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## NOAA TECHNICAL REPORT ERL 258-POL 15

# **Bathymetric and Magnetic Data From the Northeast Pacific 40° to 58°N, 125° to 160°W**

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BATHYMETRIC AND MAGNETIC DATA  
FROM THE NORTHEAST PACIFIC  
40° to 58°N, 125° to 160°W

William H. Lucas and Richard R. Uhlhorn

This report summarizes data from fifteen lines of underway geophysics taken aboard the NOAA Ships PATHFINDER, SURVEYOR and OCEANOGRAPHER in the north-eastern Pacific. Bathymetric and magnetic data from over 16,000 n mi were recorded during the cruises and data profiles of magnetic anomalies and bathymetry have been produced.

## 1. INTRODUCTION

NOAA Ships crossed the northeast Pacific several times between 1967 and 1970 enroute to and from various working areas. This report is a compilation of previously unpublished data from those ships that towed a magnetometer. The data includes 7 lines traversed by the NOAA Ship SURVEYOR, 7 lines by the NOAA Ship PATHFINDER and one line by the NOAA Ship OCEANOGRAPHER (app.). Magnetic and bathymetric information from 16,020 n mi of trackline between 40° and 58°N Latitude and 125° and 160° Longitude (fig. 1) is presented. The magnetic data north of 52°N are included in a study by Naugler and Wageman (in press).

## 2. INSTRUMENTATION

Magnetic and bathymetric data were collected with Varian proton precession magnetometers and precision depth recorders, respectively. Accuracies of these instruments are discussed in Peter et. al. (1965) and Elvers et. al. (1967).

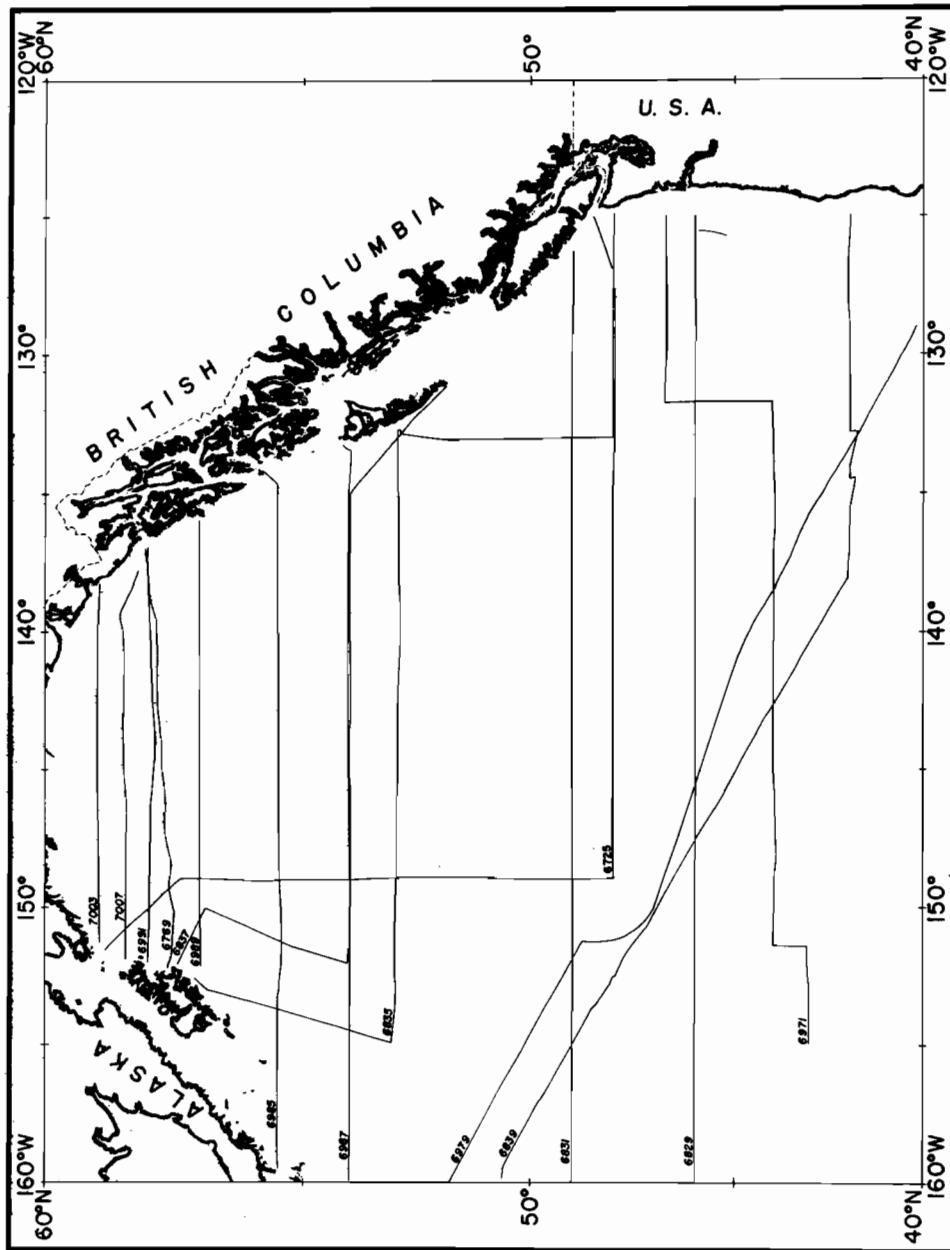


Figure 1. Tracklines along which bathymetry and magnetic data were collected.

The type of navigation used for primary control on each track is given in the Appendix. For Satellite Navigation the interpolated ship positions between fixes should be generally accurate to better than 0.5 n mi. Loran A provided positions along the tracklines with an estimated accuracy of 0.7 n. mi.

### 3. DATA PROCESSING

#### 3.1 Shipboard

Depths were scaled from the fathograms every 5 min and at intermediate times where peaks and deeps were encountered. The magnetometer analog recorder was generally run at 6 in/hr and the timing cycle polarization was 60 sec, except during testing and tuning.

The bathymetric and magnetic values were logged in real time by a Raw Data Logger on punched paper tape. Sufficient positions were used to delineate the track and to keep the interval between positions below a maximum of 1 1/2 hr.

#### 3.2 Pacific Oceanographic Laboratories

The bathymetric and magnetic data were further processed and edited at the Pacific Oceanographic Laboratories (POL) in Seattle, Washington. The geophysical and navigation data, furnished by the ships, were transferred from punched paper tape to punched cards, using an IBM 1620 computer.

The geophysical data were hand edited for potential errors. The navigation data were further edited on the IBM 1620 by a program that calculates ship speed and course which is used in determining problem areas of navigation.

