DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Cruise Report for EEZ-SCAN Cruise F8-88-AA: Eastern Aleutian Arc Oceanic Plate and Western Alaska Peninsula Margin between 179° and 158° West Longitude, North Pacific Ocean

by

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INTRODUCTION

M/V Farnella left Dutch Harbor, Alaska at 2200 hours local time (LT) on July 5, 1988 (188/0900 GMT) to conduct a geophysical and GLORIA survey (cruise F8-88-AA) of the U.S. Exclusive Economic Zone (EEZ) south of the Aleutian islands and Alaska Peninsula (Fig. 1). We deployed gear and began operations in the study area on July 6 at 1630 hours LT (189/0330 GMT). We ended the survey at 0615 hours LT, August 2 (214/1715 GMT) and transited to Dutch Harbor, arriving there at 2200 hours LT on August 2 (215/0900 GMT). The scientific crew list is given in Table 1.

Table 1. List of Scientific Participants. USGS, United States Geological Survey; IOS, Institute of Oceanographic Sciences, United Kingdom.

Karl, H.A. (USGS)	Chief Scientist
Vallier, T.L. (USGS)	Chief Scientist
Masson, D.G. (IOS)	Chief Scientist
Cherryman, John (IOS)	Senior GLORIA Engineer
Harris, Andy (IOS)	GLORIA Engineer
Gray, Alan (IOS)	Air-Gun Technician
Evans, Jeremy (IOS)	Photographer
Beney, Martin (IOS)	RVS Software Engineer
Boyle, Michael (USGS)	Electronics Technician
Pickthorn, L.B. (USGS)	Geologist
Rearic, Douglas (USGS)	Geologist
Riordan, Jean (USGS)	Geologist

The primary purpose of the cruise was to collect overlapping long-range side-scan images with the GLORIA III system. During the cruise, we collected approximately 280,000 km^2 of seafloor GLORIA images and about 9800 line-km of dual-channel seismic (air gun source), 3.5 kHz high-resolution acoustic-reflection, 10 kHz bathymetry, magnetic, and gravity field data. Track lines generally were spaced 30 km apart in water deeper than 2000 m and as close as 15 km apart in shallow water (Fig. 1). The ship's tracks were oriented parallel or subparallel to regional bathymetry and submarine structures.

Operationally, the cruise was very successful. We surveyed the outer part of the EEZ south of the eastern Aleutian Islands chain, and the inner part of the western Alaska Peninsula EEZ. The preceding cruise, F7-88-AA, surveyed the southern margin of the eastern Aleutian Islands. Our survey data from the region south of the Alaska Peninsula were turned over to the co-chief scientists of the succeeding cruise, F9-88 to assist their geologic studies of the Alaska Peninsula EEZ.

EQUIPMENT REPORT

The equipment functioned well throughout the cruise. The occasional problems were easily solved by the technicians. The GLORIA fish was brought aboard only one time during the entire cruise between its deployment and final retrieval. Either a seafloor acoustic system or a submarine, transmitted signals with a frequency that greatly interfered with the GLORIA system, causing problems for several hours. This interference occurred in the southwestern corner of the survey area near 48° to 49° N. Latitude and 178° to 179° W. Longitude (Fig. 1). Navigation depended greatly on the GPS system, particularly for about 12 hours each day when the satellites were in appropriate positions. At other times, we relied mostly on the LORAN systems. The trackline following displays were helpful, both in the laboratory and on the bridge.

Weather observations were transmitted at approximate 6 hour intervals using the GOES/XBT system. XBT casts were generally made each day and the data transmitted using the GOES/XBT system.

PRELIMINARY SCIENTIFIC RESULTS

The Pacific plate has three prominent geologic features in the surveyed region south of the eastern Aleutian islands: seamounts, fracture zones, and the Zodiac Fan. Several different types of seamounts were imaged by the GLORIA III system. Some seamounts have clusters of two or more peaks, whereas others are large solitary cones. A few seamounts are shield-like in appearance. There is no definite pattern for the location of seamounts; they seem to be more or less randomly scattered over the seafloor. Near the Aleutian trench, seamounts are broken by faults that parallel the trench. These faults are largely responsible for the breakup of seamounts along the trench outer high as the oceanic plate approaches the Aleutian Trench prior to subduction.

The most prominent bathymetric feature on the oceanic plate is the Amlia Fracture Zone (Fig. 1). It parallels, and lies near, 173° W. Longitude and is offset slightly at about 49° 30' N. Latitude.

