

A. COVER PAGE

Project Title: Launching WebCOOS: Webcams for Coastal Observations and Operational Support	
Grant Number: NA20NOS0120220-T1-01	Project/Grant Period: 09/01/2020 - 08/31/2024
Reporting Period: 09/01/2023 - 02/29/2024	Requested Budget Period: 09/01/2020 - 08/31/2024
Report Term Frequency: Semi-Annual	Date Submitted:
Program Director/Principal Investigator Information: DEBRA HERNANDEZ , MS	Recipient Organization: SECOORA 1368 PHERIGO ST MOUNT PLEASANT, SC 294644825
Phone Number: 8438646755 Email: mlee@secoora.org	DUNS: 829041339 UEI: EEL2LR5E2R85 EIN: 26-1215705
	RECIPIENT ID:
Change of Contact PD/PI: NA	
Administrative Official: MEGAN LEE 1368 Pherigo Street Mount Pleasant, SC 29464	Signing Official: MEGAN LEE 1368 Pherigo Street Mount Pleasant, SC 29464
Phone number: 8438646755 Email: mlee@secoora.org	Phone number: 8438646755 Email: mlee@secoora.org
Human Subjects: No	Vertebrate Animals: No
hESC: No	Inventions/Patents: No

B. ACCOMPLISHMENTS

B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?

The goal of this project is to develop a sustained operational webcam coastal observing network for quantitative scientific analysis, public safety, and resource management for coastal municipalities. To accomplish this, standardized data processing and management methodology will be established to provide stakeholders actionable information from webcam video.

The objectives of the project will progress the network and its products to near RL 9 by establishing standards for webcam sensor installation and operations, data management, AI/ML applications to image and video processing, and delivery of training and products to end-users for decision making. The results will have immediate benefits to both partners (e.g. NOAA, USGS, USACE) and end-users (e.g. environmental resource managers, public safety officials, tourism officials, and public health officials), as there will be critical coastal observations where presently very limited or no observations exist. Other benefits include supporting the validation and improvement of the NOAA rip current forecast model; joint USGS-NOAA forecasts of total water level and coastal change; and the development of tools to assess beach usage, beach and surf zone conditions, and water quality for swimmer safety and shellfish harvesting.

Our primary goals and objectives for this project are to:

Goal 1) Engage demonstrated webcam operators and other end-users; Objective 1.1) Identify and engage Tier 1 and 2 users
Objective 1.2) Develop, assess and disseminate stakeholder appropriate outreach and education materials

Objective 1.3) Identify testers within the network and conduct survey to assess ease-of-use, utility of various analyses and informational products, and willingness to pay for webcam imagery or downstream product access or customization.

Goal 2) Operationalize the WebCAT system to a national webcam data management network;

Objective 2.1) Select camera providers and maintain webcams

Objective 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products

Objective 2.3) Standardize webcam imagery and metadata documentation and delivery

Objective 2.4) Develop end-to-end data management workflow integration

Objective 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms

Goal 3) Automate and validate downstream processing of webcam data; Objective 3.1) Further develop detection algorithms

Objective 3.2) Develop operational prototype products Objective 3.3) Validation of prototype

Objective 3.4) Operationalization of approach and resultant output

Goal 4) Package image products into geographically and thematically transferable decision-support tools.

Objective 4.1) Develop, validate and operationalize a 'situational monitoring and reporting' tool

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

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B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

For this reporting period, is there one or more Revision/Supplement associated with this award for which reporting is required?

No

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

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B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

- SmartCS undergoing 2nd round of review at Citizen Science Journal. RipScout under review at Nature Scientific Reports, and RipFinder under review at EVS/CVPR.
- SECOORA: several news & social media stories published, including social media posts on marine mammals visible at Pt Reyes and maintenance at Jennette's Pier, which drew interest from local TV news station. Published news story on effects of nor'easter in December 2023, featuring imagery from WebCOOS cameras.
- USC: Based on interviews by MPH student Samantha Hulett with Rosemont Community residents, a kiosk is expected to be featured at the Whaley Community Center in Charleston, SC.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Objective 1.1) Identify and engage Tier 1 and 2 users

- SECOORA: continue to meet with USACE on a monthly basis with co-PI Long. Meeting with USGS scheduled in March. Continued collaboration with NOAA partners, as well as local partners/operators.

Objective 2.1) Engage with identified cameras of opportunity

- SECOORA: meeting with USGS in March on Madeira camera of opportunity. Continue collaborating with Tiffany Troxler of FIU on COO in Ramrod Key FL; and other potential partners including Katherine Anarde of NCSU, Matthew Widlansky of UH-Manoa, Philip Orton of Stevens Institute of Technology, Angelos Hannides of Coastal Carolina University, Chris Dembinsky of Volusia County FL on potential future COOs.

Objective 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products

- Maintain WebCOOS portal and make requested updates and changes
- Expand time series data products pages for additional cameras and products

Objective 2.3) Standardize webcam imagery and metadata documentation and delivery

- Maintain WebCOOS system documentation on the WebCOOS website, making updates as needed

Objective 2.4) Develop end-to-end data management workflow integration

- Maintain data management workflow.
- Maintain data products developed by science PIs and continue to iterate for improved visualization and use.

Obj 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms

- SECOORA: continue checks on public-facing camera streams. Continue to work with local partners/operators and project team to troubleshoot cameras.

Objective 3.1) Further develop detection algorithms

- Labeling additional footage from fall 23/winter 24 for rips and retraining detection model.

Objective 3.2) Develop operational prototype products

- Work to integrate shoreline detection algorithms operationally.

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Goal 1) Engage demonstrated webcam operators and other end-users

Obj. 1.1) Identify & engage Tier 1 & 2 users: 80% Complete

- Ground work began for a meeting on global rip detection working group to familiarize/share work by researchers from Australia, New Zealand, Japan, France and the U.S.
- SECOORA: Monthly meetings with co-PI Long and collaborators at USACE. Working with Greg Dusek & other users from NOAA regarding end use from Charleston Harbor camera. Communication with USGS partners on potential camera of opportunity, and future collaboration- meeting scheduled in March 2024.
- Met with Aspen Cook (Mote Marine Lab) and Chris Dembinsky (Volusia County) and others, including from NOAA, on beach safety. Collaborations developing among this group.
- Met with SC DHEC staff on beach safety & situational awareness in Grand Strand (Myrtle Beach SC) area.
- Continue to engage with the USACE about overlap with their CorpsCams network and interest in using some WebCOOS cameras for their analysis.

Obj 1.2) Develop, assess and disseminate stakeholder appropriate outreach and education materials: 80% Complete

- SECOORA: ongoing discussion with team on appropriate communications around rip currents, especially when one is not detected- avoiding communicating that it is safe to swim.
- USC: MPH student Samantha Hulett interviewing Rosemont Community residents as to how they want to access the data and images and how to view it.

Objective 1.3) Identify testers within the network and conduct survey to assess ease-of-use, utility of various analyses and informational products, and willingness to pay for webcam imagery or downstream product access or customization: 40% Complete

- Aspen Cook (Mote Marine Lab) and Chris Dembinsky (Volusia County) have a set of volunteers to help with beta testing in Florida. Daris Jasper may also be able to find some volunteers in Santa Cruz. David Darlington from the UK also expressed interest.
- UNCW: Met with Wilmington NWS to discuss analysis products from the Masonboro Inlet camera.
- SECOORA: budget analyses have revealed more precise estimates for hardware, data storage, and personnel costs of operating an individual camera over time. This information is relevant to “willingness to pay.”

Goal 2) Operationalize the WebCAT system to a national webcam data management network

Obj 2.1) Select camera providers and maintain webcams: 98% Complete

- SECOORA: set up & ingested camera at Duke Marine Lab/NOAA NWLON station in Beaufort, NC, with NOAA, Duke, and Axiom. Communicated with Tiffany Troxler of FIU on potential COO at Ramrod Key, FL; with Katherine Anarde of NCSU, Matthew Widlansky of UH-Manoa, and Philip Orton of Stevens Inst. of Tech. on camera standards and potential COOs; with Angelos Hannides of Coastal Carolina U on existing cameras in SC; and with Meg Palmsten of USGS on COO at Madeira Beach.
- SECOORA: continued troubleshooting & operations work with Axiom, project team, and camera operators on cameras that experience outages or need maintenance. Notable in this category include: Oak Island East, Cocoa Beach and Masonboro Inlet with PI Long; Rosemont Peace #1 &

Folly 6th Ave with PI Porter; Beaufort NC & Jeanette's Pier with Dusek; though checks & maintenance were performed on other cameras as well. Partners in Hawaii & a local contractor re-mounted camera for safety and fixed PTZ schedule to better incorporate our field of view of interest. Programmed PTZ schedule with PI Long & Dusek at Charleston camera to enhance coverage of field of view; working with NOAA partners to optimize use of the data.

- USC: Ongoing technical discussions with Volusia Beaches staff (Florida, Chris Dembinsky) regarding their [camera streams on youtube](#) and possible beach activity (person, vehicle counts) and riptide detection. Setup a [test website using 3 of their camera feeds](#) providing counts and annotated image links for person and vehicle counts.
- USC: Rosemont Community - Troubleshooting operational issues with Austin Avenue bridge camera. Restored Peace street camera feed.

Obj 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products: 98% Complete

- Links to sealcam at Point Reyes and Walton Lighthouse are also in webcoos.org. Rip detection running at Currituck County, NC. Next up are Holland Beach, MI and Walton Lighthouse, CA.
- Maintained WebCOOS portal and access to all webcams
- Development of webcam product visualizations for seal detection and rip currents

Obj 2.3) Standardize webcam imagery and metadata documentation and delivery: 100% Complete

- Maintained a continuous iteration of schema-based webcam metadata profile; Display of standard image products: Live video, 10 minute clips, and stills available on individual webcam pages.

Obj 2.4) Develop end-to-end data management workflow integration: 90% Complete

- Provided software engineering and cyberinfrastructure support for the data management and analysis system.
- Data management workflow is completely documented and available via the [WebCOOS website](#). Each webcam can be a bit unique so each ingestion involves hands-on support from Axiom staff and will lead to updates in the documentation as more is learned about these webcam systems.
- Continue testing and operationalizing of the ingestion process for additional data products including code, time series data, and georectified imagery.

Obj. 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms: 60% Complete

- SECOORA: checks on public-facing camera streams. Ongoing work with project team and local partners/operators to troubleshoot cameras when they have problems.

Goal 3) Automate and validate downstream processing of webcam data;

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- Seal detector now running at Point Reyes camera.

Obj 3.2) Develop operational prototype products: 80% Complete

- UNCW: Working with Axiom to integrate brightest pixel and time-averaged image products.

Obj 3.3) Validation of prototype: 50% Complete

- Nothing to report.

Obj. 3.4) Operationalization of approach and resultant output: 30% Complete

- Currituck rip detection is on. A few sightings so far.
- Working to apply detection algorithms to initial cameras for each product application.

Goal 4) Package image products into geographically and thematically transferable decision-support tools.

Obj 4.1) Develop, validate and operationalize a 'situational monitoring and reporting' tool: 80% Complete

Collaboration among project team on connecting model outputs, camera outputs, and reporting system. Use of Prometheus metrics for sharing and initial graphing of detections. Example generalized YOLO object detection provided on github for addition to site products and usage

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

- Akila de Silva has graduated and is now an assistant professor at San Francisco State University.
- Fahim Hasan Khan is expected to defend his dissertation this Spring/Summer and has been interviewing for faculty positions as well.
- Funding for two computer science students to work on operationalizing the shoreline codes and to work with the NWS on an inlet hazard detection system.

C. PRODUCTS

C.1 PUBLICATIONS

Are there publications or manuscripts accepted for publication in a journal or other publication (e.g., book, one-time publication, monograph) during the reporting period resulting directly from this award?

No

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Category	Explanation
Other	www.webcoos.org

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Have inventions, patent applications and/or licenses resulted from the award during the reporting period? No

If yes, has this information been previously provided to the PHS or to the official responsible for patent matters at the grantee organization? No

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	<ul style="list-style-type: none"> • Greg Dusek developed an animation displaying a timeseries graph of water levels at a NOAA NWLON station with synced imagery from the Charleston Harbor camera during the December 17, 2023 storm.

D. PARTICIPANTS

D.1 WHAT INDIVIDUALS HAVE WORKED ON THE PROJECT?

