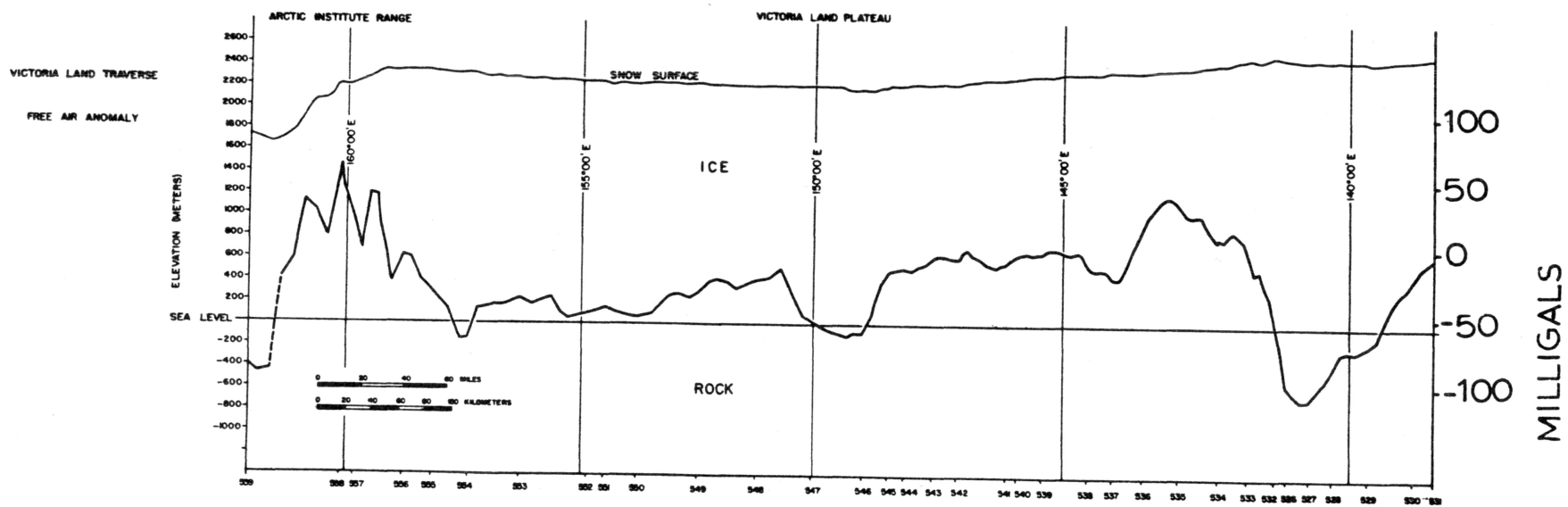


Fig. 9. Free air anomaly of North Leg (left scale converted to meters) from Station 531 to 559. (Station numbers on lower scale)

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One source of error in using gravimetry as opposed to seismology, as an aid in determining ice thicknesses, is that gravity measurement averages the attraction of an area and is affected by local topography, whereas seismic reflection gives rock depth at a point. Other inaccurate conclusions may be drawn by the assumption of incorrect densities and by improper allowance for isostasy.

A maximum difference of 2.0 to 2.5 km. between seismic and gravity results for determination of ice thickness in East Antarctica is reported by Sorokhtin²⁸. This 300% to 350% adjustment of gravity, in terms of the depth of the rock surface determined seismically, is attributed by Sorokhtin to an increase in the thickness of the earth's crust inland. This difference has subsequently been denied, however, by Kapitsa³⁴ on the basis of new seismic data.

Adjustment of all gravity values to seismic control was made by measuring the departure of gravimetric depths at the bracketing seismic points and distributing this difference linearly over the interval between, thus assuming gravity changes caused by geologic change to be linear.

Since the area between stations 526 and 531 was traversed twice, and since gravity observations were made in both directions, these two sets of data are treated independently (Figs. 8 and 9). Slight differences may be detected, as some of the intervening stations were not reoccupied exactly.

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GEOLOGICAL PROGRAM

Geological results of the Victoria Land Traverse are limited to data taken in the Arctic Institute Range where time permitted an examination of the mountains in the immediate vicinity of $72^{\circ}15.2'S$, $160^{\circ}08.3'E$. Close examination of the geological features of the Worchester and Royal Society Ranges to the south was not undertaken because of the close time schedule earlier in the traverse season. Both of those ranges have been regionally mapped, however, by New Zealand geologists.

Antarctica, generally, is divisible into two geologic provinces: West Antarctica, which occupies that region east from $160^{\circ}E$ longitude to $30^{\circ}W$ longitude and lying south of $60^{\circ}S$ latitude, and East Antarctica, which occupies the remaining portion of the continent. West Antarctica so far has been found to contain mostly tectonically disturbed Mesozoic and Tertiary sediments intruded by Andean type intrusives¹⁰. East Antarctica, of which Victoria Land is a part, represents a continental shield of Precambrian basement schists, gneisses and intrusives overlain by Paleozoic and Mesozoic sediments. The sediments have been intruded by numerous dikes and sills¹⁰.

The Arctic Institute Range, as indicated previously, is extensive, occupying an area of over 30,000 sq. km. and trending north-south (Fig. 2). The range was first entered on January 30, 1960 at station 558, $72^{\circ}S$, $160^{\circ}E$ (Fig. 10). Prominent peaks were triangulated* for location and elevation (Appendix V). The investigation included a one day ascent of the nearest mountain and general geologic identification of neighboring mountains. The impending evacuation of the party prevented close examination of all mountains.

Three geologic groups were identified from stations 558 and 559, the first of which is a series of metasediments intruded by an acidic igneous rock. This is the only group which was examined at close hand, the second and third were necessarily observed from a distance. The second group appears to be a massive intrusive; the third is a flat lying series of sedimentary rocks.

The first group, typified by Welcome Mountain** (Plate 6), consists of a metasediment host which shows distinct bedding and varies somewhat in texture from schistose to gneissic, although the gneissic phase is comparatively fine grained. It is dark gray to black. The beds are generally thin, ranging from 3.5 to 43 cm. in width, and are composed predominantly of granular quartz with lesser amounts of biotite and some limonite stain. No fossils were observed.

* Photographs of triangulated peaks are on record at the U.S.G.S. Antarctic Office, Washington 25, D. C.

** Suggested name not yet approved by the Board on Geographic Names.

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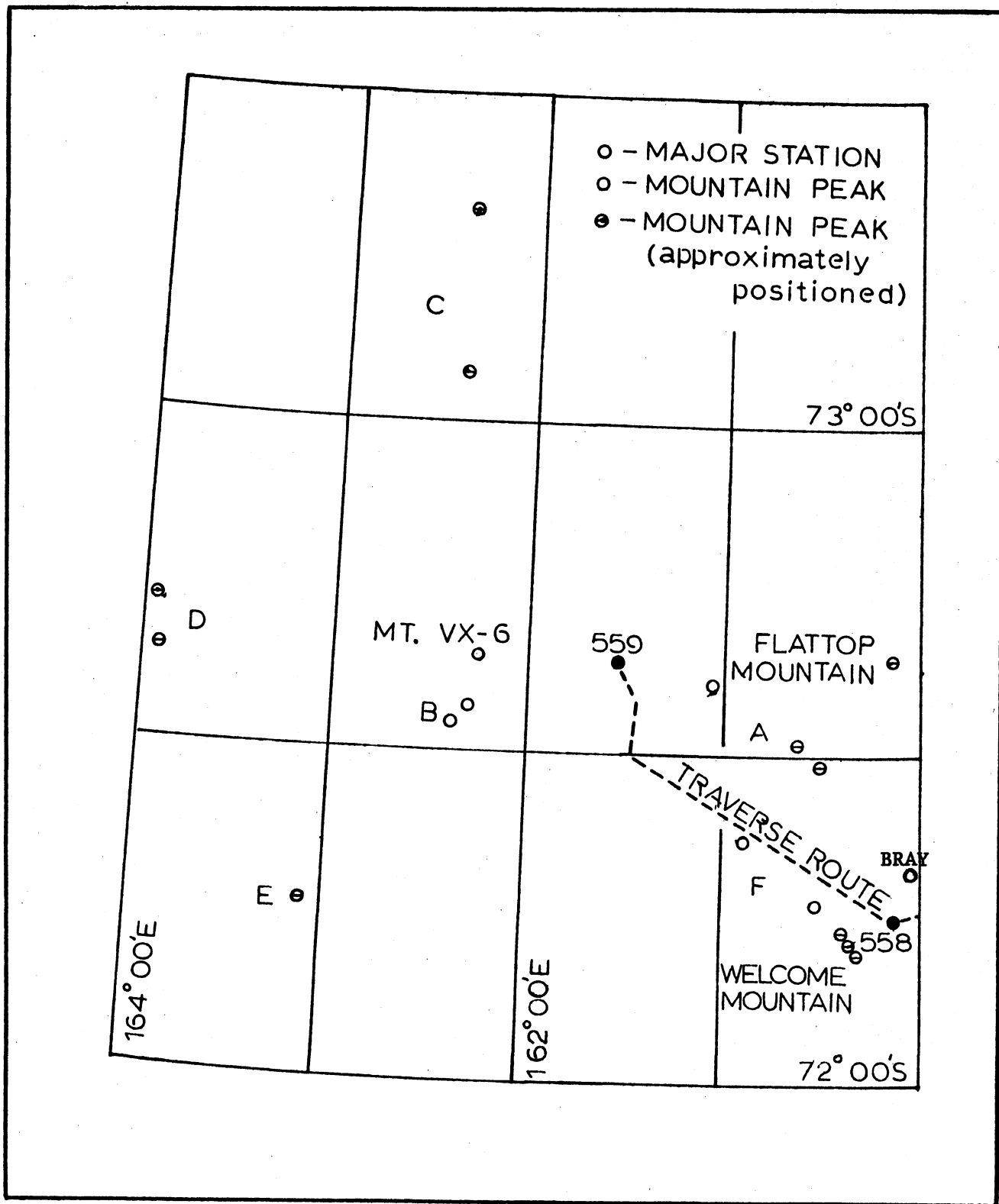
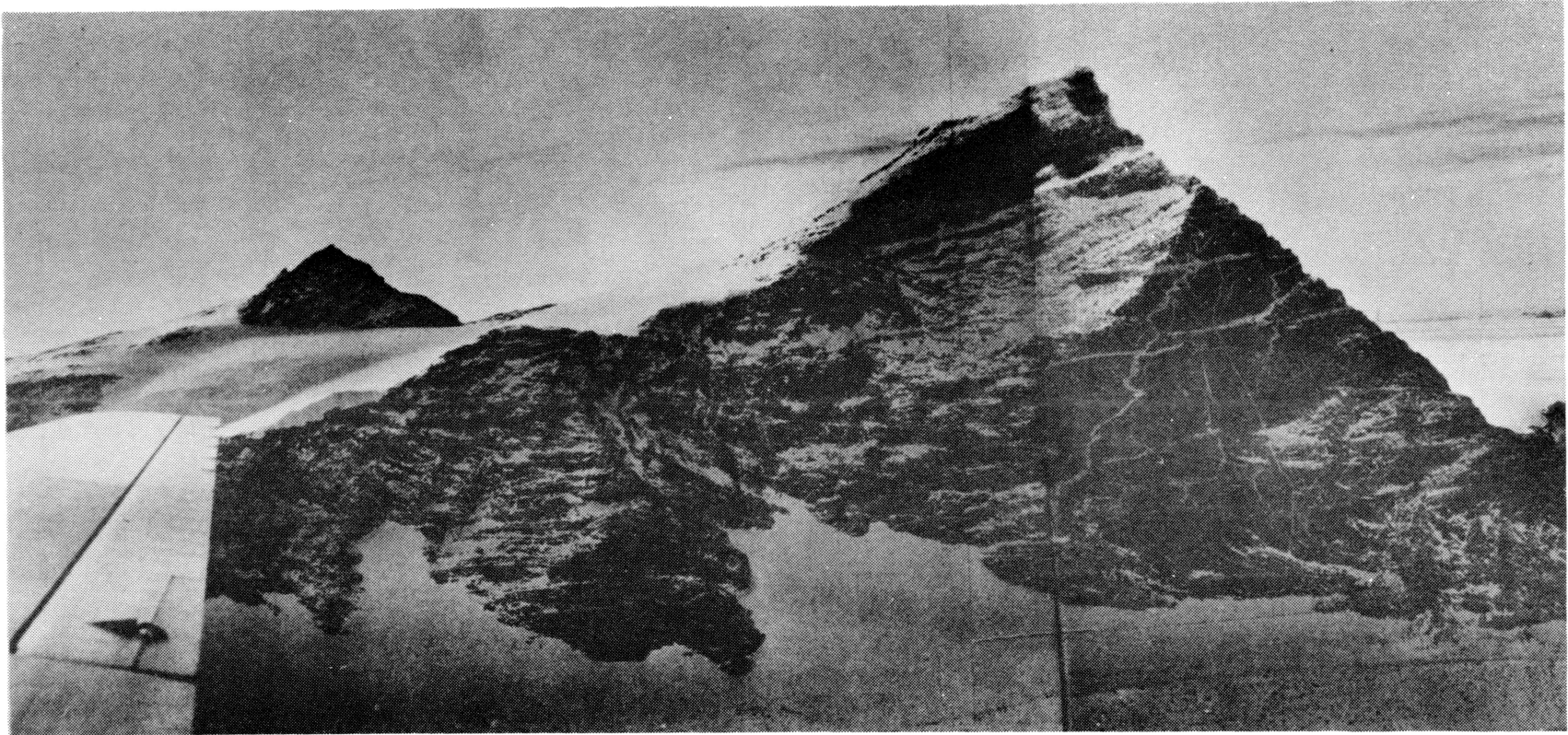


Fig. 10. Map of area of mountains entered at terminal end of traverse, showing location of neighboring peaks.



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Plate 6. Southern face of Mount Welcome showing structure of metasediments and intrusive pegmatite dikes and sills.

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The acid intrusive varies from granitic to pegmatitic in texture and occurs as dikes and sills in the metasediment. The pegmatite is massive in some areas, ranging up to 100 m wide as viewed from some points, and intrudes the host at various attitudes, cutting and often paralleling the bedding. The east face of the south peak is of massive pegmatite. Feldspar and quartz crystals comprise an estimated 95 per cent of this rock and are from 1 mm. to 5 cm. in diameter. The remaining 5 per cent is composed of red garnet, moscovite and amphibole.

Microscopic examination* of five samples of the metasediment revealed little variation in mineral content:

<u>Sample No.</u>	<u>Megascopeic Description</u>	<u>Microscopic Description</u>
1	Fine grained quartz-biotite schist.	Quartz, biotite, zircon (in biotite, with halos), garnet.
2	Fine grained quartz-biotite schist.	Quartz, biotite, zircon (in biotite, with halos), garnet.
3	Fine grained quartz-biotite schist.	Quartz, biotite, zircon (in biotite, with halos), garnet, (local zones of very fine quartz and biotite in contrast with others which are coarse).
4	Coarse biotite schist (crystals 1/16 inch diameter).	Biotite, quartz plagioclase, zircon, silimanite (fine needle-like crystals with parallel extinction).
5	Coarse biotite schist (crystals up to 1/2 inch diameter).	Biotite, quartz, plagioclase, zircon, garnet, silimanite.

The second group is represented by Bray Nunatak** and appears to be a massive intrusive. It is brown-gray in color and reveals no evidence of bedding or structure at a distance. Group three is typified by Mount VX-6** (Plate 7). This group, which comprises the major portion of the mountains in the area, is made up of an apparently uninterrupted series of sediments of not less than 350 meters thickness.

* A. R. Taylor, U.S.G.S.

** Suggested name not yet approved by the Board on Geographic Names.

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The geology of this region suggests a tie with the geology of the Ross Sea region, as described by Harrington (1958), and of the Oates and George V Coasts, as described by Klimov and Solovyev (1960). On the basis of descriptions published by these investigators, the first group appears to correspond to the Ross series of "Precambrian or Lower Paleozoic folded--nonuniformly metamorphosed sedimentary rocks" (Harrington, 1958), which are intruded by the Admiralty intrusives of granite and granodiorite. The third group may correspond to the more flat-lying Beacon series, which is reported to occur also in King George V Land¹⁷.

There is a marked structural difference between the three groups. The Welcome Mountain (first) group is composed of metasediments which dip steeply, usually to the north and west. Apparent dips are from 12° to 90° , most of them being around 50° . The second group of what appears to be massive intrusive may account for the structure of the metasediments. The VX-6 group of mountains (third) is perfectly flat-lying. Prominent beds can be traced with the unaided eye from one mountain top to another, indicating the undisturbed nature of these rocks. Flattop Mountain*, although composed of nearly flat-lying beds, is seen upon closer examination to be intruded by a network of light-colored dikes and sills, (Plate 8). The flat-lying sediments continue south, while the undisturbed types appeared to extend to the north.

*Suggested name not yet approved by the Board on Geographic Names.

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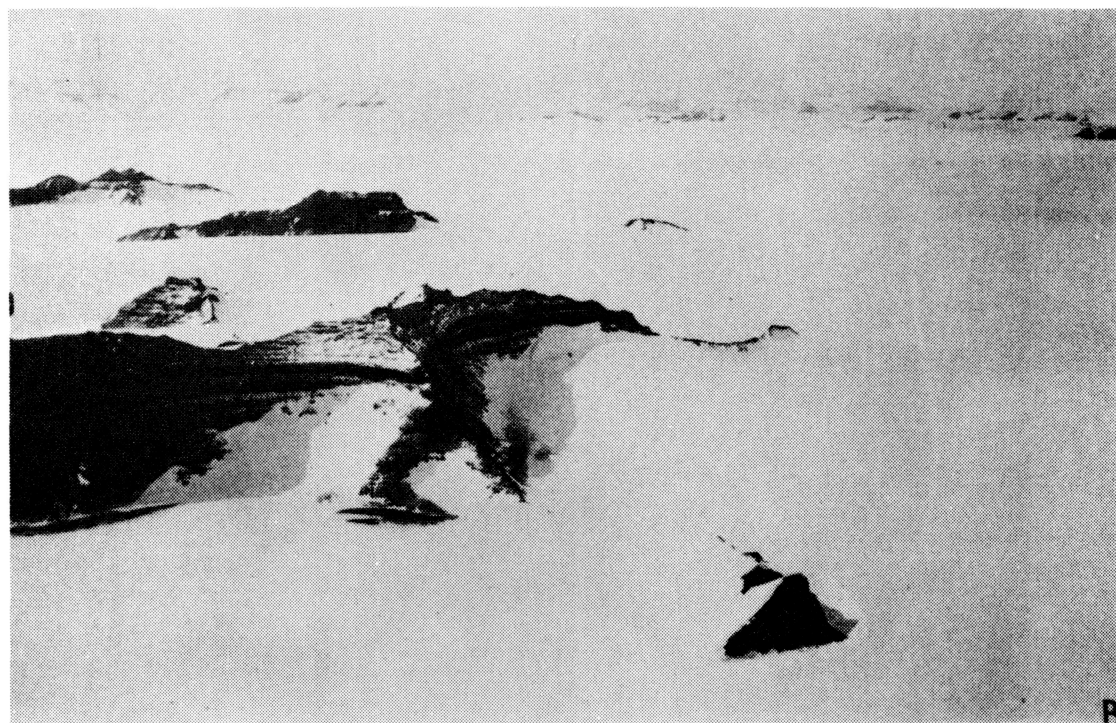
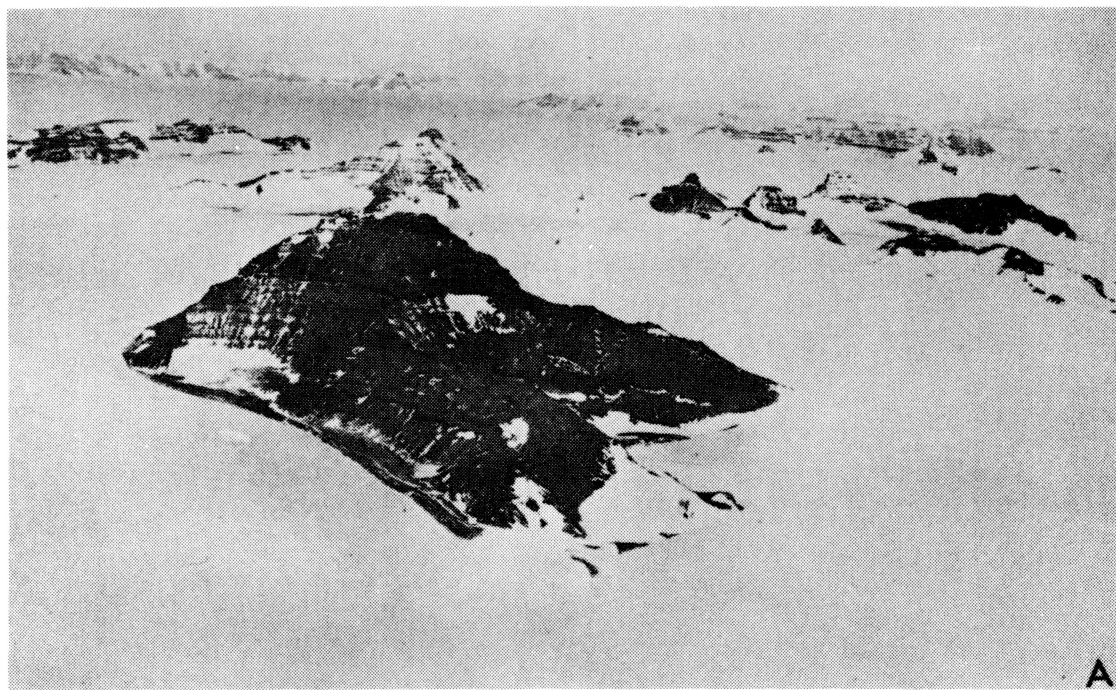
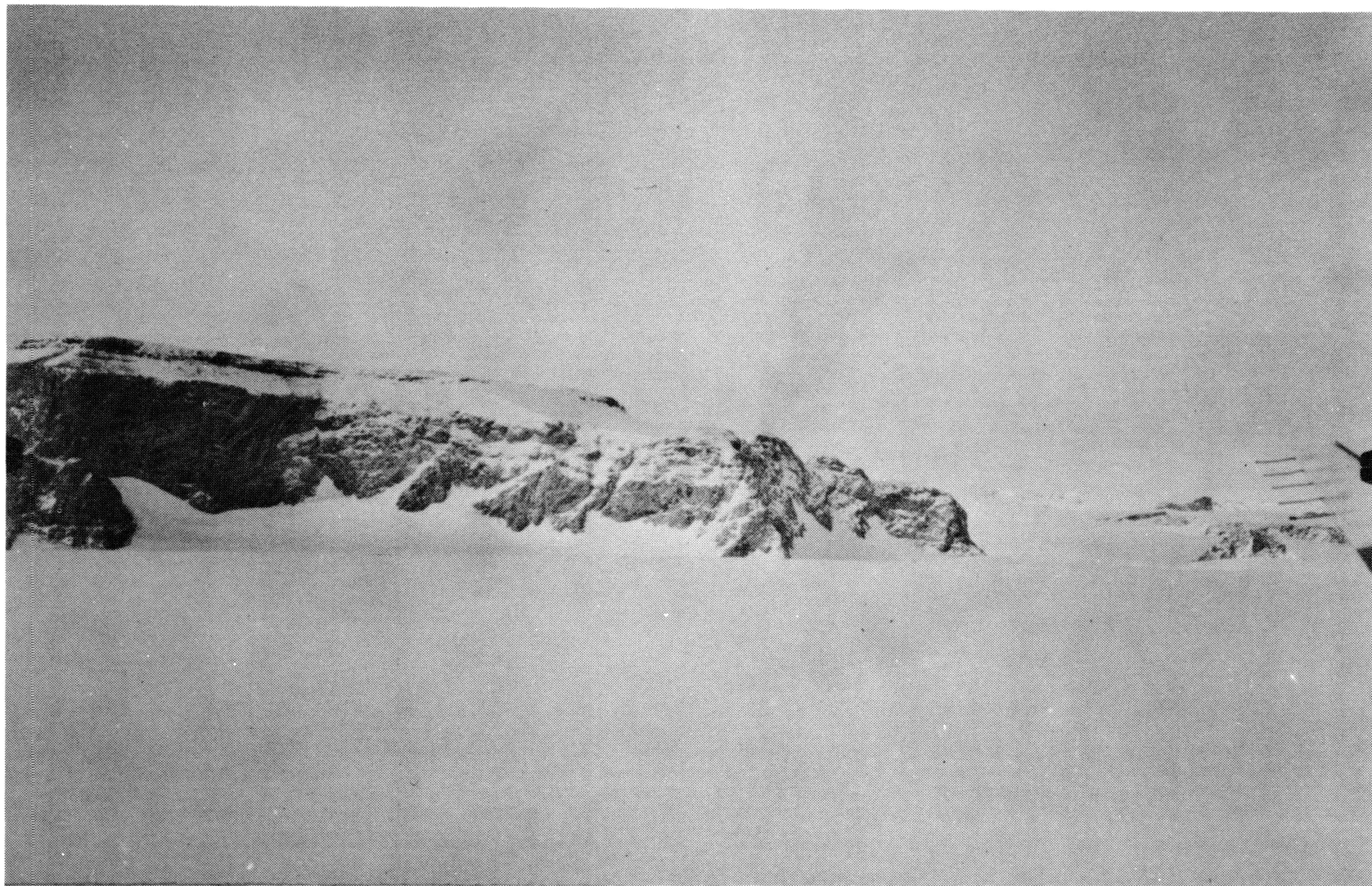


Plate 7. Mount VX-6 (top) and other members of the sedimentary series in the Arctic Institute Range, showing flat-lying formations traceable to other peaks. (Photo from 1070 meters above terrain)



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Plate 8. Flattop Mountain from Victoria Land Plateau, looking east. Note network of light-colored dikes and sills.

