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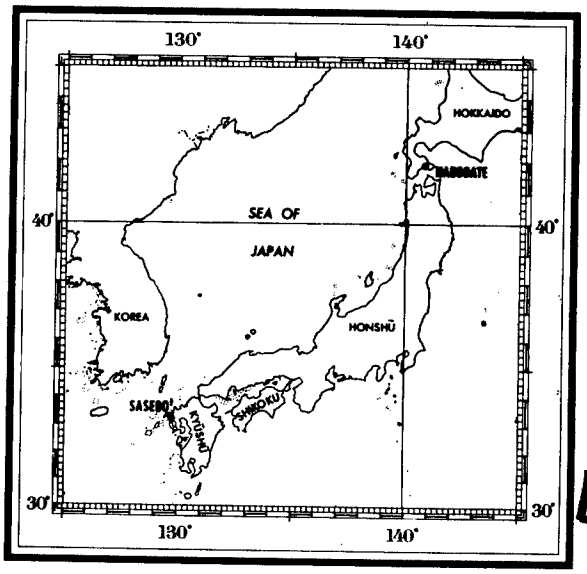
INFORMAL REPORT

OCEANOGRAPHIC CRUISE SUMMARY RECONNAISSANCE SURVEY OF SEA OF JAPAN



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INFORMAL REPORT

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ABSTRACT

An oceanographic survey of the Sea of Japan was conducted during February 1968 aboard the R/V F.V. HUNT as part of the ASW/USW Surveys Project. This was the final reconnaissance survey planned for this area and will be followed by a detailed acoustic survey. Continuous seismic profiling, bathymetric, sound velocity, and bathythermograph data were collected to further the knowledge of the area.

Analysis of the velocity profile indicate a lack, or near lack, of a winter thermocline. Preliminary interpretation of the seismic profiles shows as much as 1463 meters of sediments overlying the basement in the Japan Basin. The Yamato Rise is characterized by a thin layer of sediments with apparent outcropping of the basement on the topographic highs.

John M. Wageman

Pacific Support Group
ASW/USW Survey Project
Deep Ocean Surveys Division
Oceanographic Surveys Department

This report has been reviewed and is approved for release as an unclassified Informal Report.

C. H. CLINE
Director, Deep Ocean Surveys Division

I. PREVIOUS KNOWLEDGE OF THE REGION

The greatest amount of oceanographic data in the Sea of Japan has been collected by various Japanese government laboratories and universities since about 1932. These laboratories include, among others, the Maizuru Marine Observatory, the Kogendo Fisheries Experimental Station, the University of Tokyo, and the Maritime Safety Agency. The Japanese Upper Mantle Project has been responsible for an increasing amount of geophysical and geological data in and near the Japanese arc since 1962. Various Russian and Korean institutions have contributed data on the Sea of Japan with contributions from other nations being minor.

The Sea of Japan is an elongate marginal sea located off East Asia and bordered by the Japanese Islands. A large abyssal plain is present in the western portion while a complex ridge and trough (Yamato Bank) structure exists on the eastern side of the Sea of Japan. Approximately 2 km of sediment overlies a typically rough basement. A granitic layer of 3 to 5 km in thickness has been reported beneath the Yamato Bank and near the Japanese Islands.

A branch of the Kuroshio Current, the Tsushima Current, flows into the Sea of Japan from the south through the Korean Strait carrying water of high temperature and salinity. This current moves along the east margin of the sea and branches flow out through the straits between the northern islands. Part of the current continues northward along Sakhalin, turns, and flows southward after being cooled and diluted by river outflow. This current is now known as the Liman Cold Current and flows southward along the west boundary of the Sea of Japan. Below 400 meters the temperature difference existing between the east and west margins of the sea is not present. Instead the water displays little lateral variation in physical properties.

II. OBJECTIVES OF THE SURVEY

The survey aboard the R/V F. V. HUNT was conducted by the ASW/USW Surveys in support of the ASW/USW Oceanwide Survey Project of the U. S. Naval Oceanographic Office. The purpose of this project is to collect acoustic, geophysical, and oceanographic data to fulfill immediate and future requirements in support of naval operations, to update bathymetric charts, and to provide oceanographic data to the scientific community in support of the national interest.

Continuous seismic profiling, bathymetric, sound velocity, and bathythermograph data were collected to further the knowledge of the area.

III. NARRATIVE OF THE CRUISE

The area covered in the Sea of Japan by the survey is shown in Figure 1. The survey was accomplished between 16 February and 1 March 1968. 2780 miles of bathymetric data and 2480 miles of continuous seismic profiles were collected and three sound velocimeter stations were occupied. The particular track covered by this survey was the final reconnaissance survey planned by the ASW/USW Surveys in the Sea of Japan and will be followed by a detailed acoustic survey.