Commons ID	S/K	Name	Degree(s)	Role	Cal	Aca	Sum	Foreign Org	Country	SS
SECOORAPI	Y	Hernandez, Debra	MS	PD/PI	2.0	0.0	0.0			NA

<p>Glossary of acronyms: S/K - Senior/Key Cal - Person Months (Calendar) Aca - Person Months (Academic) Sum - Person Months (Summer)</p>	<p>Foreign Org - Foreign Organization Affiliation SS - Supplement Support RS - Reentry Supplement DS - Diversity Supplement OT - Other NA - Not Applicable</p>
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D.2 PERSONNEL UPDATES

D.2.a Level of Effort

Will there be, in the next budget period, either (1) a reduction of 25% or more in the level of effort from what was approved by the agency for the PD/PI(s) or other senior/key personnel designated in the Notice of Award, or (2) a reduction in the level of effort below the minimum amount of effort required by the Notice of Award?

No

D.2.b New Senior/Key Personnel

Are there, or will there be, new senior/key personnel?

Yes

File Uploaded: Box 34.pdf

D.2.c Changes in Other Support

Has there been a change in the active other support of senior/key personnel since the last reporting period?

No

D.2.d New Other Significant Contributors

Are there, or will there be, new other significant contributors?

No

D.2.e Multi-PI (MPI) Leadership Plan

Will there be a change in the MPI Leadership Plan for the next budget period?

NA

Box 34. Has there been a change in the active other support of the Project Director/Project Investigator(s) or senior/key personnel since the reporting period?

- Axiom: Rob Bochenek is now the Co-PI since Kyle Wilcox resigned from Axiom. Karina Khazmutdinova filled in for Lauren Showalter while Showalter was on leave. Josh Rhoades is the Technical Lead.
- SECOORA: Theo Jass joined SECOORA as the WebCOOS Project Manager on September 20, 2023.

E. IMPACT**E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?**

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

NOTHING TO REPORT

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

Not Applicable

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

NOTHING TO REPORT

F. CHANGES**F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE**

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subject**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. SPECIAL REPORTING REQUIREMENTS SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND NOTICE OF FUNDING OPPORTUNITIES REPORTING REQUIREMENTS

File(s) uploaded:

CLEAN DRAFT - submit as attachment - WebCOOS PR Sept 2023 to Feb 2024.pdf

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS

G.4.a Does the project involve human subjects?

No

G.4.b Inclusion Enrollment Data

NOTHING TO REPORT

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Are there personnel on this project who are newly involved in the design or conduct of human subjects research?

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Does this project involve vertebrate animals?

No

G.8 PROJECT/PERFORMANCE SITES

Organization Name	UEI	Congressional District	Address
Primary: SECOORA	EEL2LR5E2R85	SC-01	1368 PHERIGO ST MOUNT PLEASANT, SC 294644471

G.9 FOREIGN COMPONENT

No foreign component

G.10 ESTIMATED UNOBLIGATED BALANCE

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

No

G.11 PROGRAM INCOME

Is program income anticipated during the next budget period? No

G.12 F&A COSTS

Is there a change in performance sites that will affect F&A costs?

No

Department of Commerce

Research Performance Progress Report – Grants Online Electronic Template

Award Information: Complete Boxes 1 – 23 with the requested information

Box 1. Federal Agency – Department of Commerce/NOAA

Box 2. Federal Award Number – Assigned Award Number for the project

Box 3. Project Title

Launching WebCOOS: Webcams for Coastal Observations and Operational Support

Box 4. Award Period of Performance Start Date

September 1, 2023

Box 5. Award Period of Performance End Date

February 29, 2024

Box 6. Principal Investigator’s Last Name

Hernandez

Box 7. Principal Investigator’s (PI) First and Middle Name

Debra

Box 8. PI Job Title

SECOORA Executive Director

Box 9. PI’s Email

debra@secoora.org

Box 10. PI’s Phone Number

843.906.8686

Box 11. Authorizing Official’s (AO) Last Name

Box 12. AO First and Middle Name

Box 13. AO Job Title

Box 14. AO Email

Box 15. Signature of Recipient Authorized Representative – Non Applicable

Box 16. Submission Date and Time Stamp

Box 17. Reporting Period End Date

Box 18. Reporting Frequency – Semi-annual

Box 19. Report Type – Not Final or Final

Not final

Box 20. Recipient Name

SECOORA

Box 21. Recipient Address

Post Office Box 13856, Charleston, SC 29422

Box 22. Recipient DUNS

Box 23. Recipient EIN

Accomplishments: Boxes 24 – 27 are required for the first initial progress report. Subsequent reports will be prepopulated with the information from the previous report and have a limit of 4,000 characters. Comment Box 28 is required but will not be pre-populated in subsequent reports.

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

Box 25. What was accomplished under these goals?

Goal 1) Engage demonstrated webcam operators and other end-users

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- Ground work began for a meeting on global rip detection working group to familiarize/share work by researchers from Australia, New Zealand, Japan, France and the U.S.
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- Funding for two computer science students to work on operationalizing the shoreline codes and to work with the NWS on an inlet hazard detection system.

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

- SmartCS undergoing 2nd round of review at Citizen Science Journal. RipScout under review at Nature Scientific Reports, and RipFinder under review at EVS/CVPR.
- SECOORA: several news & social media stories published, including social media posts on marine mammals visible at Pt Reyes and maintenance at Jennette's Pier, which drew interest from local TV news station. Published [news story](#) on effects of nor'easter in December 2023, featuring imagery from WebCOOS cameras.
- USC: Based on interviews by MPH student Samantha Hulett with Rosemont Community residents, a kiosk is expected to be featured at the Whaley Community Center in Charleston, SC.

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

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Products: Comments are required in Boxes 29 – 32 are required the first initial progress report. Subsequent reports will be prepopulated with the information from the previous report and have a limit of 4,000 characters. If the comment is blank, the "Nothing to Report" checkbox must be checked.

Box 29. Publications, conferences papers and presentations

- WebCOOS data used in: Y. Wang, Y. Shen, B. Salahshour, M. Cetin, K. Iftekharuddin, N. Tahvildari, G. Huang, D.K. Harris, K. Ampofo, J.L. Goodall. Urban flood extent segmentation and evaluation from real-world surveillance camera images using deep convolutional neural network. Environmental Modelling & Software. Volume 173, 2024, 105939, ISSN 1364-8152. <https://doi.org/10.1016/j.envsoft.2023.105939>

- Greg Dusek, Debra Lee Hernandez, Joseph Long, Dwayne E Porter, Alex Pang, Jeremy Cothran, Louisa Schandera, Lauren Showalter, Josh Rhoades, Chris Sager, Margaret L Palmsten, Akila de Silva, Fahim Khan, 2024. Expanding partnerships, products and use-cases for an operational coastal web camera observation network. AGU Ocean Sciences Meeting, Feb 22, 2024, New Orleans, LA.
- Janelle Armstrong-Brown, Dwayne Porter, Joe Hoover, Sheldwin Yazzie. Panel: Building and Sustaining Local Capacities. Climate Change and Environmental Justice: Engaging Diverse Teams. February 20-22, 2024. Partnerships for Public Environmental Health 2024 Network Meeting. National Institute of Environmental Health Sciences, Research Triangle Park, NC.
- Sandifer, P.A., B. Brooks, G. Canonico, E. Chassinot, B. Kilpatrick, D.E. Porter, L. Schwacke and G.I. Scott. 2023. Chapter 19: Observing and monitoring the ocean. Contributed chapter to *Oceans and Human Health*. Elsevier. pp 549-596.
- de Silva, A. December 2023. Deep Learning for Flow Feature Detection: A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy in Computer Science and Engineering. University of California Santa Cruz. Committee: Alex Pang, James Davis, Greg Dusek.
<https://www.proquest.com/openview/ba3f3bf86eb20121736c822409fa1798/1?pq-origsite=gscholar&cbl=18750&diss=y>

Box 30. Technologies or technique

- Nothing to report

Box 31. Inventions, patent applications, and/or licenses

- Nothing to report

Box 32. Other products

- Greg Dusek developed an animation displaying a timeseries graph of water levels at a NOAA NWLON station with synced imagery from the Charleston Harbor camera during the December 17, 2023 storm.

Participants & Other Collaborating Organizations – Note that all comments boxes are required and the first report will always be blank. For comments boxes 33, 35 & 36 subsequent reports will be pre-populated with the information from the previous report. Comments boxes have a limit of 4,000 characters. For comments boxes 34 – 36, if the comment box is blank, the “Nothing to Report” checkbox must be checked.

Box 33. What individuals have worked on this project?

PI: Debra Hernandez, SECOORA Executive Director
SECOORA: Theo Jass, WebCOOS Project Manager
Lead Science PI: Dwayne Porter, Univ. SC
USC Graduate Student: Louisa Schandera

Senior Software Developer: Jeremy Cothran

Co-PI: Joseph Long, Univ. NC Wilmington

UNC Undergraduate Student: Kelsea Edwing, Summer Banning, and Drew Davey

UNCW Graduate Student: Jeremy Braun

Co-PI: Alex Pang, Univ. California Santa Cruz

UCSC Graduate Students: Akila de Silva, Fahim Khan, Omkar Ghanekar, and Nicholas Tee

UCSC Undergraduate Student: Mona Zhao, Elmer Vasquez, Kevin Young, Chinmay Gowdru

Co-PI: Rob Bochenek, Axiom Data Science

Past co-PI: Kyle Wilcox, Axiom Data Science

Axiom Project Manager: Lauren Showalter, Karina Khazmutdinova

Axiom Technical Lead: Josh Rhoades

Box 34. Has there been a change in the active other support of the Project Director/Project Investigator(s) or senior/key personnel since the reporting period?

- Axiom: Rob Bochenek is now the Co-PI since Kyle Wilcox resigned from Axiom. Karina Khazmutdinova filled in for Lauren Showalter while Showalter was on leave. Josh Rhoades is the Technical Lead.
- SECOORA: Theo Jass joined SECOORA as the WebCOOS Project Manager on September 20, 2023.

Box 35. What other organizations have been involved as partners?

- David Gutierrez has joined UCSC IMS.

Box 36. Have other collaborators or contracts been involved?

- Collaborators and potential collaborators include: Chris Dembinsky (Volusia County FL); Aspen Cook (Mote Marine Lab); Katherine Anarde (NCSU); Matthew Widlansky (UH-Manoa); Philp Orton (Stevens Institute of Technology); Angelos Hannides (Coastal Carolina University); Jacob Soter (Swim Smart Tech); Ashleigh Palinkas (Sea Grant); Brittany Bruder, Ian Conery, Tanner Jernigan (USACE); Meg Palmsten (USGS); Jonathan Lamb, Chris Sager (NOAA)

Impact – Note that all comments boxes are required and the first report will always be blank. For comments boxes 37 - 43 subsequent reports will be pre-populated with the information from the previous report. Comments boxes have a limit of 4,000 characters. For comments boxes 37 - 43, if the comment box is blank, the “Nothing to Report” checkbox must be checked. For comment box 44, only the percent is required (even if it is a zero), the explanation is not required.

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

Box 38. What was the impact on other disciplines?

- Nothing to report

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

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

- Fahim Hasan Khan was the Teaching Assistant for the Augmented Reality/Virtual Reality class at UC Santa Cruz in Winter'24. An interesting project that used object detection technology is a navigation aid for visually impaired people (mapping proximity of objects/people to sound cues).

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

- Nothing to report

Box 42. What was the impact on technology transfer?

- Nothing to report

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

- Potential to improve beach safety by alerting beachgoers of rip currents.
- USC: Rosemont Community members were monitoring the storm precipitation flooding that took place [December 17, 2023](#) and [December 25, 2023](#). Cameras documented flooding events and the timelines associated with flooding and drainage issues. Storm drains were cleared in response to monitoring of long-standing water to aid drainage.

Box 44. What percentage of the award is budget was spent on foreign countries?

Enter Percent: 0%

Changes/Problems – Note that all comment boxes are required fields and have a limit of 4,000 characters. If the comment box is blank, the “Nothing to Report” checkbox must be checked.

Box 45. Changes in approach and reason for change

- Changed data storage method from Amazon AWS S3 Standard to Amazon AWS S3 - Intelligent Tiering to save budget and maintain accessibility as data storage needs increase.

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

- Nothing to report

Box 47. Changes that had a significant impact on expenditures

- Nothing to report

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

Not Applicable.

