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Working Group 2 Tsunami Detection, Analysis and Forecasting
IOC Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions

CARIBE EWS SEA LEVEL DATA AVAILABILITY

2023 Report

Abstract

Report of coastal sea level stations and DARTs contributing to the CARIBE EWS in 2023. In December 2023, of the 198 stations in the CARIBE-EWS sea level inventory, data from 88 were available in support of tsunami warning.

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Acknowledgments

First and foremost, a special recognition to the sea level station operators and data analysts in the Caribbean and Adjacent Regions; they keep the stations running and create awareness on data issues. Our appreciation also goes out to Stuart Weinstein from the Pacific Tsunami Warning Center for generating the monthly reports and maps on sea level status and for his support and updates to the Tide Tool sea level data analysis program. We also acknowledge Tjess Hernandez and Bart Vanhoorne from the IOC Sea Level Monitoring facility for maintaining this vital tool and clarification on station status and data formats. An acknowledgment also to the International Tsunami Information Center Caribbean Office , especially, Claudia Soto Guzmán Soto, Jelis Sostre Cortés, Desiree Bayouth-García, and Christa von Hillebrandt-Andrade for tracking station status and preparing this report.

Summary

Real-time sea level data is one of the essential data streams of a tsunami warning system. Tsunami Warning Centers use seismic data to determine whether there is potential for a tsunami threat following an earthquake. Sea level data are used to detect and confirm the tsunami generation, help forecast its severity, and declare the threat is over. In the case of tsunamis generated by a non-seismic source, the sea level data will be the primary tool for the detection and evaluation of the threat. The main types of sea level data used to detect tsunamis are coastal sea level stations and tsunameters (DARTs).

Since 2010, at the request of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS), the Caribbean Office of the International Tsunami Information Center has maintained an inventory of the sea level stations used for tsunami monitoring and warning in the region. It shares and posts monthly maps on the status of sea level data from the Pacific Tsunami Warning Center, periodically updates and posts the inventory of stations and their status, and produces an annual report on sea level stations and data availability.

For this report, data availability is reported from the UNESCO/IOC Sea Level Station Monitoring Facility (SLMF) for the coastal sea level stations and most recently, DART stations. The data availability at the NOAA National Data Buoy Center is reported in the case of the DARTs and at the Pacific Tsunami Warning Center, as the designated Tsunami Service Provider for the CARIBE EWS, for both DART and coastal sea level stations.

In this report, some stations in Brazil were added, and the Barbados Meteorological Services started sharing their station's information. Barometric Pressure information was also added to the report as an additional column which indicates if there is barometric pressure information available for that station.

In December 2023, of the 198 stations in the CARIBE-EWS sea level inventory, 88 were contributing data in near real-time for tsunami warnings. This includes 7 of the 11 DART stations. In contrast, in December 2022 there were a total of 184 stations and 68 contributing.

Introduction

Since 2010, the International Tsunami Information Center Caribbean Office (ITIC-CAR), previously called the Caribbean Tsunami Warning Program, CTWP, has been reviewing the status of seismic and sea level stations contributing to the CARIBE EWS. In 2021, it transitioned from preparing monthly to biannual reports on the status of coastal sea level stations and DARTs. The PTWC also prepares monthly maps on sea level data availability at their center and ITIC-CAR has posted these on iticcar.org as well as shared with CARIBE EWS WG2 and operators of sea level stations.

At its Fourteenth Session, the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions, (ICG/CARIBE EWS-XIV) in its recommendation ICG/CARIBE-EWS-XIV.2 on Tsunami Monitoring and Detection Systems:

- Requested CTWP to continue producing up to date maps and data availability reports based on current sea level and seismic stations contributing to the CARIBE-EWS.

Furthermore, at its Fifteenth Session, which took place online on 27–29 April 2021, the ICG/CARIBE EWS-XV) in its Recommendation ICG/CARIBE-EWS-XV.1 on Tsunami Monitoring and the Systems:

- Appreciated the NOAA Caribbean Tsunami Warning Programme (CTWP) for improving the automated processing and reporting on the status of seismic and sea level stations

- Urged Member States and sea level station operators contributing to CARIBE-EWS to maintain their sea-level stations to an operational standard,
- Also urged Member States and sea level station operators to regularly review and update the status of sea level stations in the web pages of the IOC's Sea Level Station Monitoring Facility and in the CTWP reports prepared on behalf of the CARIBE-EWS,
- Recommended a survey of sea-level network operator status by WG1 and ITIC-CAR with the goal of improving the up time of the sea-level network,

