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CRUISE REPORT

Ship Name: R/ V VEMA Cruise No: 33-02

Departure: 21 December 1975 (Date) from Adelaide, Australia (Port)

Arrival: 17 January 1976 (Date) at Fremantle, Australia (Port)

Days at Sea: 27 Days Foreign Port: 3 (No. of days in arrival port)

Area of Operation:
Southeast Indian Ocean

Program Description: Marine geophysical investigation of Southeast Indian Ridge. OBS and sonobuoy refraction, heat flow, dredging and underway geophysical surveys along east-west traverses of the ridge crest and 20 m.y. old sea floor to the north and south of the ridge.

Participants: (All L-DGO unless otherwise specified)

Hayes, Dennis E.	Co-chief Scientist
Anderson, Roger N.	" "
Conrad, George	Camera
Engvik, Alan	Gravity & Computer Tech.
Holland, David	E. T.
Powell, John	Scientific O. S.
Quick, Dennis	E. T.
Rock, Anthony	Computer Tech.
Sundvik, Michael	Core Describer
Giddy, Howard	Core Bosun
Van Steveninck, William	Heat Flow
Jongsma, Derk	(B.M.R. Australia)

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

R/V VEMA 33-02

Cruise Summary

Seven dredge hauls, nine cores, six long-range and six short-range sonobuoys and a passive and active OBS experiment were completed during VEMA leg 33-02, December-January, 1975-76, from Adelaide to Fremantle. In addition, R/V VEMA completed her one-millionth mile during the leg--an occasion which was appropriately celebrated.

The dredging program was designed to sample the very youngest segments of the Southeast Indian Ridge to attempt to identify geochemical variations along strike of the spreading center. We recovered ferrobasalts in dredge 6 and what appear from hand-specimen examination aboard ship to be normal mid-ocean ridge tholeiitic basalts in dredges 7-11. These latter rocks were fine-grained basalts with abundant plagioclase plus or minus minor olivine phenocrysts.

The cores were taken primarily to sample heat flow along isocrons (20 m.y.b.p.) on either side of the ridge. Whenever possible, stations were located at intersections of our tracks and previous ELTANIN profiles in the area to give us 3-D control of the sedimentary environment of each station. The entire area appears to be a "cold spot." The region, in general, is characterized by negative free-air gravity anomalies, unusually deep depths and low heat flow. These surface observations may reflect asthenospheric downwelling.

In addition to the regional anomalies mentioned above, a boomerang-shaped depth anomaly exists from the Discordance zone to the north- and south-east. To test for possible crustal sources of this anomaly, we completed long and short-range sonobuoy seismic refraction experiments along the 20 m.y. isochron to the north and south of the ridge.

An OBS was deployed at the ridge crest in a tele-seismically inactive portion of the Southeast Indian Ridge in an attempt to record microseismic activity. The instrment was on the bottom a total of eleven days--the longest deployment yet for an OBS. Recovery was routine except for pinger failure. We shot a reversed seismic refraction profile to the OBS as we departed from deployment.

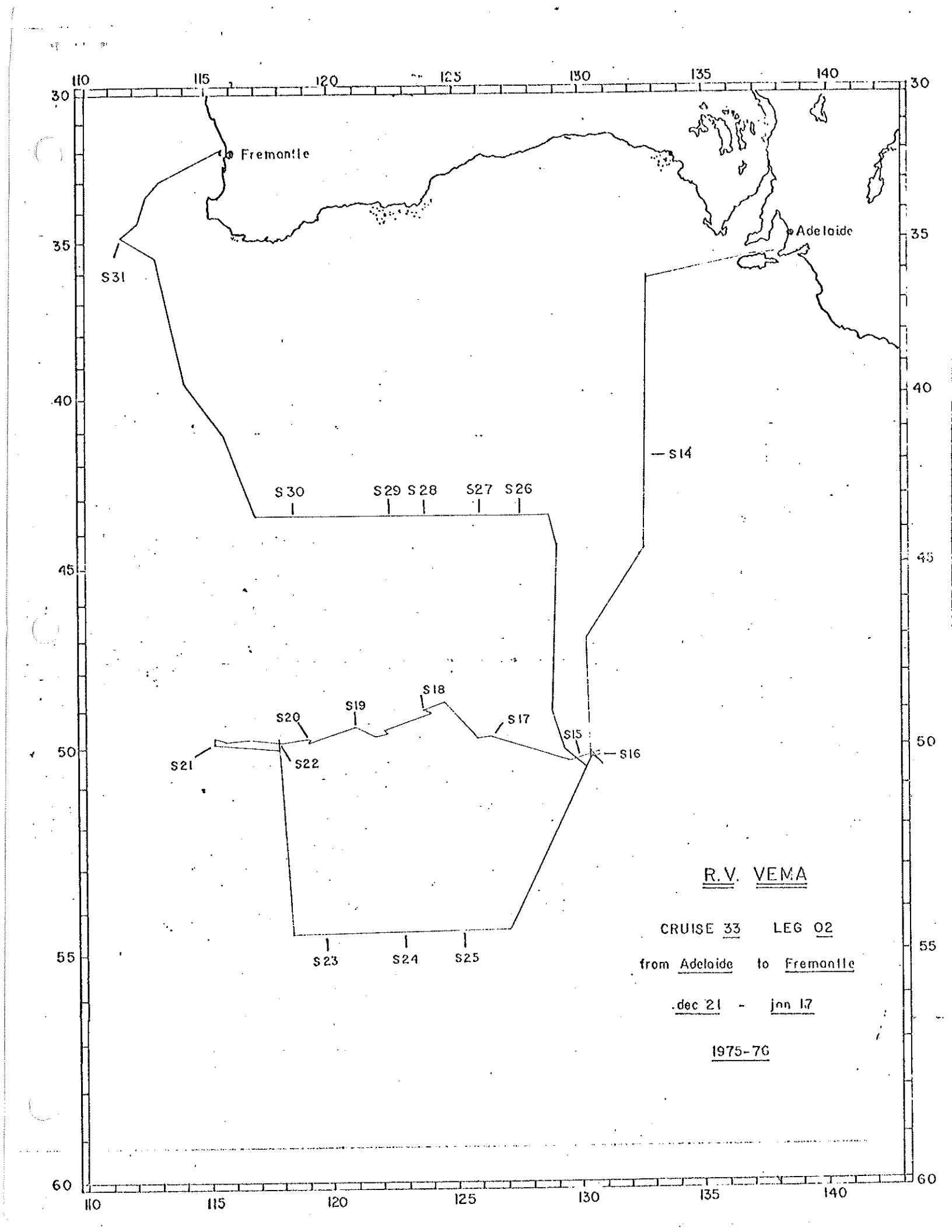
During our first multiple penetration heat-flow experiment using the L-DGO multigrad instrument and two 12 kHz pingers, the hydrowire parted, causing the loss of all of this equipment. In the opinion of one of the co-chief scientists (R. N. Anderson) such loss might be prevented in the future with the replacement of 1/4" hydrowire for the present 3/16" hydrowire. The strength of the former is approximately twice that of the latter. Similar experiences at Scripps caused the loss of three heat flow instruments in 1962-65. Their replacement of the 1/4" wire for the 3/16" wire has resulted in no hydrocast losses since that time.

The ship is in fine condition, the crew excellent, the scientific party efficient, and the cruise was a resounding success.

D. E. Hayes

R. N. Anderson

Co-Chief Scientists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R.V. VEMA
CRUISE 33 LEG 02
from Adelaide to Fremantle
dec 21 - jan 17
1975-76