



# CARICOOS

## CALL FOR EXPRESSIONS OF INTEREST

Sept 10<sup>th</sup>, 2020

### **SYNOPSIS:**

The Caribbean Coastal Ocean Observing System ([CARICOOS](#)) is seeking expressions of interest (EOIs) for collaborations on the operation, maintenance, enhancement, and outreach of the program. We welcome submissions from academic institutions, profit and non-profit organizations, and federal & state governments. EOIs to operate, maintain, and enhance our existing infrastructure, as well as pilot projects to further develop our observing and modeling subsystems are welcome. Projects that augment the reach of CARICOOS data and products are especially encouraged. All projects must respond to a well-documented user need and culminate on a concrete data product or service. CARICOOS expects to devote approximately 50% of its annual funding to these activities. Pending congressional appropriations, annual funding for the entire program may range between \$2.5-6M/yr for the next five years starting on June 1<sup>st</sup>, 2021, as expressed in the [Notice of Federal Opportunity \(NOFO\)](#). The deadline to submit your EOI is **October 7<sup>th</sup>, 2020**.

### **BACKGROUND:**

CARICOOS is one of eleven regional associations that constitute the coastal component of the [US Integrated Ocean Observing System \(IOOS\)](#). The mission of CARICOOS is the timely delivery of high-priority accurate and reliable ocean data to its stakeholders in the US Caribbean Exclusive Economic Zone. Since 2007, CARICOOS has provided citizens and entities in Puerto Rico and the US Virgin Islands with coastal ocean information, data, and products required for minimizing exposure to coastal hazards, supporting safe and efficient maritime operations and management of our coastal resources. In order to fulfill said mission, CARICOOS currently operates data buoys, an ocean acidification monitoring buoy, coastal meteorological stations, high frequency radars (HFRs), and ocean gliders, as well as wind, wave and coastal circulation models. Additionally, CARICOOS



shares data and products from partners and agencies. All data products and services are disseminated through our web portal and mobile apps.

## OBJECTIVES AND SCOPE:

In order to continue with its mission, CARICOOS will be presenting a proposal in response to [FY 2021 Implementation of the U.S. Integrated Ocean Observing System](#), which we foresee supporting CARICOOS operations for the upcoming 5 years. This opportunity will provide for sustaining existing activities which have proven to yield information of significant interest to our stakeholders, but also for the implementation of additional efforts focused on addressing emergent and yet to be provided for high-priority stakeholder needs. This call for EOIs aims to identify collaborators (individuals or entities) that can collaborate on the operation of CARICOOS and/or provide data (observational or numerical), products and/or services addressing informational gaps formally identified in our recent [user needs assessment](#) effort. Activities addressing additional data, products, or services will also be considered with proper justification of user needs. CARICOOS is particularly interested in identifying individuals or entities that can propose projects that focus on:

- Improving the quality and cost efficiency of current operations, products, and/or services.
- Designing, enhancing and/or implementing observing platforms and forecast products towards 1) assessing of potential threats to our region's access to benefits from relevant marine activities and ecosystem services; 2) enhancing the safety and efficiency of maritime operations; 3) minimizing exposure to coastal hazards; and 4) assessing climate variability.
- Implement outreach and education strategies and/or services that would further optimize the widespread and proper use of the national IOOS and CARICOOS data and services.
- Designing and implementing new data products that make use of existing data streams accessible to stakeholders.

## AREAS OF INTEREST:

A description of areas of particular interest to CARICOOS and its stakeholders, as well as potential projects, are provided below.

**Maritime operations:** CARICOOS is committed to continue providing coastal ocean observations and predictions that help improve the safety and efficiency of marine transportation and recreational activities. Situational awareness, operational support, and information sharing are fundamental necessities for maritime and port operations. CARICOOS is seeking to expand and improve its observational and modeling capabilities required for decision making, and appropriate planning of maritime and port operations. CARICOOS is interested in new projects that may contribute to a more efficient strategy in planning search and rescue operations; ensuring safe navigation and port operations; supporting emergency response to hazardous spills; among others. EOIs could address these needs by proposing projects that (but are not limited to):

- Promote the novel use of oceanographic (waves, currents) and meteorological (wind) sensors and platforms providing real-time acquisition and transmission to help ensure safe vessel operations around entrances to major seaports in Puerto Rico.
- Strengthen the CARICOOS HFR network to acquire data in a broad range of environmental conditions, sometimes in remote areas or where prolonged failures in the power grid occur. Utilize other technology components (e.g., solar panels, battery) to operate and reduce the system downtime.
- Develop a simplified visual representation for a website or mobile device that focuses on the prioritization of available content and functionalities for maritime and port operations.
- Improve CARICOOS circulation models (ROMS and FVCOM) to operational state through methods such as assimilation of HFR and mooring data.
- Develop and/or operate new ocean observing platforms such as, but not limited to, deep water data buoys, existing fish aggregating devices (FADs), autonomous underwater vehicles (AUVs), etc.
- Devise novel uses of existing oceanographic sensors and platforms to tackle challenging issues in ocean observing and prediction.

