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TITLE: The Unknown and the Unexplored: Insights Into the Pacific Deep-Sea Following NOAA CAPSTONE Expeditions

AUTHOR: ['Brian R.C. Kennedy', 'Kasey Cantwell', 'Mashkoor Malik', 'Christopher Kelley', 'Jeremy Potter', 'Kelley Elliott', 'Elizabeth Lobecker', 'Lindsay McKenna Gray', 'Derek Sowers', 'Michael P. White', 'Scott C. France', 'Steven Auscavitch', 'Christopher L. Mah', 'Virginia N. Moriwake', 'Sarah R. D. Bingo', 'Meagan Putts', 'Randi Rotjan']

ABSTRACT:

Over a three-year period, the National Oceanic and Atmospheric Administration organized and implemented a Pacific-wide field campaign entitled CAPSTONE: Campaign to Address Pacific monument Science, Technology, and Ocean NEeds. Under the auspices of CAPSTONE, NOAA mapped 597,230 km 2 of the Pacific seafloor (with ~ 61% of mapped area located within US waters), including 323 seamounts, conducted 187 ROV dives totaling 189 hours of ROV benthic imaging time, and documented more than 347,000 individual organisms. This comprehensive effort yielded dramatic insight into differences in biodiversity across depths, regions, and features, at multiple taxonomic scales. For all deep sea taxonomic groups large enough to be visualized with the ROV, we found that fewer than 20% of the species were able to be identified. The most abundant and highest diversity taxa across the dataset were from one class and two phyla (Anthozoa, Porifera and Echinodermata). We further examined these phyla for taxonomic assemblage patterns by depth, geographic region, and geologic feature. Within each taxon, there were multiple genera with specific distribution and abundance by depth, region, and feature. Additionally, we observed multiple genera with broad abundance and distribution, which may focus future ecological research efforts. Novel taxa, records, and behaviors were observed, which are suggestive of new species interactions, drivers of community composition, and overall diversity patterns. To date, only 13.8% of the Pacific has been mapped using modern methods. Despite the many new contributions and insights to the Pacific deep-sea, CAPSTONE is far from the culminating experience the name suggests. Rather, it marks the beginning of a new era for exploration that will offer extensive opportunities via mapping, technology, analysis, and insights.

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