The Sixteenth Session of the ICG/CARIBE-EWS took place from 25-28 April 2023 in San Jose, Costa Rica and was the first in person meeting since 2019. In its recommendation, ICG/CARIBE-EWS-XV:

- Revised the ICG-CARIBE Working Groups and Task Teams and changed them to:
    - Working Group 1: Tsunami Risk Knowledge
    - Working Group 2: Tsunami Detection Analysis and Forecasting
    - Working Group 3: Tsunami Warning Dissemination and Communication
    - Working Group 4: Tsunami Preparedness, Response and Mitigation
    - Task Team CARIBE WAVE
- Appreciated the International Tsunami Information Center Caribbean Office (ITIC-CAR) of the National Oceanographic and Atmospheric Agency (NOAA) and the Pacific Tsunami Warning Center (PTWC) for improving the processing and continued reporting on the status of seismic and sea level stations;
- Requested WG2 on Tsunami Detection, Analysis and Forecasting to review the status and effectiveness of the current reporting mechanism and propose at the Seventeenth Session of IGC/CARIBE-EWS (ICG/CARIBE-EWS-XVII) a model moving forward without ITIC-CAR support.
- Noted the rapid deployment of sea-level monitoring instrumentation in response to the tsunami hazard posed by the eruptive activity and potential pyroclastic flows of La Soufrière Volcano on Saint Vincent and Mt Pelée on Martinique;
- Further Noted that a high percentage of the stations in the CARIBE-EWS sea level network are currently non-operational and therefore can delay the proper assessment of tsunami events and the issuance of timely and accurate tsunami alerts;
- Appreciated the planned hosting of a five day Tides Training Course to be taught in Spanish for both oceanographic and hydrographic organizations jointly organized and funded by the International Hydrographic Organization (IHO), the International Maritime Organization (IMO), and the Intergovernmental Oceanographic Commission (IOC). The dates for this training will be 13-17 November 2023 and the venue will be located in Costa Rica;
- Urged Member States and operators of sea level stations contributing to ICG/CARIBE-EWS to maintain their sea-level stations in an operational status, regularly review and update the status of its stations in the IOC Sea Level Monitoring Facility, and inform ITIC-CAR and the Secretariat on plans for repair;

- Recommended a survey of sea-level network stations status updates by WG2 and ITIC-CAR with the goal of improving the uptime of sea-level network.
- Encouraged NOAA to rapidly repair two Deep-ocean Assessment and Reporting of Tsunami (DART) buoys that stopped transmitting data in 2022;
- Recommended that seismic and sea-level network operators seriously consider the experience from Hurricanes Harvey, Irma, Maria and Nate to increase the resilience of sea-level facilities to powerful hurricanes;

This report covers these recommendations.

Sea Level Stations Status Categories for 2023

In 2019, at the *Fourteenth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions, (ICG/CARIBE EWS-XIV)* the status categories for sea level stations were updated to the following:

Contributing Real Time (Contributing RTX)	Also known as Active on the SLMF. Data from these stations have been available for the past month in real-time or near real-time through FTP or GTS (GOES), are accessible to tsunami service providers and tsunami warning centers, and can be accessed through Tide Tool, IOC SLMF, and other sites. For reports prepared through 2018, once a station was contributing in real time, it always remained with this status, irrespective of its operational status. There were stations that had not been contributing data in real-time for months or even years. These non-contributing stations are now classified as down, being consistent with the SLMF.
Existing	Stations that are understood to be operational through national reporting, GLOSS, or other mechanisms, but whose data are not shared and are not available in real-time or near real-time.
Down	These stations at one point were Contributing in Real Time but for a period of a month or longer have not been sharing data. There is the expectation that the data from the station will become available in the future.
Planned	Stations that Member States or Network Operators have indicated they have funding for and are in the process of acquisition or installation.

Gap	Station locations that the CARIBE EWS has indicated are of high priority but for which no funding has been identified for their acquisition, installation, and operation.
Removed	Stations that have been removed or relocated.
Unknown	Stations for which there is no data on their current operational status.

This classification was used for the 2023 biannual sea level reports as well as this report. Figure 1 shows the status of the 198 coastal stations in the inventory at the end of 2023. Graph 1 shows the biannual number of sea level stations from December 2020 through December 2023 for which data was contributing close to real time (Contributing RTX). According to the statistics, there has been an increase in the total number of Contributing RTX stations, from 68 stations contributing at the end of 2022 to 88 in December 2023. Graph 2 shows all the status categories used for each six-month term. The biannual reports/maps were also posted to the ITIC-CAR website (iticcar.org). Appendix A has a table with the status of all the stations as of December 2023.