**Coastal hazards:** The CARICOOS region is constantly threatened by storm surge inundation, strong winds, and severe waves resulting from tropical and winter storms in the Caribbean and the Atlantic, respectively. These threats account for one of the highest per capita drowning rates in the US. Furthermore, the recurrent presence of potentially pathogenic organisms in coastal waters and the geological/geographical potential for a tsunami landfall represent unique challenges and opportunities for the region. CARICOOS strives to provide coastal information and decision support tools targeting coastal hazard prevention, preparedness, mitigation, and adaptation. Potential projects may propose to:

- Combine storm surge maps with freshwater inundation estimates to provide maps of total inundation.
- Implement shoreline monitoring techniques at critical locations to obtain long-term time series of beach evolution in response to normal and extreme events. This may include weekly and/or monthly beach profiles and/or a network of cost-effective coastal camera systems at selected beaches around Puerto Rico and the US Virgin Islands.
- Implement a natural coastal barrier assessment program to better understand their effectiveness in shoreline protection and their vulnerability to climate variability (e.g., sea level rise, increases in ocean temperature, pollutants and ocean acidification).
- Monitor and/or predict other coastal processes that may pose hazards to beachgoers.

**Coastal resource management:** Services provided by coastal ecosystems are of particular importance to the well-being of Puerto Rico and the US Virgin Islands. While fostering economic activity by attracting tourism and supporting fisheries and blue economy initiatives, these constitute barriers which provide essential protection from extreme wave events resulting from tropical cyclones and winter storms in the North Atlantic. During the last decades, sand dunes, coral reefs, mangroves and seagrasses have faced major challenges from overexploitation, exacerbated sediment and nutrient runoff and anthropogenic ocean warming. Also, ocean acidification has reached levels which are already compromising coral calcification and favoring carbonate sand dissolution. In addition to the above, with an already compromised integrity, coastal ecosystems were impacted by hurricanes Maria and Irma and major winter storm driven swell events. Moreover, the seasonal arrival of massive quantities of pelagic Sargasso since 2011 is now recognized as an additional persistent menace with diverse deleterious expressions.

To this end CARICOOS seeks to assess coastal ecosystems, along the nearshore to offshore gradient and including those undergoing restoration, to determine their health status, current exposure to threats, vulnerability and responses to climate change (sea level rise and heat waves), ocean acidification and extreme weather events. This data and information will support resource management decisions including undertaking mitigation measures and foreseeable ecosystem modeling initiatives.

Potential projects on this area may propose to assess the following information needs:

- Assessment of spatio-temporal water quality variability (water temperature, salinity and stratification, optical character, nutrients, suspended sediments/turbidity, organic carbon loading, metabolic status autotrophy) and acidification levels and variability.
- Sargasso monitoring, tracking and inundation forecasts.
- Exposure and response to extreme climate (wave, winds and currents) and potential mechanical damage.
- Hydrodynamics driving dispersion of organisms, pollutants (including microplastics), dissolved and particulate materials (i.e. nutrients, DOC), among others.
- Tracking of marine mammals and fish monitoring (IOOS ATN).
- Assessments of benthic assemblages and structure.

Observational approaches for the above could include satellite and local camera-derived remote sensing observations, “in situ” sensor measurements, sample collection/analysis at discrete locations and AUV based sensor measurements, among others. The design and construction of rapidly deployable and relocatable platforms hosting sensors/autosamplers is also of interest.

**Beach Water Quality:** The [CARICOOS beach water quality map](#) presents results from the latest Enterococci samples collected by the PR Environmental Quality Board, Surfrider Foundation and Blue Flag. A graph containing the full [historical data set](#) is also provided for each site. Additionally, experimental nowcasts will soon provide probability of EPA threshold exceedances for 30+ beaches around Puerto Rico. Latest samples are also presented in the [Pa’ la Playa Beach App](#) along with a beach grade spanning the last three months of samples.

CARICOOS welcomes EOIs that seek to increase sampling frequency at already sampled sites and/or incorporate new beach sites into the program. These efforts shall incorporate sampling, processing, and recording of data following EPA-approved protocols. Initiatives including modeling

and forecasting will also be reviewed, as well as new products seeking to integrate beach water quality data with other pertinent information.

**Outreach, Education and Engagement:** The mission of CARICOOS Outreach, Education and Engagement Subsystem is to raise awareness about CARICOOS data and products, educate about the correct use and full potential of CARICOOS data and products, and engage current and potential stakeholders. This subsystem operates the [CARICOOS School](#), [CARICOOS NEWS](#), the [CARICOOS newsletter](#) and social media accounts ([Facebook](#), [Twitter](#), [Instagram](#), [YouTube](#)). It also coordinates user- and/or product-specific workshops, webinars and K-12 activities.