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

- Nothing to report

RESEARCH & RELATED BUDGET - SECTION A & B, BUDGET PERIOD 1

UEI*: EEL2LR5E2R85

Budget Type*: Project Subaward/Consortium

Enter name of Organization: SECOORA

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

A. Senior/Key Person												
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Debra		Hernandez		PI	0.00	2.6			27,654.00	7,190.00	34,844.00
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons: File Name:												
											Total Senior/Key Person	34,844.00

B. Other Personnel							
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
						Total Salary, Wages and Fringe Benefits (A+B)	34,844.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E, BUDGET PERIOD 1

UEI*: EEL2LR5E2R85

Budget Type*: Project Subaward/Consortium

Enter name of Organization: SECOORA

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

C. Equipment Description		Funds Requested (\$)*
List items and dollar amount for each item exceeding \$5,000		
Equipment Item		
Total funds requested for all equipment listed in the attached file		
	Total Equipment	0.00
Additional Equipment: File Name:		

D. Travel		Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)		0.00
2. Foreign Travel Costs		0.00
	Total Travel Cost	0.00

E. Participant/Trainee Support Costs		Funds Requested (\$)*
1. Tuition/Fees/Health Insurance		0.00
2. Stipends		0.00
3. Travel		0.00
4. Subsistence		0.00
5. Other:		
0 Number of Participants/Trainees	Total Participant Trainee Support Costs	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K, BUDGET PERIOD 1

UEI*: EEL2LR5E2R85

Budget Type*: Project Subaward/Consortium

Enter name of Organization: SECOORA

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	0.00
2. Publication Costs	0.00
3. Consultant Services	0.00
4. ADP/Computer Services	0.00
5. Subawards/Consortium/Contractual Costs	0.00
6. Equipment or Facility Rental/User Fees	0.00
7. Alterations and Renovations	0.00
8. Subs	119,058.00
9.	0.00
10.	0.00
11.	0.00
12.	0.00
13.	0.00
14.	0.00
15.	0.00
16.	0.00
17.	0.00
Total Other Direct Costs	119,058.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	153,902.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
Total Indirect Costs			
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	153,902.00

J. Fee	Funds Requested (\$)*
	0.00

K. Total Costs and Fee	Funds Requested (\$)*
	153,902.00

L. Budget Justification*
File Name: SECOORA COMBINED SF424A and MASTER BUDGET JUSTIFICATION

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RESEARCH & RELATED Budget {F-K} (Funds Requested)

BUDGET INFORMATION - Non-Construction Programs

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. SECOORA only	11.012	\$	\$	\$ 1,149,096.00	\$	\$ 1,149,096.00
2.						0.00
3.						0.00
4.						0.00
5. Totals		\$ 0.00	\$ 0.00	\$ 1,149,096.00	\$ 0.00	\$ 1,149,096.00

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY						Total (5)
	(1)	Year 1	(2)	Year 2	(3)	Year 3	
a. Personnel	\$	10,225.00	\$	10,532.00	\$	10,848.00	\$ 31,605.00
b. Fringe Benefits		2,659.00		2,738.00		2,820.00	8,217.00
c. Travel		8,333.33		8,333.33		11,666.66	28,333.32
d. Equipment							0.00
e. Supplies							0.00
f. Contractual		46,666.67		46,666.67		48,333.34	141,666.68
g. Construction							0.00
h. Other		300,800.00		309,369.00		309,238.00	919,407.00
i. Total Direct Charges (sum of 6a-6h)		368,684.00		377,639.00		382,906.00	1,129,229.00
j. Indirect Charges		13,959.00		3,023.00		2,885.00	19,867.00
k. TOTALS (sum of 6i and 6j)	\$	382,643.00	\$	380,662.00	\$	385,791.00	\$ 1,149,096.00

7. Program Income	\$		\$		\$		\$ 0.00
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SECTION C - NON-FEDERAL RESOURCES					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS	
8. SECOORA - only	\$	\$	\$	\$ 0.00	
9.				0.00	
10.				0.00	
11.				0.00	
12. TOTAL (sum of lines 8-11)	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	
SECTION D - FORECASTED CASH NEEDS					
13. Federal	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
	\$ 382,643.00	\$ 95,660.75	\$ 95,660.75	\$ 95,660.75	\$ 95,660.75
14. Non-Federal	0.00				
15. TOTAL (sum of lines 13 and 14)	\$ 382,643.00	\$ 95,660.75	\$ 95,660.75	\$ 95,660.75	\$ 95,660.75
SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT					
(a) Grant Program	FUTURE FUNDING PERIODS (Years)				
	(b) First	(c) Second	(d) Third	(e) Fourth	
16. SECOORA - only	\$ 380,662.00	\$ 385,791.00	\$	\$	
17.					
18.					
19.					
20. TOTAL (sum of lines 16-19)	\$ 380,662.00	\$ 385,791.00	\$ 0.00	\$ 0.00	
SECTION F - OTHER BUDGET INFORMATION					
21. Direct Charges:		22. Indirect Charges: 8.57% MTDC, 1st \$25K of some subawards.			
23. Remarks:					

SECOORA Budget Justification

The total request for this award is **\$1,149,096**

Year 1 = \$382,643 Year 2 = \$380,662, Year 3 = \$385,791

Salary: Total Year 1 salary funds requested equals \$10,225 for the PI D. Hernandez (1 month, \$10,225). Total Year 2 salary funds requested equals \$10,532 for the PI D. Hernandez (1 month). Total Year 3 salary funds requested equals \$10,848 for the PI D. Hernandez (1 month).

Fringe: Fringe is calculated at 26% of salary (Year 1 \$2,659, Year 2 \$2,738, Year 3 \$2,820).

Salary plus fringe for Year 1-3 equals **\$39,822**.

Travel: Total for Years 1-3 is \$28,333.32 (Year 1 \$8,333.33, Year 2 \$8,333.33, Year 3 \$11,666.66). Travel support up to \$3,333.33 is requested for PI Hernandez and co-PI Wilcox and non-federal end users to attend Project Team meetings in Years 1 through 3; for PI Hernandez to attend an ocean science meeting including associated registration costs annually; and to support travel between project team members and end users at coordination and training meetings separate from the annual Project Team meetings. Funding of \$5,000 annually is requested to support hotel venue, audio visual, food and beverage costs associated with annual team meetings. An additional \$3,333.33 is requested in Year 3 for PI Hernandez and co-PI Wilcox to attend an additional science meeting such as AGU to present project findings. Allowable charges will adhere to federal per diem guidelines as appropriate.

Other Costs:

Publication Costs (\$7,000) (Year 2 \$2K, Year 3 \$5K) are requested in order to publish work from this project in scientific journals.

Subawards:

UNCW– Dr. Long Total Costs: \$188,054

Year 1 Total Costs: \$64,939

Salary and Fringe: Principal Investigator – 1 month; \$7222/month

Salary is requested for PI-Long to lead the development of algorithms to identify the extent of wave runup and occurrence of coastal dune erosion. He will also be responsible to mentoring a graduate student and working with the project team to ensure that the wave runup and dune erosion techniques are integrated into the final situational awareness platform. **Graduate Student** - 12 months; \$1500/month. A full-time graduate student stipend for one masters student (\$18,000) including academic year and summer effort, who will be enrolled at UNCW, will be co-advised by PI-Long. The student will be responsible for image processing and assisting in algorithm development.

Fringe Benefits: Fringe benefits for PI Long are calculated at 28.35% and fringe benefits for undergraduate and graduate student salary are 8.65%. Fringe total is \$3,604.

Total Salary: \$28,826

Equipment: Equipment costs of \$6,000 are requested for the purchase of one desktop computer capable of processing high-resolution videos and extracting coastal features. Cost includes the purchase of monitors and other peripherals (keyboard, mouse, etc).

Expendable Supplies: \$250 is requested hard drives (8TB) for data storage and backup.

Other Costs: Tuition Costs; Out-of-state graduate student tuition (\$15,615) based on the 2019-2020 rate is included. The rate is based on a maximum of 8 credits per semester.

Indirect Costs: F & A is charged at UNCW's federally negotiated indirect cost rate, 49% of Modified Total Direct Costs (excluding tuition). Total IDC: \$14,247

Year 2 Total Costs: \$66,290

Salary and Fringe: Principal Investigator – 1 month; \$7366/month (includes 2% increase) Salary is requested for PI-Long to lead the development of algorithms to identify the extent of wave runup and occurrence of coastal dune erosion. He will also be responsible to mentoring a graduate student and working with the project team to ensure that the wave runup and dune erosion techniques are integrated into the final situational awareness platform. **Graduate Student** - 12 months; \$1500/month. A full-time graduate student stipend for one masters student (\$18,000) including academic year and summer effort, who will be enrolled at UNCW, will be co-advised by PI-Long. The student will be responsible for image processing and assisting in algorithm development.

Fringe Benefits: Fringe benefits for PI Long are calculated at 28.35% and fringe benefits for undergraduate and graduate student salary are 8.65%. Fringe total is \$3,645.

Total Salary: \$29,012

Expendable Supplies: \$250 is requested hard drives (8TB) for data storage and backup.

Travel (Domestic): Funds are requested for PI Long and graduate student to attend the AMS meeting (5 days total) in Houston, TX in Year 2 to present results to agency, industry, and academic audiences. Trip includes airfare (\$400/person), conference registration (\$595/person), lodging (\$192/person/night), and other miscellaneous allowable travel expenses. Total anticipated trip cost is \$3,700.

Other Costs: Tuition Costs: Out-of-state graduate student tuition (\$17,177) based on a 10% increase above the 2019-2020 rate is included. The rate is based on a maximum of 8 credits per semester.

Indirect Costs: F & A is charged at UNCW's federally negotiated indirect cost rate, 49% of Modified Total Direct Costs (excluding tuition). Total IDC: \$16,151

Year 3 Total Costs: \$56,825

Salary and Fringe: Principal Investigator – 1 month; \$7514/month (includes 2% increase) Salary is requested for PI-Long to lead the development of algorithms to identify the extent of wave runup and occurrence of coastal dune erosion. He will also be responsible to mentoring a graduate student and working with the project team to ensure that the wave runup and dune erosion techniques are integrated into the final situational awareness platform. **Graduate Student** - 9 months; \$1500/month. A full-time graduate student stipend for one masters student (\$13,500) including academic year, who will be enrolled at UNCW, will be co-advised by PI-Long. The student will be responsible for image processing and assisting in algorithm development.

Fringe Benefits: Fringe benefits for PI Long are calculated at 28.35% and fringe benefits for undergraduate and graduate student salary are 8.65%. Total Fringe is \$3,298.

Total Salary: \$24,312

Expendable Supplies: \$250 is requested hard drives (8TB) for data storage and backup.

Travel (Domestic): Funds are requested for PI Long and graduate student to attend a project meeting (3 days total) in Charleston, SC in Year 3 to integrate the deliverables with the project team. Trip includes mileage (175 miles) from Wilmington, NC to Charleston, SC, lodging (\$183/person/night), and other miscellaneous allowable travel expenses. Total anticipated trip cost is \$1,000.

Other Costs: Tuition Costs: Out-of-state graduate student tuition (\$18,738) based on an increase above the 2019-2020 rate is included. The rate is based on a maximum of 8 credits per semester.

Indirect Costs: F & A is charged at UNCW's federally negotiated indirect cost rate, 49% of Modified Total Direct Costs (excluding tuition). Total IDC: \$12,525

USC– Dr. Porter Total Costs: \$257,365

Year 1 Total Costs: \$85,145

Salary and Fringe: Principal Investigator – 0.50 sum. months (\$9,333), Research, Assoc.–1.25 months (\$7,708), Professionals–1.25 months (\$7,500), Graduate Student – 12 months (\$20,000)

Personnel funds are requested to support the activities of PI Porter for project administration and overall project management. A portion of Porter's time will also be in support of community engagement activities. The latter activities will be done in conjunction with the NIEHS-supported Center for Oceans and Human Health and Climate Change Interactions housed at the University of South Carolina. Partial support of a systems analyst and programmer is requested for development, implementation and management of the "Situational Monitoring and Reporting

System” (SMRS) and for automated feature extraction algorithm development, validation and implementation. These two positions will complement and build upon ongoing SECOORA-supported water quality nowcasting activities. A Graduate Research Assistant (GRA) will be engaged in all aspects of the SMRS.

Fringe Benefits (\$9,299) Fringe benefits are charged per State of South Carolina guidelines. Fringe for PI summer salary equals 30.09%. Insurance for the Professional is charged at the family rate and for the Research Associate is charged at the individual. USC HR staff calculated the required benefits for the informatics specialist base applicable state rates (see: https://sc.edu/about/offices_and_divisions/sponsored_awards_management/essential_reference_information/fringe_benefits.php). **Total Salary: \$53,839**

Supplies: Funds totaling \$3,000 are requested for basic IT supplies. Materials and supplies include all equipment and materials costing less than \$5,000 per item. A workstation costing approximately \$2,200 will be purchased. Example items include backup power supplies at \$150 each, monitor at \$175 each, and other supporting IT, data management and data development items. Funds will also be used as partial support for continuation of GIS site license.

Travel: Requested travel funds totaling \$2,800 will partially support participation in offsite project meetings and meetings with community end users, and an annual PI meeting. Allowable charges will adhere to state and federal per diem guidelines as appropriate and is domestic.