The R/V HUNT departed Sasebo, Japan, on 16 February 1968, with 10 NAVOCEANO personnel on board. The towed bathymetric transducer was launched immediately after clearing port. Upon arrival on 17 February at the beginning of the specified survey track, a test lowering of the sound velocimeter was made. After this was satisfactorially accomplished, the seismic equipment was streamed and the HUNT proceeded along track, collecting bathymetric, continuous seismic profiling, and bathythermograph data. Stations 25, 12, and 11 were occupied between 21 and 23 February at locations shown in Figure 1. On 1 March, the HUNT arrived in Hakodate, Japan, where NAVOCEANO personnel debarked. Table 1 is a list of velocimeter and bathythermograph station locations.

IV. METHODS OF COLLECTION AND ANALYSIS

A. Physical Oceanography

Temperature and velocity measurements were made at three stations with a Marine Acoustical Services Velocimeter System. This system produces an XY plot of sound velocity versus depth and a digital and a punch tape record of temperature, sound velocity, and depth.

Bathythermographs were collected by a Sippican Expendable Bathythermograph System.

B. Bathymetry

Bathymetry was recorded on a Gifft GRD-1C-19T recorder. An Edo 12 kHz transducer was towed in an ORE fish using a faired

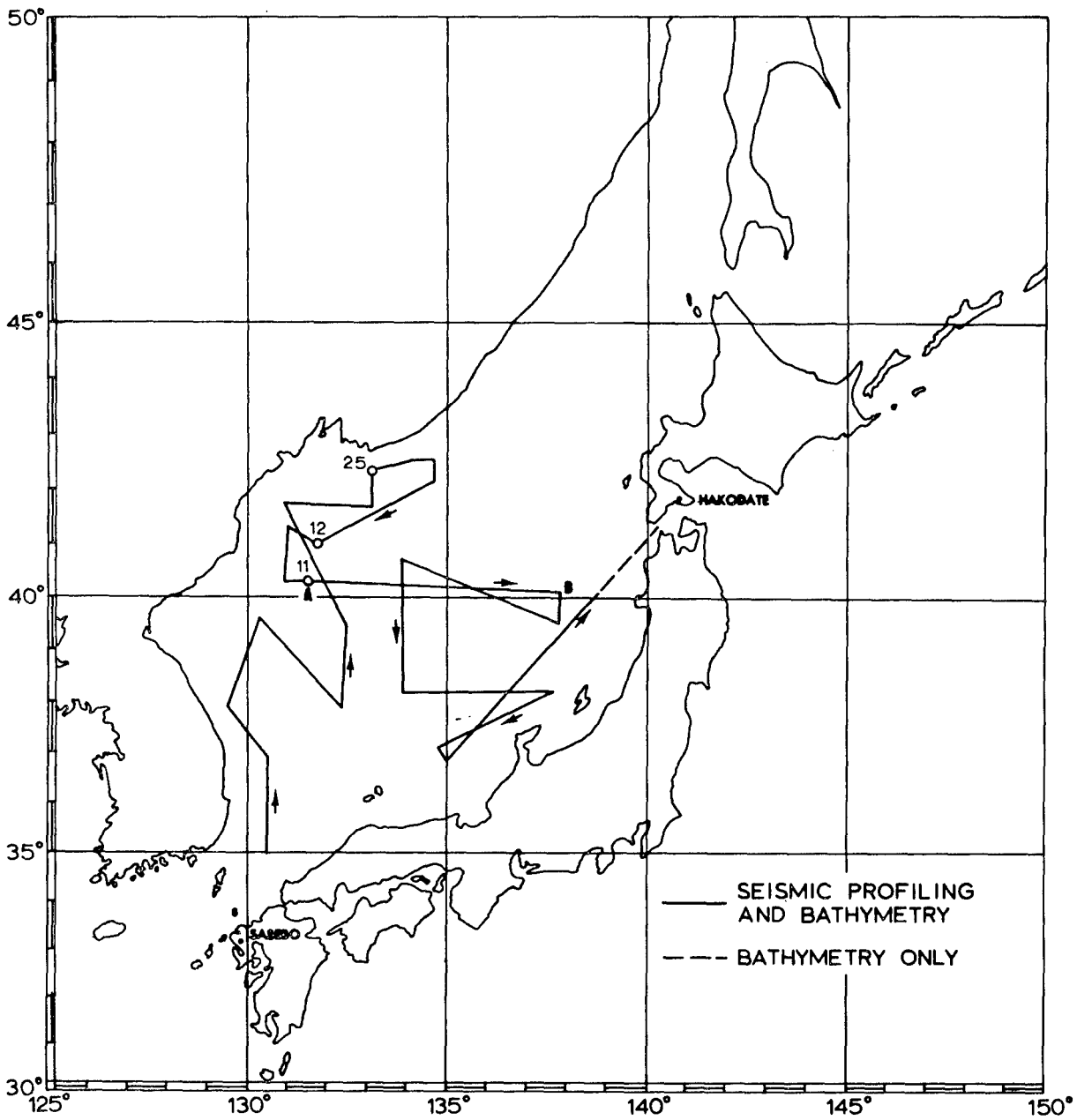

FIGURE 1. TRACK CHART

Station Number	Latitude	Longitude
	Velocimeter	
25	42-20N	133-40E
12	41-00N	131-47E
11	40-18N	131-31E
	Bathythermograph	
1	36-41N	130-30E
2	37-31N	129-52E
3	38-23N	129-40E
4	39-17N	130-04E
5	37-53N	132-24E
6	40-44N	131-30E
7	42-20N	133-04E
8	42-19N	133-09E
9	41-10N	131-47E
10	40-18N	131-31E
11	40-11N	134-04E
12	40-10N	135-21E
13	40-08N	136-49E
14	39-54N	136-34E
15	40-09N	135-44E
16	40-28N	134-40E
17	39-41N	133-50E
18	38-13N	134-18E
19	38-14N	135-32E

Table 1. Velocimeter and Bathythermograph Locations