For the Contributing Real-Time stations, the performance ratio statistics per station are based on the data from the UNESCO IOC Sea Level Monitoring Facility (SLMF), and the data from the Pacific Tsunami Warning Center (PTWC) was also used.

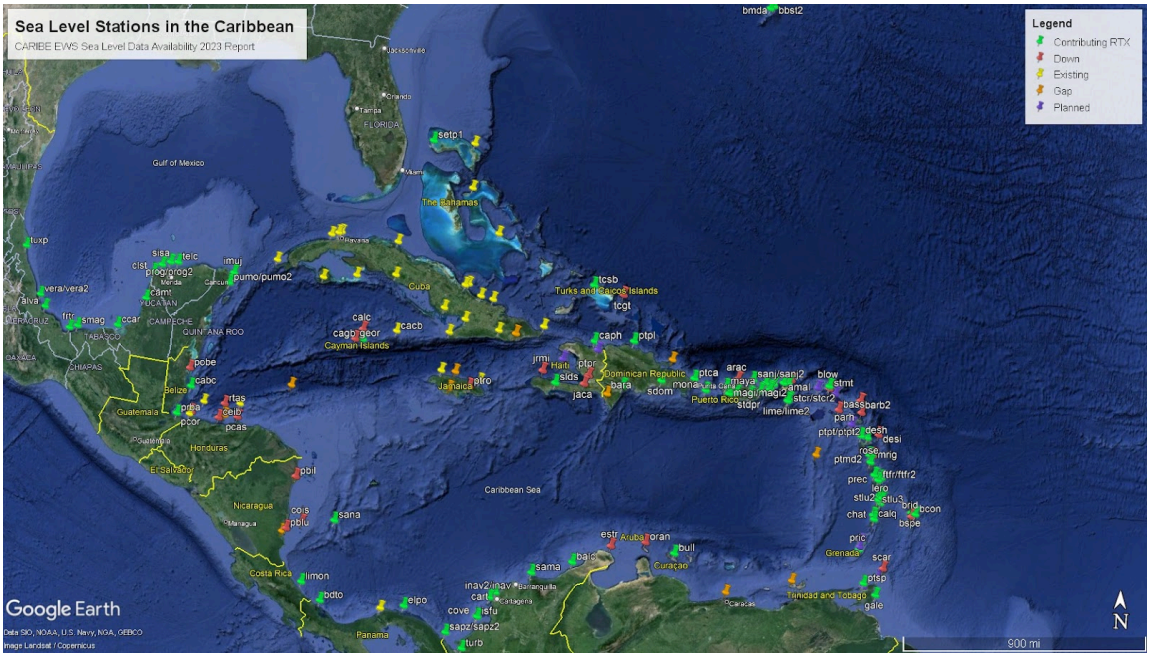
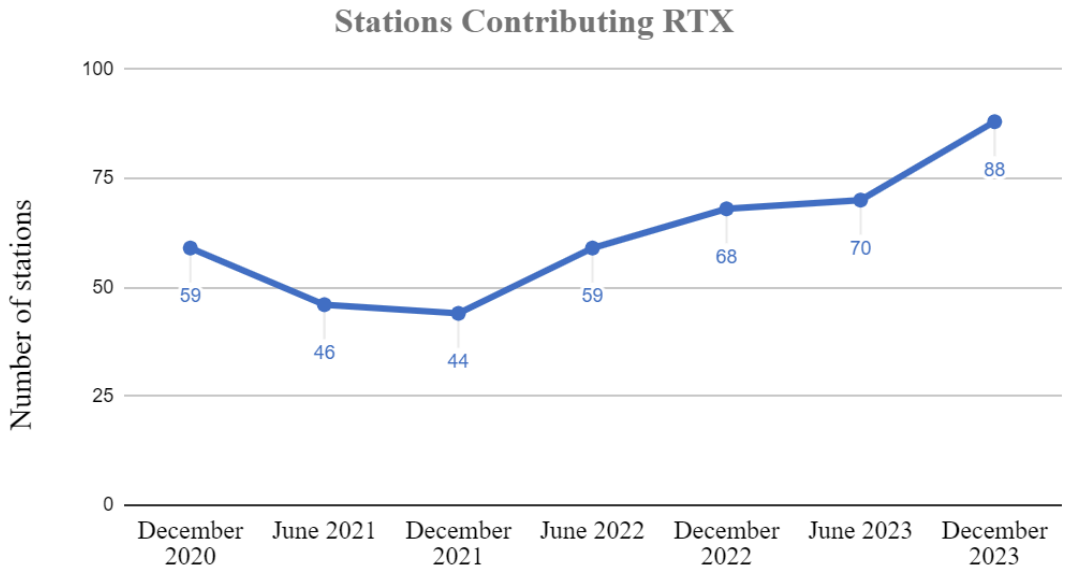
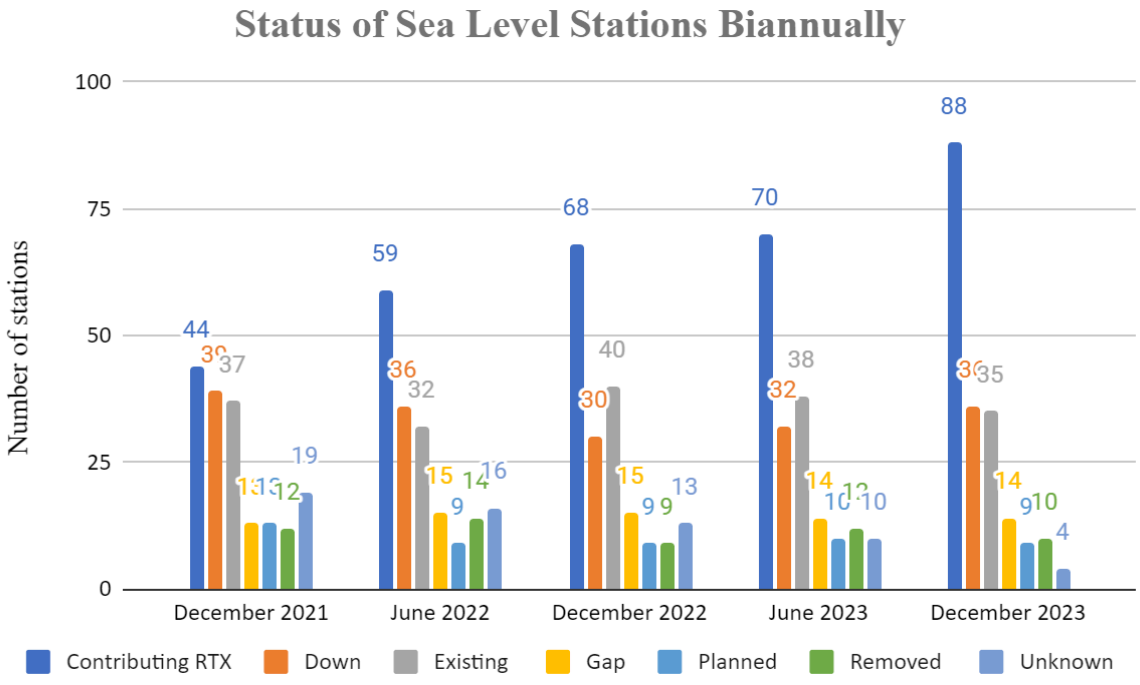


