

CARICOOS Beach Water Quality and Pa' la Playa Beach APP

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LONG-TERM GOALS

CARICOOS beach water quality efforts aim at developing decision making tools to provide timely and accurate information to beachgoers and coastal managers across the region regarding beach water quality in their locality. This initiative is part of the CARICOOS Coastal Hazards Focus Area, as well as its Observational and Modeling Subsystems, and is well aligned with CARICOOS goal of integrating observations and models into coastal intelligence for the US Caribbean region.

The CARICOOS Beach App Pa' la Playa Beach is a collaborative effort with the San Juan Weather Forecasting Office and DDA Group that aims at providing accurate weather, waves and water quality information for 100+ beaches around PR and the US Virgin Islands in a simple, reliable, and easy-to-use mobile interface.

MILESTONES / OBJECTIVES

- A. Maintenance and further development of CARICOOS Beach Water Quality Products and the new Beach Water Quality Report Card.
- B. Develop new beach water quality nowcasts using CARICOOS and/or NWS WRF.
- C. Develop new beach water quality nowcasts using weather radar data.
- D. Maintenance and further development of the CARICOOS Beach APP.

WORK COMPLETED

- A. Maintenance and further development of CARICOOS Beach Water Quality Products and the new Beach Water Quality Report Card.

CARICOOS Beach Water Quality products (Figure 1) include two Beach Water Quality Nowcasts (Balneario/Rincón Town Beach and Playa Santa, Guánica), servicing of water quality data from Surfrider/CARICOOS and JCA, and the new Beach Water Quality Report Card. The latter provides a percent value corresponding to the amount of times each beach has resulted in below-limit water quality results for the previous three months.

Maintenance of the above-mentioned product is up-to-date. As of right now the Beach Water Quality Report Card has only been implemented in the Pa' la Playa Beach App, implementation in the CARICOOS portal will take place during the next semester.



Figure 1: CARICOOS Beach Water Quality Map with infoboxes including the two beach water quality nowcasts (Balneario/Rincón Town Beach and Playa Santa-Muelle) and examples of data served from JCA (Balneario de Salinas) and Surfrider/CARICOOS (Table Rock).

B. Develop new beach water quality nowcasts using CARICOOS and/or NWS WRF.

Previous efforts from this group have documented a strong relationship between beach water quality and precipitation. Since rain gauges are not available for every beach location, this effort aims at evaluating the feasibility of using CARICOOS and/or NWS Weather Research Forecasting Model (WRF) as input for the development and operation of beach water quality nowcasts.

As a first step, WRF precipitation data must be validated against in situ observations. We have started with CARICOOS WRF-NMM 1KM. Grid data corresponding to each beach location has been downloaded from CARICOOS Thredds server. Variables include: total accumulated precipitation, total accumulated rainfall, 10cm composite reflectivity, and maximum composite reflectivity.

In situ observations have been downloaded from Mesowest and Weather Underground online services. Over 150 stations were screened for data gaps and outliers, resulting in 80+ usable data sets (Figure 2). Validation analyses will take place during the following semester.