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INTEGRATION OF RESULTS, DISCUSSION AND CONCLUSIONS

Ice Surface Relief versus Subglacial Topography

Final profiling of subglacial topography along the traverse route was done by combining seismic and gravity data. Free air gravity values were adjusted to seismic control, as indicated earlier, to determine the relief of the ice-rock interface.

Papers by Nye²⁰, Bourgoïn⁶, and Robin²² and the references therein encompass the major work to date concerning the effect of subglacial topography on surface relief. These investigators have been primarily concerned with the relation between ice thickness and surface slope over distances roughly comparable to the ice thickness, and in the direction of flow.

Although the actual components of ice flow in Victoria Land are not known, the theses proposed by Bourgoïn and Nye find no contradiction here. The relationships found in Victoria Land, however occur over greater distances than those theorized by Nye and are taken largely from profiles perpendicular to flow direction; therefore, they cannot be compared directly.

A close comparison of snow surface elevations with the ice-rock interface suggests a similarity in form. The traverse profiles (Figs. 15 and 16) show a faint reflection in the snow surface of the large scale subglacial topographic features. In order to compare ice and rock surface topography more easily, their relative changes in elevation have been plotted together, with the ice surface elevations scale expanded by a factor of 10, in Figures 12, 13, and 14. (The right and left hand scales are significant only as they indicate the degree of change of the two curves; they do not reflect actual elevations).

Analysis of Figure 12 (I) shows that a correlation cannot be drawn between ice and rock surfaces between stations 72 and 501 because of the rapid decrease in the elevation of the rock surface, as opposed to the ice surface increase, as the plateau is approached.

From station 502 the ice surface and rock surface begin to parallel one another. The rock surface depression between stations 508 and 510 is well defined by a corresponding depression in the surface ice. Figure 12 (II) shows good correlation over the broad profile, where ice and rock surfaces both show relatively high relief.

Figure 13 (III) is particularly good in terms of the correlation of the two surfaces, both on a broad and on a more localized scale. Reflection of the subglacial topography is fairly detailed in this profile, as it is in the succeeding one, (Fig. 13 IV), although parts of these curves are common since the trail was partially re-traversed. A local departure is seen between Stations 536 and 538, where the surface elevation seems to behave independently of the subglacial topography. Other influencing factors are believed to cause this

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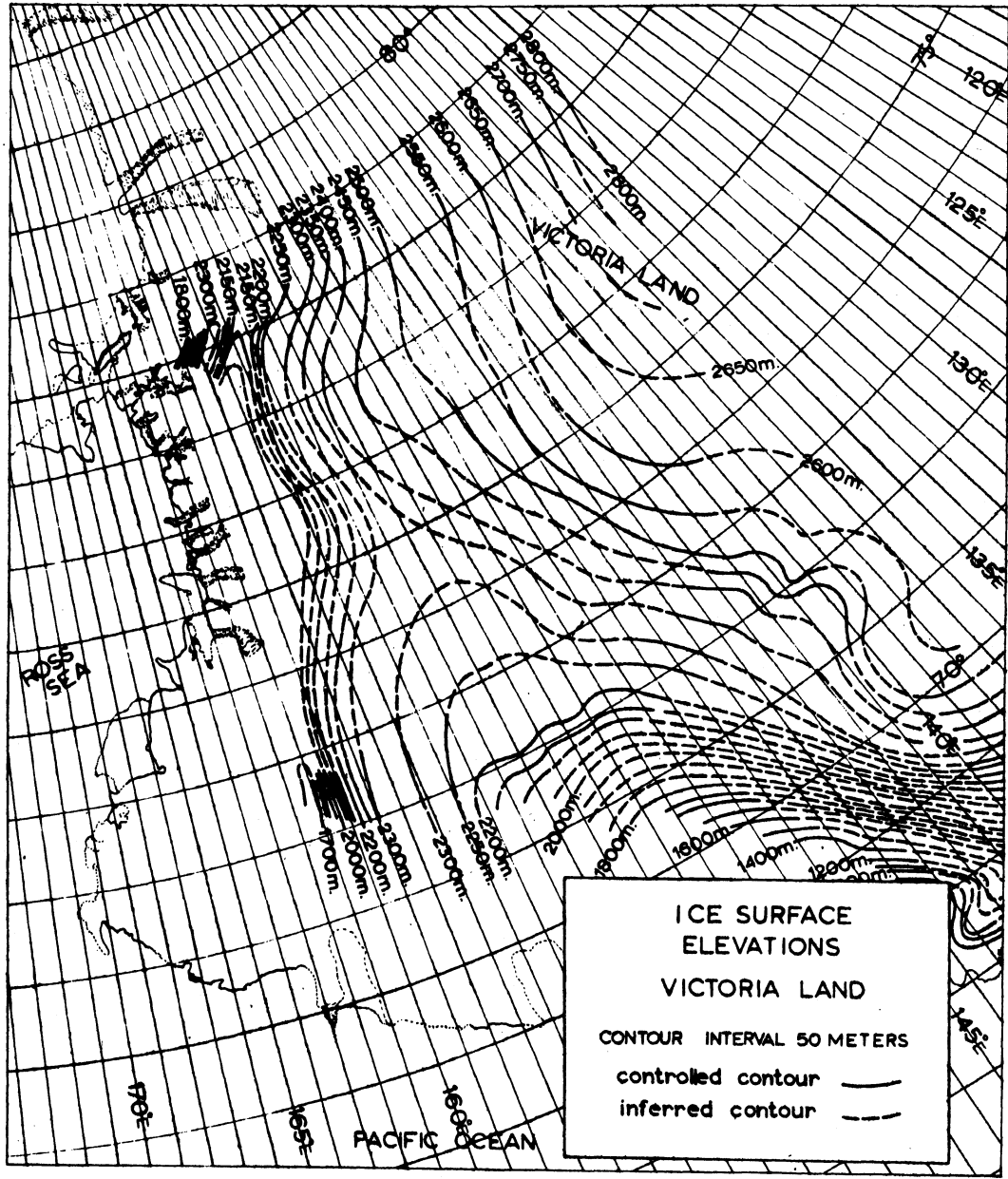


Fig. 11. Victoria Land ice surface elevation from controlled altimetry and from elevations reported by Crary, the French Traverse and by D. Mawson.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

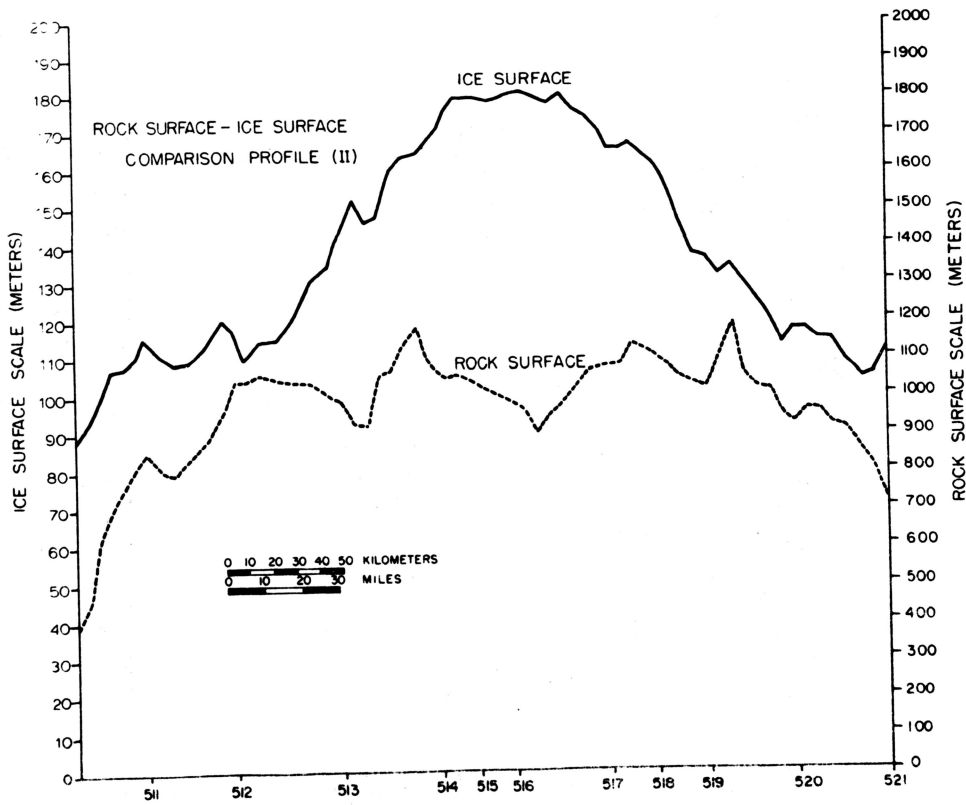
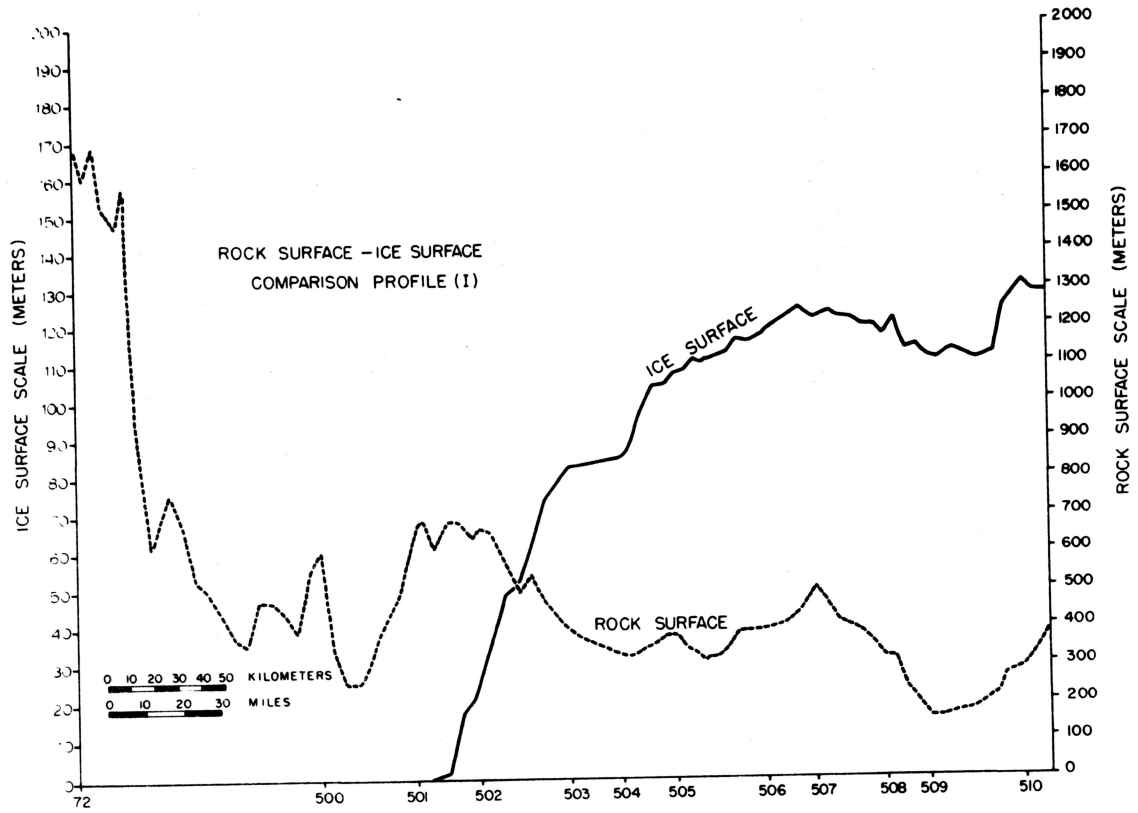


Fig. 12. Relative rock surface-ice surface comparison profiles I and II from Station 72 to 510, and 510 to 521 respectively, showing relative topography of the rock surface topography in the ice surface. (Ice surface rather exaggerated - 10 times that of the rock surface; station numbers on lower scale)

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

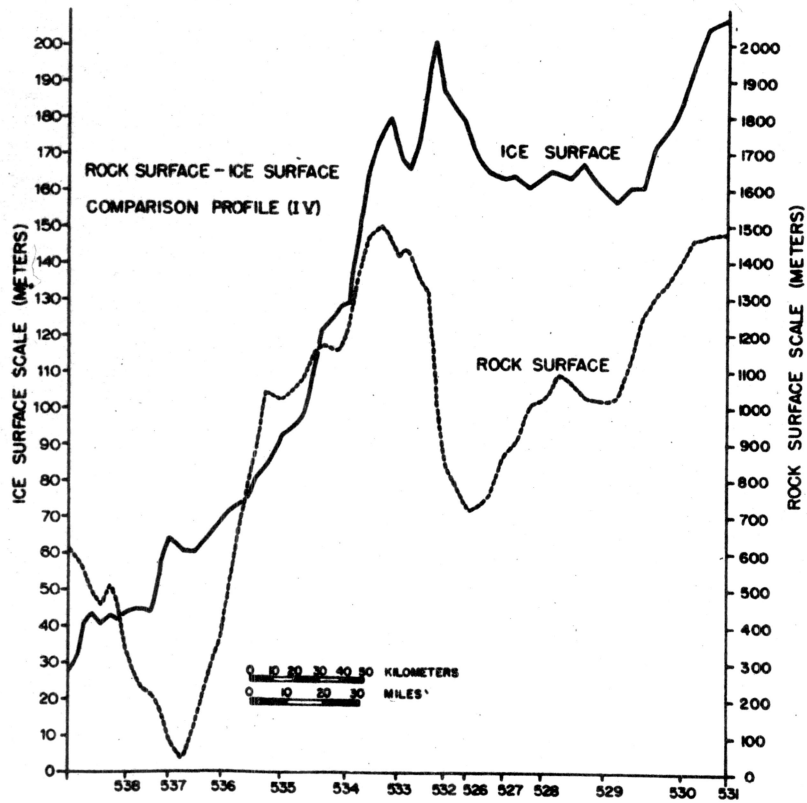
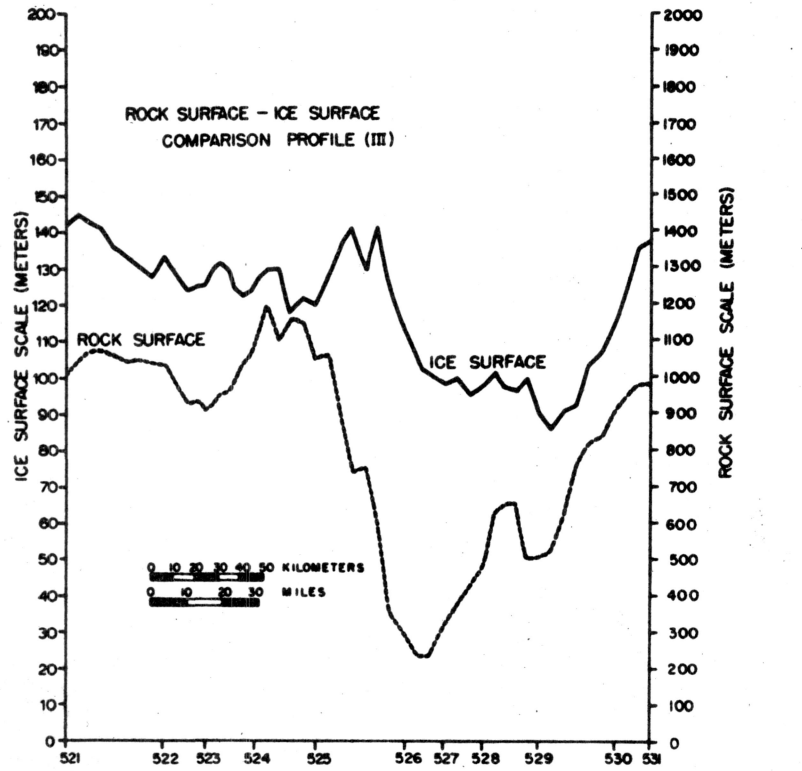


Fig. 13. Relative rock surface-ice surface comparison profiles III and IV from Station 521 to 531 and 531 to 539 respectively, showing reflection of the rock surface topography in the ice surface. (Ice surface relief exaggerated ten times that of rock surface; station numbers on lower scale)

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

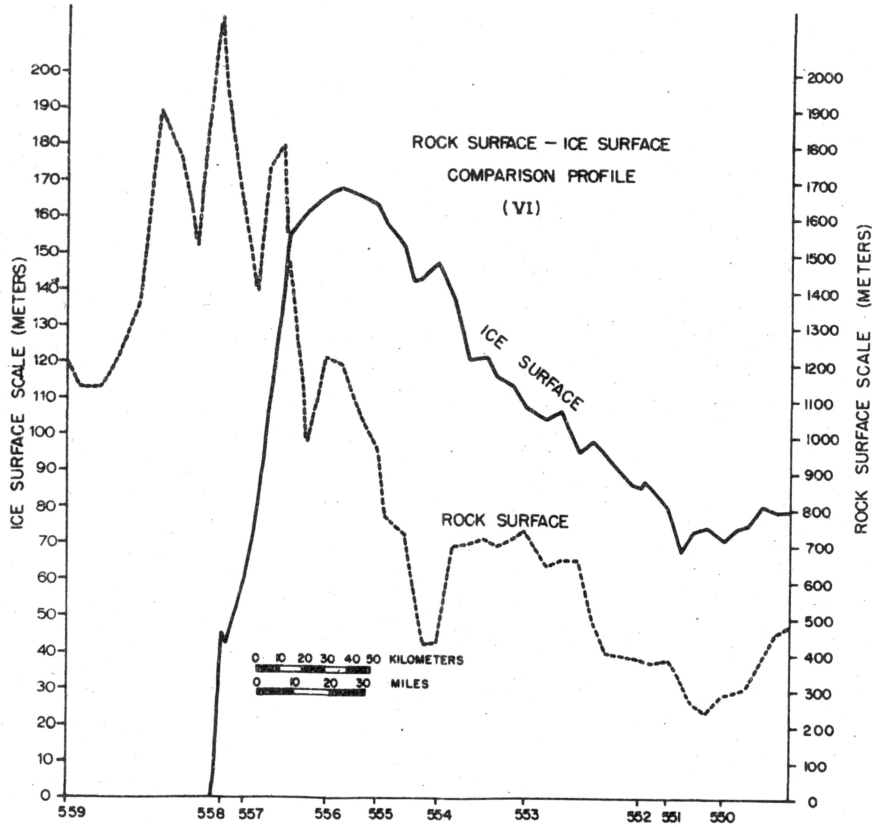
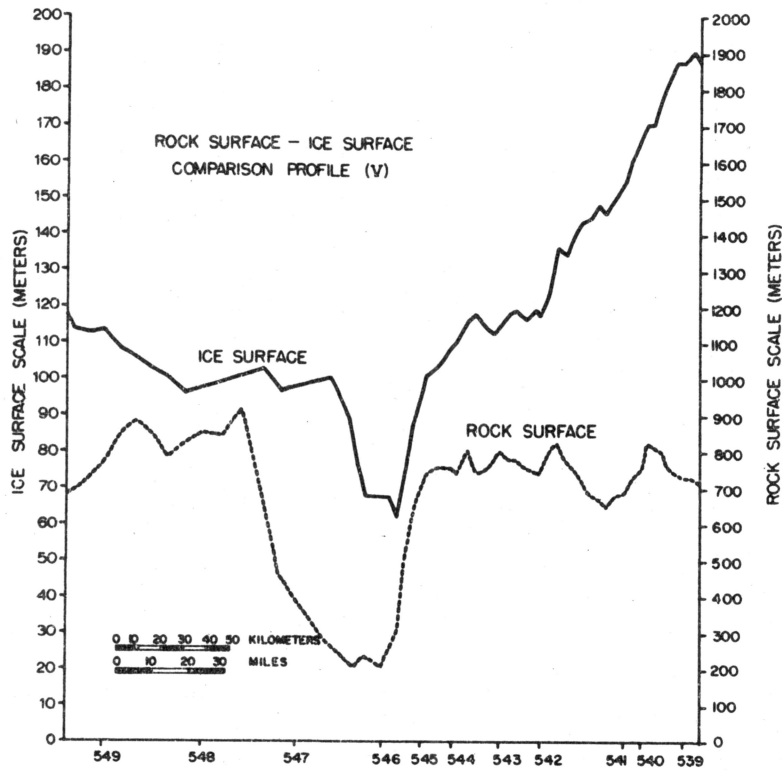


Fig. 14. Relative rock surface-ice surface comparison profiles V and VI from Station 539 to 549 and 549 to 559 respectively, showing reflection of the rock surface topography in the ice surface. (Ice surface relief exaggerated ten times that of rock surface; station numbers on lower scale)

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local lack of conformity. The most prominent factor which could support this rapid ice surface elevation decrease is the presence of both the Mertz and Ninis glaciers directly north (coastward) of the ice surface anomaly. The relatively rapid drain off in that direction, could provide the ice supply necessary for sustaining these glaciers, and probably provides a partial answer to the decrease in ice volume and the resultant elevation decrease. This is not suggested to be the sole cause of the lack of parallelism in the profiles in this relatively small area, since components of ice flow and other unknowns, such as subglacial topography north and south of the traverse line, may be strong influencing factors.

Further analysis of the last part of the traverse, Figure 14 (V) and (VI) continues to support the relationship between the two surfaces. The very prominent depression between stations 544 and 548 is particularly apparent. The profiles remain essentially parallel until station 556 where the Arctic Institute Mountains are penetrated.

Figure 21 shows a rapid increase of the rock surface elevation, since the mountains are approached in the vicinity of stations 555-558. Restriction of the ice flow from the plateau eastward is effected by this natural wall although some of the ice does overflow into the Rennick Glacier Valley.

The great decrease in ice surface elevation, which was measured after penetration of the Arctic Institute Range (Fig. 14) was presumed to be due to a corresponding decrease in the subglacial rock surface, where the mountain valley was reached beyond the first range. Examination of the subglacial rock elevation, however shows the first valley to be at a higher elevation than the rock surface in the plateau area. This situation appears to be the result of an ice deficiency in the mountainous region, as compared with that of the plateau. Regardless of the geographic source of the plateau ice supply, there is little to restrict its eventual regional distribution, with the exception of buried mountain ranges, whereas the Arctic Institute Range acts as a blockade to ice which would otherwise flow into the valley east of the range.

In addition to the relatively local reflection of the subglacial topography in the surface ice, a very broad influence is apparent over the entire Victoria Land profile. On the South leg, where the rock surface is high, the overall picture of the snow surface is one of a large low dome, whereas on the North leg where the rock surface is much lower across its central portion, the ice surface sags, reflecting this great depression.

If the parallel noted between subglacial topography and ice surface relief is accepted as a reflection of the effect of the rock surface in the ice surface, it can be concluded that the gravity effect of subglacial topographic change is of greater immediate influence in this region than that of rock density change. In other words, the ice surface relief seems to substantiate the rock surface relief, which is based largely on gravity data. It seems logical to conclude that most local changes in gravity are due to a variation in elevation of the rock-ice interface. The broad departures, noted upon entering or leaving the

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mountainous areas may be due to isostatic influence or regional lithologic change. Such regional changes are found in departure of the unadjusted gravity profile (Figs. 8 and 9) from seismic control; where the gravity departure rises above seismic control, an increased mass is indicated, and where the gravity profile shows a negative relative change, a mass decrease can be expected.

Subglacial Topography

In the area of the mountains near station 72 the rock surface is relatively high, rising to an elevation of over 1500 meters. Westward from the mountains the ice-rock interface drops abruptly to an elevation of about 300 meters and roughly maintains this general level, finally dipping to 180 meters below sea level at station 509, 400 km. out on the plateau. The intervening distance, from station 72 to station 511, constitutes a major depression in the regional subglacial topography (Fig. 15) which could conceivably be even broader if the poor seismic control from station 72 to 519 is eventually shown to be inaccurate.

From station 511 to 526 a subglacial plateau rises to 850 meters above sea level and maintains a mean elevation of over 500 meters along 500 kilometers of the section (Some uncertainty exists here, however, due to lack of seismic reliability). Examination of the rock surface contour map (Fig. 17) indicates that this geographic high may continue inland in the direction of the center of East Antarctica.

The profile of the north leg of the traverse (Fig. 16) reveals a somewhat more dissected topography than was found for the south leg. Most of the continental rock surface is depressed below sea level with a minimum elevation of -1250 meters at Station 536E. This broad regional low is part of the major depression mentioned above.

At station 555 the rock surface rises above sea level once more, remaining so throughout the rest of the traverse. Marked increases in elevation are seen in the area of the first ridge of peaks of the Arctic Institute Range. Both north and south leg profiles show what appear to be "foothills" just west of the main mountains. These have a relief of the order of 200 meters.

Figures 15 and 16 suggest the possibility of a connection between the low rock surface sections of the two traverse legs. This low is prominent on the South Leg between stations 502 and 511 and on the North Leg between 537 and 556. Parallels are also seen near the eastern ends of both legs (Stations 500 and 555) where the profiles represent a transition from plateau to mountains. The broad lows noted on these two profiles are supported by seismic depth studies made by Crary¹³ to the south. A series of lows was recorded in this area along 78°00'S latitude, followed by an elevation increase to the west. The existence of a broad trough-like feature which decreases in elevation toward the coast is further substantiated by a low in the oceanic floor off the King George V Coast¹ due north of the center of the feature.