The data were then transferred to magnetic tape using a CDC 6400 computer. The magnetic data were reduced by subtracting the International Geomagnetic Reference Field (IGRF 1965) values for the corresponding locations. A CALCOMP plotter was used to make magnetic and bathymetric profile plots along each trackline. If errors were evident after this stage pertinent data points were corrected or removed.

#### 4. PRESENTATION AND DISCUSSION OF DATA

The tracklines of the SURVEYOR, PATHFINDER, and OCEANOGRAPHER traversed several prominent marine geologic features in the N.E. Pacific. The areal extent and topographic characteristics of the tectonic provinces crossed by these tracks are indicated and some of the major features are annotated along the profiles. The magnetic anomalies are identified from the spectrum of the world-wide magnetic anomaly lineations (Pitman et al., 1968).

The profiles are arranged beginning with Cruise 7003 PATHFINDER at the north to Cruise 6829 SURVEYOR (see Plates 1-15) on the southern end of the area and can be directly keyed to figure 1 for trackline locations. The longitude and latitude appear along the bottom of the profile sections and distances are annotated at intervals of 100 n mi. Figure 2 shows the magnetic profiles plotted along each track. In plotting the intensity of the residual magnetic field, the ship's track is used as a base line and the anomalies are plotted with positive values above and negative values below the base line. To avoid crowding, some of the tracks for which measurements were made are indicated only by dashed lines. The intensities of the residual magnetic anomalies for these omitted lines are shown on the profiles (see Plates 1-15).



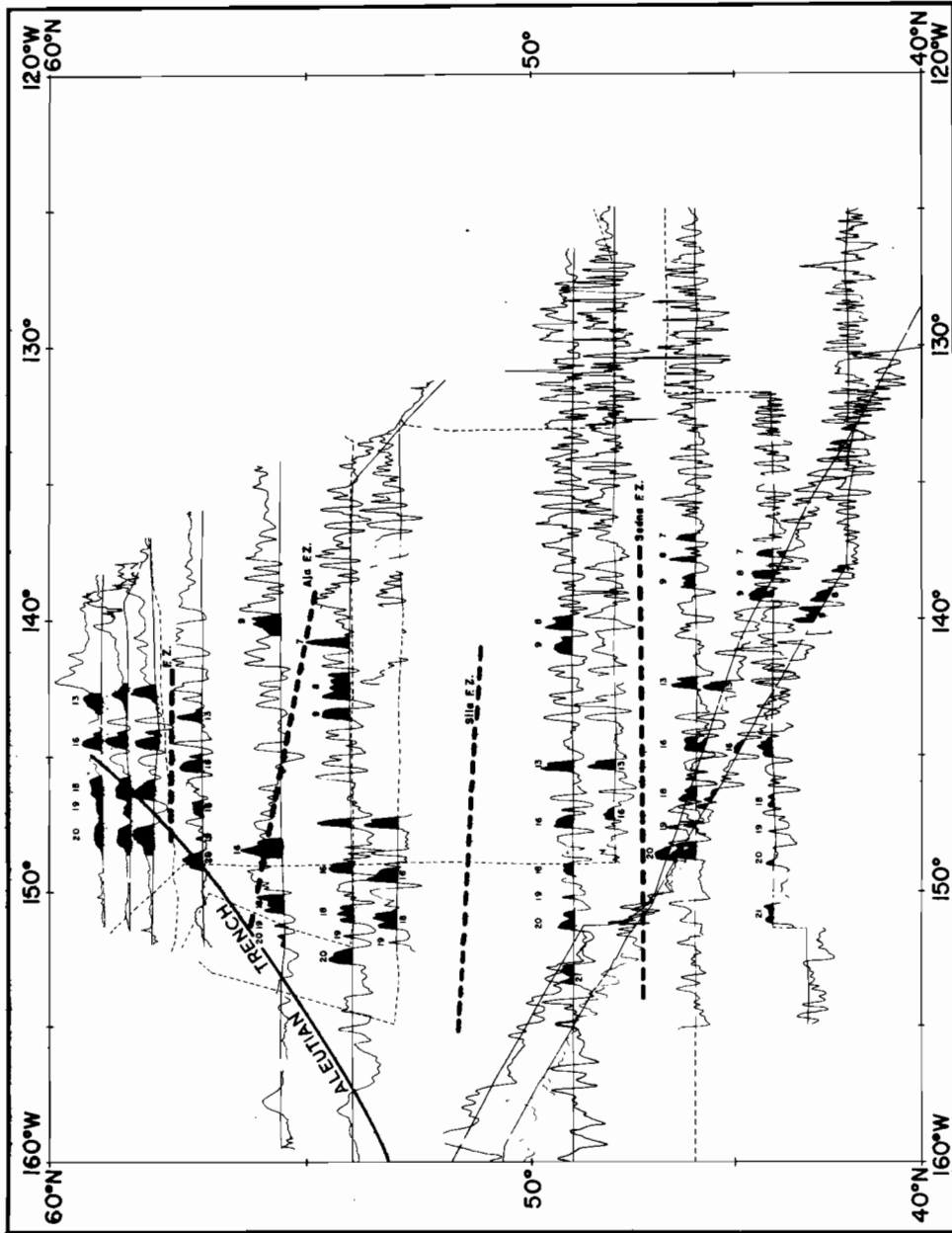


Figure 2. Residual magnetic anomalies plotted along the ships' tracklines. The light dashed lines are the ships' tracklines for which measurements were made, but are omitted to avoid crowding. The Aleutian Trench Axis is indicated.

Linear magnetic anomalies generated by sea-flow spreading in a reversing geomagnetic field are present throughout the area (fig. 2). Selected anomalies have been darkened for convenience in correlation.

Fracture zones (heavy dashed lines, fig. 2) are inferred from offsets of the magnetic anomaly pattern. The new data allow a more precise positioning of the Aja fracture zone (Atwater and Menard, 1970) and reveal an additional fracture zone to the north. We found no topographic expression for the northernmost fracture zone, but it is delineated by offsets of anomalies 13, 16, 18, 19, and 20. The Sila and Sedna fracture zones are positioned according to Atwater and Menard (1970, fig. 1).

On the most northerly profiles (7003, 7007, and 6991), the characteristic magnetic anomalies can be traced on the west across the Aleutian Trench and up to 50 km into the continental slope. However the anomalies are strikingly different on the eastern end of the profiles across the northeastern margin of the Gulf of Alaska where a relatively smooth magnetic field (about 50 km wide) is shown paralleling the continental margin.

The profiles we present are the finalized forms of POL geophysical data reduction and processing. The chief advantage of the profiles is that they permit a rapid inspection of the processed data with ready recognition of geophysical relationships to anomalies and are a quick aid in evaluating the results of the work undertaken.

