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Multi-Channel Seismic Reflection Data over the Northern Juan de Fuca Ridge

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Introduction

Multi-channel seismic reflection data were collected over the Middle Valley segment of the northern Juan de Fuca Ridge (Fig. 1) as a site survey prior to drilling by the Ocean Drilling Program (Davis, Mottl, Fisher et al., 1992). Previous work has mapped the tectonic framework, heat flow and active sulphide-forming vents (e.g. Davis and Villinger, 1992; Davis et al., 1987). A total of 100 km of seismic data were collected along three closely spaced lines (Fig. 1) across the Middle Valley; one line extends across an adjacent rift valley called West Valley. In addition, 100 km of data were collected on the eastern flank of the Endeavour segment of the Juan de Fuca Ridge over crust 1 to 4 ma; this line joins line 85-03 which crosses the ridge axis (Yorath et al., 1988, Rohr et al., 1988). This open file describes the acquisition and processing parameters and includes the final stacks and migrated sections of the multi-channel seismic reflection data.

Acquisition

This survey was collected by Digicon Inc. under contract to the Geological Survey Canada onboard the MV Geo Tide in October, 1989. Navigation was by Loran and GPS. The airgun array consisted of four 21 m long strings of Bolt airuns; the array was 26 m wide. Guns ranged from 80 to 460 in^3 (1.31 to 7.53 *l*), totaled 7800 in^3 (128 *l*) in volume, and were towed at a mean depth of 8 m. The digital streamer consisted of 144 25 m groups for a total length of 3600 m; the first trace was 260 m from the center of the airgun array. Four compasses provided constraints on the streamer's shape while ten depth transducers and birds spaced every 300 m monitored the towing depth and kept the streamer at a depth of 11+/-2 m. The data were recorded for 14 s with a 4 ms sampling rate; an anti-alias filter of 3-80 Hz was applied to the data before digitization. The data were written on 6250 bpi 9-track tapes in SEG-Y format.

Processing

Processing parameters were tested on a 2.5 km section of Line 12 (SP 535 - 565). Parameters for spherical divergence corrections, f-k filters, deconvolution before and after stack, stacking velocity and migration velocities were tested. In addition, twenty 5 km long sections of the lines were stacked at constant velocities of 1500-2200 m/s at 100 m/s intervals, and 2400-3400 m/s at 200 m/s intervals.First breaks were muted. A gain of 6 db/s from the seafloor to 2.5 s below the seafloor was applied to correct for spherical divergence and a f-k filter of -4 to 10 ms per trace was also applied to the shotpoints. The mean values of the data over a 3 s window were equalized. Deconvolution made little difference to the data so it was not used. Stacking velocity functions based on semblance and the constant velocity stacks are listed above the section. An inside mute was applied to the first multiple to reduce its amplitude. After stacking, the data were filtered from 12 to 36 Hz between 0 to 1500 ms and 6-26 Hz between 2 to 14 s. A time-variant gain was used to display the data. For migration, velocities were scaled from 100% at the seafloor to 90% 3 s below the seafloor.

Interpretation

Work on these data are in progress. Future work will include tying lab measurements and logs from ODP sites to the reflection data as well as regional structural interpretations and an in-depth study of layer 2A on line 89-15. Preliminary interpretations can be found in Davis, Mottl, Fisher et al. (1992) Davis et al. (1992) and Rohr et al. (1990).

