ABSTRACT

Multibeam survey data from the R/V Atlantis 2014 cruise AT26-21 were used to examine the east-west trending Mendocino Fracture Zone along the Gorda Escarpment, west of the Gorda Spreading Ridge. This area lies on the Pacific Plate and includes several seamounts and geologic structures. Using CARIS HiPS and SIPS 9.0 software and GeoMapApp, features along the fracture zone were characterized to evaluate offsets from plate movement along with analysis of associated seamount geomorphology. The extent of movement along the fault line was determined by relating seafloor bedrock age and spreading rate to the presence of curved seafloor fabric. The northern abyssal hills have warped, with a curvature along the fracture zone towards the east, indicating that this portion of the Pacific Plate north of the fracture is migrating westward at a faster rate than the area south of the fracture. The result is a sequence of curved seafloor fabric along the fracture. The seamount chain to the south of and parallel to the fracture zone is approximately 124 km long with the largest seamount to the west. Lava lobes and terraces are significantly more abundant on the seamount’s south flanks suggesting asymmetry in eruptive sequences. Information gathered from the study area is beneficial to understanding fracture zones of the Mendocino Triple Junction and may contribute to studies of tectonic and seismic activity for the nearby Northern California coast.

RESULTS

- The study area is characterized by a series of north-south trending abyssal hills on the northern side of the east-west fracture zone. These ridge-like features are formed by the westward plate movement from the Gorda Ridge segment, 450 km to the east.
- The curved seafloor fabric associated with the abyssal hills is associated with a higher relative rate of plate motion (Fig. 1).
- The westward rate of spreading during formation of the ridge-like abyssal hills north of the MF2 has varied with age, from 50.8 km/Myr between 44 and 20 Ma, to 31.0 km/Myr since 20 Ma (Fig. 4).
- The southern side of the fracture has a rate of only 42.5 km/Myr between 44 and 20 Ma, and is no longer spreading.
- An east-west seamount chain parallel and adjacent to the southern side of the MF2 indicates significant volcanism along the fracture (Fig. 2).
- Seamounts are present along the southern boundary of the fracture at this location.
- Seamount height decreases eastward along the chain (Fig. 5).
- A moderate, positive correlation exists between seamount height and slope, indicated by $R^2=0.588$

REFERENCES