The data from which these profiles were constructed have been recorded on magnetic tape and any of special interest may be obtained by writing to:

National Oceanic and Atmospheric Administration  
Environmental Data Service  
Page Building D 6  
Washington, D.C. 20235

## 5. ACKNOWLEDGEMENTS

We wish to thank B.H. Erickson and F.P. Naugler for providing information and helpful suggestions used in the preparation of this report. Miss Laurie Burgess typed the manuscript. A special acknowledgement is due the officers and crew of the PATHFINDER, SURVEYOR and OCEANOGRAPHER.

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- Peter, G. (1965), Preliminary results of a systematic geophysical survey south of the Alaska Peninsula, in Continental Margins and Island Arcs. Geol. Surv. Canada Papers, 66-15: P 223-237.
- Pitman, W.C., III, E.M. Herron, and J.R. Heirtzler (1968), Magnetic anomalies in the Pacific and sea-floor spreading., J. Geophys. Res., 73: P 2069-2085.

APPENDIX

Tabulation of Cruises

<u>CRUISE</u>	<u>SHIP</u>	<u>YR</u>	<u>NAV.</u>	<u>DATE</u>	<u>LOCATION</u>
7003	Pathfinder	70	Loran A Radar	5/1-5/3	Cape Fairweather to Barren Islands
7007	Pathfinder	70	Loran A Radar	9/25-9/27	Tonki Cape to Cape Spencer
6991	Pathfinder	69	Loran A	9/15-9/17	Along 58°N
6769	Pathfinder	67	Dead Rec- koning	10/10-10/11	Kodiak to Cape Spencer
6989	Pathfinder	69	Loran A	5/22-5/24	Along 57°N
6985	Surveyor	69	Loran A Radar & Visual	6/15-6/17	Along 55°30'N
6837	Pathfinder	68	Astro	9/16-9/19	Kodiak to Seattle
6987	Surveyor	69	Loran A	9/22-9/26	Along 54°N
6979	Surveyor	69	Satellite Dead Rec.	5/7-5/12	Dutch Harbor to Seattle
6839	Oceanographer	68	Satellite	4/15-4/23	San Francisco to Sea Map Channel
6831	Surveyor	68	Dead Rec- koning	5/13-5/18	160°W along 49°N to Vancouver Island
6725	Surveyor	67	Dead Rec- koning	6/2-6/7	Seattle to Barren Island along 48°N
6835	Pathfinder	68	Dead Rec- koning	5/2-5/8	Seattle to Kodiak via 133°W, 53°N
6971	Surveyor	69	Satellite Dead Rec.	2/6-2/27	Seattle to Honolulu
6829	Surveyor	68	Dead Rec- koning	4/3-4/8	Seattle to 160°W along 46°N

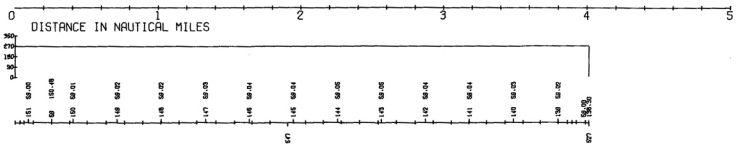
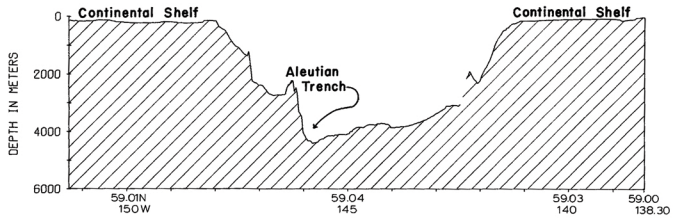
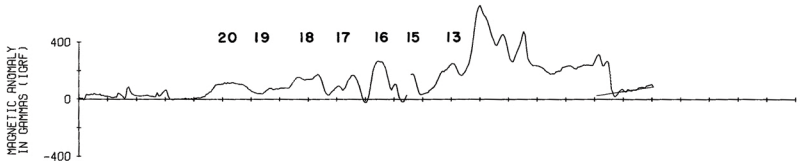