Figure 1. December 2023 Sea Level Stations Status.



Graph 1. Biannual variability of the number of Contributing RTX coastal sea level stations and DARTs from December 2020 through December 2023.



Graph 2. Station Status 2021-2023

UNESCO - Intergovernmental Oceanographic Commission (IOC) Sea Level Monitoring Facility (SLMF)

The objectives of this service are:

- to provide information about the operational status of global and regional networks of real-time sea level stations;
- to provide a display service for quick inspection of the raw data stream from individual stations.

This service and website (Figure 2) initially focused on the operational monitoring of sea level measuring stations in Africa and was developed in collaboration between Flanders Marine Institute (VLIZ) and the ODINAFRICA project of IODE. The site has since been expanded to a global station monitoring service for real-time sea-level measuring stations that are part of IOC programs, i.e. (i) the Global Sea Level Observing System Core Network and (ii) the networks under the regional tsunami warning systems in the Indian Ocean (IOTWMS), Northeast Atlantic & Mediterranean (NEAMTWS), Pacific (PTWS) and the Caribbean (CARIBE-EWS).

In the case of the IOC SLMF, the performance ratios of the desired stations for specific time periods are accessed. A manual check is done to verify operational status and check inconsistent data. For example, if there is no sea level data, a station might appear as Contributing RTX on IOC SLMF if data on battery voltage is available. ITIC-CAR and the managers of the IOC SLMF are regularly comparing data.