conductor cable. The records were recorded continuously on the 1-second (400 fm) sweep and programmed according to depth changes. The records were annotated as to depth scale, time, recorder settings, ship speed, and course. The bathymetric records were read at topographic peaks, troughs, slope changes, and at 5-minute intervals. Profiles were drawn from these at a 40:1 vertical exaggeration.

C. Continuous Seismic Profiling

Continuous seismic profiles were made using a Geotech SSP 30,000 joule, 14,000 volt sparker system. The returning signals were amplified, filtered, and recorded on a modified Raytheon PFR 193 recorder. An unfiltered signal was also recorded on an Ampex tape recorder for later playback and analysis. The returning signals were generally filtered from 31 Hz low cut and 98 Hz high cut.

The records were annotated for depth scale, time, date, and ship's course and speed. A log was kept of time, depth, reel number, and counter revolution number of each fix and special event.

V. DISPOSITION OF DATA

The bathymetric, seismic, and velocimeter data are in the custody of the ASW/USW Surveys Project for analysis and inclusion in a final report on the Sea of Japan. The XBT data have been forwarded to NODC.

VI. PRELIMINARY ANALYSIS

A. Physical Oceanography

Since only three sound velocity stations were taken, no general conclusions can be made concerning the sound velocity structure. These profiles will be combined with other data obtained from previous and subsequent surveys in the Sea of Japan and a composite descriptive analysis will be presented in a final report.

The profiles from this cruise (shown in Figure 2) are identical at depths greater than 400 meters because of pressure effect dominance. Above this depth, they all indicate the lack or near lack of a winter thermocline. Station 11 has a sound channel

