

I. SITE SURVEY ON THE MADAGASCAR RIDGE

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Deep Sea Drilling Project proposed Site 27 (24-5) on the Madagascar Ridge (not drilled) was surveyed by R/V *Robert D. Conrad* of Lamont-Doherty Geological Observatory during February 9-11, 1971. This site was proposed (as a possible location for drilling) based upon the findings of an earlier cruise of R/V *Vema* (cruise 24, Oct. 1, 1967) (Figure 1). The survey area is located over the southern part of the Madagascar Ridge. The bathymetric charts of Heezen and Tharp (1965) and Fisher (in press) show the Madagascar Ridge as a near-linear feature extending south of Madagascar trending south southwest until it connects the Southwest Indian Ocean ridge (SWIR). The Madagascar Ridge plunges down toward the south, and in the area of the site survey it rises about 2500 meters above the adjacent Mozambique Basin. There is no published account of the magnetic anomaly identification in this region. However, to the northeast of this site, in the Madagascar Basin magnetic anomalies extending to anomaly 25 of the Heirtzler et al. (1968 magnetic time scale have been identified by McKenzie and Sclater (1971). Deep Sea Drilling Project drilled a site (245, Leg 25) south of anomaly 25 in the Madagascar Basin and obtained an age of at least 63 m.y. for the basement (Simpson, Schlich, et al., 1972). The regional free-air gravity field as presented by Talwani and Kahle (in press) parallels the regional topographic trends of the ridge. There are isolated free-air gravity highs over the ridge, and the area of survey has one such high with a value of 73 mgal.

Bathymetric soundings (in corrected meters) in the survey area are contoured at 200-meter intervals (Figure 2). Total bathymetric relief over the survey region is of the order of 1400 meters. Overall, a northeast-southwest to north northeast-south southwest trend is observed.

A sediment isopach map for the region is given in Figure 3. Sediment thickness is contoured in tenths of seconds of two-way travel time (0.1 sec two-way travel time is approximately equal to 100 m sediment thickness assuming a mean velocity of 2 km/sec). The sediment is distributed as pockets in basement depressions, with a range in thickness between 0 and 700 meters and presents a northeast-southwest trend.

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REFERENCES

- Fisher, R. L., in press. Bathymetric charts of the Indian Ocean. In Udintsev, G. (Ed.), *Geol. Geophys.*
- Heezen, B. C. and Tharp, M., 1965. Physiographic diagram of the Indian Ocean, the Red Sea, the South China Sea, the Sulu Sea and the Celebes Sea: New York (Geol. Soc. Am.)
- Heirtzler, J. R., Dickson, G. O., Herron, E. M., Pitman, W. C., and Le Pichon, X., 1968. Marine magnetic anomalies, geomagnetic field reversals, and motions of the ocean floor and continents: *J. Geophys. Res.*, v. 73, p. 2119-2136.
- McKenzie, D. and Sclater, J. G., 1971. The evolution of the Indian Ocean since the Late Cretaceous: *Roy. Astron. Soc. Geophys. J.*, v. 25, p. 437-528.
- Simpson, E., Schlich, R., Leclaire, L., Moore, C., Girdley, W. A., White, S. M., Vallier, T., Muller, C., Zobel, B., Sigal, J., Gieskes, J., and Marshall, B. V., 1972. Leg 25 DSDP, Western Indian Ocean: *Geotimes*, v. 17, p. 21-24.
- Talwani, M. and Kahle, H., in press. Free-air gravity maps in the Indian Ocean. In Udintsev, G. (Ed.), *IOE atlas geol. geophys.*