CARICOOS seeks proposals that take our Outreach subsystem to the next level. Proposals for permanent exhibits, media tours, and public service announcements are especially welcomed. We will also evaluate proposals to maintain the current communication platforms described above and/or explore new communication avenues. Creative and sustained ways of raising awareness of CARICOOS products and services must be an integral part of each initiative.

**Integrated Data Products:** CARICOOS operates a network of five [oceanographic buoys](#), one ocean acidification monitoring buoy, five [high frequency radars](#), sixteen [weather stations](#), and nine [ocean glider lines](#). It also maintains operational forecasting models of [winds](#), [waves](#) and [currents](#). Data from observational and modeling assets is quality controlled and archived following NOAA standards. All data is available to the public for free using our [Thredds](#) or [ERDDAP](#) catalogs, as well as other services such as [NDBC](#), [IOOS Environmental Sensor Map](#), [CORDC](#), etc.

With this wealth of readily available information, CARICOOS has developed integrated data products to meet specific user needs. The [Yabucoa Port Dashboard](#) incorporates high-resolution wind and wave forecasts, tide predictions, and weather radar data near the Yabucoa port. This integrated data product is aimed at harbor pilots using the Yabucoa port and emerged from direct consultation with this stakeholder group. Other integrated data products include the [Breaker Height Forecasts](#) and the [Pa' la Playa](#) app for beachgoers, as well as the [CARICOOS Boating App](#) for recreational boaters.

CARICOOS is seeking EOIs that could expand the reach of CARICOOS observational and forecasting assets through the development of integrated data products. Examples include but are not limited to dashboards, simplified visualization tools, and mobile applications. User-specific needs must be well justified. For more information about integrated data products currently in place, please visit [www.caricoos.org](http://www.caricoos.org).

## ELIGIBILITY REQUIREMENTS:

### **Who is eligible?**

US-based academic institutions, federal, state and municipal agencies, academic institutions, profit and non-profit organizations, and individuals.

### **Requirements:**

- Each project **must** address a direct need of CARICOOS stakeholders
- Each project **must** result, within the project performance period, in a sustainable operational product or data stream that will aid with decision-making and which is of societal benefit and/or will increase the efficiency and resilience of a CARICOOS data stream or observing asset.
- Data yielding efforts should provide for its timely delivery to CARICOOS in an acceptable data format. For more information please visit our [Data Management Plan](#) and/or contact us.

## PREPARATION & CONTENT:

**Project budget:** For the past five years CARICOOS has operated the program at a funding level of approximately \$2M/year. For this new funding cycle CARICOOS will propose activities to fill two tier levels totaling \$3M/yr and \$6M/yr, as allowed in the NOFO. We welcome EOI's ranging from pilot projects seeking to better acquire, model or portray data on [caricoos.org](http://caricoos.org), all the way to major projects requiring major investments towards development of observational/modeling assets and/or products to fill important data gaps in the region. Given that the latter will require a major investment, its funding may require congressional appropriation of funds. Proposers are encouraged

to leverage funding and/or support from other sources, including CARICOOS existing assets, data management protocols, etc.

**Project Duration:** EOIs for project with performance periods of 1-5 years will be accepted.

**EOI format:** EOIs will only be accepted through our [online application form](#). The following information will be required:

- A description of the proposed project with goals, objectives and timeline.
- Specifics on the end-users of the data to be generated and the mechanisms of distribution.
- A preliminary budget and project duration (1 to 5 years).
- A description of how the proposed project fits CARICOOS focus areas, subsystems, and/or areas of interests here described.
- Curriculum Vitae of the principal investigator or project lead.

**Deadline and full proposal:** EOIs must be submitted through our online application form no later than October 7<sup>th</sup>, 2020. Respondents will be notified by October 21<sup>th</sup>, 2020 and those selected to form part of the CARICOOS five-year proposal will be asked to submit a proposal including a timeline and detailed budget narrative for inclusion in the submission.

### EVALUATION CRITERIA:

Projects proposed through the present EOI call will be reviewed by the CARICOOS technical team and by the CARICOOS Stakeholder Council (our Board of Directors). Evaluation will be based on the following criteria:

- **User need:** Does the proposed project directly address a data need by existing or potential users? Are these needs well established and justified?
- **Technical merit:** Is the project technically sound? Is the scope of the project feasible within the proposed project duration? Are the project proponents qualified to carry out the project?
- **Budget:** Are the project costs reasonable? Are existing efforts well leveraged, if applicable?



- **Capacity building:** Does the proposed project help build capacity and expertise within the CARICOOS region?

**ADDITIONAL INFORMATION:**

For additional information, please contact [Patricia Chardón](#), CARICOOS Technical Director; [Julio Morell](#), CARICOOS Principal Investigator and Executive Director; and/or [Ruperto Chaparro](#), Chairman of the [CARICOOS Board of Directors](#).