Plate 1. Cruise 7003 - Cape Fairweather to Barren Islands

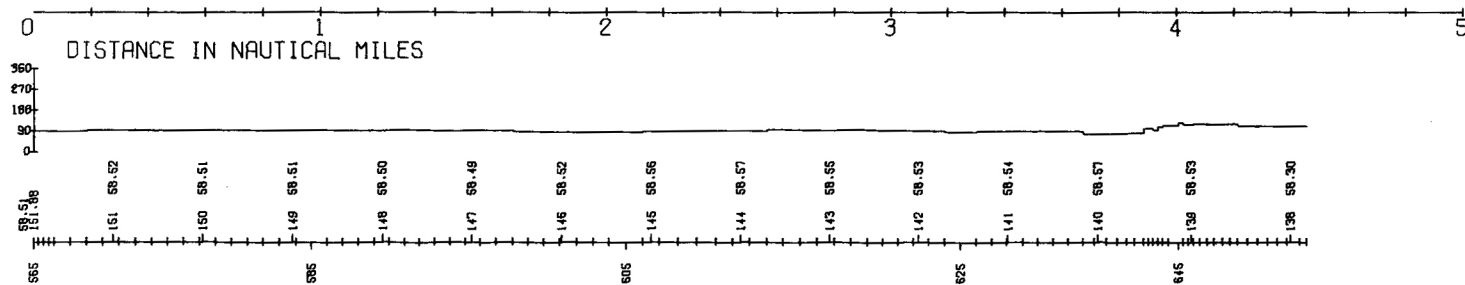
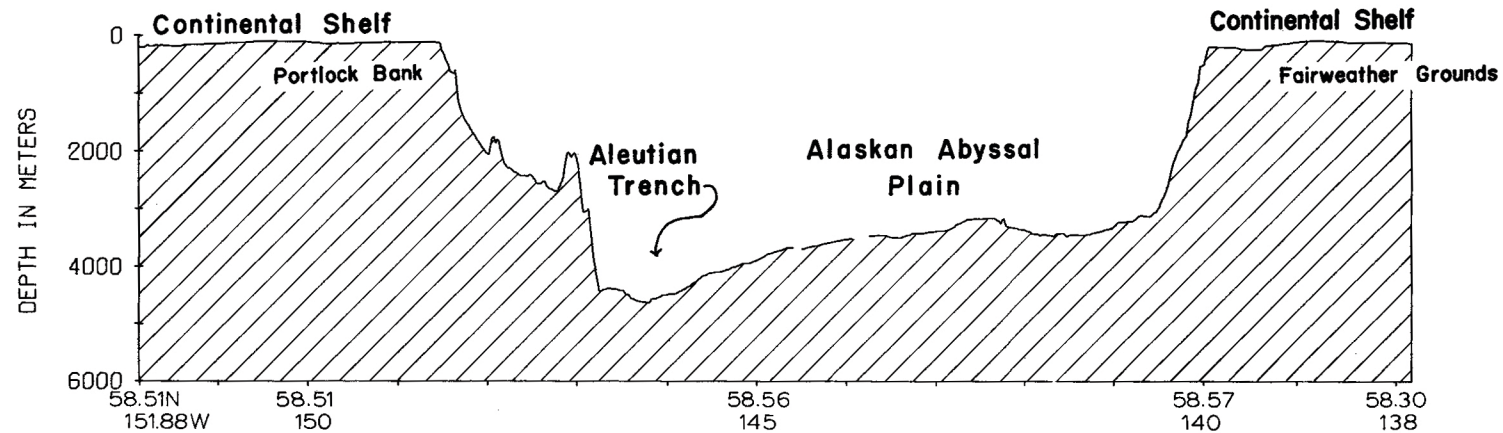
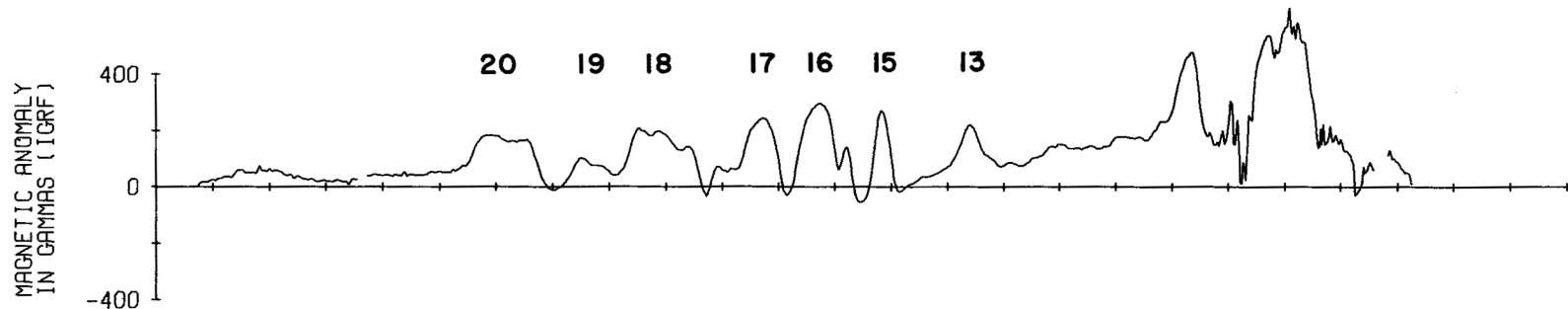
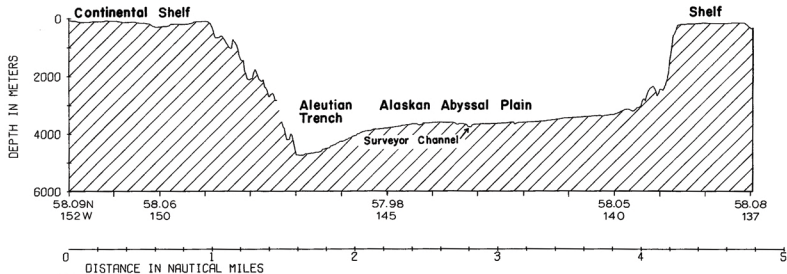
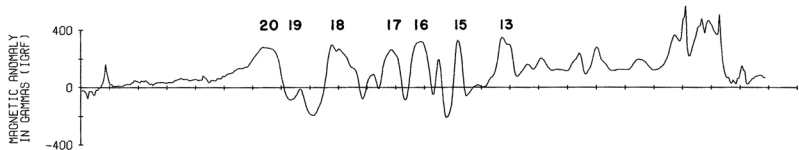


Plate 2. Cruise 7007 - Tonki Cape to Cape Spencer

7007





6991

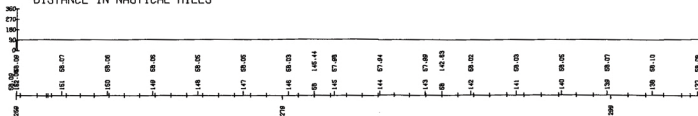
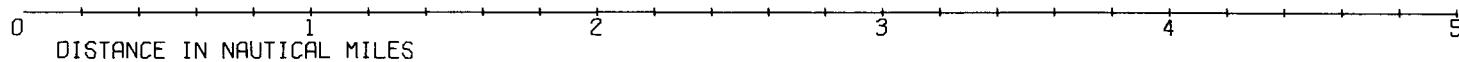
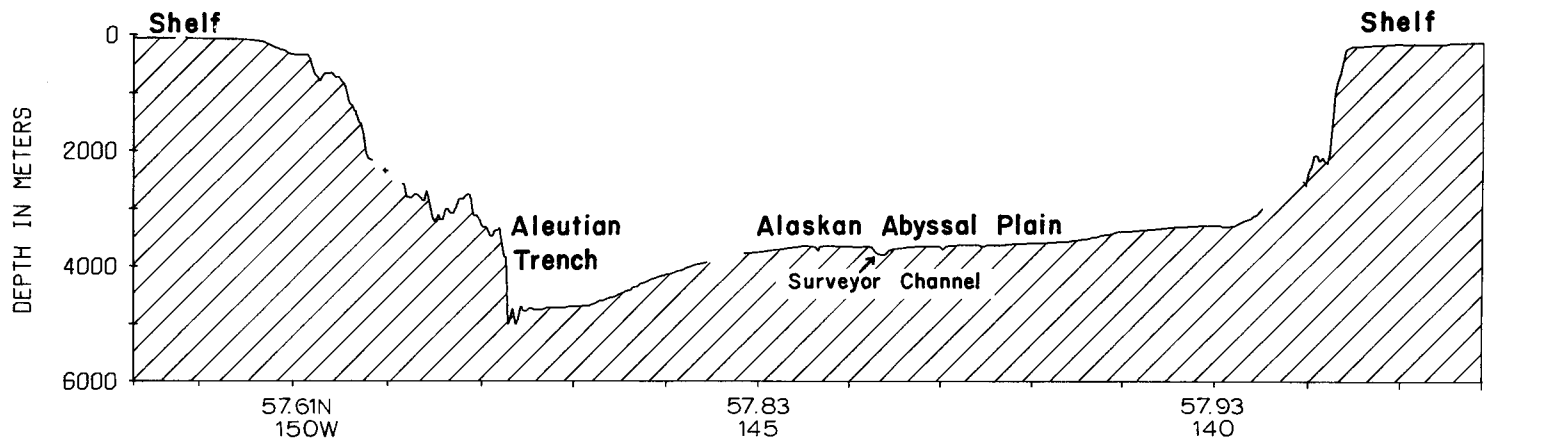
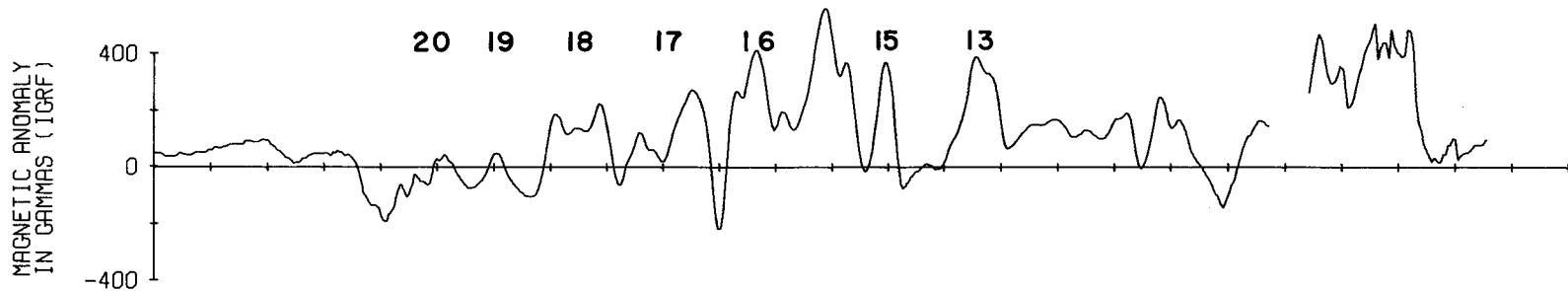