About 0.2 to 0.3 seconds (2-way time) of sediment drape acoustic basement throughout the western part of the surveyed area. Farther east, sediments of the Zodiac Fan, which have a thickness of as much as 0.6 seconds, combine with younger strata for a maximum total sediment thickness over acoustic basement of 0.8 to 0.9 seconds. The northwestern corner of Zodiac Fan lies at about 49° 30' N. Latitude, 168° W. Longitude, and from there the boundary progresses along a sinuous NE-trending line to approximately 51° 45' N., 164° 30' W. (Fig. 1).

ACKNOWLEDGMENTS

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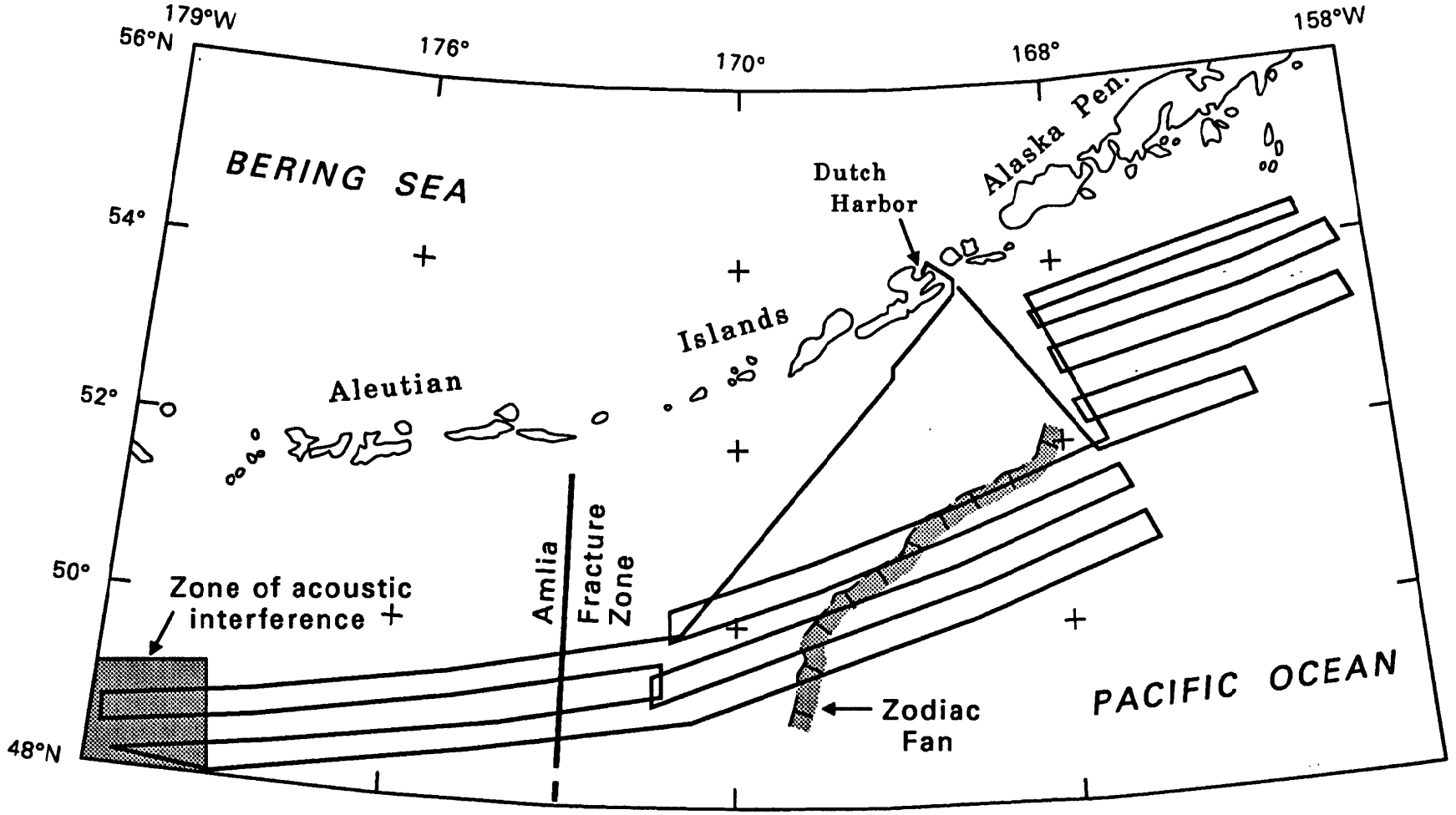

Figure 1. Tracklines for Cruise F8-88-AA.