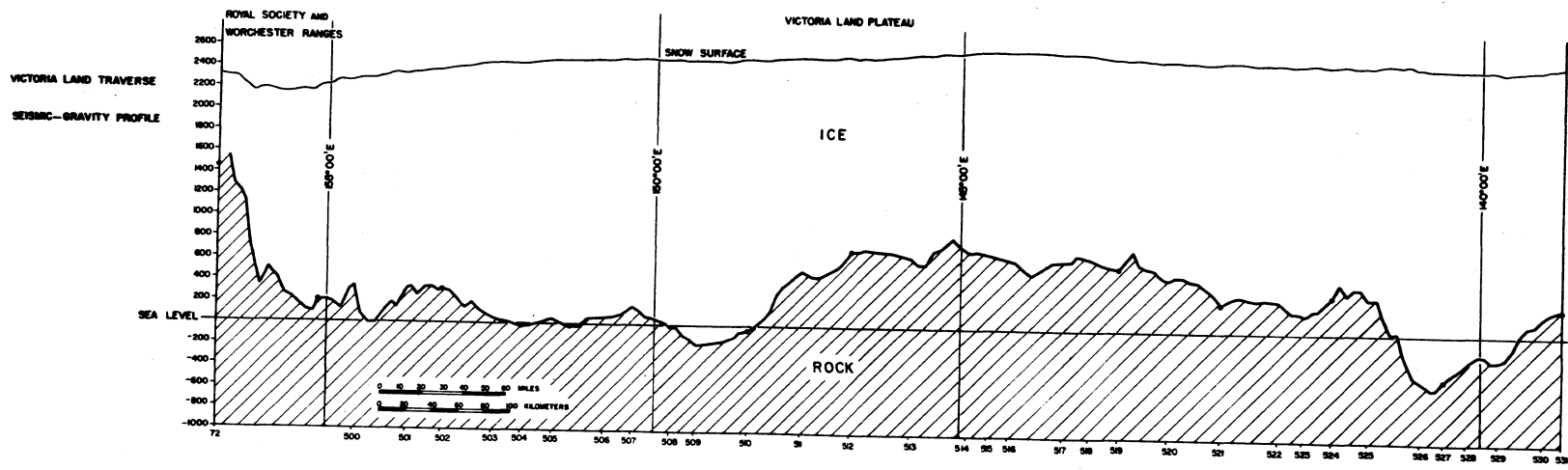


Fig. 15. Combined seismic-gravity rock surface profile of South Leg from Station 72 to 531, showing accurate elevation of the ice-rock interface. (Station numbers on lower scale)

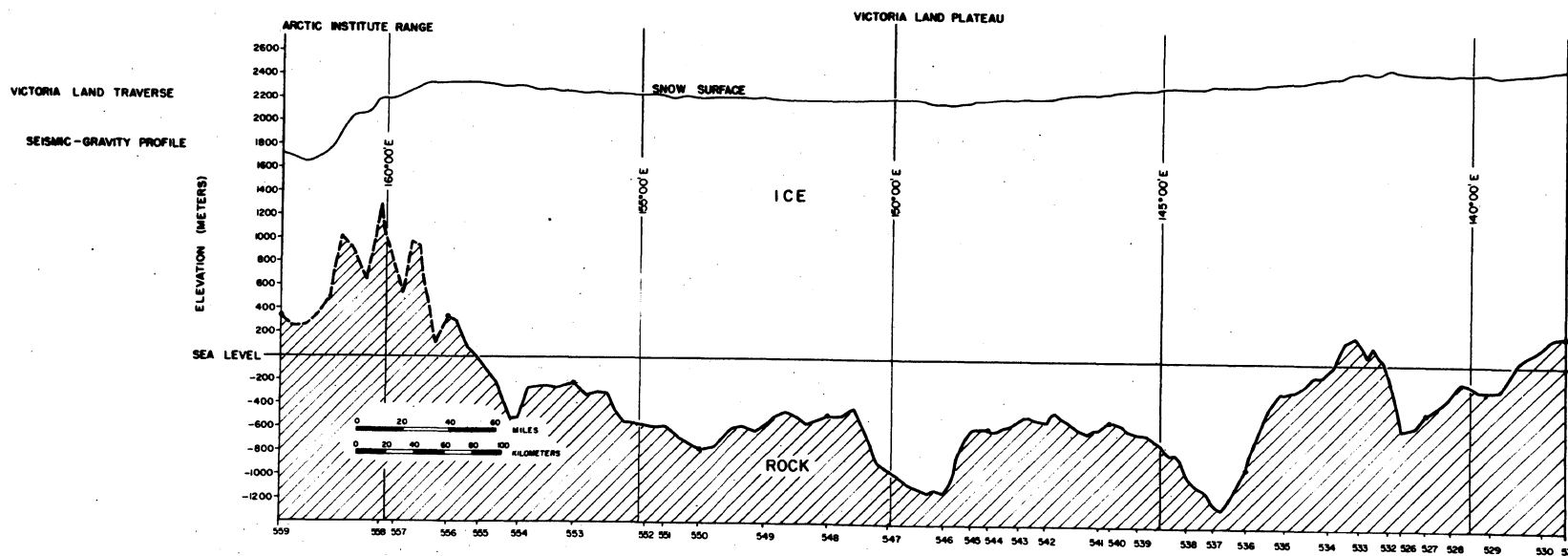


Fig. 16. Combined seismic-gravity rock surface profile of North Leg from Station 531 to 559, showing accurate elevation of ice-rock interface. (Station numbers on lower scale)

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The profile and contours drawn from the traverse data (Figs. 16 and 17) indicate a maximum subglacial relief of 2540 meters between stations 536E and 558. The implied contours which parallel the Prince Albert Mountains between 77°30'S, 155°00'E and 73°00'S, 157°00'E are extremely general because of the deficiency of information there. They are drawn on the basis of known mountains to the east, parallel to the Ross Sea Coast, and the seismic-gravity data taken near the mountains. The contours shown over the three traverse routes are based upon seismic and gravity data, while the contours intermediate to these are inferred.

The geophysical data also indicate a rock surface elevation increase to the west in the direction of Wilkes Land, which seems to be substantiated by seismic results of the 1957-58 French Traverse. Rock surface elevations along this route (Fig. 1) often rise above sea level.

Ice Flow Direction

If ice flow is assumed generally to be in the direction of surface slope, it can be stated that the general direction of glacial flow is to the northeast in the portion of Victoria Land covered by this study. Probably a considerable volume is directed toward the Mertz and Ninnis Glaciers and Cook Bay, which appear to constitute the main northern outlets. Subglacial rock and surface elevation highs along the entire south leg and in the area of the French Traverse constitute something of a western barrier and in conjunction with the Arctic Institute Mountains define the boundary of a topographic and consequently a glaciologic province. Some ice is probably contributed to Victoria Land by the ice along the mountain ranges to the south.

Local Anomaly (71°30'S, 141°30'E)

The extreme free air anomaly change noted between stations 524 and 527 (a total of 143.4 milligals) represents a marked change in mass caused in part by an actual change in the elevation of sub-surface rock topography. This difference, measured seismically (Fig. 8 and 9), amounts to 763 meters, an equivalent of 56.4 milligals on the basis of a density difference of 1.77 gm/cc, leaving a remainder of 87.0 milligals to be accounted for by other factors.

It has been suggested that the gravity decrease might be attributed to a density decrease in the subglacial material by the presence of a sedimentary basin of lower density rock or by the presence of a substantial thickness of glacial drift overlying the basement rock surface. On the basis of a drift with a density of 2.20 gm/cc, giving a density contrast between rock and drift of 0.47 gm/cc, the order of magnitude of the thickness of glacial till required to account for this anomaly can be approximated by:

$$g = 0.04185 h$$

$$h = \frac{87.0 \text{ mgls}}{0.04185 \times (2.67 - 2.20)} = 4400 \text{ meters}$$

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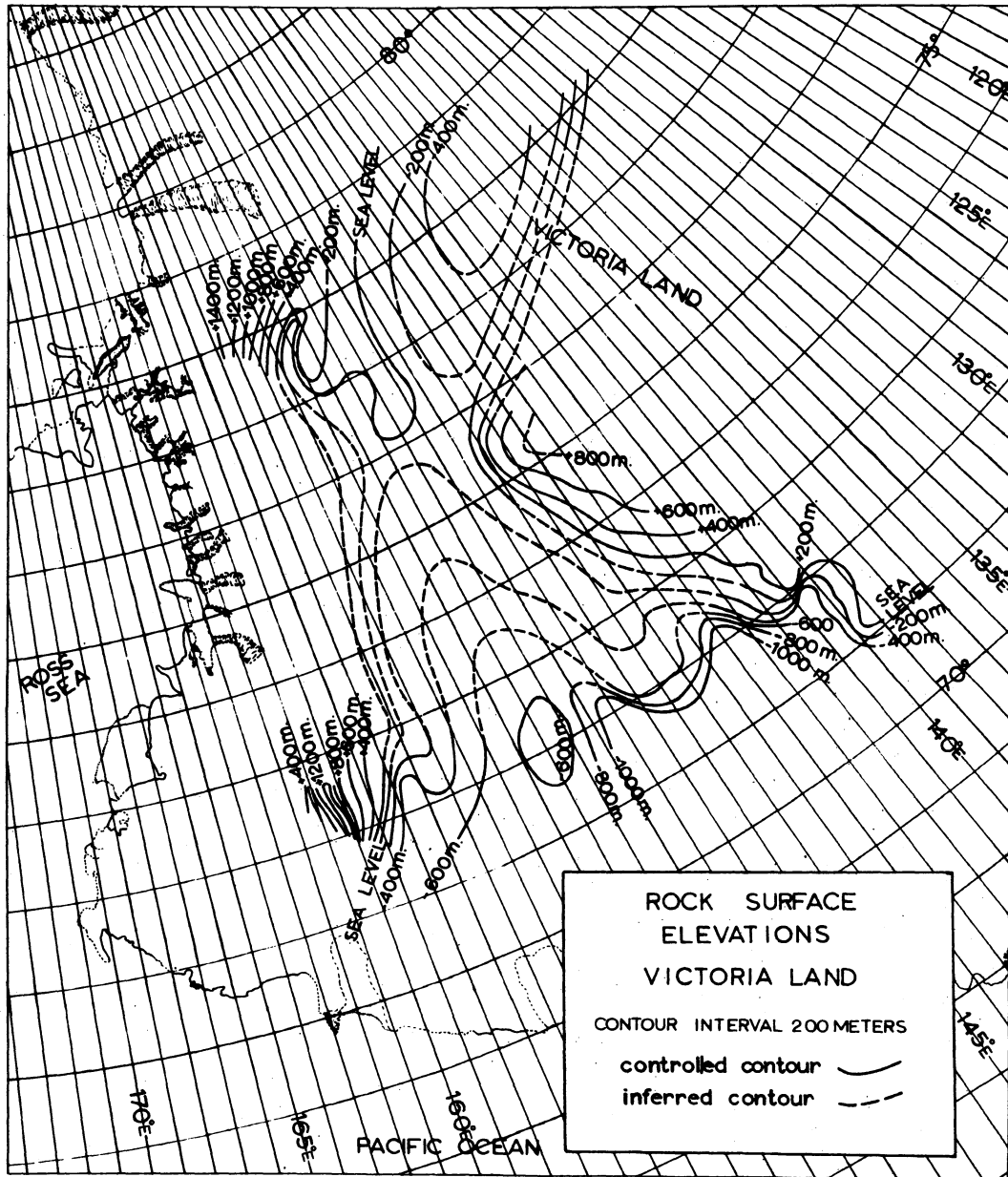


Fig. 17. Victoria Land rock surface elevation from seismic-gravity data.

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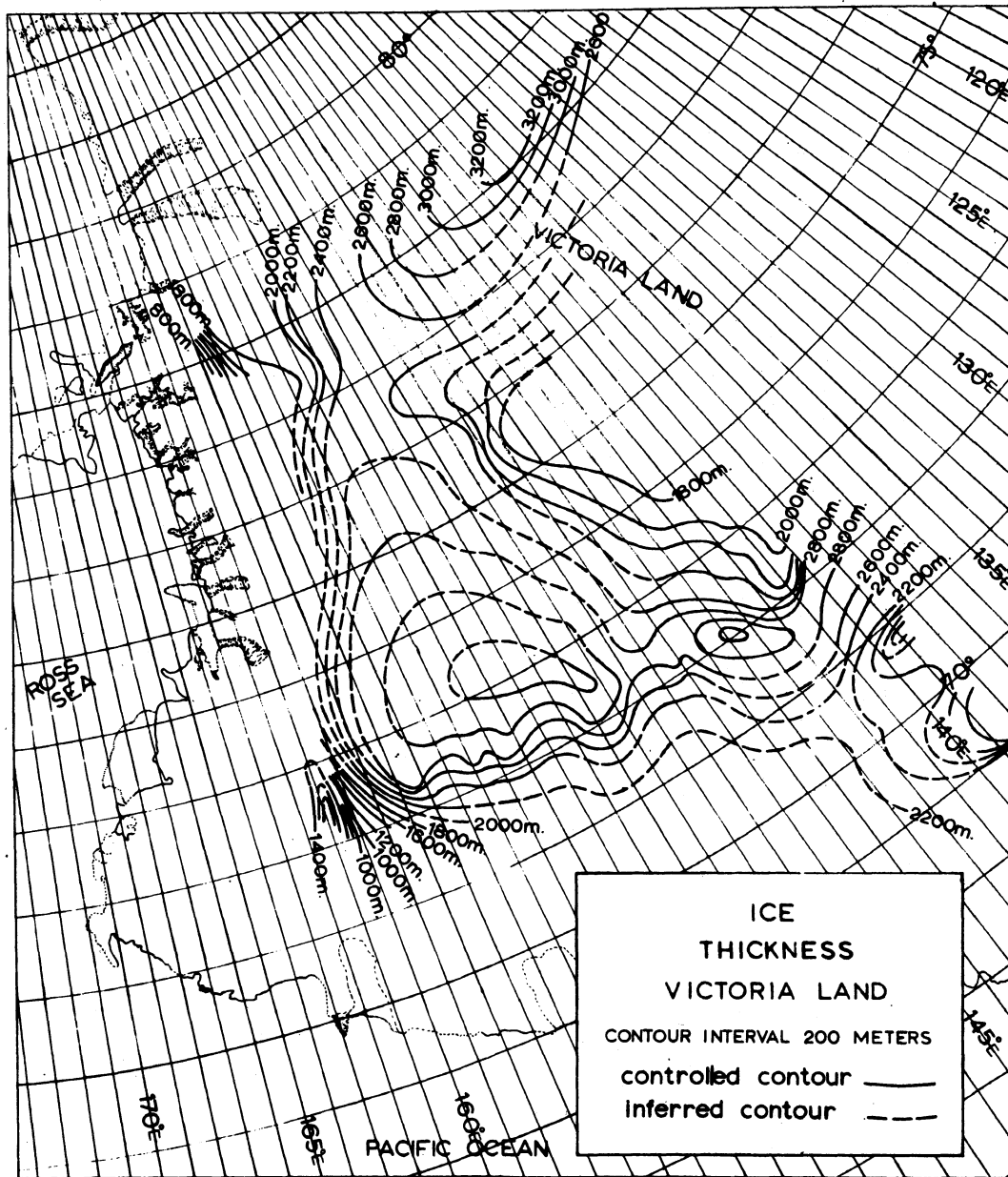


Fig. 18. Victoria Land ice thickness from combined altimetry and seismic-gravity observations.

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If, however, the assumed density of rock were greater, ie. 2.85 gm/cc, this figure is reduced to 3200 meters, which is still considered to be excessive and therefore unlikely to account for the entire anomaly.

In this area of about 7000 sq. km., the center of which is located at about 141°30'E, 71°30'S, the nature of the ice surface and subglacial topography indicates a local disturbance as contrasted with the uniform, relatively undisturbed nature of the other parts of the plateau studied. As indicated earlier, a radio message received by the field party reported the existence of an extensive crevasse field extending north and south of the traverse route. The magnitude of the crevasses and "rifts", as reported, indicates a substantial geographic feature.

The surface of this local area between stations 525 and 526, although not visibly crevassed, shows considerable relief. The following notes were made regarding the relief:

"Station (525D) located on WSW rim of shallow basin, perhaps 5 km. in diameter with 30 meters relief."

"(There) appears to be a very marked and very large depression or trough 90° from us (ENE) and running roughly parallel with our course of 334°."

These features are in sharp contrast with the plateau which had been crossed previously.

In re-crossing this part of the traverse route from Stations 525 to 526, the free air anomaly was repeated, revealing an increase of 117.3 milligals. This change over a distance of 39 kilometers corresponds to a subglacial topographic equivalent of 758 meters after adjustment to seismic control. This abrupt rock surface elevation change probably accounts for much of the observed disturbance in the ice surface immediately overlying it.

The extensive crevassing and relief reported north and south of this point is believed to owe its existence to similar subsurface conditions. It is significant also to point out the rather large ice thickness measured at these stations; station 525 and 526 overlie thicknesses of 2166 and 2915 meters respectively. Since the topography of the underlying rock was determined only beneath the traverse route proper, it is not known whether it rises or falls on either side of this line. The presence of an ice stream cannot be ruled out; although this would not account for the change in gravity, it could influence the formation of rifts and crevasses.

This observed change in rock surface, partially supported by seismic evidence, probably accounts for a large part of the anomaly, but it is not considered to be the sole cause for the effect.

Another possible answer might be found in the fact that the seismic depth picked from reflection records at station 524 was a multiple reflection and that the initial reflection was totally obscured by the strong prolonged surface noise found on the record. This would indicate a considerably smaller ice thickness

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and therefore a greater volume of rock material above sea level in this area, which could in turn account for the local gravity high. This alternative is not considered to be the case, however, since study of the character of the reflection records by the author and colleagues does not seem to warrant such a conclusion. The presence of this unusually large anomaly still requires a satisfactory explanation.

Prolonged Surface Noise

Five seismic control points between stations 502 and 519, although believed to represent accurate seismic depths, gave poor reflection results because of prolonged surface noise as indicated in the section on seismic studies.

The problem of surface noise generated from the shot energy, is one which has been commonly reported by other seismic investigators in various parts of the Antarctic and was first reported by Robin²².

Prolonged surface noise proved to be a constant problem in reflection shooting and tended to obscure first arrivals. Various attempts were made to limit all superficial noise sources by turning off engines, stopping all human activity, tying flags tight against their poles and waiting for lows in wind velocity before attempting to record shots. Since these attempts met with limited success, geophones were buried first four centimeters, then half a meter and finally one meter beneath the snow surface in order to escape vibration from constant wind. Slight improvement was noted, although four centimeter burial proved to be as satisfactory as one meter burial. Morning seismic recording also was found to be slightly more satisfactory as wind velocities were lower at that time.

In spite of these efforts to eliminate prolonged surface noise at the beginning of reflection records, poor records were obtained early in the season. As the season progressed, however, the records improved steadily.

Robin²² indicates that this problem of prolonged surface noise was sometimes resolved by observing multiple reflections. Lazarev and Ushakov¹⁶ also experienced this noise interference in East Antarctica inland from the coast and attributed the disturbance to an increase in the thickness of the firn cover since good results were obtained near the coast. Sorokhtin, Kondratev and Avsyuk²⁸ in their gravity and seismic study in East Antarctica encountered prolonged surface noise beyond a point 250 km. inland to such an extent that it was impossible to record reflections. They explained the difficulty as "connected with a heterogeneous structure in the upper part of the firn layer", stating that this structure is of little influence near the coast but that it increases in "heterogeneity" inland, thereby causing the excessive background noise. It is believed by these investigators that the heterogeneous layer also acts as a high frequency mechanical filter, reducing the amplitude of reflected waves.

The possibility of prolonged surface noise as a function of low temperature is considered a more satisfactory explanation by the author, who first became

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aware of the problem as a member of Crary's traverse of 1958-59. Earlier in the season seismic reflections were almost impossible to obtain on the Victoria Land plateau. On the return journey, however, in re-traversing their old trail during warmer months, this group was able to obtain reflections where it had previously been impossible.

During the Victoria Land Traverse of 1959-60, the author again found considerable background noise early in the traverse. As the season advanced, the surface noise decreased, with the result that reflections became quite readable. It must be admitted that this traverse drew closer to the coast during this period, but other factors tend to support the belief that lower temperatures early in the season affect the near surface firn in its accoustical properties.

The existence of winter and early summer prolonged surface noise has been found by others on the plateau and at Little America Station^{22, 3, 8}. It is interesting to note that seismologists, operating at lower elevations during the season, did not report this troublesome high noise to signal ratio. During the Victoria Land Traverse, which operated at elevations up to 2592 meters, an American traverse was operating in Marie Byrd Land at elevations around 1500 meters. The Marie Byrd Land party encountered no difficulty from excessive background noise, although they travelled from 300 to 580 km. inland early in the summer season. The absence of background noise on the Byrd Traverse records is attributed here to the fact that the Byrd traverse was at considerably lower elevations than the Victoria Land Traverse. The difference between the two, therefore, is due to a contrast in temperatures, as a function both of season and of elevation. November and December temperatures in the Marie Byrd Land area ranged from -10°F to -20°F as compared with -20°F to -55°F from October through December in Victoria Land.

Other investigators have added substantiating evidence. During the 1957-58 Little America traverse, reflection results were extremely poor in October because of excessive background noise. The temperatures at this time were in the range of -30°F .² Subsequent reoccupation of these stations near the end of the warm summer season resulted in very satisfactory reflections.

Based upon this evidence, the author has been led to the conclusion that this early season phenomenon is a function of low temperature. The exact nature of the sound producing factor is not understood although it can be speculated that decreasing temperatures affect the accoustical nature of snow or ice crystals by changing their crystallographic properties through a metamorphosis in grain boundaries, or, perhaps as a result of such changes, by causing a horizontal channelling of energy similar to that found in sea water where pressure-temperature boundaries create velocity inversions forming accoustical channels³⁵.

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SUMMARY

Integration of geographical, geophysical and geological data from the Victoria Land Traverse, 1959-60, has shown the following:

- (1) A relatively vast, featureless, elevated plateau exists in Victoria Land west of meridian 160°E , occupying a minimum area of $400,000 \text{ km}^2$. This plateau is part of that which occupies Wilkes Land to the west and the South Polar plateau to the south.
- (2) A formerly unknown geographic feature, the Arctic Institute Range, lies west of the Ross Sea and the coast ranges, trending south from about $69^{\circ}30'\text{S}$, near 160°E , to about $74^{\circ}00'\text{S}$. The range occupies an area of over $30,000 \text{ km}^2$, much of it ice covered. The elevation of the highest peak at $72^{\circ}39'\text{S}$, $160^{\circ}05'\text{E}$, was observed to be 2956 meters.
- (3) A very large glacier (Rennick Glacier) exists in the Arctic Institute Range, flowing north from about $73^{\circ}00'\text{S}$ into Rennick Bay on the Oates Coast. The glacier is at least 50 km. wide and 260 km. long.
- (4) A vast thickness of ice covers Victoria Land, in many cases exceeding 2.0 km. This thickness is not uniform, but varies with the subglacial relief. The total volume of ice overlying Victoria Land west of the mountains is estimated by seismic and gravity measurements to be in excess of $6 \times 10^5 \text{ cu. km}$.
- (5) The probable presence of the Beacon sandstone and other geologic units in the Arctic Institute Range is reported and may be correlated with occurrences in other parts of Antarctica, particularly in areas adjacent to the Arctic Institute Range.
- (6) The subglacial topography of Victoria Land is reflected on a smaller scale in the ice surface. This fact tends to support the contention that variations in gravity are affected more by subglacial topography than by density change, at least in Victoria Land.
- (7) A subglacial topographic depression exists in Victoria Land. This depression is shown to extend from a point well inland to the South Pacific Coast in the region of Oates Coast. This trough is reflected on a broad scale by a surface elevation change on the North Leg of the Victoria Land Traverse.
- (8) An unusually prominent negative free air gravity anomaly exists in a superficially disturbed and crevassed area around $141^{\circ}30'\text{E}$, $71^{\circ}30'\text{S}$. Nearby crevasses or rifts up to one hundred meters wide are reported in the same general area.
- (9) The presence of prolonged seismic surface noise on the Victoria Land Plateau early in the summer season is reported. Early season low temperatures appear to favor this phenomenon which tends to disappear as the summer season advances.