Plate 3. Cruise 6991 - Along 58°N





6769

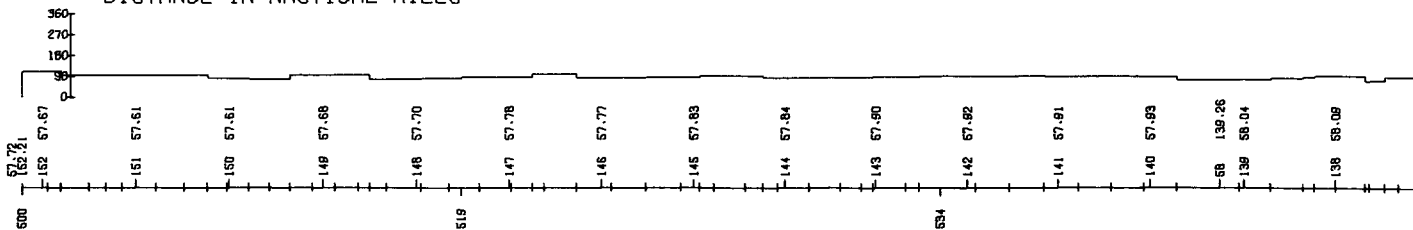
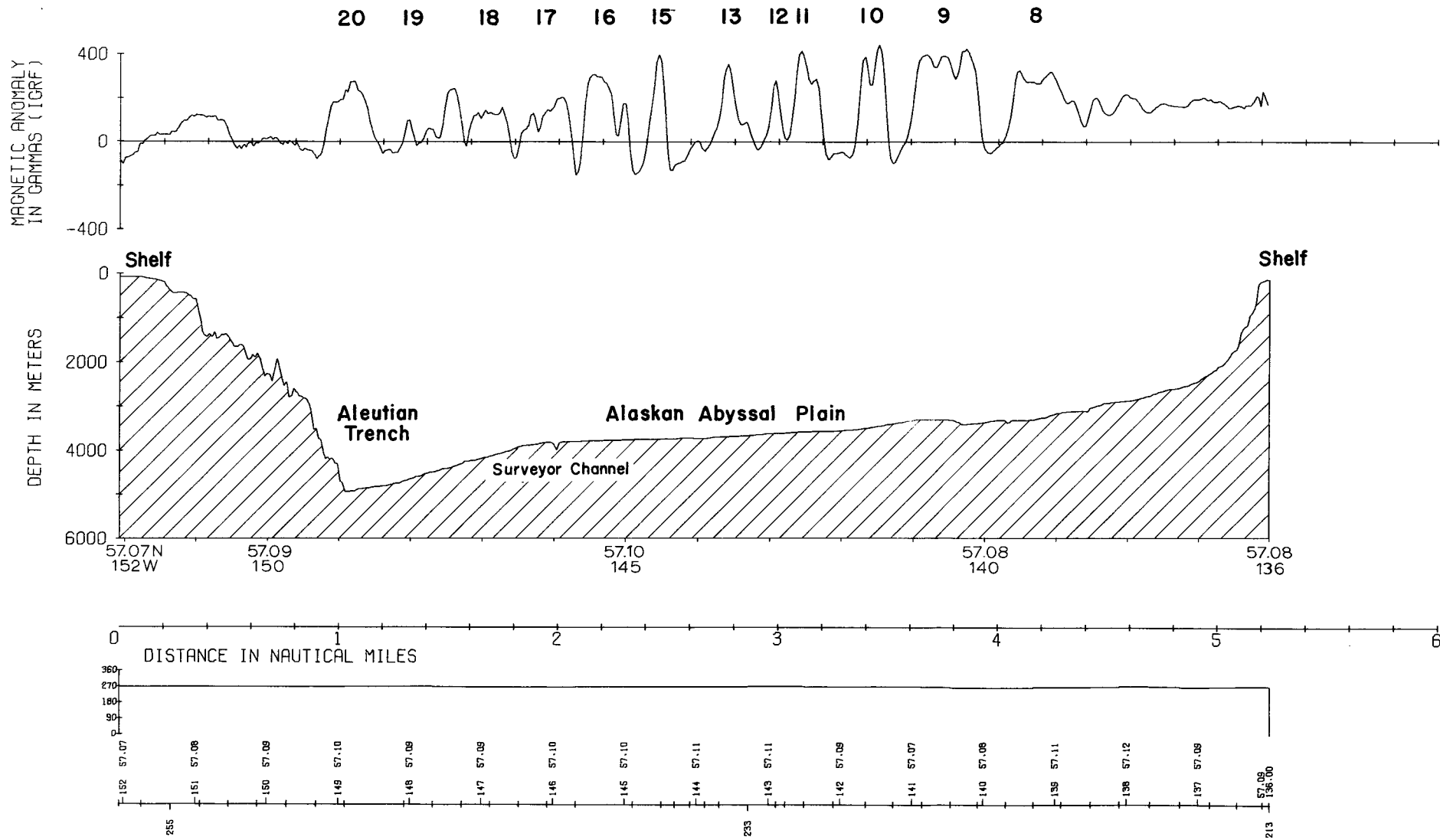