Other Costs: Tuition Costs: \$10,000 per year is requested for a tuition abatement for the GRA.

Indirect Costs (\$15,506): IDC is calculated as 26.0% of allowable direct costs. This rate reflects USC’s federally-approved IDC rate for off-campus research activities.

Year 2 Total Costs: \$84,719

Salary and Fringe: Principal Investigator – 0.50 months summer support (\$9,613), **Research Associates** – 1.25 months (\$7,939); **Professionals** – 1.25 months (\$7,725); **Graduate Student** – 12 months (\$20,000)

Fringe Benefits (\$9,524): Fringe benefits are charged per State of South Carolina guidelines. Fringe for PI summer salary equals 30.09%. Insurance for the Professional is charged at the family rate and for the Research Associate is charged at the individual. USC HR staff calculated the required benefits for the informatics specialist base applicable state rates (see: https://sc.edu/about/offices_and_divisions/sponsored_awards_management/essential_reference_information/fringe_benefits.php).

Total Salary: \$55,400

Expendable Supplies: Funds totaling \$1,500 are requested for basic IT supplies. Materials and supplies include all equipment and materials costing less than \$5,000 per item. Example items include backup power supplies at \$150 each, monitor at \$175 each, and other supporting IT, data management and data development items. Funds will also be used as partial support for continuation of GIS site license.

Travel: Requested travel funds totaling \$2,400 will partially support participation in offsite project meetings and meetings with community end users, and an annual PI meeting. Allowable charges will adhere to state and federal per diem guidelines as appropriate. All travel will be domestic.

Other Costs; Tuition Costs: We are requesting \$10,000 per year for a tuition abatement for the GRA.

Indirect Costs (\$15,418): IDC is calculated as 26.0% of allowable direct costs. This rate reflects USC's federally-approved IDC rate for off-campus research activities.

Year 3 Total Costs: \$87,501

Salary and Fringe: Principal Investigator – 0.50 summer months (\$9,901), Research Associates – 1.25 months (\$8,177), Professionals – 1.25 months (\$7,957), Graduate Student – 12 months (\$20,000)

Fringe Benefits (\$9,756): are charged per State of South Carolina guidelines. Fringe for PI summer salary equals 30.09%. Insurance for the Professional is charged at the family rate and for the Research Associate is charged at the individual. USC HR staff calculated the required benefits for the informatics specialist base applicable state rates (see: https://sc.edu/about/offices_and_divisions/sponsored_awards_management/essential_reference_information/fringe_benefits.php). **Total Salary: \$57,009**

Expendable Supplies: Funds totaling \$1,500 are requested for basic IT supplies. Materials and supplies include all equipment and materials costing less than \$5,000 per item. Example items include backup power supplies at \$150 each, monitor at \$175 each, and other supporting IT, data management and data development items. Funds will also be used as partial support for continuation of GIS site license.

Travel: Requested travel funds totaling \$3,000 will partially support participation in offsite project meetings and meetings with community end users, and an annual PI meeting. Allowable charges will adhere to state and federal per diem guidelines as appropriate. Travel will include presentation of project accomplishments at an appropriate conference. All travel will be domestic.

Other Costs; Tuition Costs: \$10,000 per year is requested for a tuition abatement for the GRA.

Indirect Costs (\$15,992): IDC is calculated as 26.0% of allowable direct costs. This rate reflects USC's federally-approved IDC rate for off-campus research activities.

Axiom– Kyle Wilcox Total Costs: \$215,746

Year 1 Total Costs: \$75,864

Salary and Fringe: Principal Investigator - Kyle Wilcox, Senior Software Engineer, is budgeted at 16 %FTE (\$18560; 332.8 hours) to manage the technical personnel, to coordinate with the WebCOOS team on the DMAC strategy, and to attend all project meetings and management communications. Mr. Wilcox will also develop and enhance the WebCOOS ingestion system, integrate real-time and historical datasets, and develop and enhance the data quality applications according to data standards. **Research Associate** - Brian Stone, Software Engineer, is budgeted at 5 %FTE (\$5850; 104 hours) to ingest data products to the WebCOOS portal or a common project platform for visualization and public access, and to assist with webcam visualization updates. Dave Foster, Software Engineer, is budgeted at 8 %FTE (\$8960; 166.4 hours) to develop web services and process data into standard formats for access using interoperability services. Stacey Buckelew, Project Manager, is budgeted at 3 %FTE (\$3150; 62.4 hours) to manage the project, budget, reporting, and to communicate with project partners. Shane St. Savage, Senior Software Engineer, is budgeted at 5 %FTE (\$5336; 104 hours) to support the WebCOOS data system and manage the physical data center.

Fringe Benefits: \$10,464- Fringe benefits are calculated at 25% to cover 401K, health insurance, and paid leave for staff salaries.

Total Salary: \$52,320

Indirect Costs: Axiom Data Science's federally approved indirect cost rate requested is 45% MTDC (total direct costs, minus equipment, supplies, and subcontracts in excess of \$25,000). IDC for Year 1 is **\$23,544**.

Year 2 Total Costs: \$70,006

Salary and Fringe: Principal Investigator - Kyle Wilcox, Senior Software Engineer, is budgeted at 16 %FTE (\$19117; 332.8 hours) to manage the technical personnel, to coordinate with the WebCOOS team on the DMAC strategy, and to attend all project meetings and management communications. Mr. Wilcox will also develop and enhance the WebCOOS ingestion system, integrate real-time and historical datasets, and develop and enhance the data quality applications according to data standards. **Research Associate** - Brian Stone, Software Engineer, is budgeted at 5 %FTE (\$6026; 104 hours) to ingest data products to the WebCOOS portal or a common project platform for visualization and public access, and to assist with webcam visualization updates. Dave Foster, Software Engineer, is budgeted at 6 %FTE (\$6922; 124.8 hours) to develop web services and process data into standard formats for access using interoperability services. Stacey Buckelew, Project Manager, is budgeted at 2 %FTE (\$2163; 41.6 hours) to manage the project, budget, reporting, and to communicate with project partners. Shane StSavage, Senior Software Engineer, is budgeted at 4 %FTE (\$4397; 83.2 hours) to support the WebCOOS data system and manage the physical data center.

Fringe Benefits: \$9,656- Fringe benefits are calculated at 25% to cover 401K, health insurance, and paid leave for staff salaries.

Total Salary: \$48,280

Indirect Costs: Axiom Data Science's federally approved indirect cost rate requested is 45% MTDC (total direct costs, minus equipment, supplies, and subcontracts in excess of \$25,000).

IDC for Year 2 is **\$21,726**.

Year 3 Total Costs: \$69,876

Salary and Fringe: Principal Investigator - Kyle Wilcox, Senior Software Engineer, is budgeted at 15 %FTE (\$18460; 312 hours) to manage the technical personnel, to coordinate with the WebCOOS team on the DMAC strategy, and to attend all project meetings and management communications. Mr. Wilcox will also develop and enhance the WebCOOS ingestion system, integrate real-time and historical datasets, and develop and enhance the data quality applications according to data standards. **Research Associate** - Brian Stone, Software Engineer, is budgeted at 5 %FTE (\$6206; 104 hours) to ingest data products to the WebCOOS portal or a common project platform for visualization and public access, and to assist with webcam visualization updates. Dave Foster, Software Engineer, is budgeted at 6 %FTE (\$7129; 124.8 hours) to develop web services and process data into standard formats for access using interoperability services. Stacey Buckelew, Project Manager, is budgeted at 2 %FTE (\$2228; 41.6 hours) to manage the project, budget, reporting, and to communicate with project partners. Shane StSavage, Senior Software Engineer, is budgeted at 4 %FTE (\$4529; 83.2 hours) to support the WebCOOS data system and manage the physical data center.

Fringe Benefits: \$9,638 Fringe benefits are calculated at 25% to cover 401K, health insurance, and paid leave for staff salaries.

Total Salary: \$48,190

Indirect Costs: Axiom Data Science's federally approved indirect cost rate requested is 45% MTDC (total direct costs, minus equipment, supplies, and subcontracts in excess of \$25,000). IDC for Year 3 is **\$21,686**.

UCSC– Dr. Pang Total Costs: \$251,243

Year 1 Total Costs: \$74,852

Salary and Fringe; Graduate Student – Akila de Silva, 12 months, 50% time - \$30,783. **Fringe Benefits** (rate of 2.10%): \$647. **Total Salary (with fringe): \$31,430**

Travel; The same conference can have both domestic and foreign venues. Both domestic and foreign travel are included because we also don't know ahead of time where a paper may get accepted. **Domestic - \$1,300/year.** Sample conference venues: OSM/AGU and IEEE Visualization. Using OSM 2020 and IEEE Visualization 2019 as reference point: Registration: \$525 | \$800; Accommodation: \$200/night | \$170/night; Meals: \$64/day | \$66/day; Airfare: \$120 | \$350; Transfers: \$250 | \$260. **Foreign – \$1,300/year.** Sample conference venues: OSM/AGU and IEEE Visualization. Using OSM 2020 and IEEE Visualization 2019 as reference point: Registration: \$525 | \$800; Accommodation: \$200/night | \$170/night; Meals: \$64/day | \$66/day; Airfare: \$120 | \$350; Transfers: \$250 | \$260

Other Costs: Publications - \$1,400/year. Publication charges, using Journal of Coastal Research as an example: Publication charge: \$700, Color figure charge: \$700

Tuition Costs (Total Graduate Fees): \$20,290

Indirect Costs: 54% on \$35,430 = \$19,132

Year 2 Total Costs: \$86,354

Salary and Fringe; Principal Investigator Alex Pang, 0 months; Grad. Student - Akila de Silva, 12 months, 50% time (\$36,971). **Fringe Benefits** (rate of 2.10%) \$776. **Total Salary:** \$37,747

Travel: Same as Year 1 (\$2,600)

Other Costs : Publication Costs (\$1,400), Tuition Costs: \$22,064

Indirect Costs: 54% on \$41,747 = \$22,543

Year 3 Total Costs: \$90,037

Salary and Fringe: Principal Investigator-Alex Pang, 0 months; Grad Student - Akila de Silva, 12 months, 50% time (\$38,080). Fringe Benefits (rate of 2.10%): \$800. Total Salary: \$38,880

Travel: Same as Year 1 (\$2,600)

Other Costs: Publication Costs (\$1,400): Tuition Costs: \$24,002

Indirect Costs: 54% on \$42,880 = \$23,155

Contractual:

TBD – Private Sector Camera Operator: Based on the costs of operating the cameras for the WebCAT project, and research with three commercial webcam providers, we estimate costs for annual operation of a webcam at \$5,000 per camera per year.

Total Costs: \$90,000 (Each Year \$30K)

Project Coordination contractor: Megan Trembl is an existing SECOORA contractor with experience coordinating scientific projects. Her responsibilities as Project Coordinator will include scheduling monthly team calls, planning annual team meetings, working with project PIs to define user requirements and coordinate those requirements across the efforts of the funded partners. She will work with PI Hernandez to draft and update the Transition Plan as the project develops, and will plan the annual team meetings in coordination with project PIs. Effort will be 4 hours per week for 50 weeks annually at a rate of \$75/hour, totaling **\$45,000**. **Travel Total for the Contractor Years 1-3 is \$6,666.68** (Year 1 \$1,666.67, Year 2 \$1,666.67, Year 3 \$3,333.34). Travel support up to \$1,666.67 is requested for contractor Trembl to attend Project Team meetings in Years 1 through 3. An additional \$1,666.67 is requested in Year 3 for contractor Trembl to attend an additional science meeting such as AGU to present project findings. Allowable charges will adhere to federal per diem guidelines as appropriate.

Indirect: SECOORA charges 8.57% on all direct charges and the first \$25,000 in contracts/subawards. Total indirect is **\$19,867 (Year 1 \$13,959, Year 2 \$3,023, Year 3 \$2,885)**.

