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DEPARTMENT OF COMMERCE
RESEARCH PERFORMANCE PROGRESS REPORT (RPPR)

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AWARD INFORMATION	
1. Federal Agency: Department of Commerce / NOAA	2. Federal Award Number: NA20OAR4320278
3. Project Title: Cooperative Institute for Marine, Earth and Atmospheric Systems (CIMEAS)	
4. Award Period of Performance Start Date: 07/01/2020	5. Award Period of Performance End Date: 06/30/2025
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	
6. Last Name and Suffix: ,	7. First and Middle Name: ,
8. Title:	
9. Email:	10. Phone Number:
AUTHORIZING OFFICIAL	
11. Last Name and Suffix: Park , III	12. First and Middle Name: William , Thomas
13. Title: Principal Contract and Grant Officer	
14. Email: wparkiii@ucsd.edu	15. Phone Number: 858-822-1350
REPORTING INFORMATION	
Signature of Submitting Official: William Thomas Park	
16. Submission Date and Time Stamp: 04/12/2023	17. Reporting Period End Date: 03/31/2023
18. Reporting Frequency: (●) Annual ( ) Semi-Annual ( ) Quarterly	19. Report Type: (●) Not Final ( ) Final
RECIPIENT ORGANIZATION	
20. Recipient Name: UNIVERSITY OF CALIFORNIA SAN DIEGO	
21. Recipient Address: 8622 DISCOVERY WAY RM 116, LA JOLLA, CA 92093-1500 USA	
22. Recipient UEI: QJ8HMDK7MRM3	23. Recipient EIN: 956006144

ACCOMPLISHMENTS

24. What were the major goals and objectives of this project?

The goal of the Cooperative Institute for Marine, Earth, and Atmospheric Systems (CIMEAS) is to facilitate and enhance research cooperation between NOAA entities and partner institutions including the University of California (UC), California State Universities (CSU), and the Farallon Institute (FI). CIMEAS strives to improve resilience by providing decision makers usable information through integrating cutting-edge physical, ecological, and social science. Only a subset of accomplishments can be reported due to space considerations, so some contributions will not be covered here but can be found in the individual reports.

Many projects support graduate student training in NOAA-related fields, including marine resource assessment and quantitative population dynamics. This happens through ongoing education opportunities, graduate student mentoring, and formal course offerings.

SEE ATTACHED

25. What was accomplished under these goals?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

ACCOMPLISHMENTS *(cont'd)*

26. What opportunities for training and professional development has the project provided?

SEE ATTACHED

27. How were the results disseminated to communities of interest?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

ACCOMPLISHMENTS *(cont'd)*

28. What do you plan to do during the next reporting period to accomplish the goals and objectives?

SEE ATTACHED

PRODUCTS

29. Publications, conference papers, and presentations

See attached for Publications, Conference Papers and Presentations

PRODUCTS *(cont'd)*

30. Technologies or techniques

Coastal Mapping System
Lidar, SFM, GPS, IMU

Soundscape and Cetacean Acoustic Studies in the Central and Western Pacific/ Passive Acoustic Studies in the Central Pacific
Data repository: Ziegenhorn, Morgan (2022), Echolocation clicks and anthropogenic detections with neural network labels in Hawaiian Island HARP data from Kona, Kaua`i, and Pearl and Hermes Reef, Dryad, Dataset, https://doi.org/10.5061/dryad.8pk0p2npb

California Underwater Glider Network
We continue to push forward on underwater glider technology.

California Cooperative Oceanic Fisheries Investigations: Ocean Observations to Inform Ecosystem-Based Management
During the reporting period, 9 various technologies were created related to CalCOFI. These include: a beta participatory citizen science application currently only available in TestPilot and 2 apps created by data science students (a CalCOFI and OAH primer CA citizen outreach on hypoxias, and an interactive data explorer for CalCOFI data), Ecological Metadata Language templates for CalCOFI data, integrated database, a CalCOFI API, and beta version of a data visualization tool, and a hypoxia data primer. All can be found at https://calcofi.org/data-products/ and calcofi.io.

