

Bathymetry and Magnetic Structure of the Southern Lau Basin and Havre Trough

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The Lau Basin and Havre Trough are active back-arc basins associated with Pacific-Australian plate convergence. The graben, located at 24S, 177W is suggested to be the southern end of the spreading center of the Lau Basin. Spreading of the oceanic crust started 1.75 Ma at 22°S. The half spreading rate of the western flank is 18.5 mm/yr, and the rate of the eastern flank is 14.6 mm/yr. Directions of magnetic boundaries in the Havre Trough show a NNE-SSW trend in general. Bathymetry in the Havre Trough shows circular or elongated knolls and small ridges of several hundred meters in relative height. They are considered to be formed by rift volcanism intruded into the arc crust. The main structural trend is N40-N45, which is oblique to the general trend of the Havre Trough.

The Lau Basin and Havre Trough are active back-arc basins associated with Pacific-Australian plate convergence. The Lau Basin is a fast-spreading back-arc basin, whereas the Havre Trough is considered to be in a rifting stage. A morphological and geomagnetic study, focused on the less-studied southern Lau Basin and the Havre Trough, was carried out to clarify magnetic structure in order to understand the extensional tectonics of this region. The graben, located at 24S, 177W, is accompanied by strong, negative downward component geomagnetic anomalies, which indicate positive magnetization and strong magnetization. The results suggest the southern end of the spreading center of the Lau Basin, location of the southern extension of the Valu Fa Ridge of the Eastern Lau Spreading Center. Spreading of the oceanic crust started from 2n Chron (1.75 Ma) at 22°S. Spreading rates show asymmetry with respect to the axis. The half spreading rate of the western flank is 18.5 mm/yr, and the spreading rate of the eastern flank is 14.6 mm/yr. Directions of magnetic boundaries in the Havre Trough show a NNE-SSW trend in general, which is consistent with the general trend of the trough. Toward the east, the directions of magnetic boundaries tend to increase their angles in a clockwise direction. A N10-N20W trend is also apparent in some places. Bathymetry in the Havre Trough shows circular or elongated knolls and small ridges of several hundred meters in relative height. They are considered to be formed by rift volcanism intruded into the arc crust. The main structural trend is N40-N45, which is 25 to 45° oblique to the general trend of the Havre Trough. Trends in directions of magnetic boundaries are not consistent with the trend of elongation in the small volcanic ridges. The trend of the magnetic structure would reflect strikes of faults by rifting, and the trend of the bathymetry would reflect strikes of fractures.