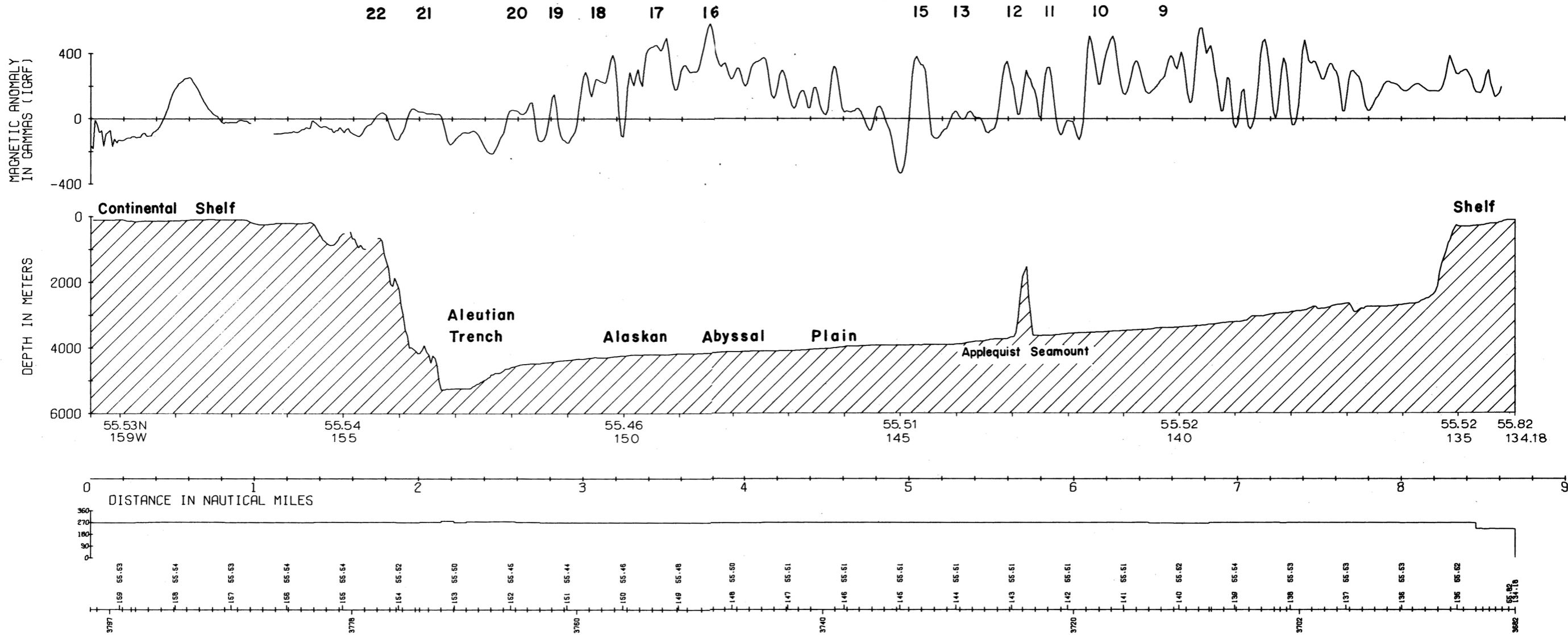
Plate 4. Cruise 6769 - Kodiak to Cape Spencer



