A characterization of the megafauna at Davidson Seamount

Introduction

The hard substrate, complex habitat, and modified hydrographic conditions found at many seamounts favor faunal assemblages that differ from those found on the flat, sediment-covered seafloor more typical of the deep-seas (4, 10). Additional factors contributing to the increased levels of abundance and diversity observed at some seamounts include elevated current velocities, entrainment of migrating populations, enhanced productivity due to the formation of Taylor columns (4, 6, 9, 15). Due to these physical characteristics, biological communities found on seamounts are often very abundant, show high levels of diversity, and contain many endemic organisms (9). These unique communities are composed of corals, sponges, a variety of other invertebrates, as well as commercially important Crinoid

Davidson Seamount

Quicks Look

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<thead>
<tr>
<th>Distance from shore (km)</th>
<th>120</th>
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<tr>
<td>Depth at earliest (m)</td>
<td>1536</td>
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<tr>
<td>Depth at foot (m)</td>
<td>4000</td>
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<td>Organisms/m transected</td>
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Methods

Geological features and biological communities were observed using the Monterey Bay Aquarium Research Institute (MBARI) ROV Tiburon (Fig. 1). Sixteen dives representing 110 hours of video from Davidson Seamount off the coast of California, USA (Fig. 2), were annotated using MBARI Video Annotation and Reference System (VARS, Fig. 3) to determine seamount community composition. Several hundred individual organisms were collected and subsequently were taxonomically identified. Using VARS, we identified benthic and demersal megafauna to the lowest possible taxonomic level. Each video observation was merged with ancillary data (geographic position, CTD, and camera information) within VARS. In 2006 we recorded 53 haphazardly selected video transects which were used to help describe the community. Video observations were imported into ArcGIS and mapped with high-resolution bathymetric data. A three-meter-water depth contour was used to define the Davidson Seamount was analyzed using ArcGIS's Spatial Analysis extension to calculate aspect and slope. NOAA's ArcGIS extension, the Benthic Terrain Modeler (BTM), was used to calculate Bathymetric Position Index (BPI).

Results

Qualitative observations reveal that nearly 70% of the megafauna identified at Davidson Seamount are sessile (85% when functionally sessile organisms are included), 35 are suspension feeders, and 35% are filter feeders. Dominant phyla include the cnidaria (many of which are corals), echinoderms, and porifera (Fig. 4). Similar patterns were found using quantitative transect data.

We identified 60,374 benthic organisms and demersal fishes in this analysis, which represented 190 species. We observed 406-100% at each site (range of 37-131.7 m per meter transected). Transects varied in depth (-120 m -3,300 m) and length (35 m - 445 m).

Twenty-five coral species were identified. Paragorgia arbores is the largest of the habitat-forming corals and it has a narrow defined depth range. Dense stands of P. arborea were found on the peaks of shallow corals, whereas occupying deeper cliff faces. Other large habitat-forming corals, like the solitary corals, sp., appear to have a more broad depth distribution and were found in both foot and on slopes. Interestingly, the average depth range of all live corals is below the average depth of P. arborea. Corals in the family perploids are numerous, although there were several species in this group and they were difficult to distinguish in video and are being reviewed now. Two new species of corals in the genus Gorgypsis are collected and are currently being described. These two corals have similar depth distributions, though the filiforme is more abundant in slightly deeper water. The precious coral, Cordylis sp., was also abundant below the P. arborea stands. Fig. 5B

Fig. 6B (Center) Depth dist. of echinoderms. Fig. 6C (Right) Percent abun. of fish families.

Fig. 7C  BPI analysis indicated that higher densities of organisms were found on the following slopes: Northeast, East, West and South-facing slopes. No organisms were found in the Southeast slopes.

Conclusions

- The biological communities at Davidson Seamount are composed mainly of sessile suspension and filter feeders.
- A community of large corals and several species of sponge compose a “peak” community, which is found between 1530 and 1500 meters. The occurrence of this community is most likely due to the combination of factors including reproductive strategies, substrate type, and elevated current velocities (6, 7, 9).
- Organisms found below the “peak” seem to have broader depths of occurrence, patchy distribution, and increased diversity.
- Fish abundance is low when compared to the other organisms observed, but these results are consistent with other reports for this region (1).
- Data from this research is being used to draft a management plan for incorporating Davidson Seamount into the Monterey Bay National Marine Sanctuary.
- VARS is a powerful tool for recording video observations and can be used to characterize unique habitats.

Acknowledgments

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References

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Fig. 7A  Acanthogorgia and Porifera were sampled in 2006 and has a depth

Fig. 7B  Slope analysis indicated that higher densities of organisms were found on the following slopes: Northeast, East, West and South-facing slopes. No organisms were found in the Southeast slopes.

Fig. 7C  BPI analysis indicated that higher densities of organisms were found on the following slopes: Northeast, East, West and South-facing slopes. No organisms were found in the Southeast slopes.

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