RESEARCH & RELATED BUDGET - SECTION A & B, BUDGET PERIOD 1

UEI*: L1GPHS96MUE1

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of North Carolina Wilmington

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

A. Senior/Key Person														
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*		
1.	Joseph		Long		PI	0.00		2.6		19,339.00	5,483.00	24,822.00		
Total Funds Requested for all Senior Key Persons in the attached file														
Additional Senior Key Persons:											File Name:		Total Senior/Key Person	24,822.00

B. Other Personnel							
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
						Total Salary, Wages and Fringe Benefits (A+B)	24,822.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E, BUDGET PERIOD 1

UEI*: L1GPHS96MUE1

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of North Carolina Wilmington

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	
	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	
	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K, BUDGET PERIOD 1

UEI*: L1GPHS96MUE1

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of North Carolina Wilmington

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	0.00
2. Publication Costs	0.00
3. Consultant Services	0.00
4. ADP/Computer Services	0.00
5. Subawards/Consortium/Contractual Costs	0.00
6. Equipment or Facility Rental/User Fees	0.00
7. Alterations and Renovations	0.00
8.	0.00
9.	0.00
10.	0.00
11.	0.00
12.	0.00
13.	0.00
14.	0.00
15.	0.00
16.	0.00
17.	0.00
Total Other Direct Costs	0.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	24,822.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
Total Indirect Costs			
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	24,822.00

J. Fee	Funds Requested (\$)*
	0.00

K. Total Costs and Fee	Funds Requested (\$)*
	24,822.00

L. Budget Justification*
File Name: UNCW COMBINED Budget and Justification .pdf

RESEARCH & RELATED Budget (F-K) (Funds Requested)



SOUTHEAST COASTAL OCEAN OBSERVING REGIONAL ASSOCIATION

Budget sheet covers a three-year period.							
Project Title:	WebCOOS: Development and Transfer of an Operational "Situational Monitoring and Reporting System"						
Principal Investigator(s):	Joseph Long						
Institution: UNCW							

BUDGET ITEMS	No. of Individuals	Man-Months		Grant Funds Year 1	Grant Funds Year 2	Grant Funds Year 3	Grant Funds Total
		Grant	Match				
Salary and Wages							
1. Principal Investigator (s)	1	1.00		\$ 7,222	\$ 7,366	\$ 7,514	\$ 22,102.21
2. Associate Investigator(s)							
3. Professionals							
4. Research Associates							
5. Research Asst. Grad. Students	1	12.00		\$ 18,000	\$ 18,000	\$ 13,500	\$ 49,500
6. Prof. School Students							
7. Pre-Bac. Students							
8. Secretarial/Clerical							
9. Technical-Shop							
10. Other							
TOTAL SALARIES and WAGES				\$ 25,222	\$ 25,366	\$ 21,014	\$ 71,602
Fringe Benefits - Formula = 28.35% (faculty); 8.65%				\$ 3,604	\$ 3,645	\$ 3,298	\$ 10,548
TOTAL SALARIES, WAGES and FRINGE BENEFITS				\$ 28,826	\$ 29,012	\$ 24,312	\$ 82,150
PERMANENT EQUIPMENT (computer)				\$ 6,000	\$ -	\$ -	\$ 6,000
EXPENDABLE SUPPLIES, etc.				\$ 250	\$ 250	\$ 250	\$ 750
TRAVEL							\$ -
1. Domestic				\$ -	\$ 3,700	\$ 1,000	\$ 4,700
2. Foreign (requires prior approval)							
PUBLICATION COSTS							
OTHER COSTS (Tuition, max 8 credit/semester)				\$ 15,615	\$ 17,177	\$ 18,738	\$ 51,530
TOTAL DIRECT COSTS				\$ 50,691	\$ 50,138	\$ 44,300	\$ 145,129
INDIRECT COSTS							\$ -
1. On campus - Formula = 49% (minus tuition)				\$ 14,247	\$ 16,151	\$ 12,525	\$ 42,924
2. Off campus - Formula =							\$ -
TOTAL COST				\$ 64,939	\$ 66,290	\$ 56,825	\$ 188,053

UNCW– Dr. Long Total Costs: \$188,054**Year 1 Total Costs: \$64,939****Salary and Fringe: Principal Investigator** – 1 month; \$7222/month

Salary is requested for PI-Long to lead the development of algorithms to identify the extent of wave runup and occurrence of coastal dune erosion. He will also be responsible to mentoring a graduate student and working with the project team to ensure that the wave runup and dune erosion techniques are integrated into the final situational awareness platform. **Graduate Student** - 12 months; \$1500/month. A full-time graduate student stipend for one masters student (\$18,000) including academic year and summer effort, who will be enrolled at UNCW, will be co-advised by PI-Long. The student will be responsible for image processing and assisting in algorithm development.

Fringe Benefits: Fringe benefits for PI Long are calculated at 28.35% and fringe benefits for undergraduate and graduate student salary are 8.65%. Fringe total is \$3,604.

Total Salary: \$28,826

Equipment: Equipment costs of \$6,000 are requested for the purchase of one desktop computer capable of processing high-resolution videos and extracting coastal features. Cost includes the purchase of monitors and other peripherals (keyboard, mouse, etc).

Expendable Supplies: \$250 is requested hard drives (8TB) for data storage and backup.

Other Costs: Tuition Costs; Out-of-state graduate student tuition (\$15,615) based on the 2019-2020 rate is included. The rate is based on a maximum of 8 credits per semester.

Indirect Costs: F & A is charged at UNCW's federally negotiated indirect cost rate, 49% of Modified Total Direct Costs (excluding tuition). Total IDC: \$14,247

Year 2 Total Costs: \$66,290**Salary and Fringe: Principal Investigator** – 1 month; \$7366month (includes 2% increase)

Salary is requested for PI-Long to lead the development of algorithms to identify the extent of wave runup and occurrence of coastal dune erosion. He will also be responsible to mentoring a graduate student and working with the project team to ensure that the wave runup and dune erosion techniques are integrated into the final situational awareness platform. **Graduate Student** - 12 months; \$1500/month. A full-time graduate student stipend for one masters student (\$18,000) including academic year and summer effort, who will be enrolled at UNCW, will be co-advised by PI-Long. The student will be responsible for image processing and assisting in algorithm development.

Fringe Benefits: Fringe benefits for PI Long are calculated at 28.35% and fringe benefits for undergraduate and graduate student salary are 8.65%. Fringe total is \$3,645.

Total Salary: \$29,012

Expendable Supplies: \$250 is requested hard drives (8TB) for data storage and backup.

Travel (Domestic): Funds are requested for PI Long and graduate student to attend the AMS meeting (5 days total) in Houston, TX in Year 2 to present results to agency, industry, and academic audiences. Trip includes airfare (\$400/person), conference registration (\$595/person), lodging (\$192/person/night), and other miscellaneous allowable travel expenses. Total anticipated trip cost is \$3,700.

Other Costs: Tuition Costs: Out-of-state graduate student tuition (\$17,177) based on a 10% increase above the 2019-2020 rate is included. The rate is based on a maximum of 8 credits per semester.

Indirect Costs: F & A is charged at UNCW's federally negotiated indirect cost rate, 49% of Modified Total Direct Costs (excluding tuition). Total IDC: \$16,151

Year 3 Total Costs: \$56,825

Salary and Fringe: Principal Investigator – 1 month; \$7514/month (includes 2% increase) Salary is requested for PI-Long to lead the development of algorithms to identify the extent of wave runup and occurrence of coastal dune erosion. He will also be responsible to mentoring a graduate student and working with the project team to ensure that the wave runup and dune erosion techniques are integrated into the final situational awareness platform. **Graduate Student** - 9 months; \$1500/month. A full-time graduate student stipend for one masters student (\$13,500) including academic year, who will be enrolled at UNCW, will be co-advised by PI-Long. The student will be responsible for image processing and assisting in algorithm development.

Fringe Benefits: Fringe benefits for PI Long are calculated at 28.35% and fringe benefits for undergraduate and graduate student salary are 8.65%. Total Fringe is \$3,298.

Total Salary: \$24,312

Expendable Supplies: \$250 is requested hard drives (8TB) for data storage and backup.

Travel (Domestic): Funds are requested for PI Long and graduate student to attend a project meeting (3 days total) in Charleston, SC in Year 3 to integrate the deliverables with the project team. Trip includes mileage (175 miles) from Wilmington, NC to Charleston, SC, lodging (\$183/person/night), and other miscellaneous allowable travel expenses. Total anticipated trip cost is \$1,000.

Other Costs: Tuition Costs: Out-of-state graduate student tuition (\$18,738) based on an increase above the 2019-2020 rate is included. The rate is based on a maximum of 8 credits per semester.

Indirect Costs: F & A is charged at UNCW's federally negotiated indirect cost rate, 49% of Modified Total Direct Costs (excluding tuition). Total IDC: \$12,525

RESEARCH & RELATED BUDGET - SECTION A & B, BUDGET PERIOD 1

UEI*: J22LNTMEDP73

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of South Carolina

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

A. Senior/Key Person														
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*		
1.	Dwayne		Porter		PI	0.00		1.3		25,241.00	7,595.00	32,836.00		
Total Funds Requested for all Senior Key Persons in the attached file														
Additional Senior Key Persons:											File Name:		Total Senior/Key Person	32,836.00

B. Other Personnel							
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
						Total Salary, Wages and Fringe Benefits (A+B)	32,836.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E, BUDGET PERIOD 1

UEI*: J22LNTMEDP73

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of South Carolina

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	
	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	
	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K, BUDGET PERIOD 1

UEI*: J22LNTMEDP73

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of South Carolina

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	0.00
2. Publication Costs	0.00
3. Consultant Services	0.00
4. ADP/Computer Services	0.00
5. Subawards/Consortium/Contractual Costs	0.00
6. Equipment or Facility Rental/User Fees	0.00
7. Alterations and Renovations	0.00
8.	0.00
9.	0.00
10.	0.00
11.	0.00
12.	0.00
13.	0.00
14.	0.00
15.	0.00
16.	0.00
17.	0.00
Total Other Direct Costs	0.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	32,836.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
Total Indirect Costs			
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	32,836.00

J. Fee	Funds Requested (\$)*
	0.00

K. Total Costs and Fee	Funds Requested (\$)*
	32,836.00

L. Budget Justification*
File Name: USC COMBINED Budget and Justification .pdf

RESEARCH & RELATED Budget (F-K) (Funds Requested)



SOUTHEAST COASTAL OCEAN OBSERVING REGIONAL ASSOCIATION

Budget sheet covers a three-year period.

Project Title: WebCOOS: Development and Transfer of an Operational "Situational Monitoring and Reporting System"

Principal Investigator(s):
Dr. Dwayne E. Porter

Institution:
Arnold School of Public Health, University of South Carolina

BUDGET ITEMS	No. of Individuals	Man-Months / Year		Grant Funds	Grant Funds	Grant Funds	Grant Funds
		Grant	Match	Year 1	Year 2	Year 3	Total
1. Principal Investigator (s)	1	0.50		\$ 9,333	\$ 9,613	\$ 9,901	\$28,847.37
2. Associate Investigator(s)							
3. Professionals	1	1.25		\$ 7,708	\$ 7,939	\$ 8,177	\$23,823.11
4. Research Associates	1	1.25		\$ 7,500	\$ 7,725	\$ 7,957	\$23,181.75
5. Research Asst. Grad. Students	1	12.00		\$ 20,000	\$ 20,600	\$ 21,218	\$61,818.00
6. Prof. School Students							
7. Pre-Bac. Students							
8. Secretarial/Clerical							
9. Technical-Shop							
10. Other							
TOTAL SALARIES and WAGES				\$ 44,541	\$ 45,877	\$ 47,253	\$ 137,670
Fringe Benefits - Formula =				\$ 9,299	\$ 9,524	\$ 9,756	\$ 28,578
TOTAL SALARIES, WAGES and FRINGE BENEFITS				\$ 53,839	\$ 55,400	\$ 57,009	\$ 166,248
PERMANENT EQUIPMENT (list)							\$ -
EXPENDABLE SUPPLIES, etc.				\$ 3,000	\$ 1,500	\$ 1,500	\$ 6,000
TRAVEL							\$ -
1. Domestic				\$ 2,800	\$ 2,400	\$ 3,000	\$ 8,200
2. Foreign (requires prior approval)							\$ -
PUBLICATION COSTS							\$ -
OTHER COSTS (Tuition)				\$ 10,000	\$ 10,000	\$ 10,000	\$ 30,000
TOTAL DIRECT COSTS				\$ 69,639	\$ 69,300	\$ 71,509	\$ 210,448
INDIRECT COSTS	1. On campus - Formula =						\$ -
	2. Off campus - Formula = 26% of (Direct Costs - Equipment - Tuition)			\$ 15,506	\$ 15,418	\$ 15,992	\$ 46,916
TOTAL COST				\$ 85,145	\$ 84,719	\$ 87,501	\$ 257,365

USC– Dr. Porter Total Costs: \$257,365**Year 1 Total Costs: \$85,145**

Salary and Fringe: Principal Investigator – 0.50 sum. months (\$9,333), Research, Assoc.–1.25 months (\$7,708), Professionals–1.25 months (\$7,500), Graduate Student – 12 months (\$20,000)

Personnel funds are requested to support the activities of PI Porter for project administration and overall project management. A portion of Porter’s time will also be in support of community engagement activities. The latter activities will be done in conjunction with the NIEHS-supported Center for Oceans and Human Health and Climate Change Interactions housed at the University of South Carolina. Partial support of a systems analyst and programmer is requested for development, implementation and management of the “Situational Monitoring and Reporting System” (SMRS) and for automated feature extraction algorithm development, validation and implementation. These two positions will complement and build upon ongoing SECOORA-supported water quality nowcasting activities. A Graduate Research Assistant (GRA) will be engaged in all aspects of the SMRS.