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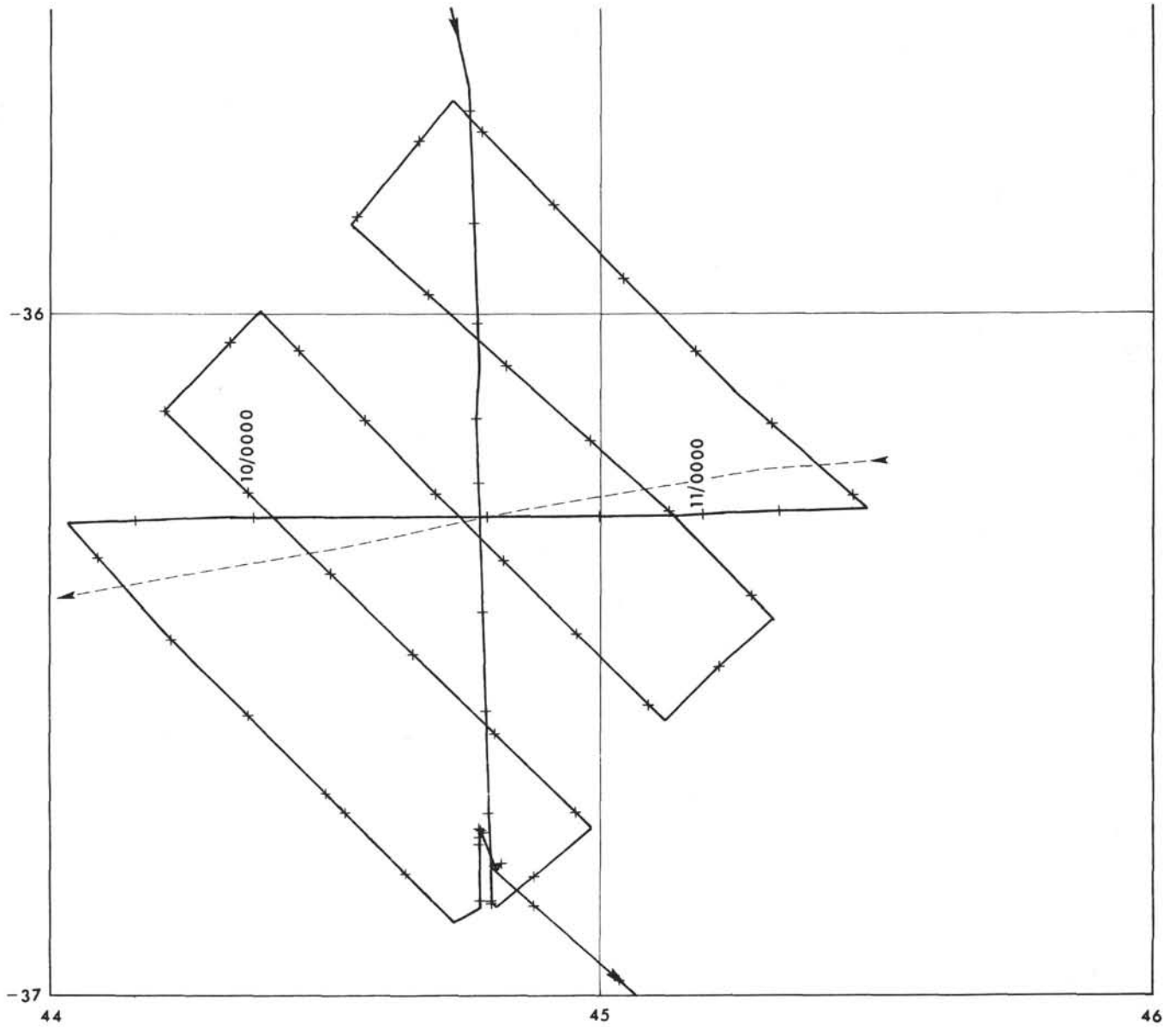


Figure 1. Area of survey with tracks of R/V Conrad cruise 14 (solid line) with plus marks every hour on the hour. 0000 hours each day is identified with the date. Also shown is the track of R/V Vema cruise 24 (dotted line).

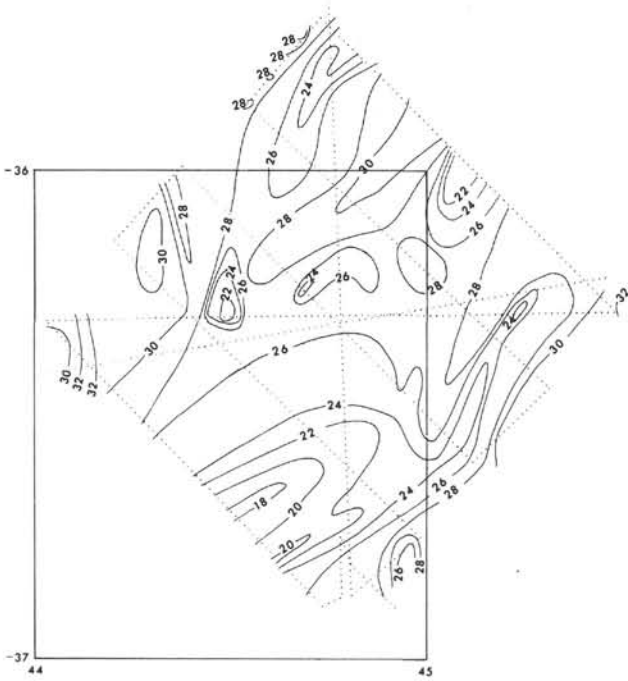


Figure 2. Bathymetric soundings in corrected meters. Contour interval 200 meters.



Figure 3. Sediment isopach map of the survey area. Contour interval tenth of a second (two-way travel time). Basement outcrops are shown by hachures.