A document with figures highlighting the variability of data availability per station and sensor in SLMF can also be accessed through the ITIC-CAR website. Figure 2 shows a screenshot of the map of coastal sea level stations in the IOC SLMF database taken on January 8, 2024. As of February 2023, SLMF has been including DART stations' availability on their website. More information on DARTs will be discussed in another section of this report.

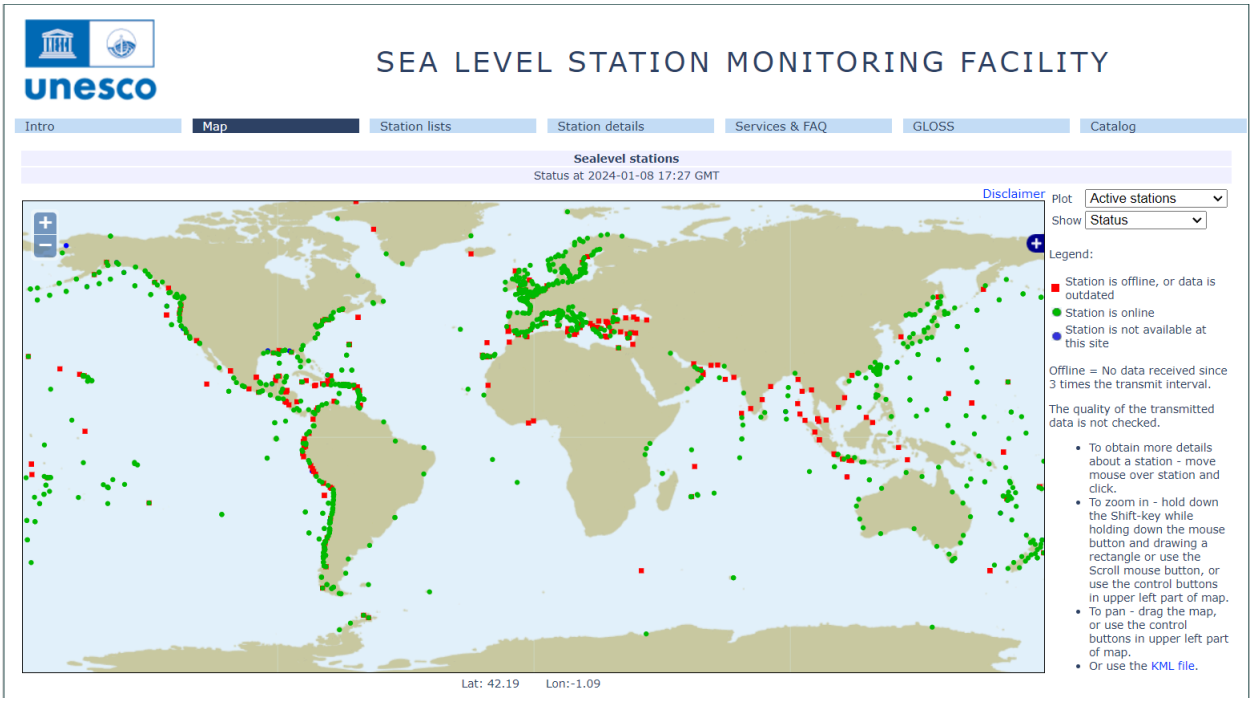


Figure 2. Screenshot of IOC Sea Level Monitoring Station Website on Map on January 8, 2024

Pacific Tsunami Warning Center (PTWC)

The Pacific Tsunami Warning Center (PTWC) operated by the United States National Weather Service of NOAA served from 2005-2015 as the interim Tsunami Warning Center. Since 2016 the PTWC has been designated as a Tsunami Service Provider (TSP) for the Tsunami and Other Hazards Warning and Mitigation System for the Caribbean and Adjacent Seas (CARIBE-EWS), a subsidiary body of UNESCO's Intergovernmental Oceanographic Commission (IOC).

Products issued by PTWC to countries around the Caribbean in support of this mission have evolved over time as supporting data, analysis methods, computational capabilities, and communications have all improved. The products developed by the PTWC are only advisory for the CARIBE EWS Member State. National authorities are responsible for determining the level of tsunami alert within each Member State.

On 1 March 2016, the US NOAA Pacific Tsunami Warning Center (PTWC) commenced issuance of new forecast-based Enhanced Tsunami Products for all Caribbean countries. The PTWC, PTWS, and CARIBE-EWS products use the same forecast methodologies and the same graphical formats to depict the tsunami threat for the basin and coastal polygons.