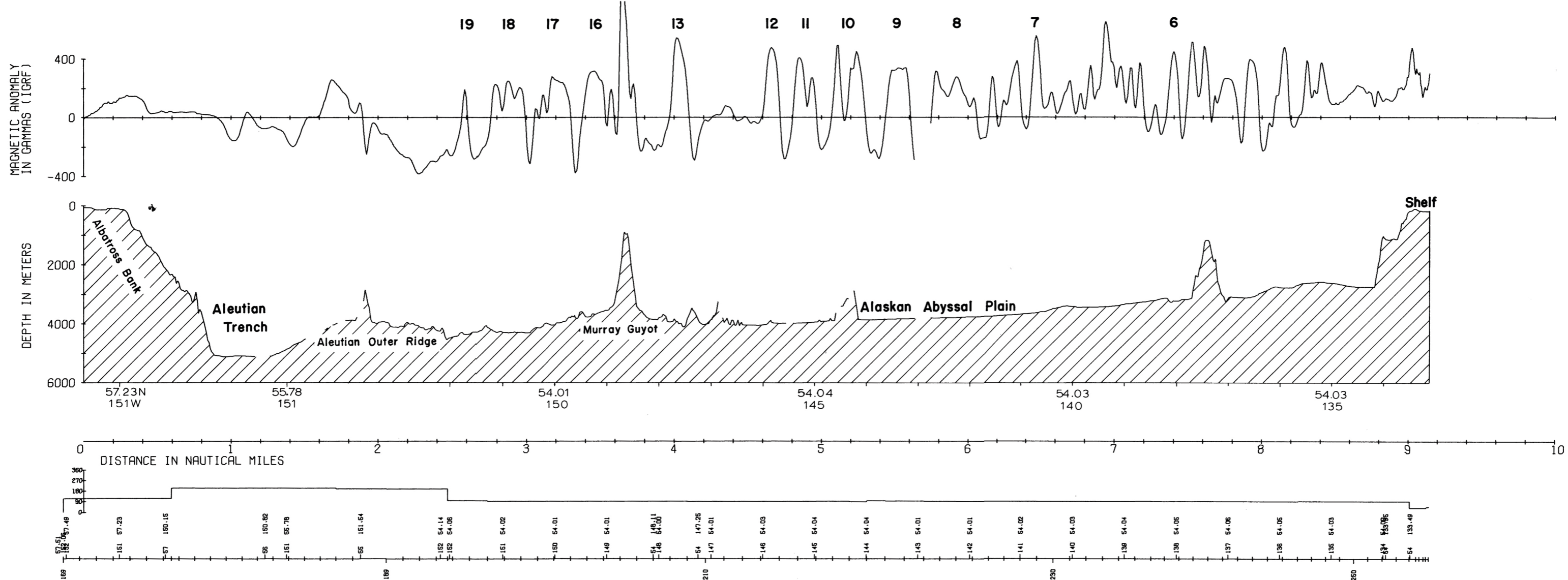
6989



**Plate 5. Cruise 6989 - Along 57°N**



**Plate 6. Cruise 6985 - Along 55° 30'N**



6837

Plate 7. Cruise 6837 - Kodiak to Seattle

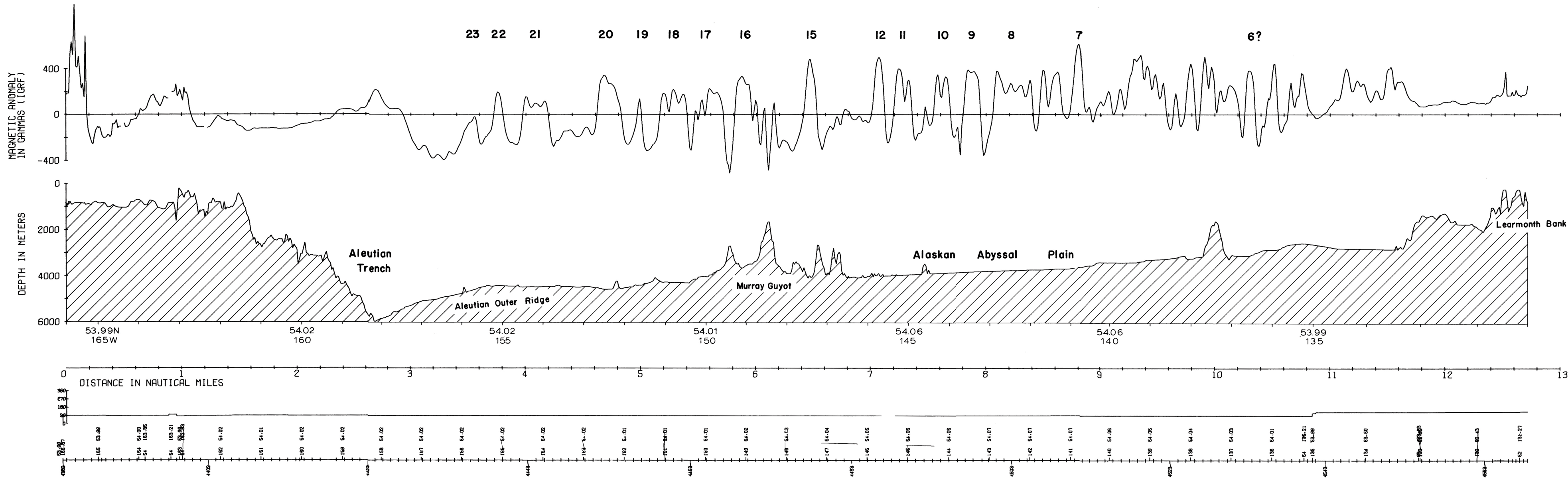


Plate 8. Cruise 6987 - Along 54°N

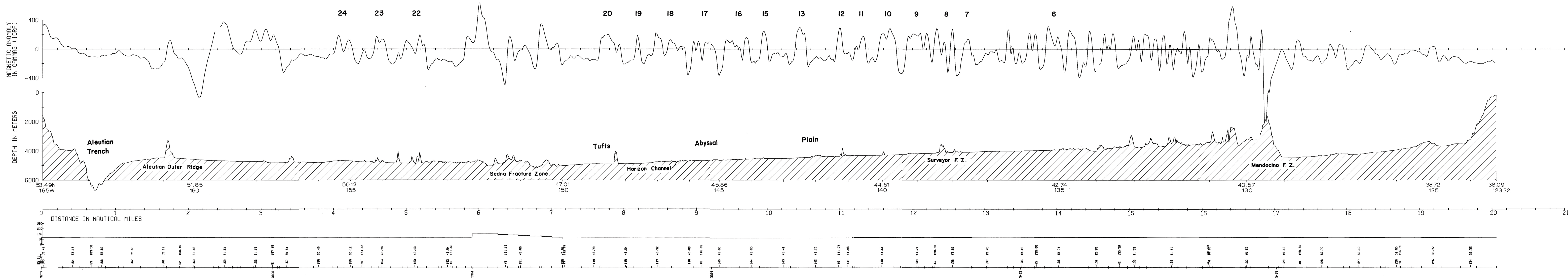


Plate 9. Cruise 6979 - Dutch Harbor to Seattle

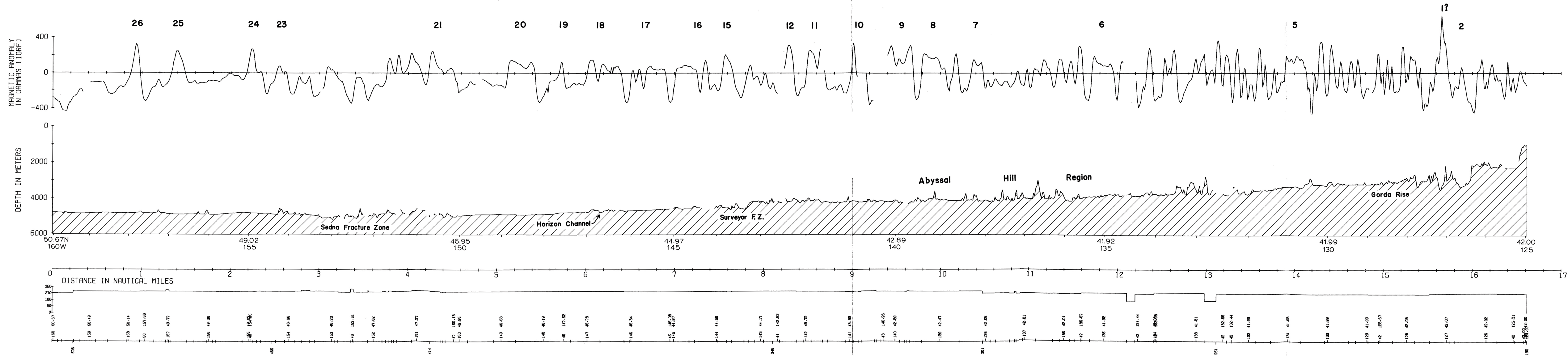