Fringe Benefits (\$9,299) Fringe benefits are charged per State of South Carolina guidelines. Fringe for PI summer salary equals 30.09%. Insurance for the Professional is charged at the family rate and for the Research Associate is charged at the individual. USC HR staff calculated the required benefits for the informatics specialist base applicable state rates (see: https://sc.edu/about/offices_and_divisions/sponsored_awards_management/essential_reference_information/fringe_benefits.php). **Total Salary: \$53,839**

Supplies: Funds totaling \$3,000 are requested for basic IT supplies. Materials and supplies include all equipment and materials costing less than \$5,000 per item. A workstation costing approximately \$2,200 will be purchased. Example items include backup power supplies at \$150 each, monitor at \$175 each, and other supporting IT, data management and data development items. Funds will also be used as partial support for continuation of GIS site license.

Travel: Requested travel funds totaling \$2,800 will partially support participation in offsite project meetings and meetings with community end users, and an annual PI meeting. Allowable charges will adhere to state and federal per diem guidelines as appropriate and is domestic.

Other Costs: Tuition Costs: \$10,000 per year is requested for a tuition abatement for the GRA.

Indirect Costs (\$15,506): IDC is calculated as 26.0% of allowable direct costs. This rate reflects USC’s federally-approved IDC rate for off-campus research activities.

Year 2 Total Costs: \$84,719

Salary and Fringe: Principal Investigator – 0.50 months summer support (\$9,613), **Research Associates** – 1.25 months (\$7,939); **Professionals** – 1.25 months (\$7,725); **Graduate Student** – 12 months (\$20,000)

Fringe Benefits (\$9,524): Fringe benefits are charged per State of South Carolina guidelines. Fringe for PI summer salary equals 30.09%. Insurance for the Professional is charged at the family rate and for the Research Associate is charged at the individual. USC HR staff calculated the required benefits for the informatics specialist base applicable state rates (see: https://sc.edu/about/offices_and_divisions/sponsored_awards_management/essential_reference_information/fringe_benefits.php).

Total Salary: \$55,400

Expendable Supplies: Funds totaling \$1,500 are requested for basic IT supplies. Materials and supplies include all equipment and materials costing less than \$5,000 per item. Example items include backup power supplies at \$150 each, monitor at \$175 each, and other supporting IT, data management and data development items. Funds will also be used as partial support for continuation of GIS site license.

Travel: Requested travel funds totaling \$2,400 will partially support participation in offsite project meetings and meetings with community end users, and an annual PI meeting. Allowable charges will adhere to state and federal per diem guidelines as appropriate. All travel will be domestic.

Other Costs: Tuition Costs: We are requesting \$10,000 per year for a tuition abatement for the GRA.

Indirect Costs (\$15,418): IDC is calculated as 26.0% of allowable direct costs. This rate reflects USC's federally-approved IDC rate for off-campus research activities.

Year 3 Total Costs: \$87,501

Salary and Fringe: Principal Investigator – 0.50 summer months (\$9,901), Research Associates – 1.25 months (\$8,177), Professionals – 1.25 months (\$7,957), Graduate Student – 12 months (\$20,000)

Fringe Benefits (\$9,756): are charged per State of South Carolina guidelines. Fringe for PI summer salary equals 30.09%. Insurance for the Professional is charged at the family rate and for the Research Associate is charged at the individual. USC HR staff calculated the required benefits for the informatics specialist base applicable state rates (see: https://sc.edu/about/offices_and_divisions/sponsored_awards_management/essential_reference_information/fringe_benefits.php). **Total Salary: \$57,009**

Expendable Supplies: Funds totaling \$1,500 are requested for basic IT supplies. Materials and supplies include all equipment and materials costing less than \$5,000 per item. Example items include backup power supplies at \$150 each, monitor at \$175 each, and other supporting IT, data management and data development items. Funds will also be used as partial support for continuation of GIS site license.

Travel: Requested travel funds totaling \$3,000 will partially support participation in offsite project meetings and meetings with community end users, and an annual PI meeting. Allowable

charges will adhere to state and federal per diem guidelines as appropriate. Travel will include presentation of project accomplishments at an appropriate conference. All travel will be domestic.

Other Costs; Tuition Costs: \$10,000 per year is requested for a tuition abatement for the GRA.

Indirect Costs (\$15,992): IDC is calculated as 26.0% of allowable direct costs. This rate reflects USC's federally-approved IDC rate for off-campus research activities.

RESEARCH & RELATED BUDGET - SECTION A & B, BUDGET PERIOD 1

UEI*: PRQBHUD4ZJ31

Budget Type*: Project Subaward/Consortium

Enter name of Organization: Axiom Data Science, LLC

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

A. Senior/Key Person												
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Rob		Bochenek		PI	0.00	4.9			49,120.00	12,280.00	61,400.00
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:											File Name:	
											Total Senior/Key Person	61,400.00

B. Other Personnel							
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
						Total Salary, Wages and Fringe Benefits (A+B)	61,400.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E, BUDGET PERIOD 1

UEI*: PRQBHUD4ZJ31

Budget Type*: Project Subaward/Consortium

Enter name of Organization: Axiom Data Science, LLC

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	
	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	
	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget {C-E} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K, BUDGET PERIOD 1

UEI*: PRQBHUD4ZJ31

Budget Type*: Project Subaward/Consortium

Enter name of Organization: Axiom Data Science, LLC

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	0.00
2. Publication Costs	0.00
3. Consultant Services	0.00
4. ADP/Computer Services	0.00
5. Subawards/Consortium/Contractual Costs	0.00
6. Equipment or Facility Rental/User Fees	0.00
7. Alterations and Renovations	0.00
8.	0.00
9.	0.00
10.	0.00
11.	0.00
12.	0.00
13.	0.00
14.	0.00
15.	0.00
16.	0.00
17.	0.00
Total Other Direct Costs	0.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	61,400.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
Total Indirect Costs			
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	61,400.00

J. Fee	Funds Requested (\$)*
	0.00

K. Total Costs and Fee	Funds Requested (\$)*
	61,400.00

L. Budget Justification*
File Name: AXIOM COMBINED Budget and Justification .pdf

RESEARCH & RELATED Budget (F-K) (Funds Requested)



SOUTHEAST COASTAL OCEAN OBSERVING REGIONAL ASSOCIATION

Budget sheet covers a three-year period.

Project Title: WebCOOS

Principal Investigator(s): Kyle Wilcox

Institution: Axiom Data Science

BUDGET ITEMS	No. of Individuals	Man-Months		Grant Funds Year 1	Grant Funds Year 2	Grant Funds Year 3	Grant Funds Total
		Grant	Match				
1. Principal Investigator (s)	1	5.64		\$ 18,560	\$ 19,117	\$ 18,460	\$56,137.00
2. Associate Investigator(s)							
3. Professionals	4	6.60		\$ 23,296	\$ 19,507	\$ 20,092	\$62,895.00
4. Research Associates							
5. Research Asst. Grad. Students							
6. Prof. School Students							
7. Pre-Bac. Students							
8. Secretarial/Clerical							
9. Technical-Shop							
10. Other							
TOTAL SALARIES and WAGES				\$ 41,856	\$ 38,624	\$ 38,552	\$ 119,032
Fringe Benefits - Formula =		25%		\$ 10,464	\$ 9,656	\$ 9,638	\$ 29,758
TOTAL SALARIES, WAGES and FRINGE BENEFITS				\$ 52,320	\$ 48,280	\$ 48,190	\$ 148,790
PERMANENT EQUIPMENT (list)							\$ -
EXPENDABLE SUPPLIES, etc.							\$ -
TRAVEL							\$ -
1. Domestic							\$ -
2. Foreign (requires prior approval)							\$ -
PUBLICATION COSTS							\$ -
OTHER COSTS							\$ -
TOTAL DIRECT COSTS				\$ 52,320	\$ 48,280	\$ 48,190	\$ 148,790
INDIRECT COSTS	1. On campus - Formula =						\$ -
	2. Off campus - Formula =		45%	\$ 23,544	\$ 21,726	\$ 21,686	\$ 66,956
TOTAL COST				\$ 75,864	\$ 70,006	\$ 69,876	\$ 215,746

Axiom– Kyle Wilcox Total Costs: \$215,746**Year 1 Total Costs: \$75,864**

Salary and Fringe: Principal Investigator - Kyle Wilcox, Senior Software Engineer, is budgeted at 16 %FTE (\$18560; 332.8 hours) to manage the technical personnel, to coordinate with the WebCOOS team on the DMAC strategy, and to attend all project meetings and management communications. Mr. Wilcox will also develop and enhance the WebCOOS ingestion system, integrate real-time and historical datasets, and develop and enhance the data quality applications according to data standards. **Research Associate** - Brian Stone, Software Engineer, is budgeted at 5 %FTE (\$5850; 104 hours) to ingest data products to the WebCOOS portal or a common project platform for visualization and public access, and to assist with webcam visualization updates. Dave Foster, Software Engineer, is budgeted at 8 %FTE (\$8960; 166.4 hours) to develop web services and process data into standard formats for access using interoperability services. Stacey Buckelew, Project Manager, is budgeted at 3 %FTE (\$3150; 62.4 hours) to manage the project, budget, reporting, and to communicate with project partners. Shane St. Savage, Senior Software Engineer, is budgeted at 5 %FTE (\$5336; 104 hours) to support the WebCOOS data system and manage the physical data center.

Fringe Benefits: \$10,464- Fringe benefits are calculated at 25% to cover 401K, health insurance, and paid leave for staff salaries.

Total Salary: \$52,320

Indirect Costs: Axiom Data Science’s federally approved indirect cost rate requested is 45% MTDC (total direct costs, minus equipment, supplies, and subcontracts in excess of \$25,000). IDC for Year 1 is **\$23,544**.

Year 2 Total Costs: \$70,006

Salary and Fringe: Principal Investigator - Kyle Wilcox, Senior Software Engineer, is budgeted at 16 %FTE (\$19117; 332.8 hours) to manage the technical personnel, to coordinate with the WebCOOS team on the DMAC strategy, and to attend all project meetings and management communications. Mr. Wilcox will also develop and enhance the WebCOOS ingestion system, integrate real-time and historical datasets, and develop and enhance the data quality applications according to data standards. **Research Associate** - Brian Stone, Software Engineer, is budgeted at 5 %FTE (\$6026; 104 hours) to ingest data products to the WebCOOS portal or a common project platform for visualization and public access, and to assist with webcam visualization updates. Dave Foster, Software Engineer, is budgeted at 6 %FTE (\$6922; 124.8 hours) to develop web services and process data into standard formats for access using interoperability services. Stacey Buckelew, Project Manager, is budgeted at 2 %FTE (\$2163; 41.6 hours) to manage the project, budget, reporting, and to communicate with project partners. Shane StSavage, Senior Software Engineer, is budgeted at 4 %FTE (\$4397; 83.2 hours) to support the WebCOOS data system and manage the physical data center.

Fringe Benefits: \$9,656- Fringe benefits are calculated at 25% to cover 401K, health insurance,

and paid leave for staff salaries.

Total Salary: \$48,280

Indirect Costs: Axiom Data Science's federally approved indirect cost rate requested is 45% MTDC (total direct costs, minus equipment, supplies, and subcontracts in excess of \$25,000). IDC for Year 2 is **\$21,726**.

Year 3 Total Costs: \$69,876

Salary and Fringe: Principal Investigator - Kyle Wilcox, Senior Software Engineer, is budgeted at 15 %FTE (\$18460; 312 hours) to manage the technical personnel, to coordinate with the WebCOOS team on the DMAC strategy, and to attend all project meetings and management communications. Mr. Wilcox will also develop and enhance the WebCOOS ingestion system, integrate real-time and historical datasets, and develop and enhance the data quality applications according to data standards. **Research Associate** - Brian Stone, Software Engineer, is budgeted at 5 %FTE (\$6206; 104 hours) to ingest data products to the WebCOOS portal or a common project platform for visualization and public access, and to assist with webcam visualization updates. Dave Foster, Software Engineer, is budgeted at 6 %FTE (\$7129; 124.8 hours) to develop web services and process data into standard formats for access using interoperability services. Stacey Buckelew, Project Manager, is budgeted at 2 %FTE (\$2228; 41.6 hours) to manage the project, budget, reporting, and to communicate with project partners. Shane StSavage, Senior Software Engineer, is budgeted at 4 %FTE (\$4529; 83.2 hours) to support the WebCOOS data system and manage the physical data center.