The PTWC depends on sea level data to confirm, forecast, and determine the end of the threat from tsunamis in the region. In the case of non-seismic generated tsunamis, sea level data is the main mechanism used to detect and inform on tsunami threat. Over the past years, the PTWC has been developing an alarm event detection system based on sea level data.

Since November 2019, the PTWC data have been incorporated into the ITIC-CAR Sea Level biannual reports to compare the data reported by the IOC SLMF with the data from PTWC. Stations reported in the PTWC are also included in the Tide Tool Sea Level Data Analysis Program. The PTWC-generated map for December 2023 is shown in Figure 3. The color legend is included in the map; sea level stations are represented as circles while the DART stations are represented by triangles. These maps show the ranges of percentage availability of the *Contributing RTX* stations. *Down* stations are reported in black. *Removed*, *Planned, Gap,* and *Unknown* stations are not included in the PTWC reports, nor do they appear on this map.

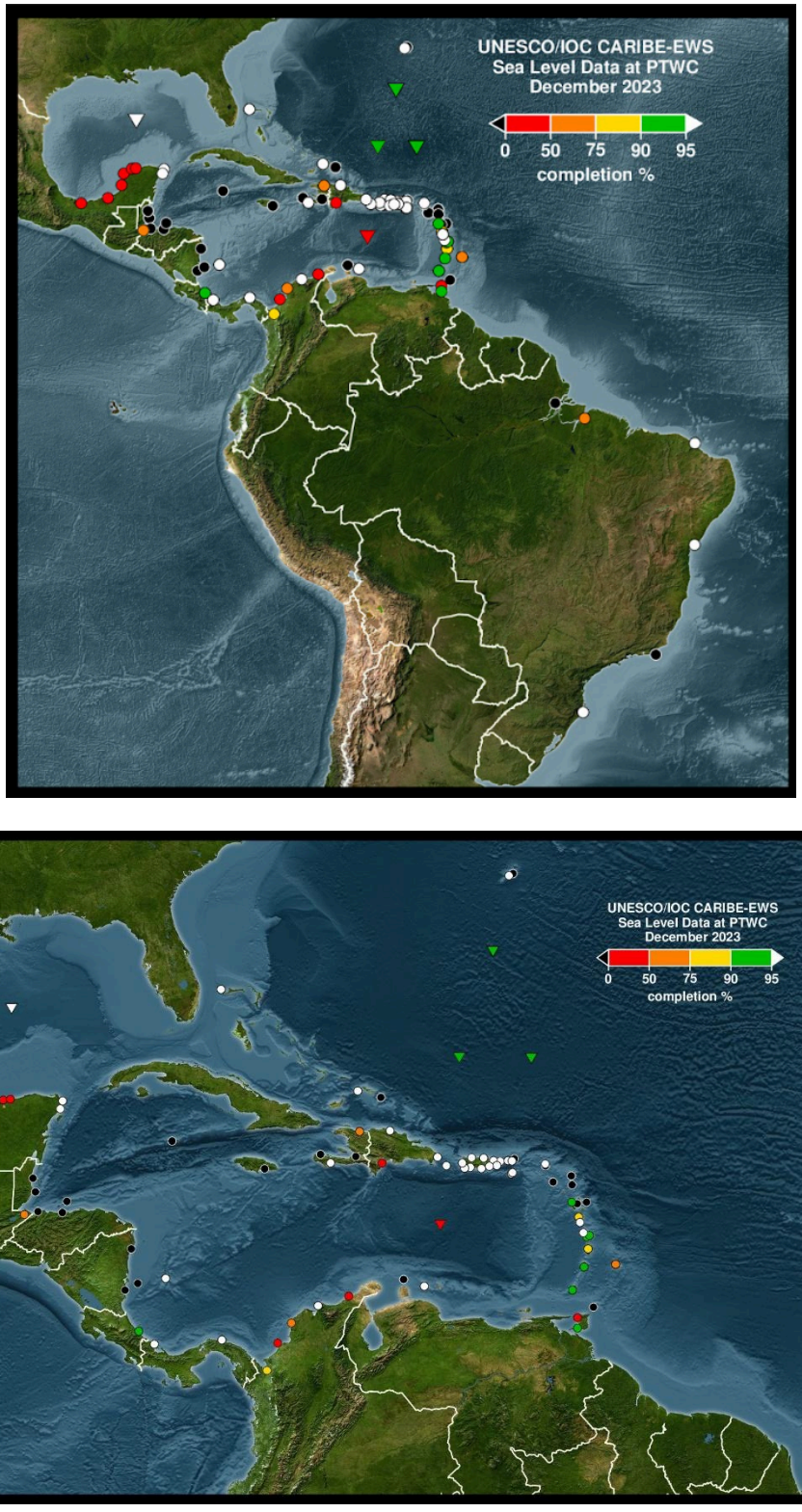


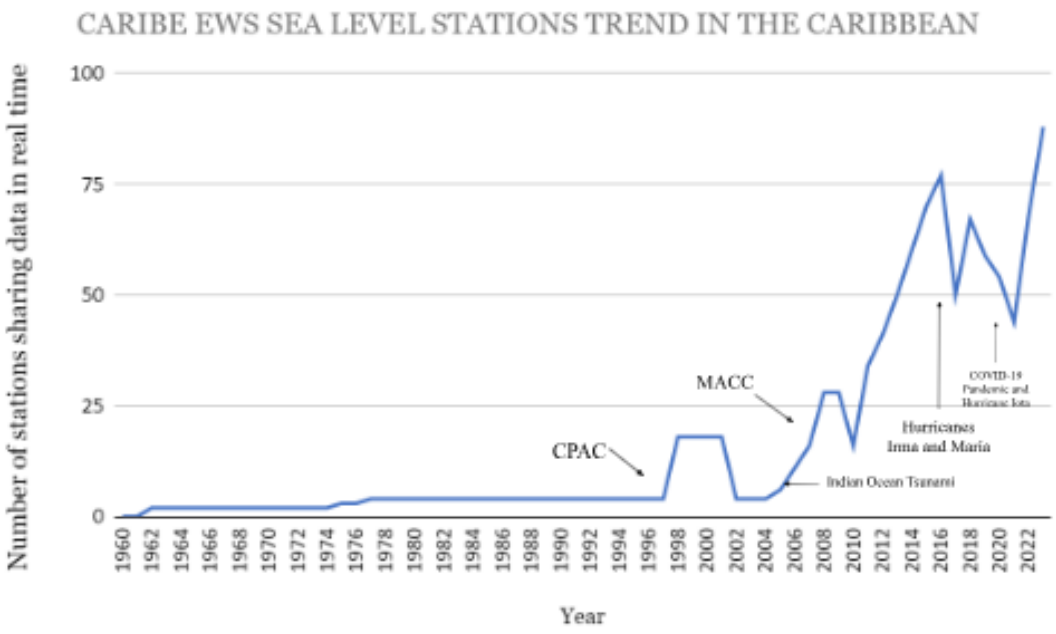
Figure 3. Regional and Expanded maps of status data from Sea Level and DART Station at PTWCs for December 2023. Circles represent coastal sea level stations and triangles, DARTs. The percentage refers to the percentage of data received at the PTWC within 15 minutes of recording.