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APPENDIX I

STATION NUMBERS, LOCATIONS AND ELEVATIONS

Station	Latitude	Longitude	Elevation (meters)
93	77 52.7	167 26	25
92A	77 51.8	167 50	29
91	77 55.0	168 06	27
90	77 58.0	168 22	27
89	78 00.6	168 40	24
88	78 04.5	168 57	32
87	78 10.0	169 30	34
87A	78 12.2	169 39	33
87B	78 14.7	169 49	36
87C	78 16.9	170 01	39
87D	78 19.5	170 10	44
86A	78 24.6	170 19	46
86	78 26.0	170 12	52
86B	78 30.8	170 04	52
86C	78 34.1	169 58	52
86D	78 38.5	169 51	52
86E	78 41.2	169 47	49
86F	78 44.6	169 41	49
86G	78 48.9	169 34	49
86H	78 51.8	169 28	49
86I	78 56.8	169 20	54
86J	78 59.9	169 14	50
86K	79 01.8	169 11	51
86L	79 03.9	169 07	51
57	79 05.0	169 05	51
57A	79 05.0	168 47	51
57B	79 05.0	168 44	54
57C	79 05.0	168 30	53
57D	79 05.0	168 20	51
57E	79 05.0	168 10	47
57F	79 05.0	167 56	47
57G	79 05.0	167 44	46
57H	79 05.0	167 34	46
57I	79 05.0	167 22	43
57J	79 05.0	167 08	38

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Station	Latitude	Longitude	Elevation (meters)
57K	79 05.0	167 02	37
57L	79 05.0	166 48	35
57M	79 05.0	166 30	32
57N	79 05.0	166 17	34
57O	79 05.0	166 07	31
57P	79 05.0	165 56	32
59	79 05.0	165 38	32
59A	79 05.0	165 22	36
59B	79 06.2	164 54	40
59C	79 06.8	164 29	39
59D	79 07.9	163 56	33
60	79 07.0	163 54	33
60A	79 05.0	163 26	29
60B	79 03.2	163 03	17
60C	79 01.8	162 43	27
60D	79 00.5	162 27	47
61	79 00.0	162 16	58
61A	78 58.0	162 12	63
61B	78 55.8	162 08	66
61C	78 53.0	162 03	70
61D	78 49.3	161 56	80
61E	78 44.9	161 48	76
61F	78 39.3	161 37	76
61G	78 34.9	161 30	121
61H	78 31.2	161 30	139
61I	78 29.8	161 30	197
66	78 29.0	161 40	221
66A	78 28.4	161 42	345
66B	78 28.2	161 41	360
66C	78 27.7	161 42	372
66D	78 27.7	161 40	381
66E	78 27.0	161 39	391
66F	78 25.0	161 41	471
66G	78 24.2	161 36	616
66H	78 24.1	161 36	623

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Station	Latitude	Longitude	Elevation (meters)
66I	78 23.8	161 36	639
66J	78 22.7	161 36	686
66K	78 22.0	161 36	733
66L	78 21.4	161 36	778
66M	78 20.0	161 36	805
66N	78 18.0	161 36	872
66O	78 17.6	161 33	892
66P	78 17.1	161 26	976
66Q	78 15.8	161 20	1088
66R	78 14.8	161 17	1211
66S	78 12.6	161 12	1414
66T	78 11.2	161 03	1552
66U	78 09.0	160 54	1630
66V	78 08.2	160 42	1707
66W	78 06.7	160 18	1743
66X	78 03.8	159 42	1977
66Y	78 02.2	159 21	2084
66Z	78 01.8	159 05	2179
66AA	78 01.6	158 50	2271
66BB	78 01.5	158 35	2347
72	78 01.4	158 25	2316
0.5	78 01.4	158 23	2313
1.0	78 01.4	158 21	2306
1.5	78 01.4	158 19	2303
2.0	78 01.4	158 16	2293
2.5	78 01.4	158 14	2284
3.0	78 01.4	158 11	2290
3.5	78 01.4	158 10	2291
4.0	78 01.4	158 07	2297
4.5	78 01.4	158 05	2302
6.4	78 01.5	157 58	2298
9.2	78 01.5	157 43	2241
11	78 01.5	157 36	2215
13	78 01.6	157 27	2168
17	78 01.6	157 09	2180

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
21	78 01.7	156 52	2172
24	78 01.7	156 39	2159
27	78 01.8	156 25	2150
30	78 01.8	156 11	2150
33	78 01.9	155 57	2163
36	78 01.9	155 43	2170
39	78 02.0	155 29	2165
41	78 02.0	155 19	2204
45	78 02.1	155 00	2222
48	78 02.1	154 46	2257
51	78 02.2	154 33	2264
54	78 02.2	154 18	2263
84	78 02.2	154 06	2276
500	78 02.2	154 06	2276
500A	78 00.0	154 02	2285
500B	77 56.8	153 56	2290
500C	77 54.1	153 52	2294
500D	77 52.1	153 47	2305
500E	77 50.0	153 44	2311
500F	77 47.5	153 40	2337
500G	77 45.3	153 36	2339
501	77 41.5	153 29	2336
501A	77 40.0	153 26	2342
501B	77 37.3	153 22	2343
501C	77 34.8	153 18	2344
501D	77 32.1	153 13	2362
501E	77 29.2	153 08	2366
502	77 27.8	153 06	2371
502A	77 25.0	153 01	2383
502B	77 22.5	152 56	2397
502C	77 20.0	152 52	2401
502D	77 17.5	152 47	2411
502E	77 14.8	152 42	2425
502F	77 12.0	152 37	2429
503	77 09.0	152 33	2435

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
503A	77 06.8	152 27	2435
504	77 02.1	152 19	2437
504A	77 00.5	152 14	2440
504B	76 58.2	152 06	2452
504C	76 56.0	151 59	2459
504D	76 53.7	151 51	2460
505	76 52.0	151 46	2463
505A	76 50.3	151 41	2464
505B	76 48.5	151 35	2467
505C	76 47.0	151 30	2466
505D	76 46.1	151 27	2467
505E	76 44.2	151 21	2468
505F	76 42.2	151 15	2469
505G	76 40.5	151 10	2473
505H	76 38.5	151 03	2472
505I	76 36.2	150 55	2474
506	76 35.3	150 53	2476
506A	76 32.7	150 43	2479
506B	76 30.1	150 34	2482
507	76 27.0	150 24	2479
507A	76 25.0	150 18	2481
507B	76 22.7	150 10	2480
507C	76 20.5	150 04	2479
507D	76 19.0	149 58	2977
507E	76 16.7	149 51	2477
508	76 15.5	149 47	2474
508A	76 13.5	149 42	2479
508B	76 11.3	149 35	2470
508C	76 09.7	149 30	2471
509	76 07.5	149 23	2468
509A	76 05.0	149 16	2467
509B	76 02.7	149 09	2470
509C	76 00.0	149 02	2469
509D	75 57.2	148 54	2467
509E	75 54.8	148 46	2469

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
509F	75 51.0	148 38	2482
510	75 47.3	148 27	2490
510A	75 45.4	148 19	2487
510B	75 43.3	148 12	2487
510C	75 46.1	148 04	2491
510D	75 38.9	147 56	2499
510E	75 36.7	147 48	2508
510F	75 34.2	147 40	2508
510G	75 32.0	147 32	2512
511	75 30.5	147 26	2517
511A	75 27.0	147 18	2512
511B	75 24.5	147 14	2509
511C	75 21.1	147 07	2510
511D	75 18.0	147 00	2515
511E	75 14.5	146 52	2523
512	75 12.1	146 49	2520
512A	75 10.5	146 44	2511
512B	75 07.8	146 34	2517
512C	75 04.5	146 25	2517
512D	75 01.8	146 16	2524
512E	74 58.5	146 08	2535
512F	74 55.6	145 59	2539
513	74 53.0	145 52	2549
513A	74 50.8	145 44	2559
513B	74 48.2	145 35	2552
513C	74 41.3	145 28	2554
513D	74 44.2	145 20	2568
513E	74 41.8	145 12	2572
513F	74 39.5	145 05	2573
513G	74 37.3	144 57	2577
514	74 36.0	144 52	2581
514A	74 34.5	144 46	2586
514B	74 32.3	144 43	2590
514C	74 34.1	144 26	2590
515	74 34.1	144 24	2590

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meter)
521D	72 57.1	142 12	2509
521E	72 54.5	142 07	2506
521F	72 51.6	142 02	2503
521G	72 49.3	141 58	2500
522	72 46.3	141 54	2506
522A	72 45.7	141 53	2504
522B	72 43.4	141 48	2499
522C	72 41.6	141 45	2496
522D	72 40.0	141 42	2497
522E	72 38.9	141 40	2497
523	72 38.0	141 38	2498
523A	72 36.4	141 35	2503
523B	72 35.2	141 32	2504
523C	72 33.8	141 29	2502
523D	72 32.0	141 25	2596
523E	72 30.7	141 22	2494
523F	72 29.0	141 20	2495
524	72 28.7	141 21	2498
524A	72 26.1	141 15	2502
524B	72 23.8	141 10	2502
524C	72 21.0	141 06	2488
524D	72 18.5	141 02	2493
525	72 15.8	140 56	2491
525A	72 13.2	140 52	2500
525B	72 11.0	140 48	2510
525C	72 08.1	140 44	2515
525D	72 05.8	140 39	2501
525E	72 03.2	140 35	2514
525F	72 00.3	140 30	2494
526	71 58.0	140 27	2482
526A	71 55.2	140 23	2472
526B	71 53.0	140 20	2470
527	71 50.2	140 15	2467
527A	71 47.6	140 12	2469
527B	71 45.0	140 10	2465

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
528	71 42.2	140 06	2467
528A	71 39.3	140 04	2471
528B	71 37.1	140 01	2466
528C	71 34.5	139 57	2465
528D	71 31.9	139 54	2469
529	71 29.6	139 54	2458
529A	71 27.0	139 50	2453
529B	71 24.2	139 46	2459
529C	71 21.8	139 41	2461
529D	71 19.3	139 37	2474
529E	71 16.7	139 32	2478
530	71 14.0	139 28	2487
530A	71 11.6	139 22	2498
530B	71 10.0	139 18	2509
530C	71 09.2	139 16	2511
B61	71 07.8	139 11	2513
530C	71 09.2	139 16	2510
530B	71 10.0	139 18	2507
530A	71 11.6	139 22	2496
530	71 14.0	139 28	2486
529E	71 16.7	139 32	2479
529D	71 19.3	139 37	2474
529C	71 21.8	139 41	2461
529B	71 24.2	139 46	2461
529A	71 27.0	139 50	2456
529	71 29.6	139 54	2461
528DD	71 31.9	139 54	2469
528CC	71 34.5	139 57	2464
528BB	71 37.1	140 01	2466
528AA	71 39.3	140 04	2467
528BD	71 40.2	140 06	2469
528	71 42.2	140 08	2464
527BB	71 45.0	140 10	2461
527AA	71 47.6	140 12	2465
527	71 50.2	140 15	2464

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
526BB	71 53.0	140 20	2466
526AA	71 55.2	140 23	2471
526	71 58.0	140 27	2482
525FF	72 00.2	140 31	2491
532	72 01.8	140 34	2507
532A	72 01.8	140 40	2494
532B	72 01.8	140 47	2476
532C	72 01.8	140 53	2465
532D	72 01.8	141 00	2468
532E	72 01.8	141 06	2481
533	72 01.8	141 08	2477
533A	72 01.8	141 14	2469
533B	72 01.9	141 20	2463
533C	72 02.2	141 26	2449
533D	72 02.1	141 32	2430
533E	72 02.2	141 38	2424
533F	72 02.3	141 44	2424
534	72 02.4	141 45	2422
534A	72 02.4	141 52	2418
534B	72 02.5	141 58	2415
534C	72 02.6	142 04	2404
534D	72 02.7	142 10	2390
534E	72 02.8	142 16	2386
534F	72 02.9	142 23	2384
534G	72 03.0	142 29	2383
535	72 03.0	142 33	2383
535A	72 03.5	142 39	2378
535B	72 04.0	142 45	2373
535C	72 04.5	142 50	2370
535D	72 05.0	142 56	2364
535E	72 05.5	143 02	2362
535F	72 06.0	143 08	2359
536	72 06.5	143 12	2356
536A	72 06.4	143 18	2352
536B	72 06.3	143 24	2349

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
536C	72 06.2	143 32	2346
536D	72 06.1	143 38	2346
536E	72 06.1	143 42	2346
537	72 06.0	143 51	2351
537A	72 06.2	143 58	2344
537B	72 06.4	144 04	2328
537C	72 06.6	144 11	2329
537D	72 06.8	144 17	2329
538	72 07.0	144 23	2328
538A	72 07.0	144 30	2325
538B	72 07.0	144 36	2327
538C	72 07.1	144 42	2324
538D	72 07.1	144 49	2328
538E	72 07.1	144 55	2324
538F	72 07.2	145 02	2314
538G	72 07.2	145 08	2309
538H	72 07.2	145 14	2313
539	72 07.2	145 20	2309
539A	72 07.4	145 27	2309
539B	72 07.6	145 33	2304
539C	72 07.7	145 38	2298
539D	72 07.8	145 43	2291
539E	72 07.9	145 48	2291
540	72 08.0	145 53	2287
540A	72 08.1	146 00	2280
541	72 08.2	146 05	2273
541A	72 08.2	146 11	2268
541B	72 08.2	146 17	2263
541C	72 08.2	146 23	2266
541D	72 08.1	146 30	2262
541E	72 08.1	146 33	2261
541F	72 08.1	146 40	2258
541G	72 08.0	146 47	2251
541H	72 08.0	146 52	2246
541I	72 08.0	146 59	2232

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
542	72 08.0	147 05	2225
542A	72 07.8	147 12	2227
542B	72 07.6	147 18	2224
542C	72 07.4	147 24	2227
542D	72 07.2	147 31	2226
543	72 07.0	147 36	2222
543A	72 07.1	147 44	2219
543B	72 07.3	147 50	2223
543C	72 07.4	147 56	2226
543D	72 07.6	148 03	2223
543E	72 07.7	148 08	2217
544	72 07.8	148 12	2216
544A	72 07.8	148 20	2211
544B	72 07.9	148 26	2208
544C	72 07.9	148 31	2206
545	72 08.0	148 34	2199
545A	72 08.2	148 40	2191
545B	72 08.4	148 47	2173
545C	72 08.6	148 52	2163
545D	72 08.8	148 58	2170
546	72 09.0	149 02	2170
546A	72 09.2	149 09	2170
546B	72 09.4	149 15	2170
546C	72 09.6	149 21	2180
546D	72 09.8	149 26	2194
546E	72 10.0	149 33	2201
546F	72 10.2	149 40	2207
456G	72 10.4	149 48	2206
546H	72 10.7	149 56	2207
547	72 11.0	150 06	2206
547A	72 11.1	150 19	2204
547B	72 11.3	150 32	2211
547C	72 11.5	150 46	2209
547D	72 11.7	151 01	2207
548	72 11.8	151 14	2205

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
548A	72 12.0	151 27	2203
548B	72 12.2	151 38	2208
548C	72 12.4	151 50	2210
548D	72 12.6	152 03	2214
548E	72 12.8	152 14	2217
549	72 13.0	152 28	2223
549A	72 13.1	152 40	2222
549B	72 13.3	152 51	2223
549C	72 13.4	152 57	2229
549D	72 13.6	153 08	2229
549E	72 13.7	153 19	2231
549F	72 13.9	153 30	2225
549G	72 14.0	153 38	2224
550	72 14.2	153 48	2220
550A	72 14.4	154 01	2224
550B	72 14.6	154 12	2223
550C	72 14.8	154 21	2217
551	72 15.0	154 30	2231
551A	72 15.5	154 43	2239
551B	72 15.7	154 48	2237
552	72 16.0	154 53	2237
552A	72 16.1	155 00	2238
552B	72 16.3	155 10	2243
552C	72 16.4	155 19	2247
552D	72 16.5	155 30	2252
552E	72 16.7	155 40	2248
552F	72 16.9	155 54	2261
552G	72 17.1	156 06	2258
553	72 17.3	156 22	2262
553A	72 17.6	156 32	2269
553B	72 17.9	156 45	2272
553C	72 18.1	156 54	2280
553D	72 18.4	156 06	2279
553E	72 18.7	156 16	2298
554	72 19.0	156 27	2309

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elevation (meters)
554A	72 19.2	156 37	2304
554B	72 19.4	156 46	2303
554C	72 19.5	156 51	2315
554D	72 19.7	158 06	2323
555	72 20.0	158 12	2328
555A	72 21.0	158 24	2331
555B	72 21.9	158 35	2333
556	72 22.6	158 45	2331
556A	72 21.0	159 00	2327
556B	72 19.5	159 15	2319
556C	72 19.0	159 18	2304
556D	72 18.1	159 29	2265
556E	72 17.2	159 40	2235
557	72 16.3	159 49	2213
557A	72 15.5	160 04	2194
558	72 15.1	160 08	2198
558A	72 17.8	160 24	2072
558B	72 20.2	160 36	2045
558C	72 22.8	160 50	1917
558D	72 25.0	161 02	1761
558E	72 27.2	161 16	1681
558F	72 30.0	161 28	1652
558G	72 35.0	161 26	1696
559	72 37.8	161 32	1720

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
72.00.0	78° 01.4'S	158° 25.0'E	2316	982.3426	982.9976	+59.7
72.05.0	78° 01.4'S	158° 23.0'E	2313	982.3368	982.9976	+52.9
72.10.0	78° 01.4'S	158° 21.0'E	2306	982.3341	982.9976	+48.1
72.15.0	78° 01.4'S	158° 19.0'E	2303	982.3310	982.9976	+44.1
72.20.0	78° 01.4'S	158° 16.0'E	2293	982.3300	982.9976	+40.0
72.26.0	78° 01.4'S	158° 14.0'E	2284	982.3314	982.9976	+38.6
72.30.0	78° 01.4'S	158° 11.0'E	2290	982.3345	982.9976	+43.5
72.35.0	78° 01.4'S	158° 10.0'E	2291	982.3407	982.9976	+50.1
72.40.0	78° 01.4'S	158° 07.0'E	2297	982.3487	982.9976	+59.9
72.45.0	78° 01.4'S	158° 05.0'E	2302	982.3527	982.9976	+65.5
72.64.0	78° 01.5'S	157° 58.0'E	2298	982.3395	982.9977	+51.0
72.92.0	78° 01.5'S	157° 43.0'E	2241	982.3569	982.9977	+50.8
72.11.2	78° 01.5'S	157° 36.0'E	2215	982.3602	982.9977	+46.0
72.13.4	78° 01.6'S	157° 27.0'E	2168	982.3472	982.9978	+18.5
72.17.0	78° 01.6'S	157° 09.0'E	2180	982.3184	982.9978	-6.6
72.17A	S	E		982.3270		
72.21.0	78° 01.7'S	156° 52.0'E	2172	982.3344	982.9978	+6.9
72.24.2	78° 01.7'S	156° 39.0'E	2159	982.3334	982.9978	+1.8
72.27.2	78° 01.8'S	156° 25.0'E	2150	982.3275	982.9979	-6.9
72.30.2	78° 01.8'S	156° 11.0'E	2150	982.3258	982.9979	-8.6
72.33.2	78° 01.9'S	155° 57.0'E	2163	982.3173	982.9979	-13.1
72.36.2	78° 01.9'S	155° 43.0'E	2170	982.3109	982.9979	-17.4
72.39.2	78° 02.0'S	155° 29.0'E	2165	982.3127	982.9980	-17.2
72.41.5	78° 02.0'S	155° 19.0'E	2204	982.3065	982.9980	-11.4
72.45.0	78° 02.1'S	155° 00.0'E	2222	982.2984	982.9981	-14.0

OBSERVED, THEORETICAL AND FREE AIR GRAVITY

APPENDIX II

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
72.48.0	78° 02.1'S	154° 46.0'E	2257	982.2818	982.9981	-19.8
72.50.7	78° 02.2'S	154° 33.0'E	2264	982.2737	982.9981	-25.8
72.53.7	78° 02.2'S	154° 18.0'E	2263	982.2858	982.9981	-14.0
84(500)	78° 02.2'S	154° 06.0'E	2276	982.2837	982.9981	-12.1
500A	78° 00.0'S	154° 02.0'E	2285	982.2582	982.9968	-33.4
500B	77° 56.8'S	153° 56.0'E	2290	982.2463	982.9948	-41.8
500C	77° 54.1'S	153° 52.0'E	2294	982.2426	982.9931	-42.6
500D	77° 52.1'S	153° 47.0'E	2305	982.2408	982.9919	-39.8
500E	77° 50.0'S	153° 44.0'E	2311	982.2414	982.9906	-36.0
500F	77° 47.5'S	153° 40.0'E	2337	982.2336	982.9890	-34.2
500G	77° 45.3'S	153° 36.0'E	2339	982.2266	982.9877	-39.3
50100	77° 41.5'S	153° 29.0'E	2336	982.2369	982.9853	-27.5
501A	77° 40.0'S	153° 26.0'E	2342	982.2348	982.9843	-26.8
501B	77° 37.3'S	153° 22.0'E	2343	982.2257	982.9826	-33.9
501C	77° 34.8'S	153° 18.0'E	2344	982.2283	982.9810	-29.4
501D	77° 32.1'S	153° 13.0'E	2362	982.2189	982.9793	-31.5
501E	77° 29.2'S	153° 08.0'E	2366	982.2111	982.9775	-36.2
50200	77° 27.8'S	153° 06.0'E	2371	982.2095	982.9766	-35.4
502A	77° 25.0'S	153° 01.0'E	2383	982.2051	982.9748	-34.3
502B	77° 22.5'S	152° 56.0'E	2397	982.1968	982.9732	-36.7
502C	77° 20.0'S	152° 52.0'E	2401	982.1911	982.9716	-39.5
502D	77° 17.5'S	152° 47.0'E	2411	982.1932	982.9699	-32.7
502E	77° 14.8'S	152° 42.0'E	2425	982.1843	982.9682	-35.5
502F	77° 12.0'S	152° 37.0'E	2429	982.1814	982.9664	-35.4
50300	77° 09.0'S	152° 33.0'E	2435	982.1779	982.9644	-35.1

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligal)
503A	77° 06.8'S	152° 27.0'E	2435	982.1778	982.9630	-33.7
50400	77° 02.1'S	152° 19.0'E	2437	982.1827	982.9599	-25.1
504A	S	E		982.1820		
504A	77° 00.5'S	152° 14.0'E	2440	982.1792	982.9588	-26.6
504B	76° 58.2'S	152° 06.0'E	2452	982.1741	982.9573	-26.5
504C	76° 56.0'S	151° 59.0'E	2459	982.1700	982.9558	-27.0
504D	76° 53.7'S	151° 51.0'E	2460	982.1701	982.9543	-25.0
50500	76° 52.0'S	151° 46.0'E	2463	982.1677	982.9531	-25.4
505A	76° 50.3'S	151° 41.0'E	2464	982.1624	982.9520	-29.2
505B	76° 48.5'S	151° 35.0'E	2467	982.1593	982.9508	-30.2
505C	76° 47.0'S	151° 30.0'E	2466	982.1568	982.9498	-32.0
505D	76° 46.1'S	151° 27.0'E	2467	982.1560	982.9492	-31.9
505E	76° 44.2'S	151° 21.0'E	2468	982.1540	982.9479	-32.3
505F	76° 42.2'S	151° 15.0'E	2469	982.1540	982.9466	-30.6
505G	76° 40.5'S	151° 10.0'E	2473	982.1541	982.9454	-28.2
505H	76° 38.5'S	151° 03.0'E	2472	982.1527	982.9441	-28.5
505I	76° 36.2'S	150° 55.0'E	2474	982.1502	982.9425	-28.8
50600	76° 35.3'S	150° 53.0'E	2476	982.1490	982.9419	-28.8
506A	76° 32.7'S	150° 43.0'E	2479	982.1459	982.9401	-29.2
506B	76° 30.1'S	150° 34.0'E	2482	982.1446	982.9383	-27.8
50700	76° 27.0'S	150° 24.0'E	2479	982.1479	982.9362	-23.3
507A	76° 25.0'S	150° 18.0'E	2481	982.1420	982.9340	-27.2
507B	76° 22.7'S	150° 10.0'E	2480	982.1368	982.9332	-31.1
507C	76° 20.5'S	150° 04.0'E	2479	982.1340	982.9317	-32.7
507D	76° 19.0'S	149° 58.0'E	2477	982.1317	982.9307	-34.6

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
507E	76° 16.7'S	149° 51.0'E	2477	982.1276	982.9291	-37.1
50800	76° 15.5'S	149° 47.0'E	2474	982.1253	982.9282	-39.5
508A	76° 13.5'S	149° 42.0'E	2479	982.1215	982.9268	-40.3
508B	76° 11.3'S	149° 35.0'E	2470	982.1169	982.9253	-46.2
508C	76° 09.7'S	149° 30.0'E	2471	982.1126	982.9242	-49.0
50900	76° 07.5'S	149° 23.0'E	2468	982.1080	982.9226	-53.0
509A	76° 05.0'S	149° 16.0'E	2467	982.1060	982.9209	-53.6
509B	76° 02.7'S	149° 09.0'E	2470	982.1033	982.9192	-53.7
509C	76° 00.0'S	149° 02.0'E	2469	982.1020	982.9173	-53.4
509D	75° 57.2'S	148° 54.0'E	2467	982.1099	982.9153	-53.1
509E	75° 54.8'S	148° 46.0'E	2469	982.1002	982.9136	-51.5
509F	75° 51.0'S	148° 38.0'E	2483	982.0960	982.9109	-48.7
51000	75° 47.3'S	148° 27.0'E	2490	982.0908	982.9083	-49.1
510A	75° 45.4'S	148° 19.0'E	2487	982.0912	982.9069	-48.2
510B	75° 43.3'S	148° 12.0'E	2487	982.0902	982.9054	-47.7
510C	75° 46.1'S	148° 04.0'E	2491	982.0928	982.9074	-45.9
510D	75° 38.9'S	148° 56.0'E	2499	982.0937	982.9022	-37.3
510E	75° 36.7'S	148° 48.0'E	2508	982.0923	982.9006	-34.3
510F	75° 34.2'S	148° 40.0'E	2508	982.0912	982.8988	-33.6
510G	75° 32.0'S	148° 32.0'E	2512	982.0892	982.8972	-32.8
51100	75° 30.5'S	147° 26.0'E	2517	982.0858	982.8961	-33.5
511A	75° 27.0'S	147° 18.0'E	2512	982.0774	982.8935	-40.9
511B	75° 24.5'S	147° 14.0'E	2509	982.0731	982.8917	-44.3
511C	75° 21.1'S	147° 07.0'E	2510	982.0695	982.8892	-45.1
511D	75° 18.0'S	147° 00.0'E	2515	982.0648	982.8869	-45.9