Fringe Benefits: \$9,638 Fringe benefits are calculated at 25% to cover 401K, health insurance, and paid leave for staff salaries.

Total Salary: \$48,190

Indirect Costs: Axiom Data Science's federally approved indirect cost rate requested is 45% MTDC (total direct costs, minus equipment, supplies, and subcontracts in excess of \$25,000). IDC for Year 3 is **\$21,686**.

RESEARCH & RELATED BUDGET - SECTION A & B, BUDGET PERIOD 1

UEI*: VXUFPE4MCZH5

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of California Santa Cruz

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

A. Senior/Key Person														
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*		
1.	Alex		Pang		PI	0.00		1.0				0.00		
Total Funds Requested for all Senior Key Persons in the attached file														
Additional Senior Key Persons:											File Name:		Total Senior/Key Person	0.00

B. Other Personnel							
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
						Total Salary, Wages and Fringe Benefits (A+B)	0.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E, BUDGET PERIOD 1

UEI*: VXUFPE4MCZH5

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of California Santa Cruz

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget {C-E} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K, BUDGET PERIOD 1

UEI*: VXUFPE4MCZH5

Budget Type*: Project Subaward/Consortium

Enter name of Organization: University of California Santa Cruz

Start Date*: 09-01-2020

End Date*: 08-31-2024

Budget Period: 1

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	0.00
2. Publication Costs	0.00
3. Consultant Services	0.00
4. ADP/Computer Services	0.00
5. Subawards/Consortium/Contractual Costs	0.00
6. Equipment or Facility Rental/User Fees	0.00
7. Alterations and Renovations	0.00
8.	0.00
9.	0.00
10.	0.00
11.	0.00
12.	0.00
13.	0.00
14.	0.00
15.	0.00
16.	0.00
17.	0.00
Total Other Direct Costs	0.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	0.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
Total Indirect Costs			
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	0.00

J. Fee	Funds Requested (\$)*
	0.00

K. Total Costs and Fee	Funds Requested (\$)*
	0.00

L. Budget Justification*
File Name: UCSC COMBINED Budget and Justification .pdf

RESEARCH & RELATED Budget (F-K) (Funds Requested)



SOUTHEAST COASTAL OCEAN OBSERVING REGIONAL ASSOCIATION

Budget sheet covers a three-year period.							
Project Title:	Launching WebCOOS, Webcams for Coastal Observations and Operational Support						
Principal Investigator(s):	Alex Pang						
Institution:	UCSC						

BUDGET ITEMS	No. of Individuals	Man-Months		Grant Funds Year 1	Grant Funds Year 2	Grant Funds Year 3	Grant Funds Total
		Grant	Match				
1. Principal Investigator (s)	1			\$ -	\$ -	\$ -	\$ -
2. Associate Investigator(s)							
3. Professionals							
4. Research Associates							
5. Research Asst. Grad. Students	1			\$ 30,783	\$ 36,971	\$ 38,080	\$ 105,834
6. Prof. School Students							
7. Pre-Bac. Students							
8. Secretarial/Clerical							
9. Technical-Shop							
10. Other							
TOTAL SALARIES and WAGES				\$ 30,783	\$ 36,971	\$ 38,080	\$ 105,834
Fringe Benefits - Formula =		2.10%		\$ 647	\$ 776	\$ 800	\$ 2,223
TOTAL SALARIES, WAGES and FRINGE BENEFITS				\$ 31,430	\$ 37,747	\$ 38,880	\$ 108,057
PERMANENT EQUIPMENT (list)							
EXPENDABLE SUPPLIES, etc.							
TRAVEL							
1. Domestic				\$ 1,300	\$ 1,300	\$ 1,300	\$ 3,900
2. Foreign (requires prior approval)				\$ 1,300	\$ 1,300	\$ 1,300	\$ 3,900
PUBLICATION COSTS				\$ 1,400	\$ 1,400	\$ 1,400	\$ 4,200
OTHER COSTS				\$ 20,290	\$ 22,064	\$ 24,002	\$ 66,356
TOTAL DIRECT COSTS				\$ 55,720	\$ 63,811	\$ 66,882	\$ 186,413
INDIRECT COSTS	1. On campus - Formula =	54.00%		\$ 19,132	\$ 22,543	\$ 23,155	\$ 64,830
	2. Off campus - Formula =						\$ -
TOTAL COST				\$ 74,852	\$ 86,354	\$ 90,037	\$ 251,243

UCSC– Dr. Pang Total Costs: \$251,243**Year 1 Total Costs: \$74,852**

Salary and Fringe; Graduate Student – Akila de Silva, 12 months, 50% time - \$30,783. **Fringe Benefits** (rate of 2.10%): \$647. **Total Salary (with fringe): \$31,430**

Travel; The same conference can have both domestic and foreign venues. Both domestic and foreign travel are included because we also don't know ahead of time where a paper may get accepted. **Domestic - \$1,300/year.** Sample conference venues: OSM/AGU and IEEE Visualization. Using OSM 2020 and IEEE Visualization 2019 as reference point: Registration: \$525 | \$800; Accommodation: \$200/night | \$170/night; Meals: \$64/day | \$66/day; Airfare: \$120 | \$350; Transfers: \$250 | \$260. **Foreign – \$1,300/year.** Sample conference venues: OSM/AGU and IEEE Visualization. Using OSM 2020 and IEEE Visualization 2019 as reference point: Registration: \$525 | \$800; Accommodation: \$200/night | \$170/night; Meals: \$64/day | \$66/day; Airfare: \$120 | \$350; Transfers: \$250 | \$260

Other Costs: Publications - \$1,400/year. Publication charges, using Journal of Coastal Research as an example: Publication charge: \$700, Color figure charge: \$700

Tuition Costs (Total Graduate Fees): \$20,290

Indirect Costs: 54% on \$35,430 = \$19,132

Year 2 Total Costs: \$86,354

Salary and Fringe; Principal Investigator Alex Pang, 0 months; Grad. Student - Akila de Silva, 12 months, 50% time (\$36,971). **Fringe Benefits** (rate of 2.10%) \$776. **Total Salary: \$37,747**

Travel: Same as Year 1 (\$2,600)

Other Costs : Publication Costs (\$1,400), Tuition Costs: \$22,064

Indirect Costs: 54% on \$41,747 = \$22,543

Year 3 Total Costs: \$90,037

Salary and Fringe: Principal Investigator-Alex Pang, 0 months; Grad Student - Akila de Silva, 12 months, 50% time (\$38,080). **Fringe Benefits** (rate of 2.10%): \$800. **Total Salary: \$38,880**

Travel: Same as Year 1 (\$2,600)

Other Costs: Publication Costs (\$1,400): Tuition Costs: \$24,002

Indirect Costs: 54% on \$42,880 = \$23,155

J. MISCELLANEOUS DOCUMENTS

J.1 Other Documents

Please upload any additional attachments needed for your award that do not have a specific upload field in another section of the RPPR.

Department of Commerce

Research Performance Progress Report – Grants Online Electronic Template

Award Information: Complete Boxes 1 – 23 with the requested information

Box 1. Federal Agency – Department of Commerce/NOAA

Box 2. Federal Award Number – Assigned Award Number for the project

Box 3. Project Title

Launching WebCOOS: Webcams for Coastal Observations and Operational Support

Box 4. Award Period of Performance Start Date

Box 5. Award Period of Performance End Date

August 30, 2023

Box 6. Principal Investigator's Last Name

Hernandez

Box 7. Principal Investigator's (PI) First and Middle Name

Debra

Box 8. PI Job Title

SECOORA Executive Director

Box 9. PI's Email

debra@secoora.org

Box 10. PI's Phone Number

843.906.8686

Box 11. Authorizing Official's (AO) Last Name

Box 12. AO First and Middle Name

Box 13. AO Job Title

Box 14. AO Email

Box 15. Signature of Recipient Authorized Representative – Non Applicable

Box 16. Submission Date and Time Stamp

Box 17. Reporting Period End Date

Box 18. Reporting Frequency – Semi-annual

Box 19. Report Type – Not Final or Final

Not final

Box 20. Recipient Name

SECOORA

Box 21. Recipient Address

Post Office Box 13856, Charleston, SC 29422

Box 22. Recipient DUNS

Box 23. Recipient EIN

Accomplishments: Boxes 24 – 27 are required for the first initial progress report. Subsequent reports will be prepopulated with the information from the previous report and have a limit of 4,000 characters. Comment Box 28 is required but will not be pre-populated in subsequent reports.

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

Box 25. What was accomplished under these goals?

Goal 1) Engage demonstrated webcam operators and other end-users

Obj. 1.1) Identify & engage Tier 1 & 2 users: 75% Complete

- **SECOORA:** WebCOOS funded a camera installation at a new tide station in Charleston, SC and Beaufort, NC in partnership with NOAA COOPS.
- **SECOORA:** Greg Dusek connected the team to USGS to discuss the technical logistics of integration of USGS cameras, which if successful, could expand the network significantly. Work continues to integrate the camera into the system.
- **USC:** Ongoing technical discussions with Volusia Beaches staff (Florida, Chris Dembinsky) regarding their [camera streams on YouTube](#) and possible riptide detection. Helped advise in their recent selection of two cameras to monitor North and South Beach.
- **UNCW:** PI-Long gave a presentation to over 100 participants at the Coastal Imaging Research Network (CIRN) annual bootcamp and research meeting. Meeting follow-up showed significant interest from research in other IOOS regions.

Obj 1.2) Develop, assess and disseminate stakeholder appropriate outreach and education materials: 75% Complete

- USC: In conjunction with the EPA EJ STRONG initiative and the NIEHS Center of Excellence for Oceans and Human Health and Climate Change Interactions, graduate students at USC worked with community members in the Rosemont Community of Charleston, SC to develop a presentation for use by community members highlighting the community's efforts to use science to address quality of life issues.
- USC: On 6 and 7 June 2023 we participated in a community event hosted by the Lowcountry Alliance for Model Communities (LAMC) and the Charleston Community Research to Action Board (CCRAB) to highlight research and practice initiatives involving USC (WebCOOS and the Southeast Water Level Network), College of Charleston, The Citadel, Medical University of South Carolina, City of Charleston, and Charleston County and begin development of a plan for research coordination, data management, and information dissemination. CCRAB will be the lead.

Objective 1.3) Identify testers within the network and conduct survey to assess ease-of-use, utility of various analyses and informational products, and willingness to pay for webcam imagery or downstream product access or customization: 25% Complete

- Recruited additional testers from Sea Grant partners (Ashleigh Palinkas and Nicholas Carver).
- Interface for DroneML (now renamed to RipScout) was updated to include flight planning (setting of waypoints), and actions to take when a rip is spotted (stationary video, or circling videos).

Goal 2) Operationalize the WebCAT system to a national webcam data management network

Obj 2.1) Select camera providers and maintain webcams: 97% Complete

- **SECOORA:** Five new WebCOOS funded webcams installed: the Beachfront at Cocoa Beach; Masonboro Inlet, NC; Charleston, SC; Walton Lighthouse in Santa Cruz, CA, and one at the LAMC (LowCountry Alliance for Model Communities), Dorchester Street, Charleston, SC.
- **SECOORA:** We also have two new cameras of opportunity in the works, a USGS webcam on Madeira Beach and one near Port Aransas, TX, which is now available on the [WebCOOS website](#).
- UCSC: Updated seal detection app with additional training data and new class for rocks to improve seal detection accuracy. Rip detection code for Currituck and Holland Beach were provided to Axiom. Collecting more data for Walton Lighthouse camera – progress is slower this time of year since there is not much swell/rip action.
- USC: LAMC (Lowcountry Alliance for Model Communities), Dorchester Street, Charleston, SC camera installed and follow-up visit to repair. Rosemont Community: Camera installed at Whaley Way cul-de-sac to monitor flooding in that area. Rosemont Community: Remote solar-panel camera setup installed in marsh area, adjacent to water level sensor, focused on tide and flood level at Austin Avenue bridge. Rosemont Community: Camera power cord repaired at Peace Street and camera equipment removed at Peonie Street. Folly 6th Ave: Camera connectivity fixed and camera post repositioned further back after November 2022 storms dune erosion. South Carolina Maritime Museum: Camera install and second trial of Reolink E1 outdoor model for problem with blurry image but same problem occurred - third camera install of Reolink model RLC-510A, a dual fixed-focus camera which provides a doubled field of view.

- UNCW: Shipped a camera and installation/setup instructions to a homeowner on the East coast of Florida. They were able to install the camera and work with the project data manager to ingest the stream and post it online.

Obj 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products: 97% Complete

- Maintained WebCOOS portal and access to all webcams.
- Created temporary links for Walton lighthouse webcam, and seal detection at the marine mammal center while awaiting Axiom to incorporate these into webcoos.org.