Climate change and essential fish habitats of Gulf of Alaska and East Bering Sea
Python programming using Jupyter Notebook to analyze datasets

Gulf of Mexico Rice's Whale Passive Acoustic Monitoring
New SD HARP technology built and deployed for low power consumption

An Interactive Machine Learning Toolkit for Classifying Species Identity of Cetacean Echolocation Signals in Passive Acoustic
Human in the loop process combining unsupervised and deep learning for impulsive signals

HF Radar National Network Data Management Development
High Frequency radar surface current mapping

Black Abalone Monitoring and Mitigation
Use of drones for abalone habitat assessment

CORC: "Integrated Boundary Current Observations in the Global Climate System"

31. Inventions, patent applications, and/or licenses

HF Radar National Network Data Management Development
Federal Communications Commission (FCC) Universal Licensing System (ULS) to operate in the International Telecommunications Union (ITU) HF radar allocated frequency bands

Attach a separate document if more space is needed for #6-10, or #24-50.

PRODUCTS *(cont'd)*

32. Other products

SEE ATTACHED

PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

33. What individuals have worked on this project?

SEE ATTACHED

PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS *(cont'd)*

34. Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

None

35. What other organizations have been involved as partners?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS *(cont'd)*

36. Have other collaborators or contacts been involved?

SEE ATTACHED

IMPACT

37. What was the impact on the development of the principal discipline(s) of the project?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

IMPACT *(cont'd)*

38. What was the impact on other disciplines?

SEE ATTACHED

39. What was the impact on the development of human resources?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

IMPACT *(cont'd)*

40. What was the impact on teaching and educational experiences?

SEE ATTACHED

41. What was the impact on physical, institutional, and information resources that form infrastructure?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

IMPACT *(cont'd)*

42. What was the impact on technology transfer?

Soundscape and Cetacean Acoustic Studies in the Central and Western Pacific/ Passive Acoustic Studies in the Central Pacific
PIFSC improved their instrument pool over the funding period.

SIO High Resolution XBT Transects
The use of innovative systems including SEAS formats for data transfer, iridium data streams and sftp protocols, as well as continuing development of best practices have improved the success rate of the XBT probe deployment.

The Argo Program, Global Observations for Understanding and Prediction of Climate Variability
SIO-Argo works with MRV Systems to provide commercial versions of the Argo floats developed at Scripps.

California Cooperative Oceanic Fisheries Investigations: Ocean Observations to Inform Ecosystem-Based Management
In the past year CalCOFI's observations continued to support model validation for applications in remote sensing products, fisheries and ecosystem modeling, and physical ocean models. Each of these model products represent technologies that improve our understanding of current and future ocean state. In addition, CalCOFI's methods and protocols are used by other international oceanographic institutions and sampling cruises. Finally, CalCOFI promotes open science so supports development and sharing of data, code, models, and methods associated with long term observations.

An Interactive Machine Learning Toolkit for Classifying Species Identity of Cetacean Echolocation Signals in Passive Acoustic Technology was made publicly available.

REFOCUS
None yet, although we hope to make our integration of pH and nitrate sensors available for license.

43. What was the impact on society beyond science and technology?

SEE ATTACHED

Attach a separate document if more space is needed for #6-10, or #24-50.

IMPACT *(cont'd)*

44. What percentage of the award's budget was spent in foreign country(ies)?

0 , SIO High Resolution XBT Transects
Approximately 5% primarily on accommodation for ship riders when their XBT cruise ends in a foreign port.

NOAA Support for the CCHDO Hydrographic Data Office at UCSD/SIO
<3% (~$10,000) for foreign conference travel

The Argo Program, Global Observations for Understanding and Prediction of Climate Variability
1%

Trophic roles and energetic requirements of Alaskan Ice Seals
30%

Species Distribution modeling for deep-sea corals and sponges in the Southern California Bight
25%

The Global Drifter Program
~4%

CORC: "Integrated Boundary Current Observations in the Global Climate System"
20%

Meridional Overturning Variability Experiment (MOVE)
10%

CHANGES/PROBLEMS

45. Changes in approach and reasons for change

Operation of R/V Roger Revelle: Escanaba Trough hydrothermal sulfide system- exploring the seafloor and oceanic footprints
Ship time was originally intended to be aboard RV Roger Revelle (operated by Scripps), but due to COVID-19 delays needed to be rescheduled aboard RV Thomas G Thompson (operated by University of Washington). A subaward to UW was approved by NOAA to transfer funds to UW to support the project.