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
511E	75° 14.5'S	147° 52.0'E	2523	982.0602	982.8843	-45.5
51200	75° 12.1'S	146° 49.0'E	2520	982.0624	982.8825	-42.4
512A	75° 10.5'S	146° 44.0'E	2511	982.0653	982.8813	-41.1
512B	75° 07.8'S	146° 34.0'E	2517	982.0641	982.8793	-38.4
512C	75° 04.5'S	146° 25.0'E	2517	982.0629	982.8768	-37.1
512D	75° 01.8'S	146° 16.0'E	2524	982.0594	982.8748	-36.5
512E	74° 58.5'S	146° 08.0'E	2535	982.0541	982.8723	-35.9
512F	74° 55.6'S	145° 59.0'E	2539	982.0499	982.8701	-36.6
51300	74° 53.0'S	145° 52.0'E	2549	982.0453	982.8681	-36.2
513A	74° 50.8'S	145° 44.0'E	2559	982.0368	982.8664	-39.9
513B	74° 48.2'S	145° 35.0'E	2552	982.0382	982.8644	-38.7
513C	74° 41.3'S	145° 28.0'E	2554	982.0430	982.8591	-28.0
513D	74° 44.2'S	145° 20.0'E	2568	982.0427	982.8614	-26.2
513E	74° 41.8'S	145° 12.0'E	2572	982.0455	982.8595	-20.3
513F	74° 39.5'S	145° 05.0'E	2573	982.0480	982.8578	-15.7
513G	74° 37.3'S	144° 57.0'E	2577	982.0409	982.8561	-19.9
51400	74° 36.0'S	144° 52.0'E	2581	982.0361	982.8550	-22.5
514A	74° 34.5'S	144° 46.0'E	2586	982.0331	982.8539	-22.8
514B	74° 32.3'S	144° 43.0'E	2590	982.0318	982.8522	-21.1
514C	74° 34.1'S	144° 26.0'E	2590	982.0333	982.8536	-21.0
51500	74° 34.1'S	144° 24.0'E	2590	982.0333	982.8536	-21.0
515A	74° 31.0'S	144° 20.0'E	2589	982.0315	982.8512	-20.7
51600	74° 27.5'S	144° 15.0'E	2591	982.0288	982.8484	-20.1
516A	74° 24.7'S	144° 12.0'E	2592	982.0263	982.8463	-20.1
516B	74° 21.8'S	144° 10.0'E	2590	982.0214	982.8440	-23.3

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
516C	74° 18.9'S	144° 07.0'E	2588	982.0170	982.8417	-26.1
516D	74° 15.8'S	144° 05.0'E	2591	982.0168	982.8393	-22.9
516E	74° 13.0'S	144° 02.0'E	2586	982.0215	982.8371	-17.5
516F	74° 10.0'S	143° 59.0'E	2584	982.0248	982.8347	-12.5
516G	74° 06.9'S	143° 56.0'E	2580	982.0259	982.8322	-10.2
51700	74° 05.5'S	143° 55.0'E	2575	982.0279	982.8311	-8.6
517A	74° 03.0'S	143° 51.0'E	2575	982.0272	982.8291	-7.3
517B	74° 00.0'S	143° 47.0'E	2577	982.0290	982.8267	-2.5
517C	73° 57.3'S	143° 42.0'E	2573	982.0285	982.8246	-2.0
51800	73° 55.5'S	143° 38.0'E	2571	982.0283	982.8231	-1.4
518A	73° 53.0'S	143° 35.0'E	2563	982.0288	982.8211	-1.4
518B	73° 50.3'S	143° 34.0'E	2553	982.0295	982.8189	-1.6
518C	73° 48.1'S	143° 30.0'E	2542	982.0323	982.8171	- .4
51900	73° 44.4'S	143° 28.0'E	2541	982.0302	982.8141	+ .2
519A	73° 42.0'S	143° 23.0'E	2536	982.0391	982.8122	+9.5
519B	73° 39.1'S	143° 18.0'E	2539	982.0443	982.8098	+18.0
519C	73° 37.1'S	143° 15.0'E	2535	982.0359	982.8082	+10.0
519D	73° 35.0'S	143° 12.0'E	2530	982.0363	982.8065	+10.6
519E	73° 32.0'S	143° 08.0'E	2524	982.0373	982.8040	+12.2
519F	73° 29.5'S	143° 05.0'E	2516	982.0357	982.8020	+10.2
52000	73° 27.0'S	143° 00.0'E	2521	982.0320	982.7999	+10.1
520A	73° 24.2'S	142° 55.0'E	2521	982.0349	982.7976	+15.3
520B	73° 21.8'S	142° 52.0'E	2518	982.0359	982.7956	+17.3
520C	73° 19.0'S	143° 47.0'E	2518	982.0330	982.7933	+16.8
520D	73° 16.0'S	143° 43.0'E	2512	982.0345	982.7908	+18.9

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
520E	73° 13.1'S	143° 39.0'E	2507	982.0327	982.7884	+18.0
520F	73° 10.6'S	143° 35.0'E	2508	982.0290	982.7863	+16.7
52100	73° 07.4'S	142° 30.0'E	2516	982.0187	982.7836	+11.5
521A	73° 05.0'S	142° 27.0'E	2520	982.0192	982.7816	+15.3
521B	73° 02.2'S	142° 22.0'E	2517	982.0211	982.7792	+18.6
521C	72° 59.5'S	142° 17.0'E	2515	982.0205	982.7770	+19.7
521D	72° 57.1'S	142° 12.0'E	2509	982.0207	982.7749	+20.0
521E	72° 54.5'S	142° 07.0'E	2506	982.0203	982.7727	+20.9
521F	72° 51.6'S	142° 02.0'E	2503	982.0209	982.7703	+23.1
521G	72° 49.3'S	141° 58.0'E	2500	982.0203	982.7683	+23.5
52200	72° 46.3'S	141° 54.0'E	2506	982.0161	982.7657	+23.7
522A	72° 45.7'S	141° 53.0'E	2504	982.0156	982.7652	+23.1
522B	72° 43.4'S	141° 48.0'E	2499	982.0126	982.7633	+20.5
522C	72° 41.6'S	141° 45.0'E	2496	982.0104	982.7617	+18.9
522D	72° 40.0'S	141° 42.0'E	2497	982.0101	982.7603	+20.3
522E	72° 38.9'S	141° 40.0'E	2497	982.0086	982.7594	+19.8
52300	72° 38.0'S	141° 38.0'E	2498	982.0069	982.7586	+19.2
523A	72° 36.4'S	141° 35.0'E	2503	982.0049	982.7572	+20.1
523B	72° 35.2'S	141° 32.0'E	2504	982.0064	982.7562	+22.9
523C	72° 33.8'S	141° 29.0'E	2502	982.0078	982.7550	+24.9
523D	72° 32.0'S	141° 25.0'E	2496	982.0114	982.7534	+28.2
523E	72° 30.7'S	141° 22.0'E	2494	982.0151	982.7523	+32.4
523F	72° 29.0'S	141° 20.0'E	2495	982.0158	982.7508	+34.9
52400	72° 28.7'S	141° 21.0'E	2498	982.0168	982.7506	+37.1
524A	72° 26.1'S	141° 15.0'E	2502	982.0172	982.7483	+41.0

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
524B	72° 23.8'S	141° 10.0'E	2502	982.0011	982.7463	+26.9
524C	72° 21.0'S	141° 06.0'E	2488	982.0024	982.7439	+26.3
524D	72° 18.5'S	141° 02.0'E	2493	981.9927	982.7417	+20.3
52500	72° 15.8'S	140° 56.0'E	2491	981.9781	982.7393	+7.5
525A	72° 13.2'S	140° 52.0'E	2500	981.9659	982.7371	+3
525B	72° 11.0'S	140° 48.0'E	2510	981.9424	982.7351	-18.2
525C	72° 08.1'S	140° 44.0'E	2515	981.9210	982.7326	-35.5
525D	72° 05.8'S	140° 39.0'E	2501	981.9198	982.7305	-38.9
525E	72° 03.2'S	140° 35.0'E	2514	981.8926	982.7282	-59.8
525F	72° 00.3'S	140° 30.0'E	2494	981.8746	982.7257	-81.4
52600	71° 58.0'S	140° 27.0'E	2482	981.8608	982.7236	-96.9
526A	71° 55.2'S	140° 23.0'E	2472	981.8557	982.7211	-102.6
526B	71° 53.0'S	140° 20.0'E	2470	981.8512	982.7192	-105.7
52700	71° 50.2'S	140° 15.0'E	2467	981.8491	982.7167	-106.3
527A	71° 47.6'S	140° 12.0'E	2469	981.8530	982.7143	-99.4
527B	71° 45.0'S	140° 10.0'E	2465	981.8589	982.7120	-92.4
52800	71° 42.2'S	140° 06.0'E	2467	981.8624	982.7095	-85.8
528A	71° 39.3'S	140° 04.0'E	2471	981.8649	982.7069	-79.4
528B	71° 37.1'S	140° 01.0'E	2466	981.8693	982.7049	-74.6
528C	71° 34.5'S	139° 57.0'E	2465	981.8695	982.7025	-72.4
528D	71° 31.9'S	139° 54.0'E	2469	981.8644	982.7002	-73.9
52900	71° 29.6'E	139° 54.0'E	2458	981.8691	982.6981	-70.5
529A	71° 27.0'S	139° 50.0'E	2453	981.8729	982.6957	-65.9
529B	71° 24.2'S	139° 46.0'E	2459	981.8780	982.6932	-56.3
529B	S	E		981.8852		

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
529C	71° 21.8'S	139° 41.0'E	2461	981.8885	982.6910	-43.0
529D	71° 19.3'S	139° 37.0'E	2474	981.8890	982.6887	-36.2
529E	71° 16.7'S	139° 32.0'E	2478	981.8894	982.6863	-32.2
53000	71° 14.0'S	139° 28.0'E	2487	981.8920	982.6838	-24.4
530A	71° 11.6'S	139° 22.0'E	2498	981.8919	982.6816	-18.9
530B	71° 10.0'S	139° 18.0'E	2509	981.8896	982.6802	-16.3
530C	71° 09.2'S	139° 16.0'E	2511	981.8892	982.6794	-15.3
531B6	71° 07.8'S	139° 11.0'E	2513	981.8889	982.6781	-13.7
530C	71° 09.2'S	139° 16.0'E	2510	981.8895	982.6794	-15.3
530B	71° 10.0'S	139° 18.0'E	2507	981.8902	982.6802	-16.3
530A	71° 11.6'S	139° 22.0'E	2498	981.8922	982.6816	-18.6
53000	71° 14.0'S	139° 28.0'E	2486	981.8919	982.6838	-24.8
529E	71° 16.7'S	139° 32.0'E	2479	981.8895	982.6863	-31.8
529D	71° 19.3'S	139° 37.0'E	2474	981.8885	982.6887	-36.7
529C	71° 21.0'S	139° 41.0'E	2461	981.8881	982.6910	-43.4
529B1		S	E	981.8846		
529B	71° 24.2'S	139° 46.0'E	2461	981.8776	982.6932	-56.1
529A	71° 27.0'S	139° 50.0'E	2456	981.8722	982.6957	-65.6
52900	71° 29.6'S	139° 54.0'E	2461	981.8690	982.6981	-69.6
528DD	71° 31.9'S	139° 54.0'E	2469	981.8638	982.7002	-74.5
528CC	71° 34.5'S	139° 57.0'E	2464	981.8689	982.7025	-73.3
528BB	71° 37.1'S	139° 01.0'E	2466	981.8691	982.7049	-74.8
528AA	71° 39.3'S	139° 04.0'E	2467	981.8655	982.7069	-80.1
52800	71° 42.2'S	140° 08.0'E	2464	981.8618	982.7095	-87.3
527BB	71° 45.0'S	140° 10.0'E	2461	981.8582	982.7120	-94.4

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
527AA	71° 47.6'S	140° 12.0'E	2465	981.8528	982.7143	-100.9
52700	71° 50.2'S	140° 15.0'E	2464	981.8492	982.7167	-107.1
526BB	71° 53.0'S	140° 20.0'E	2466	981.8505	982.7192	-107.7
526AA	71° 55.2'S	140° 23.0'E	2471	981.8551	982.7211	-103.5
52600	71° 58.0'S	140° 27.0'E	2482	981.8601	982.7236	-97.6
525FF	72° 00.2'S	140° 31.0'E	2491	981.8702	982.7256	-86.7
53200	72° 01.8'S	140° 34.0'E	2507	981.8803	982.7270	-73.1
532 1	S	E		981.9002		
532A	72° 01.8'S	140° 40.0'E	2494	981.9108	982.7270	-46.6
532B	72° 01.8'S	140° 47.0'E	2476	981.9321	982.7270	-30.8
532C	72° 01.8'S	140° 53.0'E	2465	981.9471	982.7270	-19.2
532D	72° 01.8'S	141° 00.0'E	2468	981.9440	982.7270	-21.4
532E	72° 01.8'S	141° 06.0'E	2481	981.9489	982.7270	-12.5
53300	72° 01.8'S	141° 08.0'E	2477	981.9567	982.7270	-5.9
533A	72° 01.8'S	141° 14.0'E	2469	981.9660	982.7270	+9.9
533B	72° 01.9'S	141° 20.0'E	2463	981.9714	982.7271	+4.4
533C	72° 02.0'S	141° 26.0'E	2449	981.9798	982.7272	+8.4
533D	72° 02.1'S	141° 32.0'E	2430	981.9848	982.7273	+7.4
533F	72° 02.2'S	141° 38.0'E	2424	981.9830	982.7274	+3.7
533F	72° 02.3'S	141° 44.0'E	2424	981.9848	982.7274	+5.4
53400	72° 02.4'S	141° 45.0'E	2422	981.9843	982.7275	+4.2
534A	72° 02.4'S	141° 52.0'E	2418	981.9898	982.7275	+8.4
534B	72° 02.5'S	141° 58.0'E	2415	981.9973	982.7276	+14.9
534C	72° 01.6'S	142° 04.0'E	2404	982.0073	982.7268	+22.3
534D	72° 02.7'S	142° 10.0'E	2390	982.0133	982.7278	+23.0

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
534E	72° 02.8'S	142° 16.0'E	2386	982.0139	982.7279	+22.3
534F	72° 02.9'S	142° 23.0'E	2384	982.0169	982.7280	+24.6
534G	72° 03.0'S	142° 29.0'E	2383	982.0214	982.7281	+28.7
53500	72° 03.0'S	142° 33.0'E	2383	982.0243	982.7281	+31.6
535A	72° 03.5'S	142° 39.0'E	2378	982.0303	982.7285	+35.6
535B	72° 04.0'S	142° 45.0'E	2373	982.0339	982.7290	+37.2
535C	72° 04.5'S	142° 50.0'E	2370	982.0339	982.7294	+35.9
535D	72° 05.0'S	142° 56.0'E	2364	982.0328	982.7298	+32.5
535E	72° 05.5'S	143° 02.0'E	2362	982.0299	982.7303	+28.5
535F	72° 06.0'S	143° 08.0'E	2359	982.0265	982.7307	+23.8
53600	72° 06.5'S	143° 12.0'E	2356	982.0216	982.7312	+17.5
536A	72° 06.4'S	143° 18.0'E	2352	982.0150	982.7311	+9.7
536B	72° 06.3'S	143° 24.0'E	2349	982.0080	982.7310	+1.9
536C	72° 06.2'S	143° 32.0'E	2346	981.9998	982.7309	-7.1
536D	72° 06.1'S	143° 38.0'E	2346	981.9924	982.7308	-14.4
536E	72° 06.1'S	143° 42.0'E	2346	981.9899	982.7308	-16.9
53700	72° 06.0'S	143° 51.0'E	2351	981.9888	982.7307	-16.4
537A	72° 06.2'S	143° 58.0'E	2344	981.9963	982.7309	-11.3
537B	72° 06.4'S	144° 04.0'E	2328	982.0036	982.7311	-9.1
537C	72° 06.6'S	144° 11.0'E	2329	982.0024	982.7313	-10.1
537D	72° 06.8'S	144° 17.0'E	2329	982.0036	982.7314	-9.1
53800	72° 07.0'S	144° 23.0'E	2328	982.0076	982.7316	-5.6
538A	72° 07.0'S	144° 30.0'E	2325	982.0158	982.7316	+1.7
538B	72° 07.0'S	144° 36.0'E	2327	982.0164	982.7316	+2.9
538C	72° 07.1'S	144° 42.0'E	2324	982.0157	982.7317	+1.2

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
538D	72° 07.1'S	144° 49.0'E	2328	982.0145	982.7317	+1.2
538E	72° 07.1'S	144° 55.0'E	2324	982.0178	982.7317	+3.3
538F	72° 07.2'S	145° 02.0'E	2314	982.0228	982.7318	+5.1
538G	72° 07.2'S	145° 08.0'E	2309	982.0250	982.7318	+5.8
538H	72° 07.2'S	145° 14.0'E	2313	982.0230	982.7318	+5.0
53900	72° 07.2'S	145° 20.0'E	2309	982.0218	982.7318	+2.6
539A	72° 07.4'S	145° 27.0'E	2309	982.0221	982.7320	+2.7
539B	72° 07.6'S	145° 33.0'E	2304	982.0234	982.7321	+2.3
539C	72° 07.7'S	145° 38.0'E	2298	982.0271	982.7322	+4.0
539D	72° 07.8'S	145° 43.0'E	2291	982.0291	982.7323	+3.8
539E	72° 07.9'S	145° 48.0'E	2291	982.0288	982.7324	+3.4
54000	72° 08.0'S	145° 53.0'E	2287	982.0292	982.7325	+2.5
540A	72° 08.1'S	146° 00.0'E	2280	982.0299	982.7326	+0.9
54100	72° 08.2'S	146° 05.0'E	2273	982.0297	982.7327	-1.5
541A	72° 08.2'S	146° 11.0'E	2268	982.0311	982.7327	-1.7
541B	72° 08.2'S	146° 17.0'E	2263	982.0309	982.7327	-3.4
541C	72° 08.2'S	146° 23.0'E	2266	982.0310	982.7327	-2.4
541D	72° 08.1'S	146° 30.0'E	2262	982.0334	982.7326	-1.1
541E	72° 08.1'S	146° 33.0'E	2261	982.0365	982.7326	+1.7
541F	72° 08.1'S	146° 40.0'E	2258	982.0398	982.7326	+4.0
541G	72° 08.0'S	146° 47.0'E	2251	982.0439	982.7325	+6.1
541H	72° 08.0'S	146° 52.0'E	2246	982.0498	982.7325	+10.4
541I	72° 08.0'S	146° 59.0'E	2232	982.0527	982.7325	+9.0
54200	72° 08.0'S	147° 05.0'E	2225	982.0509	982.7325	+5.0
542A	72° 07.8'S	147° 12.0'E	2227	982.0504	982.7323	+5.3

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
542B	72° 07.6'S	147° 18.0'E	2224	982.0520	982.7321	+6.2
542C	72° 07.4'S	147° 24.0'E	2227	982.0518	982.7320	+7.1
542D	72° 07.2'S	147° 31.0'E	2226	982.0521	982.7318	+7.3
54300	72° 07.0'S	147° 36.0'E	2222	982.0515	982.7316	+5.6
543A	72° 07.1'S	147° 44.0'E	2219	982.0494	982.7317	+2.5
543B	72° 07.3'S	147° 50.0'E	2223	982.0463	982.7319	+4.4
543C	72° 07.4'S	147° 56.0'E	2226	982.0446	982.7320	-.4
543D	72° 07.6'S	148° 03.0'E	2223	982.0435	982.7321	-2.6
543E	72° 07.7'S	148° 08.0'E	2217	982.0462	982.7322	-1.9
54400	72° 07.8'S	148° 12.0'E	2216	982.0473	982.7323	-1.2
544A	72° 07.8'S	148° 20.0'E	2211	982.0487	982.7323	-1.3
544B	72° 07.9'S	148° 26.0'E	2208	982.0490	982.7324	-2.0
544C	72° 07.9'S	148° 31.0'E	2206	982.0485	982.7324	-3.1
54500	72° 08.0'S	148° 34.0'E	2199	982.0485	982.7325	-5.4
545A	72° 08.2'S	148° 40.0'E	2191	982.0466	982.7327	-9.9
545B	72° 08.4'S	148° 47.0'E	2173	982.0423	982.7328	-20.0
545C	72° 08.6'S	148° 52.0'E	2163	982.0360	982.7330	-29.5
545D	72° 08.8'S	148° 58.0'E	2170	982.0246	982.7332	-38.9
54600	72° 09.0'S	149° 02.0'E	2170	982.0214	982.7334	-42.3
546A	72° 09.2'S	149° 09.0'E	2170	982.0219	982.7335	-42.0
546B	72° 09.4'S	149° 15.0'E	2170	982.0224	982.7337	-41.7
546C	72° 09.6'S	149° 21.0'E	2180	982.0168	982.7339	-44.4
546D	72° 09.8'S	149° 26.0'E	2194	982.0117	982.7341	-45.3
546E	72° 10.0'S	149° 33.0'E	2201	982.0104	982.7342	-44.6
546F	72° 10.2'S	149° 40.0'E	2207	982.0095	982.7344	-43.9

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
55100	72° 15.0'S	154° 30.0'E	2231	982.0204	982.7386	-29.8
551A	72° 15.5'S	154° 43.0'E	2239	982.0150	982.7391	-33.1
55200	72° 16.0'S	154° 53.0'E	2237	982.0150	982.7395	-34.2
552A	72° 16.1'S	155° 00.0'E	2238	982.0138	982.7396	-35.2
552B	72° 16.3'S	155° 10.0'E	2243	982.0107	982.7398	-36.9
552C	72° 16.4'S	155° 19.0'E	2247	982.0083	982.7399	-38.2
552D	72° 16.5'S	155° 30.0'E	2252	982.0108	982.7400	-34.2
552E	72° 16.7'S	155° 40.0'E	2248	982.0230	982.7401	-23.4
552F	72° 16.9'S	155° 54.0'E	2261	982.0157	982.7403	-26.9
552G	72° 17.1'S	156° 06.0'E	2258	982.0139	982.7405	-29.8
55300	72° 17.3'S	156° 22.0'E	2262	982.0168	982.7407	-25.8
553A	72° 17.6'S	156° 32.0'E	2269	982.0120	982.7409	-28.7
553B	72° 17.9'S	156° 45.0'E	2272	982.0086	982.7412	-31.5
553C	72° 18.1'S	156° 54.0'E	2280	982.0064	982.7414	-31.4
553D	72° 18.4'S	157° 06.0'E	2279	982.0051	982.7416	-33.2
553E	72° 18.7'S	157° 16.0'E	2298	981.9970	982.7419	-35.7
55400	72° 19.0'S	157° 27.0'E	2309	981.9725	982.7421	-57.1
554A	72° 19.2'S	157° 37.0'E	2304	981.9736	982.7423	-57.7
554B	72° 19.4'S	157° 46.0'E	2303	981.9859	982.7425	-45.9
554C	72° 19.5'S	157° 51.0'E	2315	981.9912	982.7426	-37.0
554D	72° 19.7'S	158° 06.0'E	2322	981.9965	982.7428	-29.7
55500	72° 20.0'S	158° 12.0'E	2328	981.9986	982.7430	-26.0
555A	72° 21.0'S	158° 24.0'E	2331	982.0057	982.7439	-18.9
555B	72° 21.9'S	158° 35.0'E	2333	982.0209	982.7447	-3.8
55600	72° 22.6'S	158° 45.0'E	2331	982.0238	982.7453	-2.2

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Latitude	Longitude	Elev (meters)	Obs Gravity (gals)	Theor Gravity (gals)	Free Air Anomaly (milligals)
556A	72° 21.0'S	159° 00.0'E	2327	982.0054	982.7439	-20.4
556B	72° 19.5'S	159° 15.0'E	2319	982.0486	982.7426	-21.7
556C	72° 19.0'S	159° 18.0'E	2304	982.0720	982.7421	+40.9
556D	72° 18.1'S	159° 29.0'E	2265	982.0870	982.7414	+44.6
556E	72° 17.2'S	159° 40.0'E	2235	982.0596	982.7406	+8.7
55700	72° 16.3'S	159° 49.0'E	2213	982.0872	982.7398	+30.3
557A	72° 15.5'S	160° 04.0'E	2194	982.1165	982.7391	+54.5
55800	72° 15.1'S	160° 08.0'E	2198	982.1301	982.7387	+69.7
558A	72° 17.8'S	160° 24.0'E	2072	982.1312	982.7411	+29.5
558B	72° 20.2'S	160° 36.0'E	2045	982.1618	982.7432	+49.7
558C	72° 22.8'S	160° 50.0'E	1917	982.2200	982.7455	+66.1
558D	72° 25.0'S	161° 02.0'E	1761	982.2411	982.7474	+37.2
558E	72° 27.2'S	161° 16.0'E	1681	982.2598	982.7493	+29.3
558F	72° 30.0'S	161° 28.0'E	1652	982.2113	982.7517	-30.6
558G	72° 35.0'S	161° 26.0'E	1696	982.1971	982.7560	-35.6
55900	72° 37.8'S	161° 32.0'E	1720	982.1950	982.7584	-32.7