<https://users.soe.ucsc.edu/~fkhan4/ipcam.html>

https://users.soe.ucsc.edu/~fkhan4/point_reyes.html

Obj 2.3) Standardize webcam imagery and metadata documentation and delivery: 100% Complete

- Maintained a continuous iteration of schema-based webcam metadata profile; Display of standard image products: Live video, 10 minute clips, and stills available on individual webcam pages.

Obj 2.4) Develop end-to-end data management workflow integration: 85% Complete

- Provided software engineering and cyberinfrastructure support for the data management and analysis system.
- Data management workflow is completely documented and available via the [WebCOOS website](#). Each webcam can be a bit unique so each ingestion involves hands-on support from Axiom staff and will lead to updates in the documentation as more is learned about these webcam systems.
- Continue testing and operationalizing of the ingestion process for additional data products including code, time series data, and georectified imagery.
- USC: Worked with Axiom staff to access imagery via Amazon 'Rekognition' type service for future object detection processing. Discussed API usage for summary totals with Axiom staff.

Obj. 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms: 50% Complete

- Continue to collect data and retraining ML models to improve model accuracy.
- UNCW - compared automated shoreline detection algorithms to manual QA/QC to detect at 55% accuracy in identifying suitable shorelines at the Oak Island camera.

Goal 3) Automate and validate downstream processing of webcam data;

Obj 3.1 Further develop detection algorithms: 90% Complete

- Developing pathway to run rip models on Currituck and Holland Beach in order to evaluate model accuracy.
- UNCW: Ran shoreline detection algorithms at four sites with more than 1-year of data at each site for QA/QC purposes.

Obj 3.2) Develop operational prototype products: 75% Complete

- USC: Worked with UCSC to define a webpage user interface to set notifications on riptide detections.
- UNCW: Undergraduate REU student worked for 10 weeks on developing boat detection algorithms for cameras in the intracoastal waterway.

Obj 3.3) Validation of prototype: 50% Complete

- USC: Ran and provided some [example detection](#) from beach drone footage

Obj. 3.4) Operationalization of approach and resultant output: 10% Complete

- Nothing to report

Goal 4) Package image products into geographically and thematically transferable decision-support tools.

Obj 4.1) Develop, validate and operationalize a 'situational monitoring and reporting' tool: 75% Complete

- USC: An ASPH MPH student (Samantha Hulette) has begun an Integrated Learning Experience focusing on the variety of data that are being collected in the Rosemont Community and identifying community-identified products and modes of distribution.

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

- UCSC Phd student Akila de Silva expected to defend his dissertation in Fall 2023. He will be joining San Francisco State University as an Assistant Professor starting January 2024.
- UCSC MS students Nicholas Tee and Omkar Ghanekar are working with Akila to extend results of RipViz to more generalized flows, specifically vortex boundary detection.
- UCSC Phd student Fahim Khan is working with undergrads Chinmay Gowdru and Kevin Young on data labeling, Elmer Vasquez on data augmentation, and 5 high school students through the Science Internship program to provide additional use cases for SmartCS.
- USC: We are engaging graduate students in our ASPH MPH Program and the Masters in Earth and Environmental Management (MEERM) program in community engagement and science translation.

- UNCW: Masters students Jeremy Braun defended his thesis and is now a data manager with the US Army Corps of Engineers Field Research Facility.

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

- Resubmitted papers on RipScout (formerly DroneML) to Coastal Engineering, SmartCS to Citizen Science Journal, and working on a new paper on vortex boundary detection (offshoot of work on RipViz). Obtained grant to develop RipFinder (phone based app) from SeaGrant, and coastline monitoring for beach safety from UCSC Center for Coastal Climate Resilience.

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

Objective 1.1) Identify and engage Tier 1 and 2 users

- We expect to continue product development and will engage with more users as testers of these products during the next reporting period.

Objective 2.1) Engage with identified cameras of opportunity

- **SECOORA:** New camera of opportunity in the works with USGS on Madeira Beach. Work continues to integrate USGS cameras into the system, which if successful, could expand the network significantly.

Objective 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products

- Maintain WebCOOS portal and make requested updates and changes.
- Add time series data products to camera pages

Objective 2.3) Standardize webcam imagery and metadata documentation and delivery

- Maintain WebCOOS system documentation on the WebCOOS website, making updates as needed

Objective 2.4) Develop end-to-end data management workflow integration

- Maintain data management workflow.
- Maintain data products developed by science PIs and continue to iterate for improved visualization and use.

Obj 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms

- We expect to further evaluate and develop QA/QC protocols for camera streams & detection algorithms.

Objective 3.1) Further develop detection algorithms

- UNCW: Continue work of storm-related dune impacts using shoreline detection methods.

Objective 3.2) Develop operational prototype products

- USC: Work towards using Amazon Rekognition service for object detection labeling of images

Objective 4.1) Develop, validate and operationalize a ‘situational monitoring and reporting’ tool

- USC: We will continue to work with our community partners and engaged organizations to define and refine data and derived information needs including methods of information dissemination.
- UNCW: Finalize QA/QC of shoreline projects at four cameras for suitable shoreline detection.

Products: Comments are required in Boxes 29 – 32 are required the first initial progress report. Subsequent reports will be prepopulated with the information from the previous report and have a limit of 4,000 characters. If the comment is blank, the “Nothing to Report” checkbox must be checked.

Box 29. Publications, conferences papers and presentations

- We submitted a paper entitled: “RipFinder: Real time Rip Current Detection on Mobile Devices” to AAAI track on: AI for Social Impact [August 15, 2023; under review]
- We submitted a revised version of earlier work on DroneML entitled: “RipScout: Realtime ML-Assisted Rip Current Detection and Automated Data Collection using UAVs” to Coastal Engineering [July 20, 2023; under review]
- We submitted a revised version of earlier work on SmartCS entitled: “SmartCS: Enabling the Creation of ML Powered Computer Vision Mobile Apps for Citizen Science Applications without Coding” to Citizen Science Journal [May 20, 2023; under review]
- Altman, K., B. Yelton, JR Viado, Z. Hart, L. Schandera, M. Carson, R.H. Kelsey, D.E. Porter, and D.B. Friedman. 2023. A Trio of Studies Examining Benefits of Partner-Engaged Qualitative Research with Environmental Health Researchers and Stakeholders to Improve Science Communication and Research Translation. Joint Oceans and Human Health Meeting, Ft. Myers, FL. Presentation. May 9-12, 2023.
- Altman, K., R.H. Kelsey, S. Libes, G.I. Scott, B. Kloot, D.E. Porter. 2023. Coastal Community Communication Structure to Share Socio-Environmental Information. Joint Oceans and Human Health Meeting, Ft. Myers, FL. Presentation. May 9-12, 2023.
- Porter, D.E., E. Altman, J. Cothran, H.R. Kelsey, P. Sandifer, and N. Miller. 2023. OHHC2I Community Engagement Core and EJ STRONG: Empowering communities to “use data and

sound science to make noise!”. Joint Oceans and Human Health Meeting, Ft. Myers, FL. Presentation. May 9-12, 2023.

- Porter, D.E., E. Altman, J. Cothran, H.R. Kelsey, P. Sandifer, and N. Miller. 2023. OHHC2I Community Engagement Core and EJ STRONG: Empowering communities to “use data and sound science to make noise!”. Environmental Justice and Equity MAP Webinar. March 2023. Invited virtual presentation.

Box 30. Technologies or technique

- Nothing to report

Box 31. Inventions, patent applications, and/or licenses

- Nothing to report

Box 32. Other products

- USC: We have continued to collaborate with the EPA EJ STRONG initiative and the NIEHS Center of Excellence for Oceans and Human Health and Climate Change Interactions and during this reporting period established a collaboration with the EPA Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTAC) Program (Porter has been appointed to the EPA Region 4 Community Advisory Board) to highlight the value of community-based environmental monitoring and reporting systems. These ‘systems’ which are geographically and thematically transfer demonstrate the value of community-led collaborations as we integrate monitoring activities supported by the SECOORA WebCOOS and Southeast Water Level Network with efforts supported by the EPA and NIEHS. These engagements have led to several proposals have been developed by community organizations to establish and maintain community environmental monitoring and notification systems.

Participants & Other Collaborating Organizations – Note that all comments boxes are required and the first report will always be blank. For comments boxes 33, 35 &36 subsequent reports will be pre-populated with the information from the previous report. Comments boxes have a limit of 4,000 characters. For comments boxes 34 – 36, if the comment box is blank, the “Nothing to Report” checkbox must be checked.

Box 33. What individuals have worked on this project?

PI: Debra Hernandez, SECOORA Executive Director

Lead Science PI: Dwayne Porter, Univ. SC

USC Graduate Student: Louisa Schandera

Senior Software Developer: Jeremy Cothran

Co-PI: Joseph Long, Univ. NC Wilmington

UNC Undergraduate Student: Kelsea Edwing, Summer Banning, and Drew Davey

UNCW Graduate Student: Jeremy Braun

Co-PI: Alex Pang, Univ. California Santa Cruz

UCSC Graduate Students: Akila de Silva, Fahim Khan, Omkar Ghanekar, and Nicholas Tee

UCSC Undergraduate Student: Mona Zhao, Elmer Vasquez, Kevin Young, Chinmay Gowdru

Co-PI: Kyle Wilcox, Axiom Data Science

Axiom Project Manager: Lauren Showalter

Box 34. Has there been a change in the active other support of the Project Director/Project Investigator(s) or senior/key personnel since the reporting period?

- Axiom: Technical Project Lead and PI for Axiom Data Science, Kyle Wilcox, resigned from Axiom in June. Axiom is filling the gaps with other technical experts.
- SECOORA: Project Manager Megan Trembl's contract ended with SECOORA in August 2023. There is funding for a full time manager with the new OTT funding to transition WebCOOS to a national effort, and that person will also handle the final year of this project.

Box 35. What other organizations have been involved as partners?

- Working with Sea Grant office (Ashleigh Palinkas) on RipFinder. Will commence working with Borja Reguero (UCSC Institute of Marine Science), Jonathan Warrick (USGS), and David Gutierrez (SandS) on shoreline monitoring and beach safety.

Box 36. Have other collaborators or contracts been involved?

- We have established and maintained collaborations with a growing number of organizations including:
 - Lowcountry Alliance for Model Communities (LAMC)
 - Charleston Community Research to Action Board (CCRAB)
 - EPA's Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTAC) Program and EJ STRONG initiative
 - NIEHS Center of Excellence for Oceans and Human Health and Climate Change Interactions
 - SC Maritime Museum
 - Near Center for Climate Studies
 - In-Situ

Impact – Note that all comments boxes are required and the first report will always be blank. For comments boxes 37 - 43 subsequent reports will be pre-populated with the information from the previous report. Comments boxes have a limit of 4,000 characters. For comments boxes 37 - 43, if the comment box is blank, the "Nothing to Report" checkbox must be checked. For comment box 44, only the percent is required (even if it is a zero), the explanation is not required.

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

Box 38. What was the impact on other disciplines?

- Nothing to report

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

- USC: We currently have two graduate students and one undergraduate student engaged in our WebCOOS activities.

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

- UCSC is offering a new class on Augmented Reality and Virtual Reality. Originally scheduled for Fall 2023, but will likely be moved to Winter 2024. The phone based apps that Fahim is developing are examples of AR.

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

- Nothing to report

Box 42. What was the impact on technology transfer?

- Nothing to report

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

- A community-based environmental monitoring and notification system consisting of a water level sensor and a webcam was installed in June in the marsh adjacent to the Austen Avenue bridge in the Rosemont Community of Charleston. The purpose of the system is to monitor water levels and document flooding and drying of the bridge to inform community members as to conditions rendering the bridge unsafe for vehicular and pedestrian traffic.
- The City of Georgetown (SC) Police Department are using the WebCOOS webcam, installed at the SC Maritime Museum to monitor river and riverfront activities and flooding, to monitor for public safety.
- Rosemont Community members (Ms. Cora initiated) were monitoring the flooding that took place on Sunday, 17 September 2023, and contacted USC (Jeremy Cothran) to make sure the Peace Street WebCOOS camera was activated to document flooding (<https://webcoos.org/cameras/rosemontpeace/?gallery=rosemontpeace-10-minute-stills-s3>).

Box 44. What percentage of the award is budget was spent on foreign countries?

Enter Percent: 0%

Changes/Problems – Note that all comment boxes are required fields and have a limit of 4,000 characters. If the comment box is blank, the “Nothing to Report” checkbox must be checked.

Box 45. Changes in approach and reason for change

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

- Nothing to report

Box 47. Changes that had a significant impact on expenditures

- Nothing to report

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

Not Applicable.

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