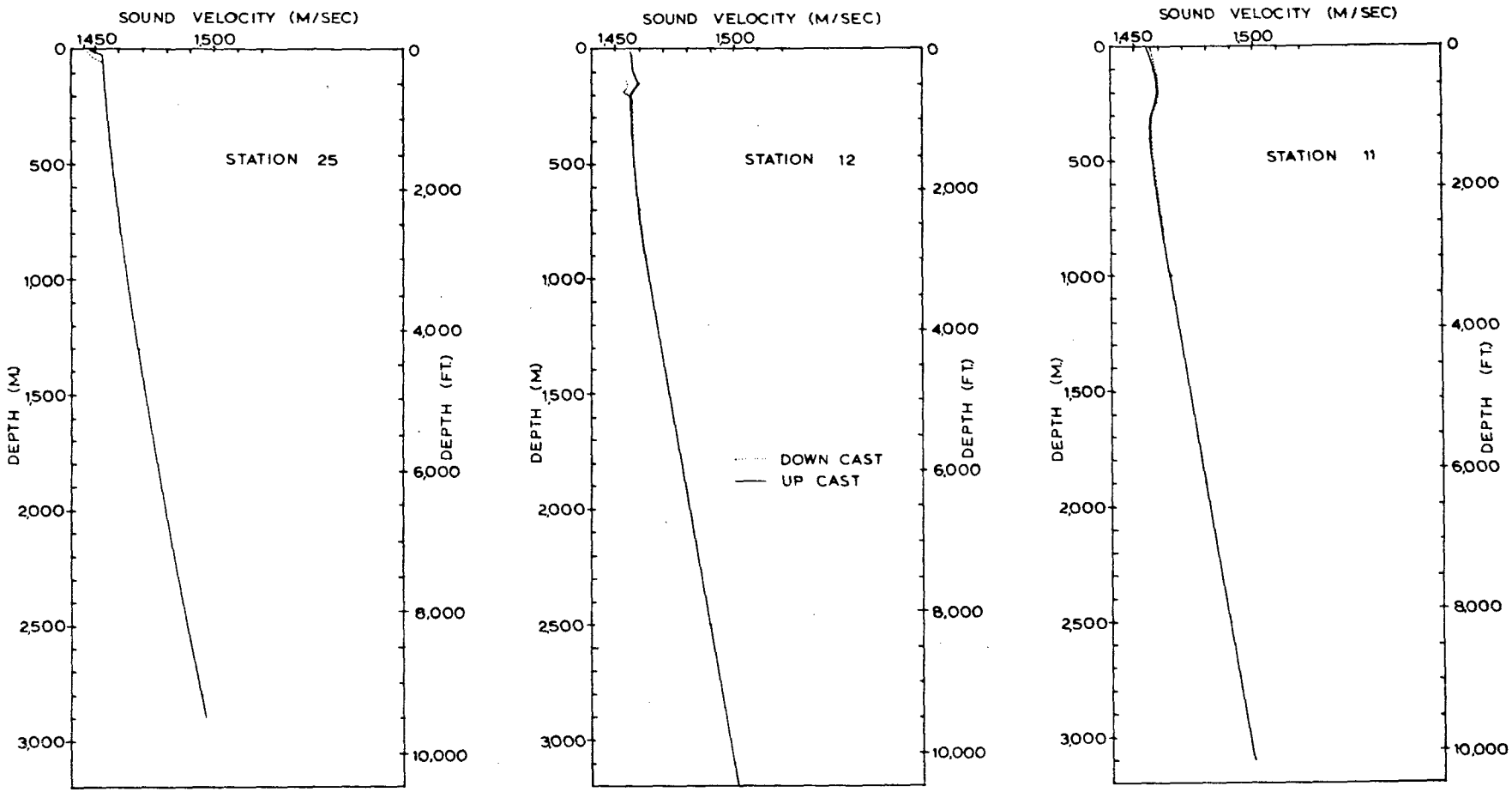

FIGURE 2. SOUND VELOCITY PROFILES

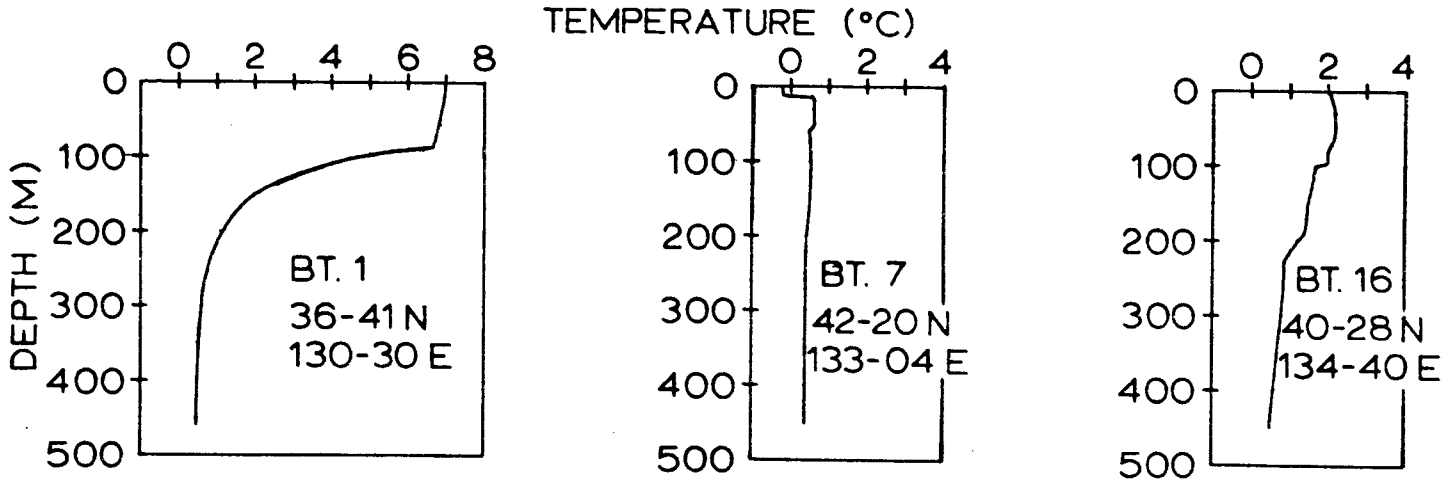

FIGURE 3. TYPICAL BATHYTHERMOGRAPHS

with its axis at 400 meters. No sound channel is present at Station 25 probably due to the colder surface water at this high latitude, as indicated by BT 7 in Figure 3.