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
72	+59.7	0.0	0.0	870	870	2316	+1446
72.05	+52.9	-6.8	-92.2		962	2313	+1351
72.10	+48.1	-11.6	-157.3		1027	2306	+1279
72.15	+44.1	-15.6	-211.5		1082	2303	+1221
72.20	+40.0	-19.7	-267.1		1137	2293	+1156
72.26	+38.6	-21.1	-286.1	870	1156	2284	+1128
72.30	+43.5	-16.2	-219.7		1090	2290	+1200
72.35	+50.1	-9.6	-130.2		1000	2291	+1291
72.40	+59.9	+0.2	+2.7		867	2297	+1430
72.45	+65.5	+5.8	+78.6		791	2302	+1551
72.64	+51.0	-8.7	-118.0	870	988	2298	+1310
72.92	+50.8	-8.9	-120.7		991	2241	+1250
72.11.2	+46.0	-13.7	-185.8		1056	2215	+1159
72.13.4	+18.5	-41.2	-558.7		1429	2168	+739
72.17	-6.6	-66.3	-899.0		1769	2180	+411
72.17A							
72.21	+6.9	-52.8	-716.0	870	1586	2172	+586
72.24.2	+1.8	-57.9	-785.1		1655	2159	+504
72.27.2	-6.9	-66.6	-903.1		1773	2150	+377
72.30.2	-8.6	-68.3	-926.1		1796	2150	+354
72.33.2	-13.1	-72.8	-987.2	870	1857	2163	+306
72.36.2	-17.4	-77.1	-1045.5		1916	2170	+254
72.39.2	-17.2	-76.9	-1042.8		1913	2165	+252
72.41.5	-11.4	-71.1	-964.1		1834	2204	+370
72.45.0	-14.0	-73.7	-999.4		1869	2222	+353

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA
APPENDIX III
FREE AIR ANOMALIES AND COMPUTED APPARENT
ROCK SURFACE ELEVATIONS

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
72.48.0	-19.8	-79.5	-1078.0	870	1948	2257	+309
72.50.7	-25.8	-85.5	-1159.4		2029	2264	+235
72.53.7	-14.0	-73.7	-999.4		1869	2263	+394
84(500)	-12.1	-71.8	-973.6		1844	2276	+432
500A	-33.4	-93.1	-1262.4		2132	2285	+153
500B	-41.8	-101.5	-1376.3	870	2246	2290	+44
500C	-42.6	-102.3	-1387.2		2257	2294	+37
500D	-39.8	-99.5	-1349.2		2219	2305	+86
500E	-36.0	-95.7	-1297.7		2168	2311	+143
500F	-34.2	-93.9	-1273.3		2143	2337	+194
500G	-39.3	-99.0	-1342.2	870	2212	2339	+127
501	-27.5	-87.2	-1182.4		2052	2336	+284
501A	-26.8	-86.5	-1172.9		2043	2342	+299
501B	-33.9	-93.6	-1269.2		2139	2343	+204
501C	-29.4	-89.1	-1208.2		2078	2344	+266
501D	-31.5	-91.2	-1236.7	870	2107	2362	+255
501E	-36.2	-95.9	-1300.4		2170	2366	+196
502	-35.4	-95.1	-1289.6		2160	2371	+211
502A	-34.3	-94.0	-1274.6		2145	2383	+238
502B	-36.7	-96.4	-1307.2		2177	2397	+220
502C	-39.5	-99.2	-1345.1	870	2215	2401	+186
502D	-32.7	-92.4	-1252.9		2123	2411	+288
502E	-35.5	-95.2	-1290.9		2161	2425	+264
502F	-35.4	-95.1	-1289.6		2160	2429	+269
503	-35.1	-94.8	-1285.5		2156	2435	+279

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equip (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
503A	-33.7	-93.4	-1266.5	870	2137	2435	+298
504	-25.1	-84.8	-1149.9		2020	2437	+417
504A	-26.6	-86.3	-1170.2		2040	2440	+400
504B	-26.5	-86.2	-1168.9		2039	2452	+413
504C	-27.0	-86.7	-1175.7		2046	2459	+413
504D	-25.0	-84.7	-1148.5	870	2019	2460	+441
505	-25.4	-85.1	-1154.0		2024	2463	+439
505A	-29.2	-88.9	-1205.5		2076	2464	+388
505B	-30.2	-89.9	-1219.0		2089	2467	+378
505C	-32.0	-91.7	-1243.5		2114	2466	+352
505D	-31.9	-91.6	-1242.1	870	2112	2467	+355
505E	-32.3	-92.0	-1247.5		2118	2468	+350
505F	-30.6	-90.3	-1224.5		2095	2469	+374
505G	-28.2	-87.9	-1191.9		2062	2473	+411
505H	-28.5	-88.2	-1196.0		2066	2472	+406
505I	-28.8	-88.5	-1200.1	870	2070	2474	+404
506	-28.8	-88.5	-1200.1		2070	2476	+406
506A	-29.2	-88.9	-1205.5		2076	2479	+403
506B	-27.8	-87.5	-1186.5		2057	2482	+425
507	-23.3	-83.0	-1125.5		1996	2479	+483
507A	-27.2	-86.9	-1178.4	870	2048	2481	+433
507B	-31.1	-90.8	-1231.2		2101	2480	+379
507C	-32.7	-92.4	-1252.9		2123	2479	+356
507D	-34.6	-94.3	-1278.7		2149	2477	+328
507E	-37.1	-96.8	-1312.6		2183	2477	+294

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
508	-39.5	-99.2	-1345.2	870	2215	2474	+259
508A	-40.3	-100.0	-1356.0		2226	2479	+253
508B	-46.2	-105.9	-1436.0		2306	2470	+164
508C	-49.0	-108.7	-1474.0		2344	2471	+127
509	-53.0	-112.7	-1528.2		2398	2468	+70
509A	-53.6	-113.3	-1536.3	870	2406	2467	+61
509B	-53.7	-113.4	-1537.7		2408	2470	+62
509C	-53.4	-113.1	-1533.6		2404	2469	+65
509D	-53.1	-112.8	-1529.6		2400	2467	+67
509E	-51.5	-111.2	-1507.9		2378	2469	+91
509F	-48.7	-108.4	-1470.0	870	2340	2483	+143
510	-49.1	-108.8	-1475.3		2345	2490	+145
510A	-48.2	-107.9	-1463.0		2333	2487	+154
510B	-47.7	-107.4	-1456.3		2326	2487	+161
510C	-45.9	-105.6	-1431.9		2302	2491	+189
510D	-37.3	-97.0	-1315.3	870	2185	2499	+314
510E	-34.3	-94.0	-1274.6		2145	2508	+363
510F	-33.6	-93.3	-1265.1		2135	2508	+373
510G	-32.8	-92.5	-1254.3		2124	2512	+388
511	-33.5	-93.2	-1263.8		2134	2517	+383
511A	-40.9	-100.6	-1364.1	870	2234	2512	+278
511B	-44.3	-104.0	-1410.2		2280	2509	+229
511C	-45.1	-104.8	-1421.1		2291	2510	+219
511D	-45.9	-105.6	-1431.9		2302	2515	+213
511E	-45.5	-105.2	-1426.5		2297	2523	+226

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
512	-42.4	-102.1	-1384.5	870	2255	2520	+265
512A	-41.1	-100.8	-1366.8		2237	2511	+274
512B	-38.4	-98.1	-1330.2		2200	2517	+317
512C	-37.1	-96.8	-1312.6		2183	2517	+334
512D	-36.5	-96.2	-1304.5		2175	2524	+349
512E	-35.9	-95.6	-1296.3	870	2166	2535	+369
512F	-36.6	-96.3	-1305.8		2176	2539	+363
513	-36.2	-95.9	-1300.4		2170	2549	+379
513A	-39.9	-99.6	-1350.6		2221	2559	+338
513B	-38.7	-98.4	-1334.3		2204	2552	+348
513C	-28.0	-87.7	-1189.2	870	2059	2554	+495
513D	-26.2	-85.9	-1164.8		2035	2568	+533
513E	-20.3	-80.0	-1084.8		1955	2572	+617
513F	-15.7	-75.4	-1022.4		1892	2573	+681
513G	-19.9	-79.6	-1079.4		1949	2577	+628
514	-22.5	-82.2	-1114.6	870	1985	2581	+596
514A	-22.8	-82.5	-1118.7		1989	2586	+597
514B	-21.1	-80.8	-1095.6		1966	2590	+624
514C	-21.0	-80.7	-1094.3		1964	2590	+626
515 (Depot "300")	-21.0	-80.7	-1094.3		1964	2590	+626
515A	-20.7	-80.4	-1090.2	870	1960	2589	+629
516	-20.1	-79.8	-1082.1		1952	2591	+639
516A	-20.1	-79.8	-1082.1		1952	2592	+640
516B	-23.3	-83.0	-1125.5		1996	2590	+594
516C	-26.1	-85.8	-1163.4		2033	2588	+555

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
516D	-22.9	-82.6	-1120.1	870	1990	2591	+601
516E	-17.5	-77.2	-1046.8		1917	2586	+669
516F	-12.5	-72.2	-979.0		1849	2584	+735
516G	-10.2	-69.9	-947.8		1818	2580	+762
517	-8.6	-68.3	-926.1		1796	2575	+779
517A	-7.3	-67.0	-908.5	870	1779	2575	+796
517B	-2.5	-62.2	-843.3		1773	2577	+864
517C	-2.0	-61.7	-836.7		1707	2573	+866
518	-1.4	-61.1	-828.5		1699	2571	+872
518A	-1.4	-61.1	-828.5		1699	2563	+864
518B	-1.6	-61.3	-831.2	870	1701	2553	+852
518C	-0.4	-60.1	-815.0		1685	2542	+857
519	+0.2	-59.5	-806.8		1677	2541	+864
519A	+9.5	-50.2	-680.7		1551	2536	+985
519B	+18.0	-41.7	-565.5		1436	2539	+1103
519C	+10.0	-49.7	-673.9	870	1544	2535	+991
519D	+10.6	-49.1	-665.8		1536	2530	+994
519E	+12.2	-47.5	-644.1		1514	2524	+1010
519F	+10.2	-49.5	-671.2		1541	2516	+975
520	+10.1	-49.6	-672.6		1543	2521	+978
520A	+15.3	-44.4	-602.1	870	1472	2521	+1049
520B	+17.3	-42.4	-574.9		1445	2518	+1073
520C	+16.8	-42.9	-581.7		1452	2518	+1066
520D	+18.9	-40.8	-553.2		1423	2512	+1089
520E	+18.0	-41.7	-565.5		1436	2507	+1071

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
520F	+16.7	-43.0	-583.1	870	1453	2508	+1055
521	+11.5	-48.2	-653.6		1524	2516	+992
521A	+15.3	-44.4	-602.1		1472	2520	+1048
521B	+18.6	-41.1	-557.3		1427	2517	+1090
521C	+19.7	-40.0	-542.4		1412	2515	+1103
521D	+20.0	-39.7	-538.3	870	1408	2509	+1101
521E	+20.9	-38.8	-526.1		1396	2506	+1110
521F	+23.1	-36.6	-496.3		1366	2503	+1137
521G	+23.5	-36.2	-490.9		1361	2500	+1139
522	+23.7	-36.0	-488.2		1358	2506	+1148
522A	+23.1	-36.6	-496.3	870	1366	2504	+1138
522B	+20.5	-39.2	-531.6		1402	2499	+1097
522C	+18.9	-40.8	-553.2		1423	2496	+1073
522D	+20.3	-39.4	-534.3		1404	2497	+1093
522E	+19.8	-39.9	-541.0		1411	2497	+1086
523	+19.2	-40.5	-549.2	870	1419	2498	+1079
523A	+20.1	-39.6	-537.0		1407	2503	+1096
523B	+22.9	-36.8	-499.0		1369	2504	+1135
523C	+24.9	-34.8	-471.9		1342	2502	+1160
523D	+28.2	-31.5	-427.1		1297	2496	+1199
523E	+32.4	-27.3	-370.2	870	1240	2494	+1254
523F	+34.9	-24.8	-336.3		1206	2495	+1289
524	+37.1	-22.6	-306.5		1177	2498	+1321
524A	+41.0	-18.7	-253.6		1124	2502	+1378
524B	+26.9	-32.8	-444.8		1315	2502	+1187

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Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equip (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
524C	+26.3	-33.4	-452.9	870	1323	2488	+1165
524D	+20.3	-39.4	-534.3		1404	2493	+1089
525	+7.5	-52.2	-707.8		1578	2491	+913
525A	+0.3	-59.4	-805.5		1676	2500	+824
525B	-18.2	-77.9	-1056.3		1926	2510	+584
525C	-35.5	-95.2	-1290.9	870	2161	2515	+354
525D	-38.9	-98.6	-1337.0		2207	2501	+294
525E	-59.8	-119.5	-1620.4		2490	2514	+24
525F	-81.4	-141.1	-1913.3		2783	2494	-289
526	-96.9	-156.6	-2123.5		2994	2482	-512
526A	-102.6	-162.3	-2200.8	870	3071	2472	-599
526B	-105.7	-165.4	-2242.8		3113	2470	-643
527	-106.3	-166.0	-2251.0		3121	2467	-654
527A	-99.4	-159.1	-2157.4		3027	2469	-558
527B	-92.4	-152.1	-2062.5		2933	2465	-468
528	-85.8	-145.5	-1973.0	870	2843	2467	-376
528A	-79.4	-139.1	-1886.2		2756	2471	-285
528B	-74.6	-134.3	-1821.1		2691	2466	-225
528C	-72.4	-132.1	-1791.3		2661	2465	-196
528D	-73.9	-133.6	-1811.6		2682	2469	-213
529	-70.5	-130.2	-1765.5	870	2636	2458	-178
529A	-65.9	-125.6	-1703.1		2573	2453	-120
529B	-56.3	-116.0	-1573.0		2443	2459	+16
529C	-43.0	-102.7	-1392.6		2263	2461	+198
529D	-36.2	-95.9	-1300.4		2170	2474	+304

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
529E	-32.2	-91.9	-1246.2	870	2116	2478	+362
530	-24.4	-84.1	-1140.4		2010	2487	+477
530A	-18.9	-78.6	-1065.8		1936	2498	+562
530B	-16.3	-76.0	-1030.6		1901	2509	+608
530C	-15.3	-75.0	-1017.0		1887	2511	+624
531(B-61)	-13.7	-73.4	-995.3	870	1865	2513	+648
530C	-15.3	-75.0	-1017.0		1887	2510	+623
530B	-16.3	-76.0	-1030.6		1901	2507	+606
530A	-18.6	-78.3	-1061.7		1932	2498	+566
530	-24.8	-84.5	-1145.8		2016	2486	+470
529E	-31.8	-91.5	-1240.7	870	2111	2479	+368
529D	-36.7	-96.4	-1307.2		2177	2474	+297
529C	-43.4	-103.1	-1398.0		2268	2461	+193
529B	-56.1	-115.8	-1570.2		2440	2461	+21
529A	-65.6	-125.3	-1699.1		2569	2456	-113
529	-69.6	-129.3	-1753.3	870	2623	2461	-162
528DD	-74.5	-134.2	-1819.8		2690	2469	-221
528CC	-73.3	-133.0	-1803.5		2674	2464	-210
528BB	-74.8	-134.5	-1823.8		2694	2466	-228
528AA	-80.1	-139.8	-1895.7		2766	2467	-299
528	-87.3	-147.0	-1993.3	870	2863	2464	-399
527BB	-94.4	-154.1	-2089.6		2960	2461	-499
527AA	-100.9	-160.6	-2177.7		3048	2465	-583
527	-107.1	-166.8	-2261.8		3132	2464	-668
526BB	-107.7	-167.4	-2270.0		3140	2466	-674

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
526AA	-103.5	-163.2	-2213.0	870	3083	2471	-612
526	-97.6	-157.3	-2133.0		3003	2482	-521
525FF	-86.7	-146.4	-1985.2		2855	2491	-364
525EE	-73.1	-132.8	-1800.8		2671	2507	-164
532A	-46.6	-106.3	-1441.4		2311	2494	+183
532B	-30.8	-90.5	-1227.2	870	2097	2476	+379
532C	-19.2	-78.9	-1070.0		1940	2465	+525
532D	-21.4	-81.1	-1099.7		1970	2468	+498
532E	-12.5	-72.2	-979.0		1849	2481	+632
533	-5.9	-65.6	-889.5		1760	2477	+717
533A	+0.9	-58.8	-797.3	870	1667	2469	+802
533B	+4.4	-55.3	-749.9		1620	2463	+843
533C	+8.4	-51.3	-695.6		1566	2449	+883
533D	+7.4	-52.3	-709.2		1579	2430	+851
533E	+3.7	-56.0	-759.4		1629	2424	+795
533F	+5.4	-54.3	-736.3	870	1606	2424	+818
534	+4.2	-55.5	-752.6		1623	2422	+799
534A	+8.4	-51.3	-695.6		1566	2418	+852
534B	+14.9	-44.8	-607.5		1478	2415	+937
534C	+22.3	-37.4	-507.1		1377	2404	+1027
534D	+23.0	-36.7	-497.7	870	1368	2390	+1022
534E	+22.3	-37.4	-507.1		1377	2386	+1009
534F	+24.6	-35.1	-476.0		1346	2384	+1038
534G	+28.7	-31.0	-420.4		1290	2383	+1093
535	+31.6	-28.1	-381.0		1251	2383	+1132

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equip (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
535A	+35.6	-24.1	-326.8	870	1197	2378	+1181
535B	+37.2	-22.5	-305.1		1175	2373	+1198
535C	+35.9	-23.8	-322.7		1193	2370	+1177
535D	+32.5	-27.2	-368.8		1239	2364	+1125
535E	+28.5	-31.2	-423.1		1293	2362	+1069
535F	+23.8	-35.9	-486.8	870	1357	2359	+1002
536	+17.5	-42.2	-572.2		1442	2356	+914
536A	+9.7	-50.0	-678.0		1548	2352	+804
536B	+1.9	-57.8	-783.8		1654	2349	+695
536C	-7.1	-66.8	-905.8		1776	2346	+570
536D	-14.4	-74.1	-1004.8	870	1875	2346	+471
536E	-16.9	-76.6	-1038.7		1909	2346	+437
537	-16.4	-76.1	-1031.9		1902	2351	+449
537A	-11.3	-71.0	-962.8		1833	2344	+511
537B	-9.1	-68.8	-932.9		1803	2328	+525
537C	-10.1	-69.8	-946.5	870	1817	2329	+512
537D	-9.1	-68.8	-932.9		1803	2329	+526
538	-5.6	-65.3	-885.5		1756	2328	+572
538A	+1.7	-58.0	-786.5		1657	2325	+668
538B	+2.9	-56.8	-770.2		1640	2327	+687
538C	+1.2	-58.5	-793.3	870	1663	2324	+661
538D	+1.2	-58.5	-793.3		1663	2328	+665
538E	+3.3	-56.4	-764.8		1635	2324	+689
538F	+5.1	-54.6	-740.4		1610	2314	+704
538G	+5.8	-53.9	-730.9		1601	2309	+708

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equip (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
538H	+5.0	-54.7	-741.7	870	1612	2313	+701
539	+2.6	-57.1	-774.3		1644	2309	+665
539A	+2.7	-57.0	-772.9		1643	2309	+666
539B	+2.3	-57.4	-778.3		1648	2304	+656
539C	+4.0	-55.7	-755.3		1625	2298	+673
539D	+3.8	-55.9	-758.0	870	1628	2291	+663
539E	+3.4	-56.3	-763.4		1633	2291	+658
540	+2.5	-57.2	-775.6		1646	2287	+641
540A	+0.9	-58.8	-797.3		1667	2280	+613
541	-1.5	-61.2	-829.9		1700	2273	+573
541A	-1.7	-61.4	-832.6	870	1703	2268	+565
541B	-3.4	-63.1	-855.6		1726	2263	+537
541C	-2.4	-62.1	-842.1		1712	2266	+554
541D	-1.1	-60.8	-824.4		1694	2262	+568
541E	+1.7	-58.0	-786.5		1657	2261	+604
541F	+4.0	-55.7	-755.3	870	1625	2258	+633
541G	+6.1	-53.6	-726.8		1597	2251	+654
541H	+10.4	-49.3	-668.5		1539	2246	+707
541I	+9.0	-50.7	-687.5		1558	2232	+674
542	+5.0	-54.7	-741.7		1612	2225	+613
542A	+5.3	-54.4	-737.7	870	1608	2227	+619
542B	+6.2	-53.5	-725.5		1596	2224	+628
542C	+7.1	-52.6	-713.3		1583	2227	+644
542D	+7.3	-52.4	-710.5		1581	2226	+645
543	+5.6	-54.1	-733.6		1604	2222	+618

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equip (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
543A	+2.5	-57.2	-775.6	870	1646	2219	+573
543B	+0.4	-59.3	-804.1		1674	2223	+549
543C	-0.4	-60.1	-815.0		1685	2226	+541
543D	-2.6	-62.3	-844.8		1715	2223	+508
543E	-1.9	-61.6	-835.3		1705	2217	+512
544	-1.2	-60.9	-825.8	870	1696	2216	+520
544A	-1.3	-61.0	-827.2		1697	2211	+514
544B	-2.0	-61.7	-836.7		1707	2208	+501
544C	-3.1	-62.8	-851.6		1722	2206	+484
545	-5.4	-65.1	-882.8		1753	2199	+446
545A	-9.9	-69.6	-943.8	870	1814	2191	+377
545B	-20.0	-79.7	-1080.7		1951	2173	+222
545C	-29.5	-89.2	-1209.6		2080	2163	+83
545D	-38.9	-98.6	-1337.0		2207	2170	-37
546	-42.3	-102.0	-1383.1		2253	2170	-83
546A	-42.0	-101.7	-1379.1	870	2249	2170	-79
546B	-41.7	-101.4	-1375.0		2245	2170	-75
546C	-44.4	-104.1	-1411.6		2282	2180	-102
546D	-45.3	-105.0	-1423.8		2294	2194	-100
546E	-44.6	-104.3	-1414.3		2284	2201	-83
546F	-43.9	-103.6	-1404.8	870	2275	2207	-68
546G	-42.5	-102.2	-1385.8		2256	2206	-50
546H	-39.2	-98.9	-1341.1		2211	2207	-4
547	-36.7	-96.4	-1307.2		2177	2206	+29
547A	-32.5	-92.2	-1250.2		2120	2204	+84

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Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
552B	-36.9	-96.6	-1309.9	870	2180	2243	+63
552C	-38.2	-97.9	-1327.5		2198	2247	+49
552D	-34.2	-93.9	-1273.3		2143	2252	+109
552E	-23.4	-83.1	-1126.8		1997	2248	+251
552F	-26.9	-86.6	-1174.3		2044	2261	+217
552G	-29.8	-89.5	-1213.6	870	2084	2258	+174
553	-25.8	-85.5	-1159.4		2029	2262	+233
553A	-28.7	-88.4	-1198.7		2069	2269	+200
553B	-31.5	-91.2	-1236.7		2107	2272	+165
553C	-31.4	-91.1	-1235.3		2105	2280	+175
553D	-33.2	-92.9	-1259.7	870	2130	2279	+149
553E	-35.7	-95.4	-1293.6		2164	2298	+134
554	-57.1	-116.8	-1583.8		2454	2309	-145
554A	-57.7	-117.4	-1591.9		2462	2304	-158
55B	-45.9	-105.6	-1431.9		2302	2303	+1
554C	-37.0	-96.7	-1311.3	870	2181	2315	+134
554D	-29.7	-89.4	-1212.3		2082	2322	+240
555	-26.0	-85.7	-1162.1		2032	2328	+296
555A	-18.9	-78.6	-1065.8		1936	2331	+395
555B	-3.8	-63.5	-861.1		1731	2333	+602
556	-2.2	-61.9	-839.4	870	1709	2331	+622
556A	-20.4	-80.1	-1086.2		1956	2327	+371
556B	+21.7	-38.0	-515.3		1385	2319	+934
556C	+40.9	-18.8	-254.9		1125	2304	+1179
556D	+44.6	-15.1	-204.8		1075	2265	+1190

Station	Free Air Anomaly (mgal)	Free Air Anomaly Relative to Base Station (mgal)	Ice Equiv (meters)	Seismic Rock Depth Base Station (meters)	Gravity Ice Thick (meters)	Snow Surf Elev (meters)	Apparent Rock Surf Elevation (meters)
556E	+8.7	-51.0	-691.6	870	1562	2235	+673
557	+30.3	-29.4	-398.7		1269	2213	+944
557A	+54.5	-5.2	-70.5		941	2194	+1253
558	+69.7	+10.0	+135.6		734	2198	+1464
558A	+29.5	-30.2	-409.5		1280	2072	+792
558B	+49.7	-10.0	-135.6	870	1006	2045	+1039
558C	+66.1	+6.4	+86.8		783	1917	+1134
558D	+37.2	-22.5	-305.1		1175	1761	+586
558E	+29.3	-30.4	-412.2		1282	1681	+399
558F	-30.6	-90.3	-1224.5		2095	1652	-443
558G	-35.6	-95.3	-1292.3	870	2162	1696	-466
559	-32.7	-92.4	-1252.9		2123	1720	-403

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

APPENDIX IV

TRUE ICE SURFACE ELEVATIONS, ROCK SURFACE ELEVATIONS
AND ICE THICKNESS

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
72	2316	+1430	886
72.05	2313	+1350	963
72.10	2306	+1279	1027
72.15	2303	+1220	1083
72.20	2293	+1150	1143
72.26	2284	+1131	1153
72.30	2290	+1200	1090
72.35	2291	+1290	1001
72.40	2297	+1431	866
72.45	2302	+1550	752
72.64	2298	+1280	1018
72.92	2241	+1217	1024
72.11.2	2215	+1322	893
72.13.4	2268	+690	1478
72.17	2180	+345	1835
72.21	2172	+510	1662
72.24.2	2159	+412	1747
72.27.2	2150	+265	1885
72.30.2	2150	+235	1915
72.33.2	2163	+177	1986
72.36.2	2170	+109	2061
72.39.2	2165	+88	2077
72.41.5	2204	+211	1993
72.45.0	2222	+205	2017
72.48.0	2257	+175	2082
72.50.7	2264	+120	2144
72.53.7	2263	+292	1973
84(500)	2276	+345	1931
500A	2285	+81	2204
500B	2290	-10	2300
500C	2294	-9	2303
500D	2305	+59	2246
500E	2311	+124	2187
500F	2337	+185	2276
500G	2339	+129	2283