Contributing RTX Sea Level Stations

The number of Contributing RTX stations increased during the 2022 to 2023 period from 68 stations in December 2022 to 70 stations in June 2023 and then 88 in December 2023 (Table 1). Note that the usual change goes from *Contributing RTX* to *Down* and vice versa. There were a few stations removed, and others reinstalled. Also, new stations were installed in Barbados, Anguilla, and Montserrat. Other stations like Cartagena from Colombia were repaired. Some stations in Brazil were also added to this report, and the Barbados Meteorological Services has also started sharing their station's information. Barometric Pressure information was added to the report as an additional column which tells if there is barometric pressure information available for that station. The evolution of sea level observations since 1960 is highlighted in Graph 3. In 2022, after several years of decreasing data availability due to the impacts of Hurricanes Irma, Maria, Eta, and Iota and COVID 19 the trend has reversed thanks to contributions of Member States and Donors.

Status by amount						
	Jun-21	**Dec-21**	**Jun-22**	**Dec-22**	**Jun-23**	**Dec-23**
Contributing RTX	46	44	59	68	70	88
Down	55	39	36	30	32	36
Existing	30	37	32	40	38	35
Gap	13	13	15	15	14	14
Planned	13	13	9	9	10	9
Removed	7	12	14	9	12	10
Unknown	1	19	16	13	10	4

