

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SEISMIC REFLECTION PROFILES FROM COOPERATIVE
INVESTIGATIONS IN THE STRAIT OF JUAN DE FUCA BY THE
U.S. GEOLOGICAL SURVEY AND GEOLOGICAL SURVEY OF CANADA
ABOARD THE CANADIAN SURVEY SHIP PARIZEAU
BETWEEN MAY 15 AND JUNE 3, 1972

PART 1 (EASTERNMOST SEGMENT)

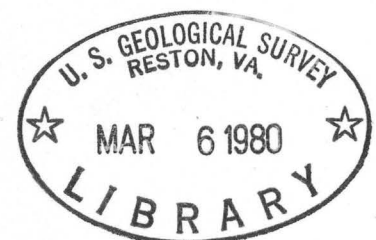
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INTRODUCTION

In order to develop new data pertaining to the tectonic setting and potential geologic hazards in the Strait of Juan de Fuca and northern Puget Sound, a cooperative seismic reflection profile, gravity, and magnetic survey was conducted aboard the Canadian Survey Ship PARIZEAU in 1972.

Results of approximately 2300 km of gravity and magnetic trackline data have been published by Snavely and others (1974), Tiffin and others (1974), and MacLeod and others (1977). A map, based upon interpretation of about 700 km of seismic reflection profiles in the easternmost part of the strait, is nearing completion by H. C. Wagner and M. C. Wiley of the U.S. Geological Survey. The seismic reflection profiles in this area are being released at this time.

SCIENTIFIC PARTY DURING SURVEY

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OPERATIONAL DATA

The subbottom acoustic reflection data were obtained using three separate seismic systems; a moderately deep penetrating sparker system, a high-resolution electro-mechanical device, and an echo-sounding device. The moderately deep penetrating sparker consisted of a van-mounted four-bank

40 to 160 kilojoule unit triggered from a single source. The triggered discharge of large capacitors traveled through six twin-electrode "ladders" trailed behind the ship. These "ladders" created sparks that produced the low-frequency acoustic pulse. These pulses were reflected from the sea bottom and from subbottom surfaces and were received and preamplified by a 100-hydrophone streamer. They were then selectively filtered and recorded graphically on two Raytheon recorders at one- and two-second sweeps.

The power source of the high-resolution E. G. & G. "Uniboom" consisted of an electrical discharge (capacitor bank) into a flat wound coil. The coil generated an eddy current with the same polarity as the encompassing aluminum disc. Similarly polarized induced magnetic fields generated by the eddy currents expelled the aluminum disc from the coil face thus delivering a mechanical impulse to the water. A rubber sheet immediately pulled the aluminum disc back to the coil face ready for the next electrical discharge. The returning signal was detected with a hydrophone, processed by a Raytheon graphic recorder, and recorded at a 1/4-second sweep rate. The dominant frequency was about 2500 hertz (range 700-14,000 Hz) and power demand was about 400 joules. A 12 kilohertz precision echo sounder system was used to obtain depth control.

Navigation for most of the tracklines utilized a Decca Minifix system with an accuracy of 100 m or better.

The "Uniboom" system was inoperative for short portions of a few lines and only the magnetic and gravity systems were operated during the running of line 47.

REFERENCES

- MacLeod, N. S., Tiffin, D. L., Snavely, P. D., Jr., and Currie, R. G., 1977, Geologic Interpretation of magnetic and gravity anomalies in the Strait of Juan de Fuca, U.S.-Canada: Canadian Journal of Earth Sciences, v. 14, no. 2, p. 223-238.
- Snavely, P. D., Jr., Tiffin, D. L., MacLeod, N. S., and Currie, R. G., 1974, Preliminary gravity and magnetic maps of the Strait of Juan de Fuca, B.C., Canada, and Washington, U.S.: U.S. Geological Survey Open-File Report, 10 p.
- Tiffin, D. L., Snavely, P. D., Jr., MacLeod, N. S., and Currie, R. G., 1974, Preliminary gravity and magnetic maps of the Strait of Juan de Fuca, B.C., Canada, and Washington, U.S.: Geological Survey of Canada Open-File Report 184.

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