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
501	2336	+315	2150
501A	2342	+332	2325
501B	2343	+255	2420
501C	2344	+331	2268
501D	2362	+332	2030
501E	2366	+290	2076
502	2371	+315	2056
502A	2383	+300	2083
502B	2397	+228	2169
502C	2401	+142	2259
502D	2411	+195	2216
502E	2425	+122	2303
502F	2429	+82	2347
503	2435	+44	2391
503A	2435	+22	2413
504	2437	-17	2454
504A	2440	-21	2461
504B	2452	-4	2456
504C	2459	+8	2451
504D	2460	+40	2420
505	2463	+42	2421
505A	2464	+4	2460
505B	2467	-8	2475
505C	2466	-31	2497
505D	2467	-22	2489
505E	2468	-22	2490
505F	2469	+6	2463
505G	2473	+49	2424
505H	2472	+50	2422
505I	2474	+52	2422
506	2476	+56	2420
506A	2479	+67	2412
506B	2482	+97	2385
507	2479	+170	2309
507A	2481	+122	2359

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
507B	2480	+75	2405
507C	2479	+60	2419
507D	2477	+47	2430
507E	2477	+12	2465
508	2474	-20	2494
508A	2479	-18	2497
508B	2470	-101	2571
508C	2471	-128	2599
509	2468	-180	2648
509A	2467	-182	2649
509B	2470	-174	2644
509C	2469	-167	2636
509D	2467	-154	2621
509E	2469	-121	2590
509F	2483	-68	2551
510	2490	-50	2540
510A	2487	-2	2489
510B	2487	+51	2436
510C	2491	+115	2376
510D	2499	+282	2217
510E	2508	+379	2129
510F	2508	+427	2081
510G	2512	+485	2027
511	2517	+515	2002
511A	2512	+465	2047
511B	2509	+458	2051
511C	2510	+499	2011
511D	2515	+548	1967
511E	2523	+630	1893
512	2520	+702	1818
512A	2511	+699	1812
512B	2517	+720	1797
512C	2517	+704	1813
512D	2524	+698	1826
512E	2535	+695	1840

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
512F	2539	+662	1877
513	2549	+651	1898
513A	2559	+590	1969
513B	2552	+585	1967
513C	2554	+723	1831
513D	2568	+732	1836
513E	2572	+798	1774
513F	2573	+848	1725
513G	2577	+751	1826
514	2581	+720	1861
514A	2586	+711	1875
514B	2590	+721	1869
514C	2590	+700	1890
515	2590	+697	1893
515A	2589	+670	1919
516	2591	+650	1941
516A	2592	+630	1962
615B	2590	+562	2028
615C	2588	+507	2081
615D	2591	+537	2054
516E	2586	+583	2003
516F	2584	+630	1954
516G	2580	+636	1944
517	2575	+640	1935
517A	2575	+642	1933
517B	2577	+697	1880
517C	2573	+680	1893
518	2571	+665	1906
518A	2563	+638	1925
518B	2553	+607	1946
518C	2542	+589	1953
519	2541	+575	1966
519A	2536	+665	1871
519B	2539	+755	1784
519C	2535	+619	1916

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
519D	2530	+582	1948
519E	2524	+575	1949
519F	2516	+510	2006
520	2521	+477	2044
520A	2521	+519	2002
520B	2518	+515	2003
520C	2518	+476	2042
520D	2512	+467	2045
520E	2507	+400	2107
520F	2508	+362	2146
521	2516	+262	2254
521A	2520	+308	2212
521B	2517	+332	2185
521C	2515	+331	2184
521D	2509	+310	2199
521E	2506	+300	2206
521F	2503	+310	2193
521G	2500	+301	2199
522	2506	+298	2208
522A	2504	+281	2223
522B	2499	+220	2279
522C	2496	+189	2307
522D	2497	+193	2304
522E	2497	+185	2312
523	2498	+165	2333
523A	2503	+180	2323
523B	2504	+212	2292
523C	2502	+220	2282
523D	2496	+255	2241
523E	2494	+298	2196
523F	2495	+324	2171
524	2498	+348	2150
524A	2502	+470	2032
524B	2502	+370	2132
524C	2488	+430	2058

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
524D	2493	+425	2068
525	2491	+325	2166
525A	2500	+338	2162
525B	2510	+167	2343
525C	2515	+10	2505
525D	2501	+25	2476
525E	2514	-125	2639
525F	2494	-384	2878
526	2482	-433	2915
526A	2472	-495	2967
526B	2470	-495	2965
527	2467	-415	2882
527A	2469	-354	2823
527B	2464	-311	2775
528	2467	-255	2722
528A	2471	-105	2576
528B	2466	-80	2546
528C	2465	-80	2545
528D	2469	-232	2701
529	2458	-230	2688
529A	2453	-215	2668
529B	2459	-120	2579
529C	2461	+23	2438
529D	2474	+90	2384
529E	2478	+109	2369
530	2487	+181	2306
530A	2498	+230	2268
530B	2509	+250	2259
530C	2511	+250	2261
531	2513	+250	2263
530C	2510	+240	2270
530B	2507	+232	2275
530A	2498	+230	2268
530	2486	+165	2321
529E	2479	+108	2371

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
529D	2474	+73	2401
529C	2461	+18	2443
529B	2461	-114	2575
529A	2456	-210	2666
529	2461	-220	2681
528DD	2469	-210	2679
528CC	2464	-160	2624
528BB	2466	-143	2609
528AA	2467	-190	2657
528	2454	-267	2731
527BB	2461	-278	2739
527AA	2465	-373	2838
527	2464	-413	2877
526BB	2466	-529	2995
526AA	2471	-550	3021
526	2482	-564	3042
525FF	2491	-440	2931
525EE	2507	-283	2790
532A	2494	+40	2454
532B	2476	+75	2401
532C	2465	+148	2317
532D	2468	+162	2306
532E	2481	+140	2341
533	2477	+190	2287
533A	2469	+231	2238
533B	2463	+208	2255
533C	2449	+190	2259
533D	2430	+89	2341
533E	2424	-15	2439
533F	2424	-55	2479
534	2422	-120	2542
534A	2418	-113	2521
534B	2415	-100	2515
534C	2404	-120	2520
534D	2390	-190	2580

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
534E	2386	-220	2606
534F	2384	-240	2624
534G	2383	-245	2628
535	2383	-260	2643
535A	2378	-253	2631
535B	2373	-235	2608
535C	2370	-390	2760
535D	2364	-515	2879
535E	2362	-624	3086
535F	2359	-760	3119
536	2356	-898	3254
536A	2352	-973	3325
536B	2349	-1060	3409
536C	2346	-1155	3501
536D	2346	-1230	3576
536E	2346	-1250	3596
537	2351	-1194	3545
537A	2344	-1105	3449
537B	2328	-1072	3400
537C	2329	-1055	3384
537D	2329	-1015	3344
538	2328	-946	3274
538A	2325	-819	3144
538B	2327	-725	3102
538C	2324	-787	3111
538D	2328	-745	3073
538E	2324	-687	3011
538F	2314	-661	2975
538G	2309	-625	2934
538H	2313	-610	2923
539	2309	-610	2919
539A	2309	-598	2907
539B	2304	-580	2884
539C	2298	-533	2831
539D	2291	-523	2814

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
539E	2291	-510	2801
540	2287	-510	2797
540A	2280	-535	2815
541	2273	-579	2852
541A	2268	-581	2849
541B	2263	-615	2878
541C	2266	-590	2856
541D	2262	-575	2837
541E	2261	-535	2796
541F	2258	-505	2763
541G	2251	-482	2733
541H	2246	-430	2676
541I	2232	-455	2687
542	2225	-519	2744
542A	2227	-510	2737
542B	2224	-499	2732
542C	2227	-478	2705
542D	2226	-478	2704
543	2222	-500	2722
543A	2219	-538	2757
543B	2223	-560	2783
543C	2226	-565	2791
543D	2223	-595	2818
543E	2217	-594	2811
544	2216	-580	2796
544A	2211	-579	2790
544B	2208	-580	2788
544C	2206	-590	2796
545	2199	-622	2821
545A	2191	-690	2881
545B	2173	-835	3008
545C	2163	-1130	3293
545D	2170	-1085	3255
546	2170	-1130	3300
546A	2170	-1109	3279

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
546B	2170	-1095	3265
546C	2180	-1125	3305
546D	2194	-1110	3304
546E	2201	-1085	3286
546F	2207	-1065	3272
546G	2206	-1038	3244
546H	2207	-983	3190
547	2206	-940	3146
547A	2204	-870	3074
547B	2211	-660	2871
547C	2209	-415	2624
547D	2207	-485	2692
548	2205	-480	2685
548A	2203	-515	2718
548B	2208	-550	2758
548C	2210	-490	2700
548D	2214	-450	2664
548E	2217	-482	2699
549	2223	-570	2793
549A	2222	-615	2837
549B	2223	-582	2805
549C	2229	-575	2804
549D	2229	-601	2830
549E	2231	-680	2911
549F	2225	-750	2975
549G	2224	-763	2987
550	2220	-770	2990
550A	2224	-722	2946
550B	2223	-690	2913
550C	2217	-615	2832
551	2231	-570	2301
551A	2239	-582	2821
552	2237	-570	2807
552A	2238	-568	2806
552B	2243	-560	2803

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA

Station	Ice Surface Elevation (meters)	True Rock Surface Elevation (meters)	Ice Thickness (meters)
552C	2247	-555	2802
552D	2252	-470	2722
552E	2248	-300	2548
552F	2261	-295	2556
552G	2258	-315	2573
553	2262	-215	2477
553A	2269	-240	2509
553B	2272	-260	2532
553C	2280	-235	2515
553D	2279	-250	2529
553E	2298	-255	2553
554	2309	-520	2829
554A	2304	-520	2824
554B	2303	-350	2653
554C	2315	-215	2530
554D	2322	-170	2492
555	2328	-22	2350
555A	2331	+85	2246
555B	2333	+310	2023
556	2331	+340	1991
556A	2327	+107	2220
556B	2319	+691	1628
556C	2304	+935	1369
556D	2265	+870	1395
556E	2235	+530	1705
557	2213	+750	1463
557A	2194	+1085	1109
558	2198	+1290	908
558A	2072	+648	1424
558B	2045	+914	1131
558C	1917	+1030	887
558D	1761	+500	1261
558E	1689	+345	1344
558F	1652	+259	1393
558G	1696	+259	1437
559	1720	+340	1380

Station	Latitude	Longitude	Elevation (meters)	Relative Strength of Position
A*	72° 15'09"S	159° 50'20"E	2359	2
B*	72° 10'49"S	159° 54'08"E	2530	3
C*	72° 11'21"S	159° 55'48"E	2431	3
D*	72° 13'47"S	160° 09'38"E	2634	2
E*	72° 14'11"S	160° 10'23"E	2605	2
F*	72° 14'33"S	160° 12'26"E	2626	2
G*	72° 16'03"S	160° 20'14"E	2141	3
H*	72° 21'59"S	160° 45'43"E	2079	3
I*	72° 30'53"S	160° 29'37"E	2359 ?	4 weak
J*	72° 39'19"S	160° 04'54"E	2956	2
K*	72° 20'41"S	160° 01'14"E	2413	2
L*	72° 20'12"S	159° 58'40"E	2546	2
VX6-(1)*	72° 37'54"S	162° 08'52"E		

* Stations that were observed from M558. The remaining stations were observed from M559.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA
APPENDIX V
SURVEYED LOCATIONS AND ELEVATIONS OF MOUNTAIN
PEAKS OF THE ARCTIC INSTITUTE RANGE

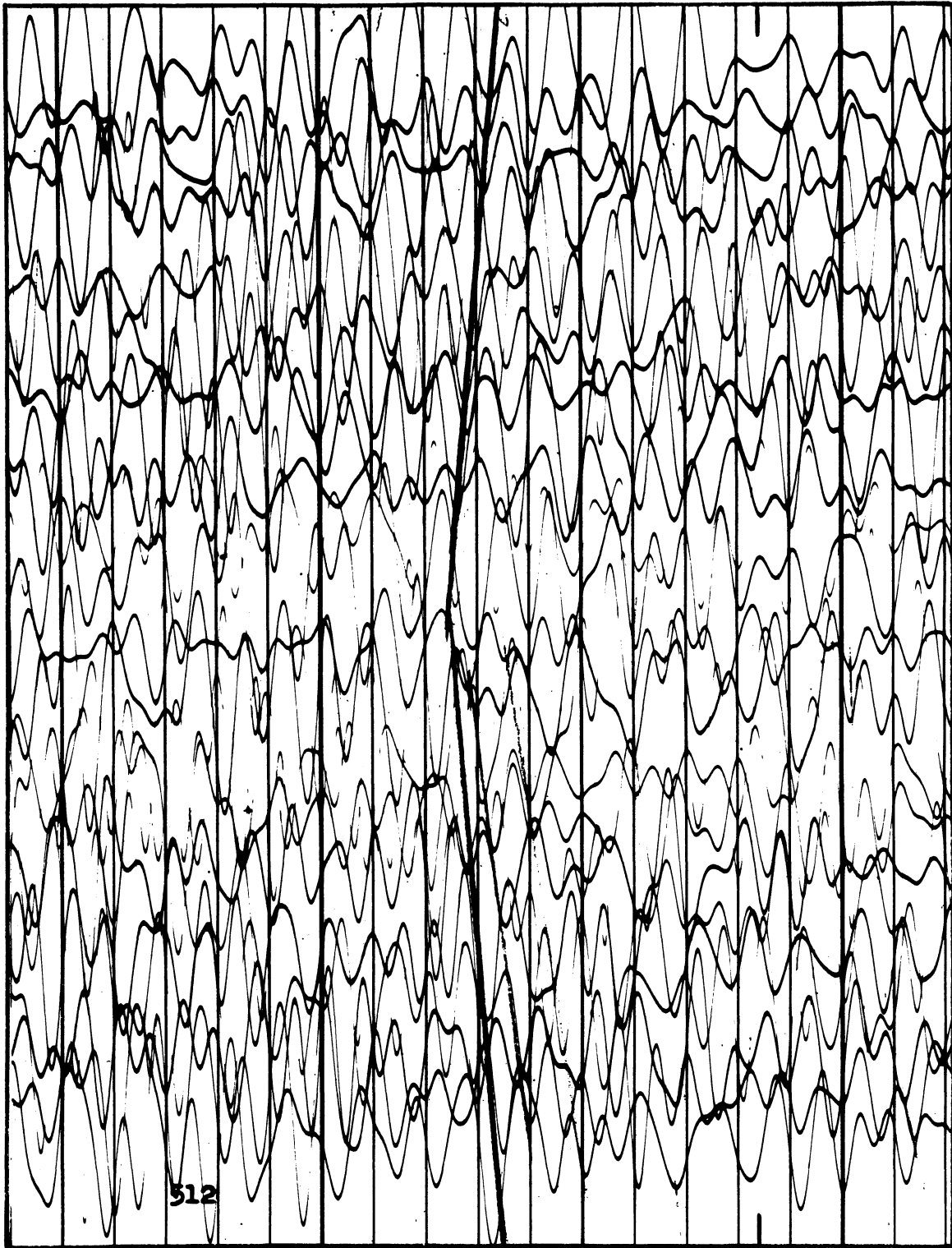
Station	Latitude	Longitude	Elevation	Relative Strength of Position
VX6-(1)	72° 37'53"S	162° 10'40"E	2001	2
VX6-(2)	72° 38'35"S	162° 12'30"E	2319	2
A1	72° 42'07"S	162° 13'53"E	2308	2
B1	72° 42'13"S	162° 10'00"E	2144	2
C1	72° 49'37"S	162° 03'28"E	2404	2
D1	72° 36'24"S	161° 03'16"E	2385	2
E1	72° 34'18"S	160° 57'54"E	2189	2
F1	72° 31'39"S	161° 06'07"E	1892	2
G1	72° 33'42"S	162° 14'08"E	2124	2
H1	72° 35'57"S	162° 11'59"E	1831	2

VX6-(1) is the only common peak determined from both M558 and M559. The difference in the two positions is 1,000 meters. The position as determined from M559 is due East of the position determined from M558. This indicates that either there is a positional difference of a 1,000 meters between M558 and M559 or the single unchecked triangle of M558 is incorrect.

APPENDIX VI

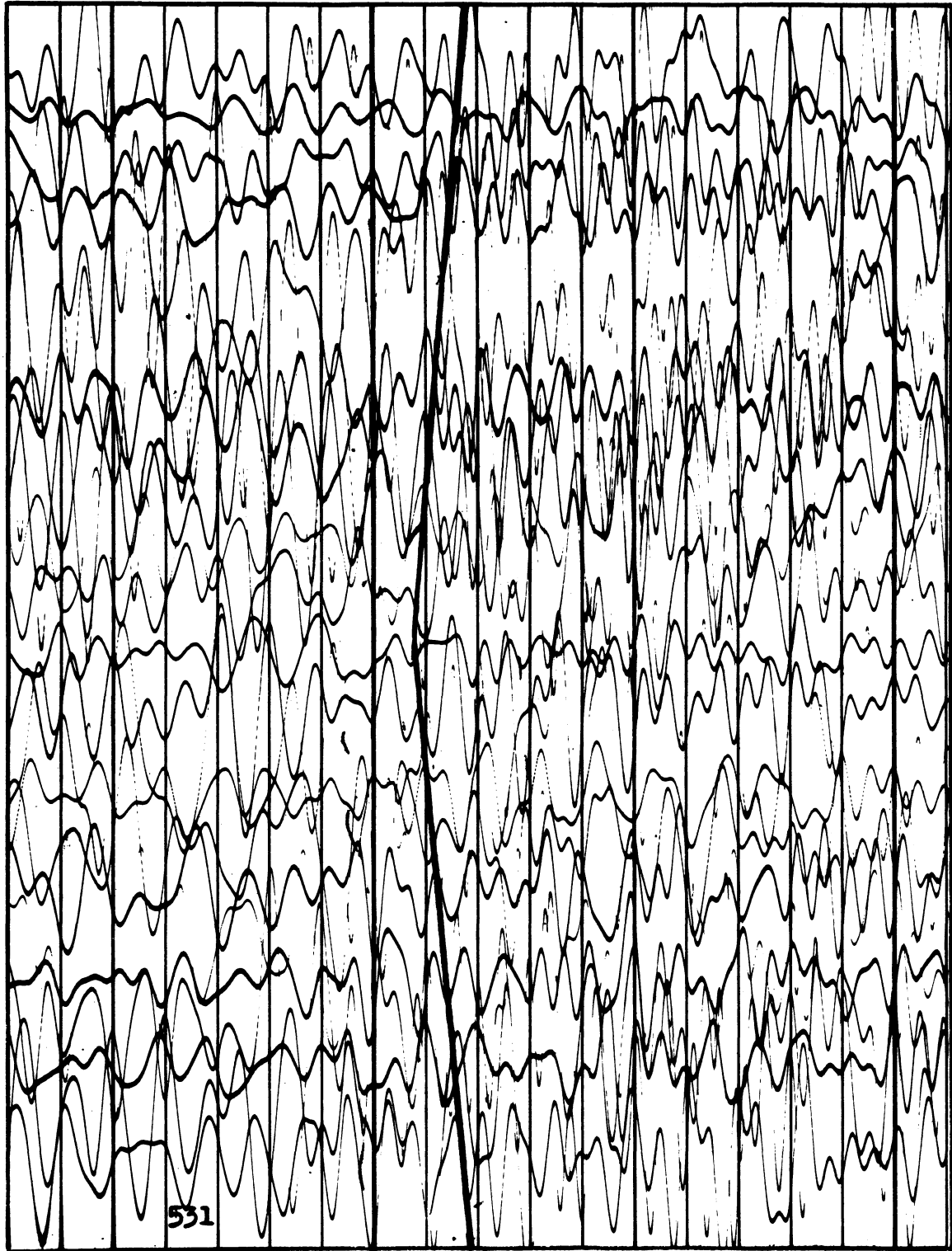
Character of Some Reflection Records,
Victoria Land, Antarctica

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



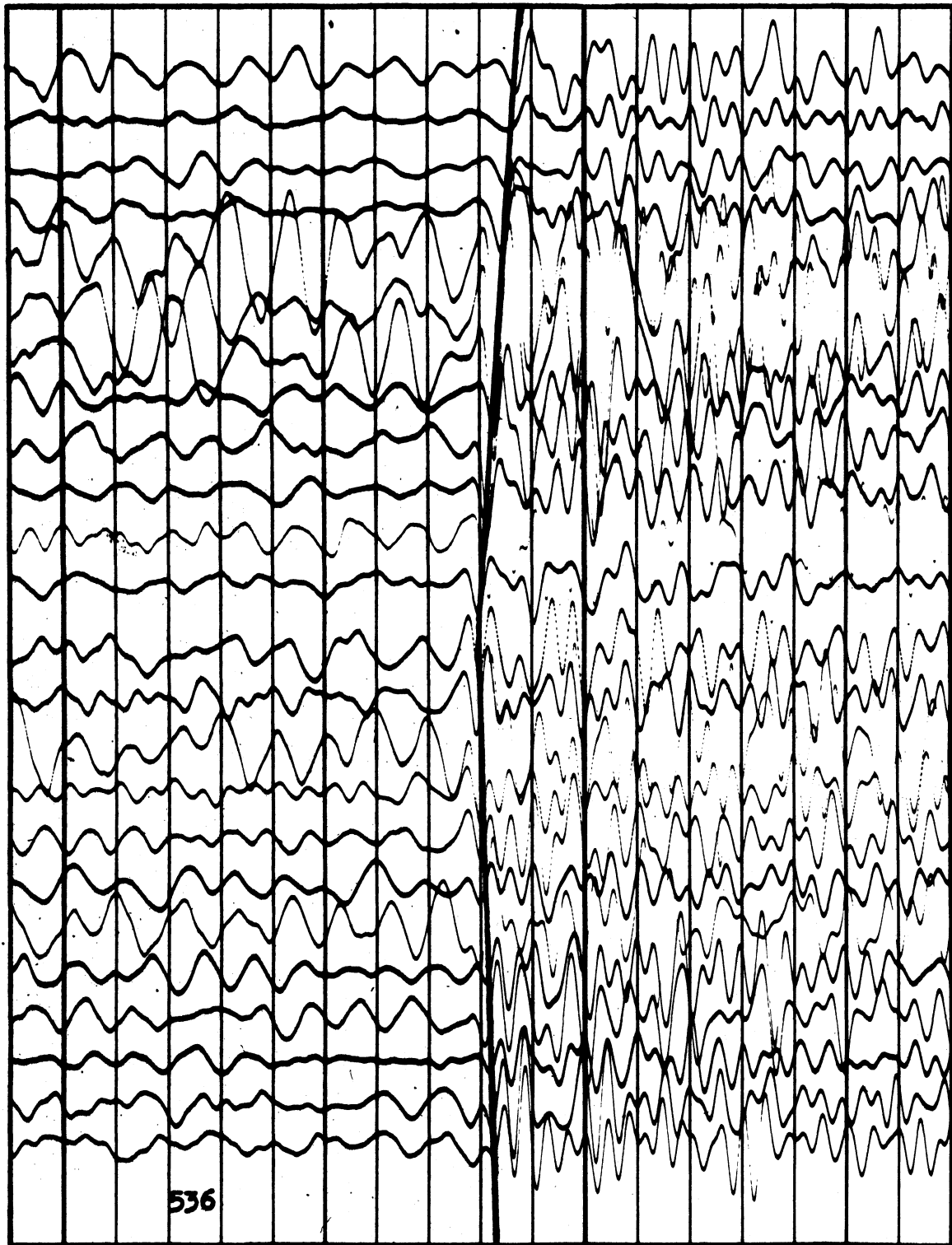
Seismic reflection at 0.9505 seconds from station 512.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



