UNEXPLORED SEAMOUNTS OF THE SALAS Y GÓMEZ RIDGE

#FKt240224| #SalasyGomezRidge

Image credit: ROV SuBastian / Schmidt Ocean Institute

24 February - 4 April 2024

Salas y Gómez Ridge

Chief Scientist: Dr. Erin Easton,

University of Texas Rio Grande Valley, U.S.

40 science days | **78,000** square kilometers mapped | **24** CTD & rosette casts | **26** ROV dives | **25** terabytes of data collected | **853** ROV samples collected

EXPEDITION OBJECTIVES INCLUDE:

- Identifying biogeographic and depth boundaries among seamount communities in the deep sea.
- Evaluating potential drivers of where animals are living and how they are surviving.
- Characterizing the physical environment and seafloor communities within the Easter Island Ecoregion to place in a broader context of other ocean regions.
- Gathering data to inform outreach to increase awareness of the biodiversity and importance of this critical region in our global Ocean.

The Salas y Gómez Ridge extends off the coast of Chile to Rapa Nui, also known as Easter Island, in the Central Pacific. Created by volcanism, these underwater mountains provide essential habitats for deep-sea organisms. Many of the species living here exist nowhere else on Earth.

The ridge exists on a gradient that spans from high nutrients with lower oxygen in east to lower nutrients with higher oxygen to the west. This makes it possible for light and photosynthetically active radiation, or PAR, to penetrate much deeper; because of these unique conditions, animals and organisms dependent on photosynthesis can survive deeper than elsewhere. This region also has the southeasternmost extent of shallow coral reefs in the Pacific and has numerous seamounts that are shallow enough to penetrate these mesophotic light zones, where PAR is available. Thus, these seamounts can support light-dependent communities at deeper depths than elsewhere in the world, and they may be hotspots of biodiversity in a relative desert of nutrient availability.

Using ROV *SuBastian*, the international science team explored several seamounts, many for the first time. The data and imagery collected on this expedition fill an expansive knowledge gap in understanding what factors, such as currents, nutrient availability, and seafloor bathymetry, influence which animals can live here and how the animals disperse larvae to reproduce while maintaining genetic diversity.

Image credit: ROV SuBastian / Schmidt Ocean Institute

Overall, the team made extensive observations of the oceanographic and biogeochemical environment, including identifying over 50 species suspected to be new to science, multiple range extensions of known species, and mapping seafloor and volcanic landforms. Communities of habitat-forming fauna were observed, such as a garden of glass sponges and large colonies of stony coral. Additionally, to improve navigation, the team integrated a hyperspectral stereo camera system with a navigation package onto ROV SuBastian to collect visual information paired with attitude, velocity, and depth.

The science team hopes the remarkable biodiversity observed and data collected will provide the scientific basis to inform marine conservation and management decisions for existing marine protected areas, their expansion, and the establishment of a potential marine protected area on the high seas. Important visual observations of relatively pristine communities — including the southeasternmost extent of shallow coral reefs in the Pacific and photosynthesis-dependent fauna at deeper depths than previously recorded — highlight the need to protect these ecosystems.

RESULTING HIGHLIGHTS INCLUDE:

- Increasing records of known species in the region, extending geographical and depth ranges, and potentially discovering an unexpectedly high number of species, at least 50, suspected to be new to science.
- Mapping six seamounts for the first time; the Rapa Nui community intends to recommend at least three of these mountains for official naming.
- Sighting the deepest-known photosynthesis-dependent animal in the world: a *Leptoseris*, commonly known as a wrinkle coral. The team also set depth records for crustose coralline algae and macroalgae observations.
- Discovering differences in ecosystems within and among seamounts, ranging from near barren to pristine coral ecosystems.

Permit Numbers: SHOA: Nota No. 597 / SUBPESCA: E-2023-612