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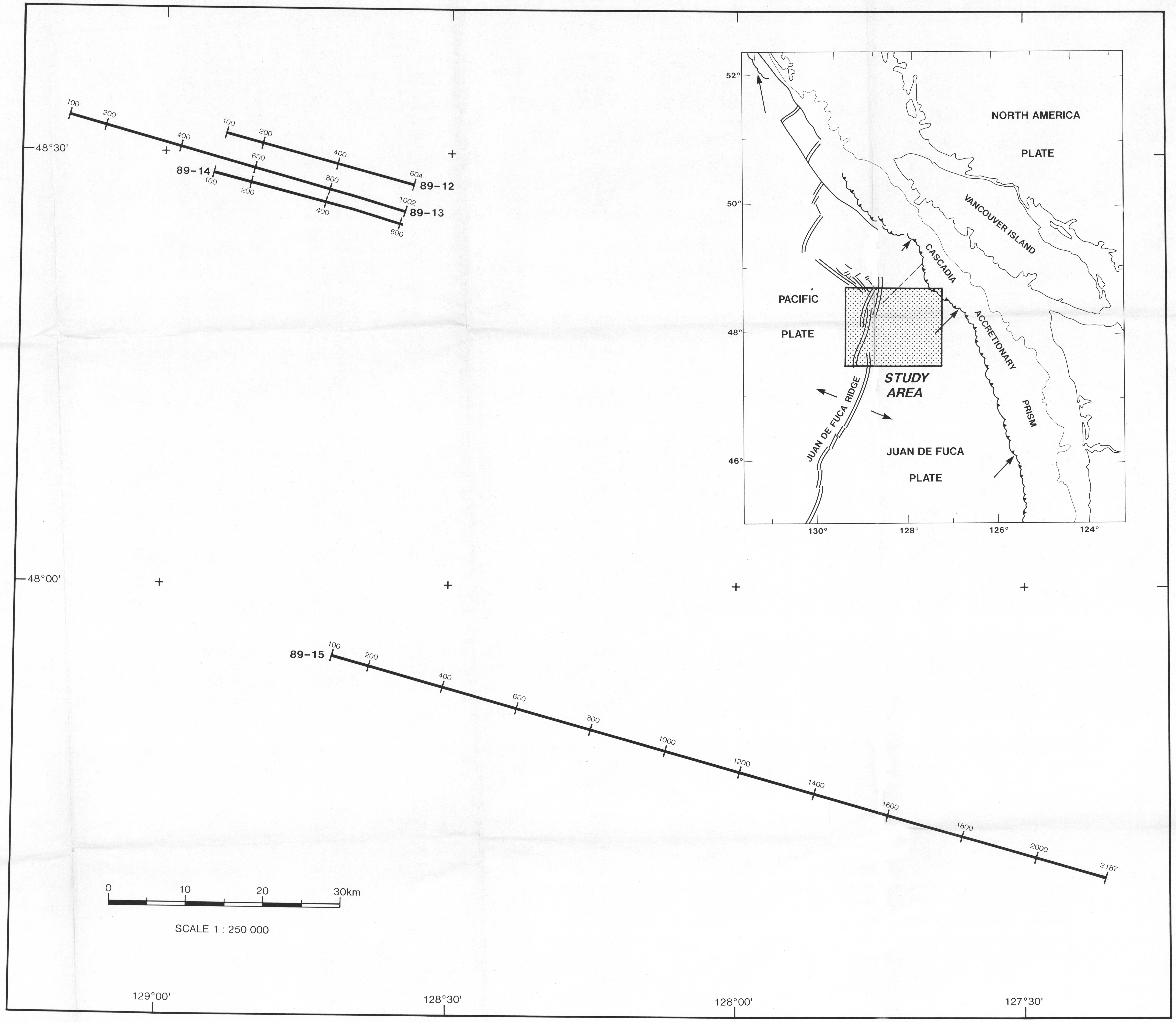

Navigation

SPHEROID:WGS-84,UTM,9,M

Line No.	Shotpoint	Lat.	Long.
89-12	100	48.52147N	128.89339W
89-12	200	48.50969N	128.82805W
89-12	300	48.49781N	128.76280W
89-12	400	48.48631N	128.69742W
89-12	500	48.47495N	128.63194W
89-12	600	48.46356N	128.56656W
89-12	604	48.46311N	128.56395W
89-13	100	48.54025N	129.16783W
89-13	200	48.52833N	129.10258W
89-13	300	48.51667N	129.03720W
89-13	400	48.50478N	128.97191W
89-13	500	48.49297N	128.90660W
89-13	600	48.48114N	128.84135W
89-13	700	48.46931N	128.77614W
89-13	800	48.45722N	128.71100W
89-13	900	48.44458N	128.64613W
89-13	1000	48.43186N	128.58133W
89-13	1002	48.43158N	128.58003W
89-14	100	48.47503N	128.91394W
89-14	200	48.46403N	128.84842W
89-14	300	48.45306N	128.78282W
89-14	400	48.44211N	128.71724W
89-14	500	48.43017N	128.65213W
89-14	600	48.41706N	128.58749W
89-14	604	48.41658N	128.58492W
89-15	100	47.91678N	128.70000W
89-15	200	47.90483N	128.63547W
89-15	300	47.89289N	128.57103W
89-15	400	47.88100N	128.50656W
89-15	500	47.86905N	128.44211W
89-15	600	47.85703N	128.37773W
89-15	700	47.84505N	128.31337W
89-15	800	47.83294N	128.24901W
89-15	900	47.82089N	128.18466W
89-15	1000	47.80864N	128.12045W
89-15	1100	47.79647N	128.05620W
89-15	1200	47.78428N	127.99191W
89-15	1300	47.77203N	127.92775W
89-15	1400	47.75972N	127.86358W
89-15	1500	47.74747N	127.79942W
89-15	1600	47.73525N	127.73528W
89-15	1700	47.72289N	127.67117W
89-15	1800	47.71028N	127.60722W
89-15	1900	47.69794N	127.54314W
89-15	2000	47.68533N	127.47923W
89-15	2100	47.67286N	127.41522W
89-15	2187	47.66189N	127.35966W

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