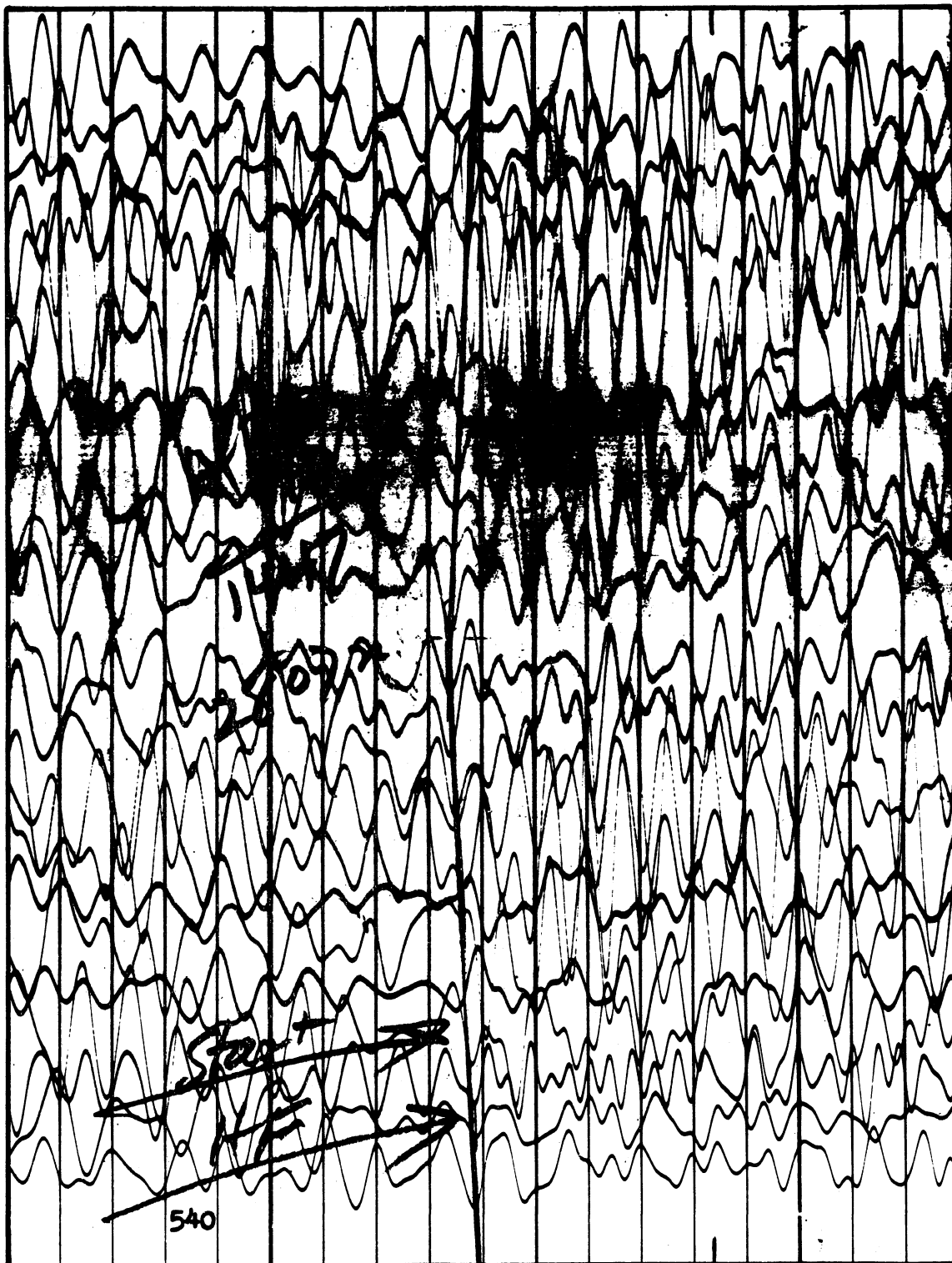
Seismic reflection at 1.1725 seconds from station 531.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



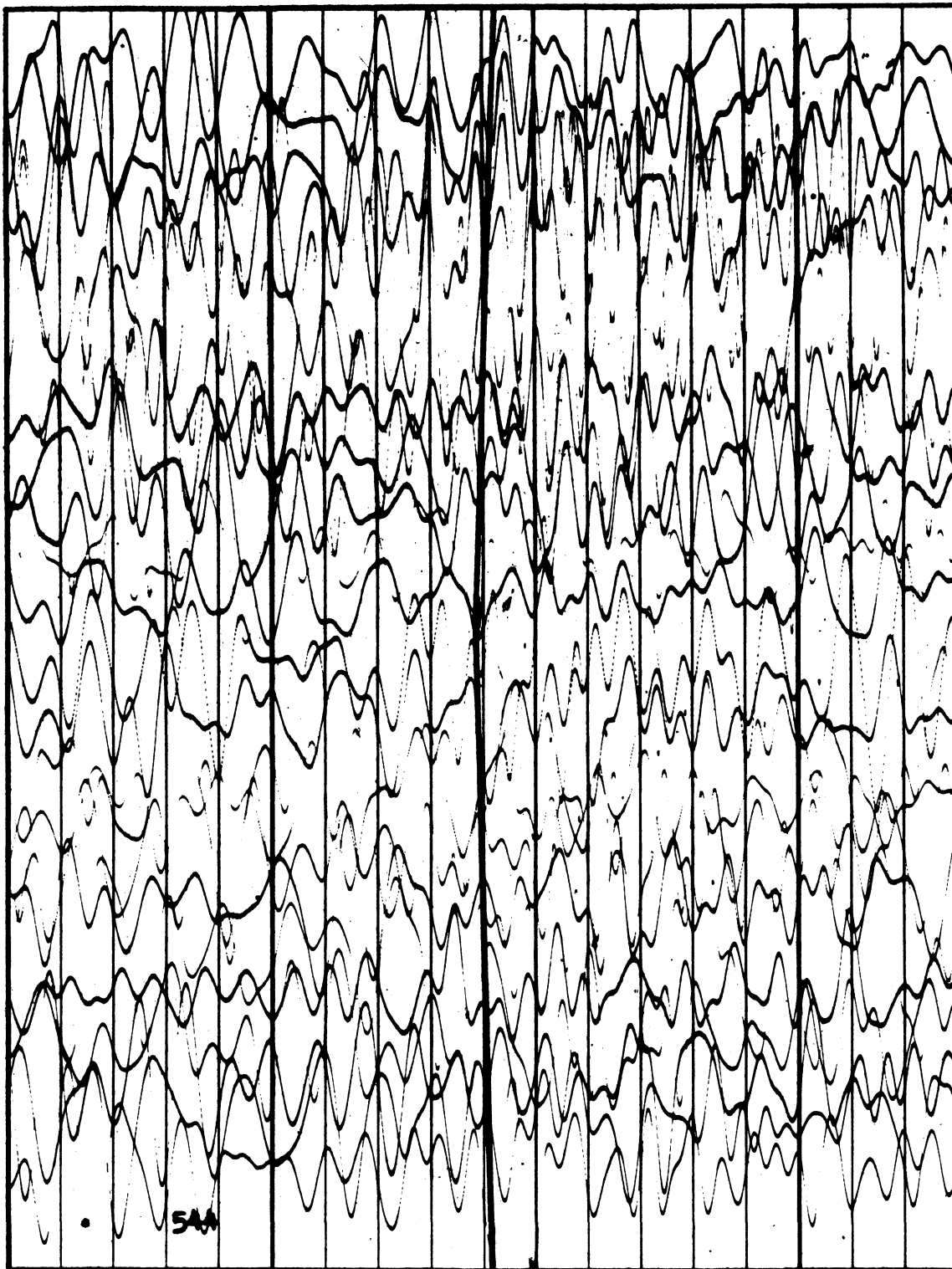
Seismic reflection at 1.6680 seconds from station 536.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



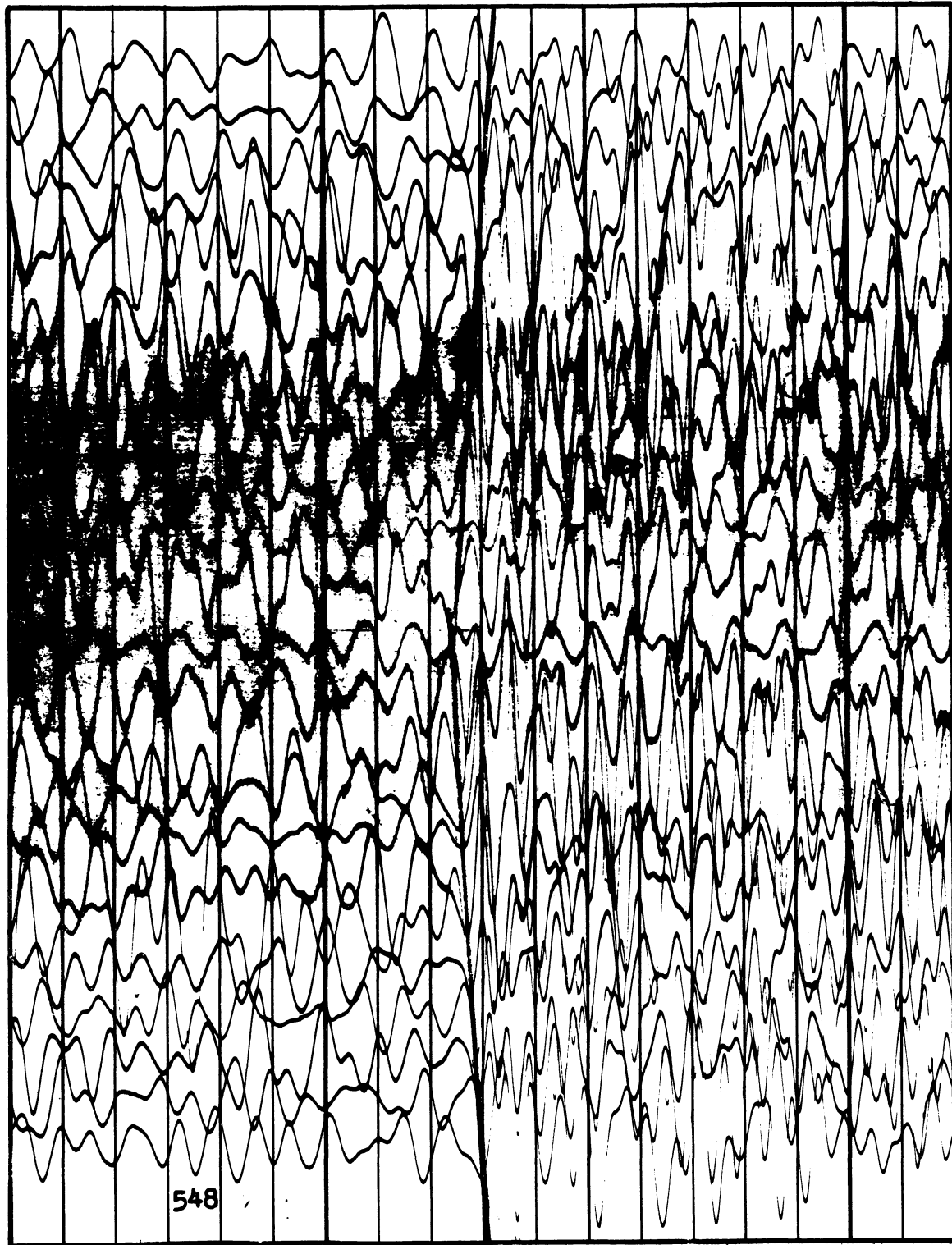
Seismic reflection at 1.4590 seconds from station 540.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



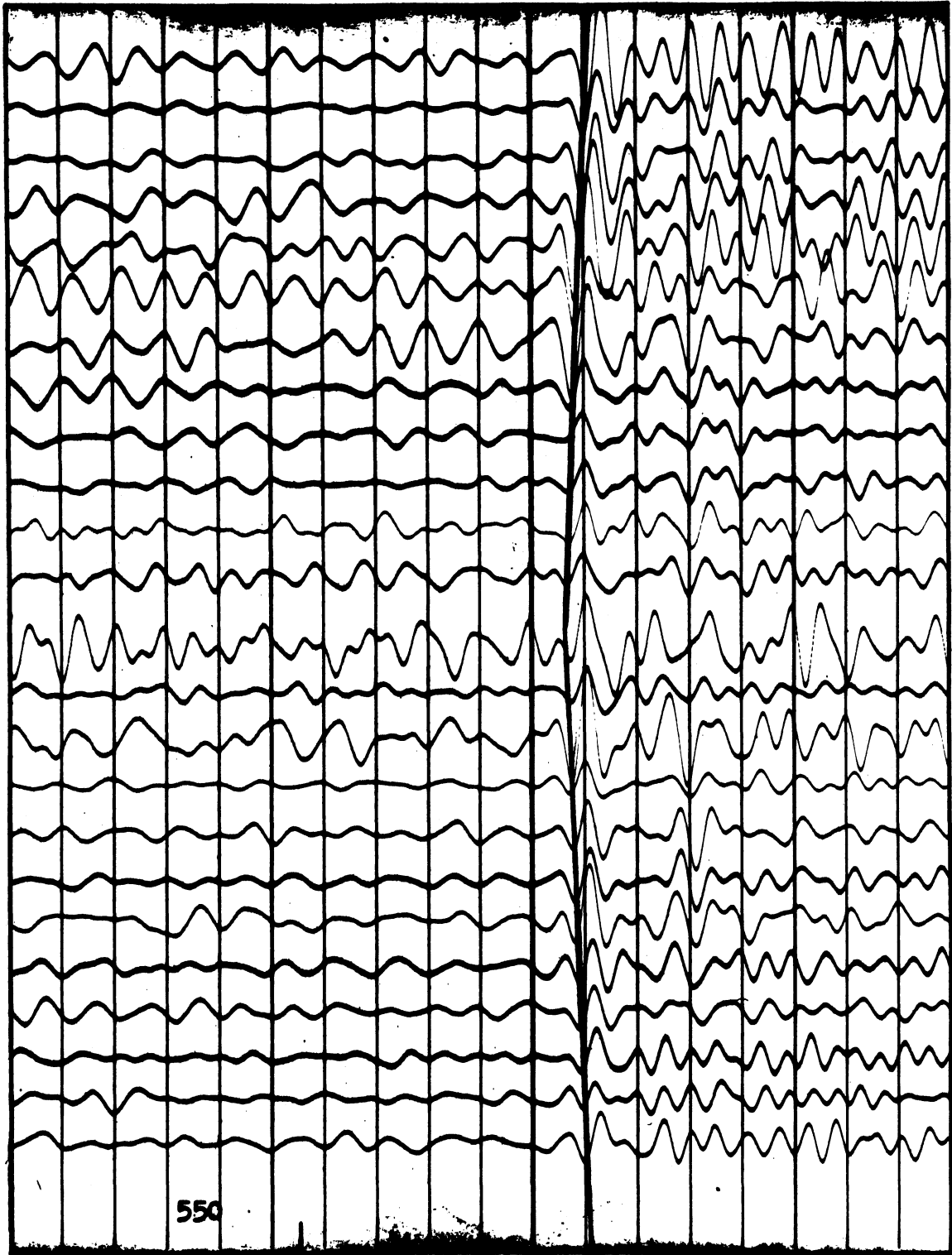
Seismic reflection at 1.4474 seconds from station 544.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



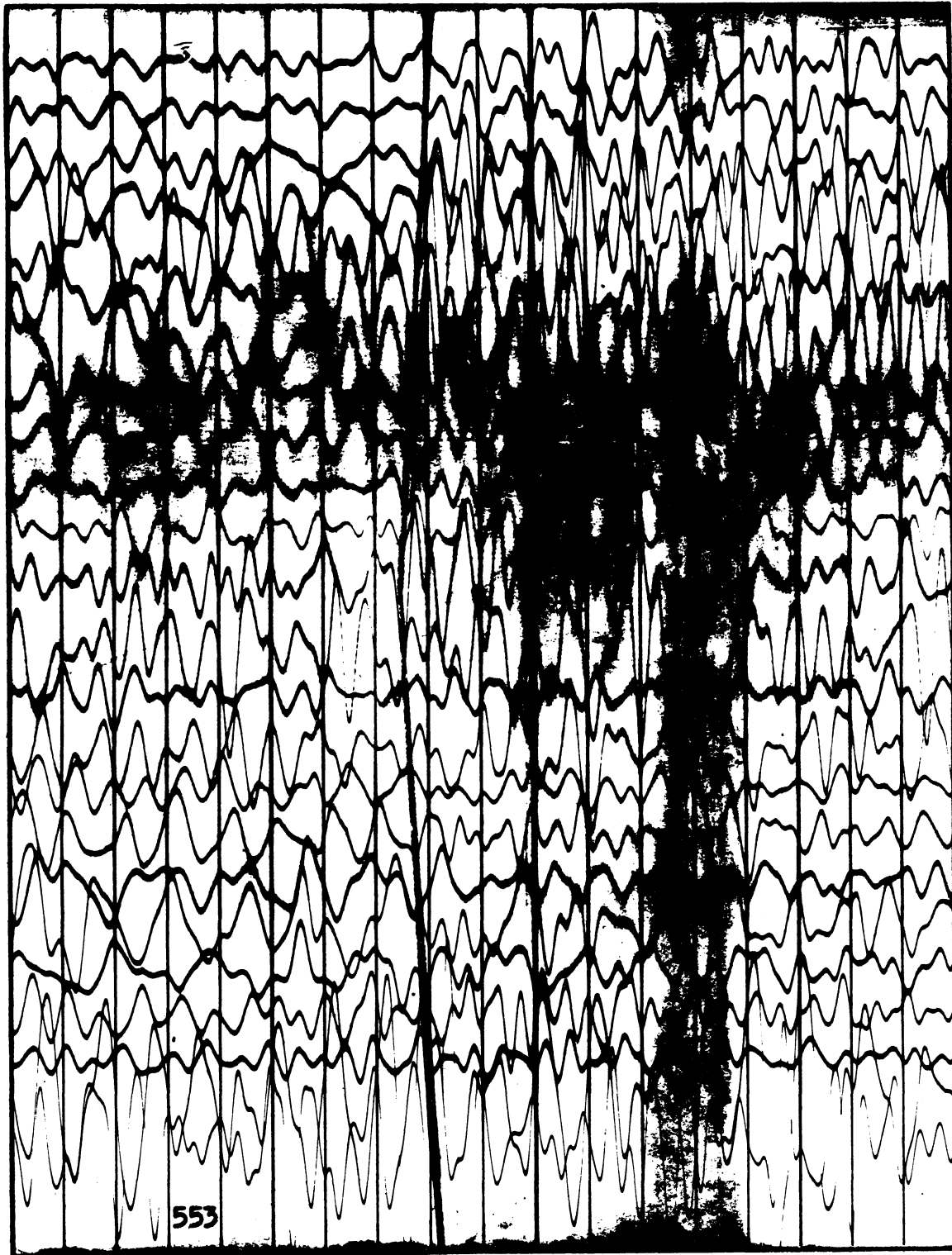
Seismic reflection at 1.4020 seconds from station 548.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



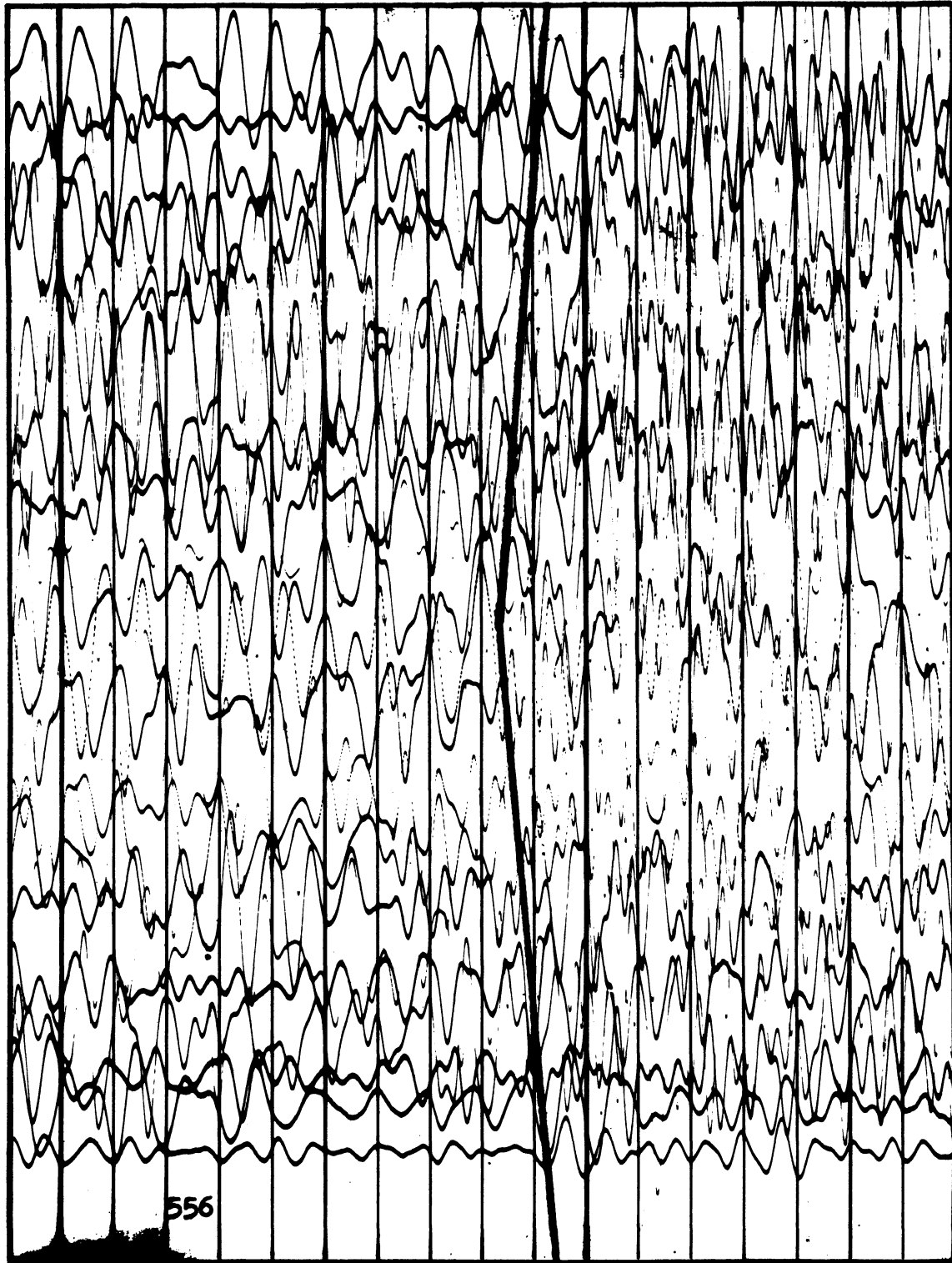
Seismic reflection at 1.5600 seconds from station 550.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



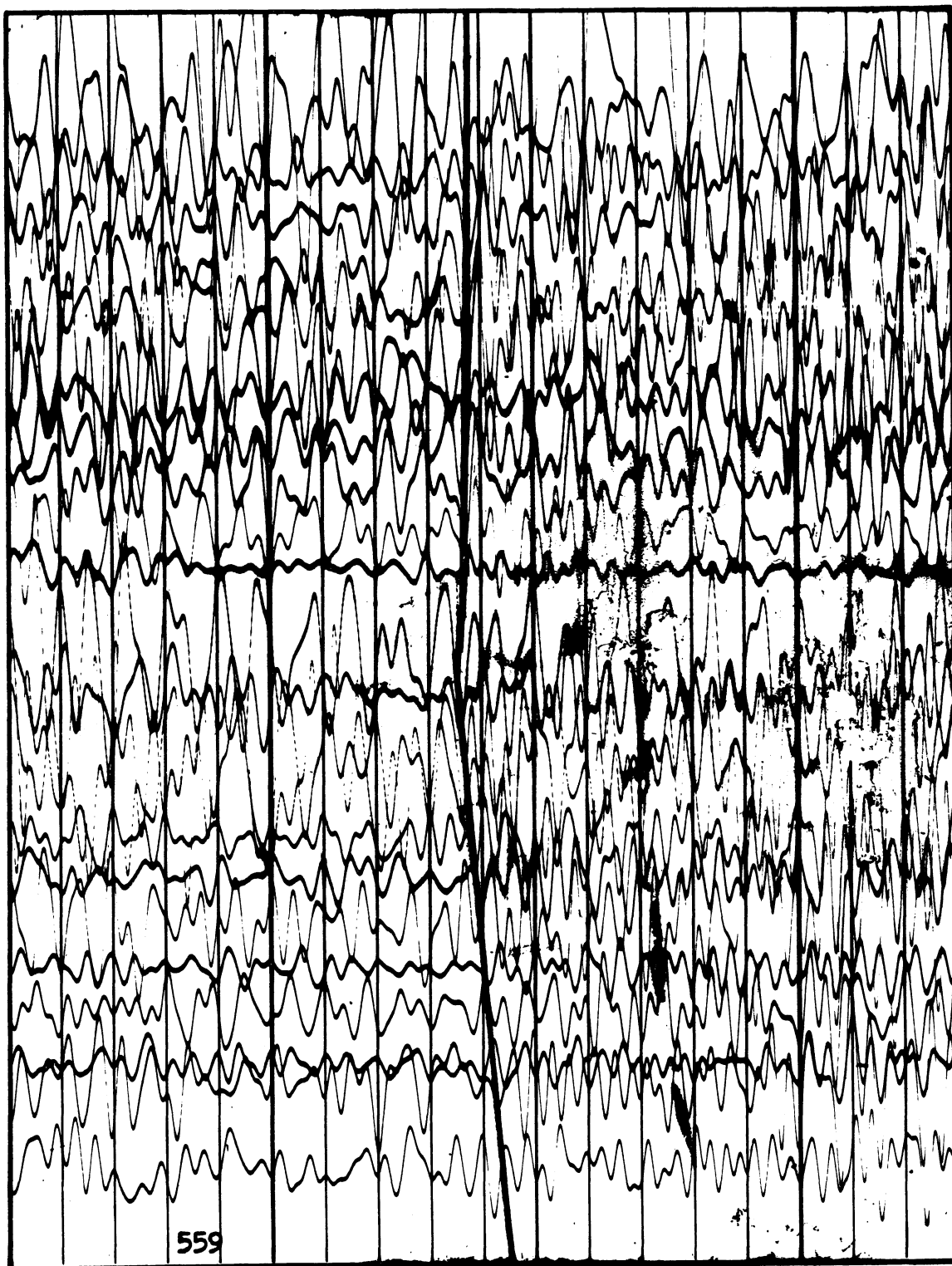
Seismic reflection at 1.2920 seconds from station 553.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



Seismic reflection at 1.0395 seconds from station 556.

GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA



Seismic reflection at 0.7250 seconds from station 559.