The Argo Program, Global Observations for Understanding and Prediction of Climate Variability
PI Roemmich formally retired from UCSD in October 2019. Roemmich remains the lead PI of Argo through Co- PIs Purkey, Zilberman and Gilson.

Monitoring Body Condition of Seals in Alaska Using Small UAS
Some rescheduling required due COVID-19 requirements

Trophic roles and energetic requirements of Alaskan Ice Seals
Initial focus on one target species (spotted seals, Phoca largha) given the source data available.

Gulf of Mexico Rice's Whale Passive Acoustic Monitoring
Challenges occurred securing a vessel, leading to deployment delays.

An Interactive Machine Learning Toolkit for Classifying Species Identity of Cetacean Echolocation Signals in Passive Acoustic
One application of this method involved towed passive acoustic array data, but it was determined that the poor quality of the available data collected using towed arrays prevented use of this method. This project was also delayed by the COVID-19 pandemic, which slowed data sharing efforts.

HF Radar National Network Data Management Development
HFRNet prioritized waves data acquisition to advance an additional parameter supported by the network.

HSU Observational and Experimental Fisheries Oceanography off the North Coast of California
No substantive changes, save that we continue to ramp up from staffing transitions coming out of the pandemic, graduation of graduate students, and return of key staff from family leave.

CHANGES/PROBLEMS *(cont'd)*

46. Actual or anticipated problems or delays and actions or plans to resolve them

SEE ATTACHED

47. Changes that had a significant impact on expenditures

Operation of R/V Roger Revelle: Escanaba Trough hydrothermal sulfide system- exploring the seafloor and oceanic footprints
Due to the COVID-19 delay in scheduling the project to go to sea, the ship use rates were different than the Dr Gartman originally proposed resulting in slightly less sea time than she proposed.

California Cooperative Oceanic Fisheries Investigations: Ocean Observations to Inform Ecosystem-Based Management
The costs associated with UNOLS ship operations have increased by 50%.

Acoustic Monitoring RESTORE
Inflation, battery shortages, supply chain issues, chip shortages and salary increases all impacted expenditures.

HSU Observational and Experimental Fisheries Oceanography off the North Coast of California
Unanticipated needs for repair/replacement/upgrades to experimental systems involved unanticipated expenses on supply lines. In part this has been offset by reduced costs elsewhere in the budget, including temporary reductions in personnel costs during transitional periods.

The Global Drifter Program
COVID19 protocols, Inflation

CHANGES/PROBLEMS *(cont'd)*

48. Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

NONE

49. Change of primary performance site location from that originally proposed

Operation of R/V Roger Revelle: Escanaba Trough hydrothermal sulfide system- exploring the seafloor and oceanic footprints
Ship time was originally intended to be aboard RV Roger Revelle (operated by Scripps), but due to COVID-19 delays needed to be rescheduled aboard RV Thomas G Thompson (operated by University of Washington). A subaward to UW was approved by NOAA to transfer funds to UW to support the project.

Attach a separate document if more space is needed for #6-10, or #24-50.

PROJECT OUTCOMES

50. What were the outcomes of the award?

SEE ATTACHED

DEMOGRAPHIC INFORMATION FOR SIGNIFICANT CONTRIBUTORS (VOLUNTARY)

Gender:

- ◯ Male
- ◯ Female
- ◯ Do not wish to provide

Ethnicity:

- ◯ Hispanic or Latina/o Not
- ◯ Hispanic or Latina/o Do not
- ◯ wish to provide

Race:

- ◯ American Indian or Alaska Native Asian
- ◯ Black or African American
- ◯ Native Hawaiian or other Pacific Islander
- ◯ White
- ◯ Do not wish to provide

Disability Status:

- ◯ Yes
  - [ ] Deaf or serious difficulty hearing
  - [ ] Blind or serious difficulty seeing even when wearing glasses
  - [ ] Serious difficulty walking or climbing stairs
  - [ ] Other serious disability related to a physical, mental, or emotional condition
- ◯ No
- ◯ Do not wish to provide

Attach a separate document if more space is needed for #6-10, or #24-50.