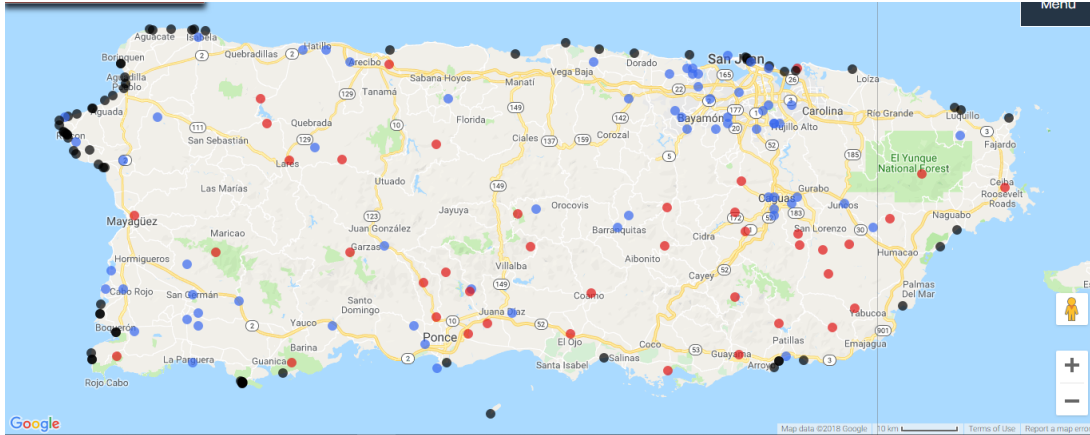


Figure 2: Map showing beach locations (black dots) with sufficient water quality data to develop nowcasts; and validation stations from Mesowest (red dots) and Weather Underground (blue dots).

C. Develop new beach water quality nowcasts using weather radar data.

Again, since rain gauges are not available for every beach location, this effort aims at evaluating the feasibility of using NEXRAD TJUA weather radar as input for the development and operation of beach water quality nowcasts.

There are two important data sources in this process: 1) historical 1-hr precipitation data for the development of nowcasts, and 2) real time and near-real time radar data for the operation of nowcasts. Historical data encompassing 2015-2018 have been downloaded and is currently in the process of conversion to NETCDF format. For the case of real time and near-real time radar data, we have only identified sources from which to obtain files in GIF format. Given that GIF images are not the most appropriate format for manipulation and conversion into 1-hr precipitation, we have instead opted for the NOAA Forecast API, which provides quantitative precipitation forecasts every six hours.

Correlation tests and subsequent linear regression analyses will take place during the following semester in order to develop the nowcasts.

D. Maintenance and further development of the CARICOOS Beach APP.

Pa' la Playa Beach App was successfully launched in the summer. Its design resulted from a customer discovery efforts that involved 100+ surveys. The final product integrates information from the National Weather Service (precipitation, wind speed and direction, temperature, weather alerts), CARICOOS Breaker Height Forecast (wave heights), and CARICOOS Beach Water Quality Products (sampling results, Beach Water Quality Report Card). It also provides photographs, aerial views, location services and sharing tools (Figure 3).

To date the application has been downloaded 6000+ times in Apple devices and 5000+ times in Android devices. During the upcoming semester we will focus on a new version of the app that provides the option to switch content to English; incorporates five days forecasts of breaker heights; and includes other static content pertinent to beachgoers (e.g. marine activities, facilities, jellyfish calendar, etc.).



Figure 3: Sample beach in the CARICOOS Pa' la Playa Beach App.

MAJOR OUTCOMES

CARICOOS Beach Water Quality program now includes the Beach Water Quality Report Card, available in the Pa' la Playa Beach App. The app includes 100+ beaches and is now fully operational with over 11,000 downloads.

RELATED PROJECTS

There are no related projects to report.

WORK PLAN FOR UPCOMING PERFORMANCE PERIOD (December 1st, 2018 – May 31st, 2018)

- A. Implementation of CARICOOS Beach Report Card in CARICOOS data portal.
- B. Validation of WRF precipitation data against in situ observations in order to assess the possibility of using WRF for the development of additional beach water quality nowcasts.
- C. Correlation tests and linear regression analyses of weather data for beach water quality nowcasts.
- D. Translation of Pa' la Playa Beach App to English and incorporation of further static data pertinent to beachgoers.

PUBLICATIONS & PRODUCTS

Rodríguez-Abudo, S., Chardón-Maldonado, P., Canals, M. and J. Morell, 2018, Nearshore Winds, Waves and Currents in Rincón, PR during Hurricane María, poster at CARICOOS 2018 General Assembly Meeting, Carolina, PR.

Rodríguez-Abudo, S., 2018, Delivering the New CARICOOS: The CARICOOS BEACH APP, presentation at CARICOOS 2018 General Assembly Meeting, Carolina, PR.