Plate 10. Cruise 6839 - San Francisco to Sea Map Channel

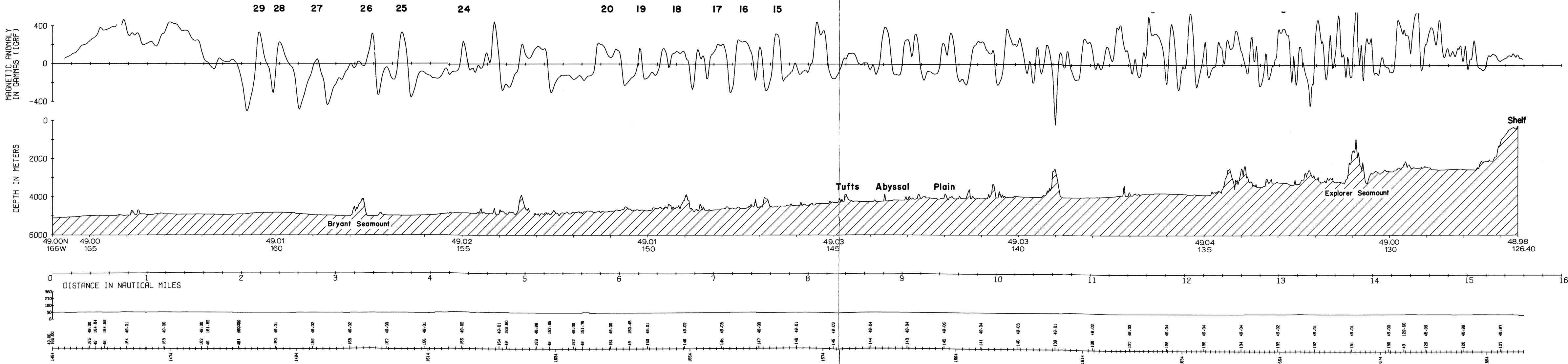


Plate 11. Cruise 6831 - N.E. Pacific to Vancouver Island via 49°N





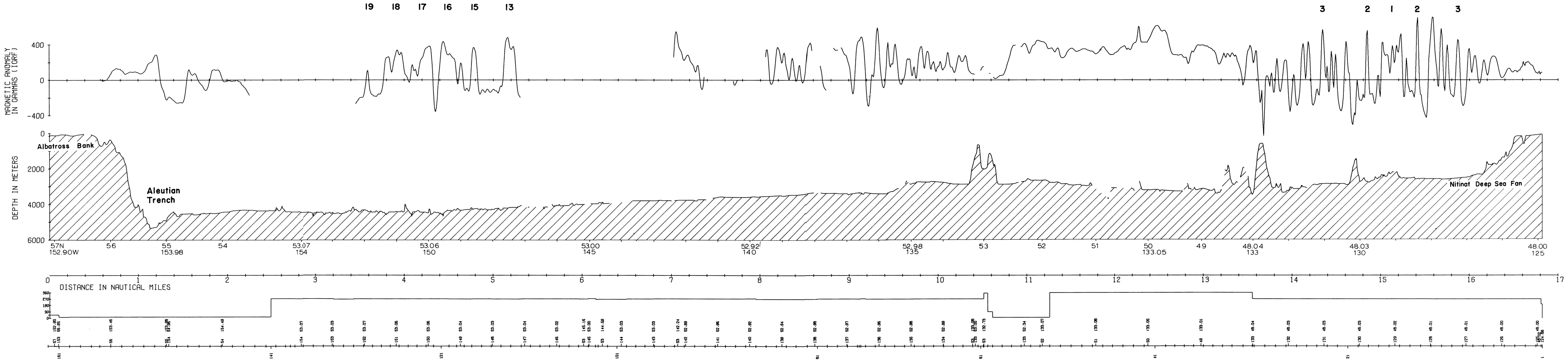


Plate 13. Cruise 6835 - Seattle to Kodiak

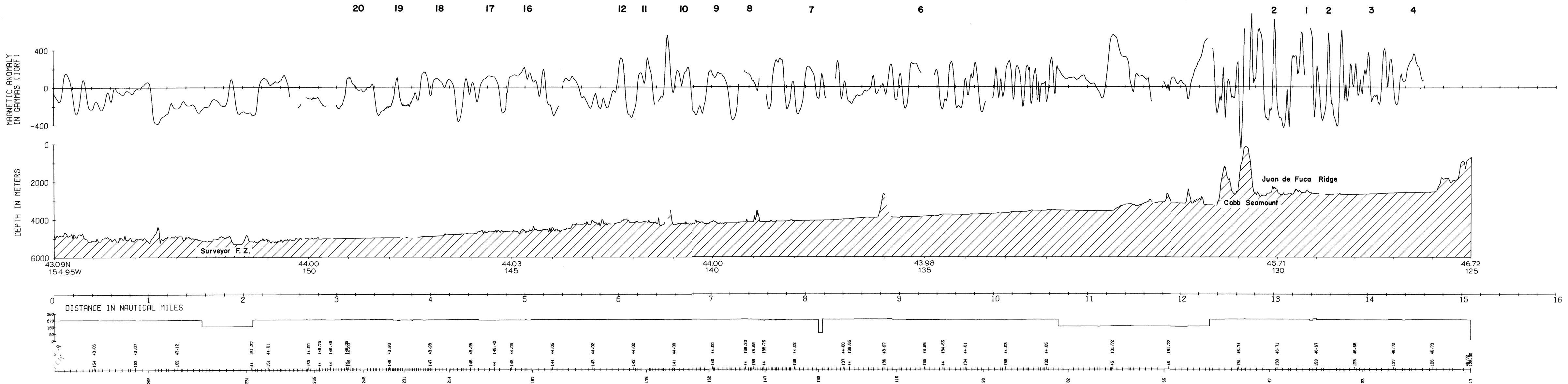


Plate 14. Cruise 6971 - Seattle to Honolulu

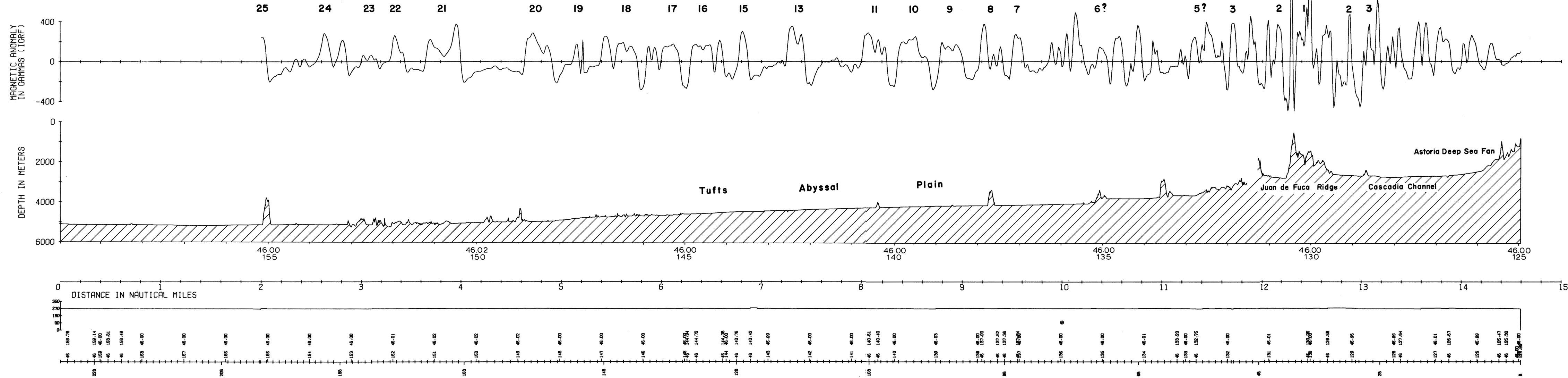


Plate 15. Cruise 6829 - Seattle to 160°W via 46°N