B. Geological Oceanography

Figure 4 is an east-west profile across the Sea of Japan traversing the Japan Basin and Yamato Rise on which both the sea floor and the basement have been traced. In general, the present sea floor parallels the basement; however, a much thicker sedimentary column exists in the basin than on the Yamato Rise and the relief of the basement is much greater than that of the sea floor. This indicates that lateral transport of sediment has smoothed the basement relief.

Approximately 1463 meters of sediment overlies parts of the basement in the Japan Basin west of the Yamato Rise. This basin appears to be floored with a thickly bedded turbidite sequence with a rough basement beneath.

Sediment on the Yamato Rise is severely distorted and appears to consist of closely spaced reflectors indicative of highly stratified sediment. In some of the small intermontane basins, this sediment overlies more acoustically transparent material, probably nearly homogeneous pelagic sediments. The basement appears to crop out in many places on the rise. It undoubtably does in some of the topographic highs; however, other apparent outcrops could be due to a sediment layer too thin to be detected by the seismic profiler at the band-pass frequencies used.

The other profiles show similar features and all will be presented and analyzed in the final report on the Sea of Japan.

VII. ADDITIONAL WORK NEEDED IN THE REGION

Additional tracks would be very useful for better delineation of physiographic provinces and bottom structure in the southeastern part of the Sea of Japan. A survey track was planned in this area on this survey but had to be cancelled due to time limitations.

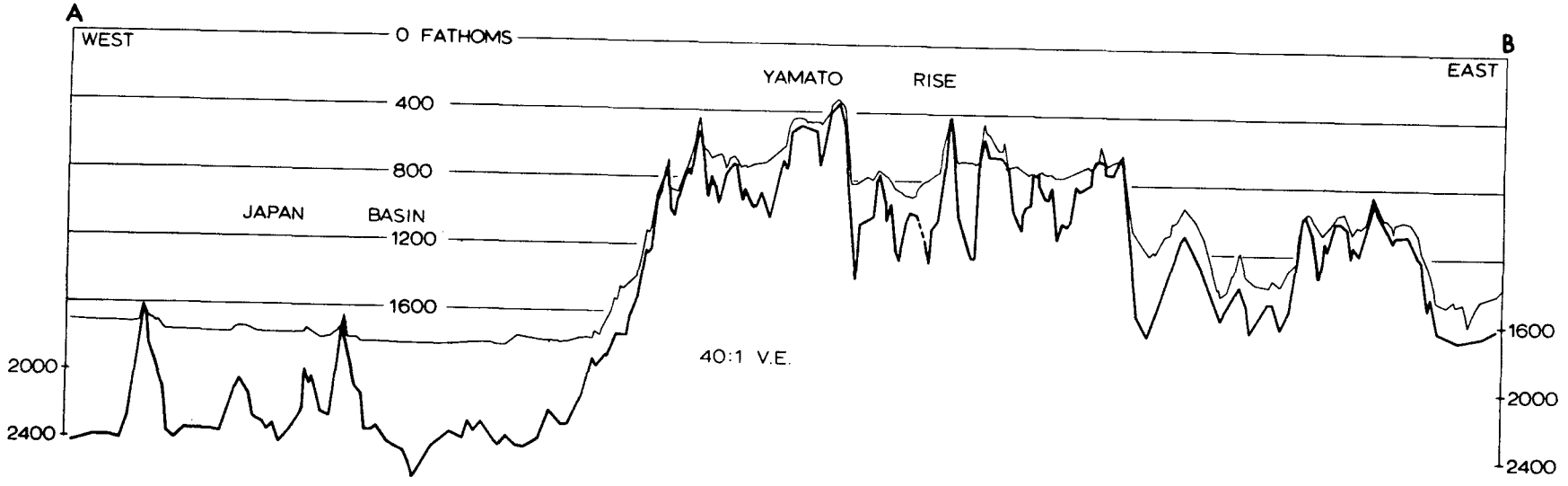

FIGURE 4. EAST-WEST PROFILE ACROSS SEA OF JAPAN. HEAVY LINE IS BASEMENT FROM SEISMIC PROFILE.

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