

R. Lyden

Lamont-Doherty Geological Observatory | Palisades, N.Y. 10964  
of Columbia University

Cable: LAMONT, Palisades, New York State

Telephone: Code 914, Elmwood 9-2000

Tlx 710-576-2053

CRUISE REPORT

Ship Name: R/V ROBERT D. CONRAD

Cruise No: 20-05

Departure: 25 Sept. 1976 from Yokohama  
Date Port

Arrival: 19 Oct. 1976 at Yokohama  
Date Port

Days at Sea: 2524

Days Foreign Port: 5

No. of days in arrival port

Area of Operation: West Pacific

Program Description:

Two ship reflection and refraction experiment to:

- 1) Continuously record depth to mantle.
- 2) Record sub-mantle reflections at designated points.

Participants: (All L-DGO unless otherwise specified)

C. Windisch	Chief Scientist
P. Stoffa	Co-Chief Scientist
J. Stennett	Multi-Channel Engineer
W. Robinson	Electronics Engineer
D. Hill	Electronics Technician
G. Walz	" "
B. Crowell	" "
C. Gutierrez	" "
D. Grob	" "
J. Sindt	Mech. Tech.
P. Casagrande	Gravity
R. Crimmins	Core Bosun
S. Murauchi	Observer (Japan)
K. Tamaki	" "
H. Tokuyama	" "

All inquiries regarding cruise should be made to the chief scientist.

V. Sedov

Observer (USSR)

A. Pokryshkin

" "

RC20-05

Conrad and Vema joined company in Yokohama late in the day of 19 Sept. 1976. The two ships took on personnel and equipment. Vema departed on the morning of the 24th to load explosives at the U. S. Naval base in Yokosuka. Conrad followed the day after, joining Vema late on the morning of the 25th off Yokosuka. A transfer of personnel was completed. The ships then weighed anchor and set out to sea to begin the step-by-step procedures that would lead up to expanding-spread profiling of the sub mantle. These exercises included streaming and testing airguns, and seismic arrays, calibrating the Raydist system, testing communications systems, and evaluating shot break detectors and data transmission links. Completing these tasks the ships set sail for a pre-arranged point, Point A, east of Tokyo where good mantle reflections had been observed on sonobuoy profiles made during multichannel seismic studies on the previous cruise leg (RC20-04).

An expanding spread profile near point A, though planned as an evaluation of the ESP technique, provided usable data. Possibly the most impressive part of this introduction to ESP was that refraction velocities could be measured along the MCS array almost instantaneously. Compressional and shear wave arrivals were readily observed, and changes in amplitudes of first arrivals could be easily noted allowing observers ample time to take note of when to increase shot size. Nevertheless, most ESP profiles are undershot due to a

general tendency to conserve explosives - not knowing whether more would be available during the latter part of the experiment.

A continuous flux of tropical storms forced us to abandon work near point A and move either north or south. A northerly direction was chosen in order to avoid a large low pressure front. We continued constant offset profiling

until a second front forced us to break off work, recover our streamer and prepare for heavy weather. The ships continued northward, however, to point E where the first major ESP profile, ESP #1, would take place - weather permitting.

At about  $39^{\circ}30'N$ ,  $147^{\circ}00'E$  the ships began their first major ESP profile. Finishing this they continued southeast to about  $33^{\circ}50'N$ ,  $153^{\circ}30'E$  to do a second ESP profile, and then moved west to about  $34^{\circ}25'N$   $146^{\circ}15'$  to complete ESP #3. Constant-offset profiling with #1 blocks was almost continuous between these points.

Upon completing ESP #3 VEMA broke off work with CONRAD to head into Yokosuka to put M. Talwani and others ashore. She also hoped to pick up more explosives but without luck. S. Murauchi transferred to VEMA to return to Japan while H. Tokuyama, A. Pokvyshkin, and V. Sedov boarded CONRAD to help with MCS work until VEMA returned.

CONRAD then set sail to the southwest completing two MCS crossings of the Bonin trench before rejoining VEMA on the gravity high along the crest of the seaward trench wall. The ships completed two more ESP profiles on the gravity high. The weather was excellent, correspondingly sea-noise levels

were very low. MCS monitor records in this area showed weak but distinct mantle reflections. After completing ESP's 4 and 5 a short constant-offset line was run on the gravity high until VEMA's explosives were exhausted. Both ships exchanged salutations upon completion of the experiment before going their separate ways - Vema to Hahodate and Conrad to Yokahama after completing a final oblique MCS crossing of the Bonin trench and western Bonin arc.

R/V Conrad arrived at Yokohama late on Oct. 19 - in time to make contact with the ship's agent and the various repair facilities engaged to tend to her problems over the succeeding five days. As far as I could determine everything was in reasonable order upon her departure on Oct. 25.

The RC25-05 - V33-11 mantle reflection exercise was by and large a technical success. It will be several months at least before the data can be reduced and analyzed to evaluate the overall scientific merit of the effort. There are tentative plans to gather constant offset and ESP profiles in the Caribbean and Western North Atlantic. At best the methods would be difficult if not impossible without thoroughly competent ship crews.

*A. Windisch*