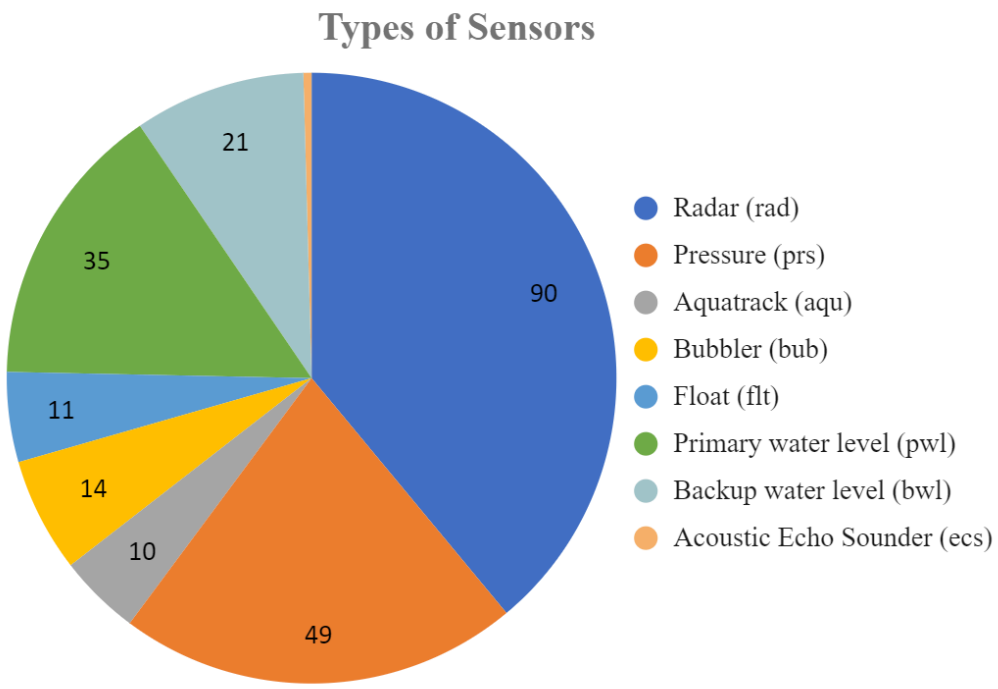
Table 1. Status of Sea Level Stations from June 2021 – December 2023.



Graph 3. Number of operational coastal sea level stations 1960 to 2023.)

Of the 198 stations being reported, 187 stations are coastal sea level stations and 11 are DARTs. The DARTs are going to be discussed in another section of this report. For the coastal Sea Level stations, each station has one or more sensors: radars (rad, ra1, ra2), pressure (prs, pr1, pr2), float (flt), or acoustic (Aquatrack, aqu). Graph 4 shows the distribution of types of sensors. For US stations, the nomenclature of the primary water level sensor (pwl) or backup water level sensor (bwl) is used depending on operational status, not on the type of sensor. In the past, the pwl were mostly Aquatrack sensors, but these have been replaced with radar sensors, while bwl sensors are bubblers or pressure sensors.

For December 2023, 88 stations were contributing RTX while 36 stations were down. The other 74 stations are existing (data not available), removed, planned, unknown, or represent gaps in monitoring.



Graph 4. Types of sensors for 2023.

DART

To facilitate early detection of tsunamis and to acquire data critical to real-time forecasts, NOAA operates Deep-ocean Assessment and Reporting of Tsunami (DART®) stations at sites in regions with a history of generating destructive tsunamis. NOAA completed the original 6-buoy operational array (map of original six stations) in 2001 and expanded to a full network of 39 stations in March 2008. See DART® development for more info. Since 2008 there have been changes in locations and upgraded technology.

The National Data Buoy Center (NDBC) currently is responsible for the operation of the DARTs. However, the Pacific Tsunami Warning Centre and the IOC Sea Level Monitoring Facility also report DART stations' availability using NOAA web services.

The DARTs in the Caribbean and Atlantic that are included in the report are Northeast Castle Rock Seamount (DART 44401), Southeast Block Canyon (DART 44402), Sable Island Bank (DART 44403), Southwest Bermuda (DART 41425), East Charleston (DART 41424), South of Puerto Rico (DART 42407), Gulf of Mexico (DART 42409), East Gulf of Mexico (DART 42408), Dart Wave Glider Station West Florida Area (DART 42429), North of St. Thomas (DART 41421) and North of Santo Domingo (DART 41420). At the end of 2023 the only stations reporting data online were the DARTs in the Southeast Block Canyon, Sable Island Bank, Southwest Bermuda, South of Puerto Rico, Gulf of Mexico, North of St. Thomas, and North of Santo Domingo (Figures 4 and 5). Graph 5 illustrates the variability of the availability of DART data between December 2020 and 2023.

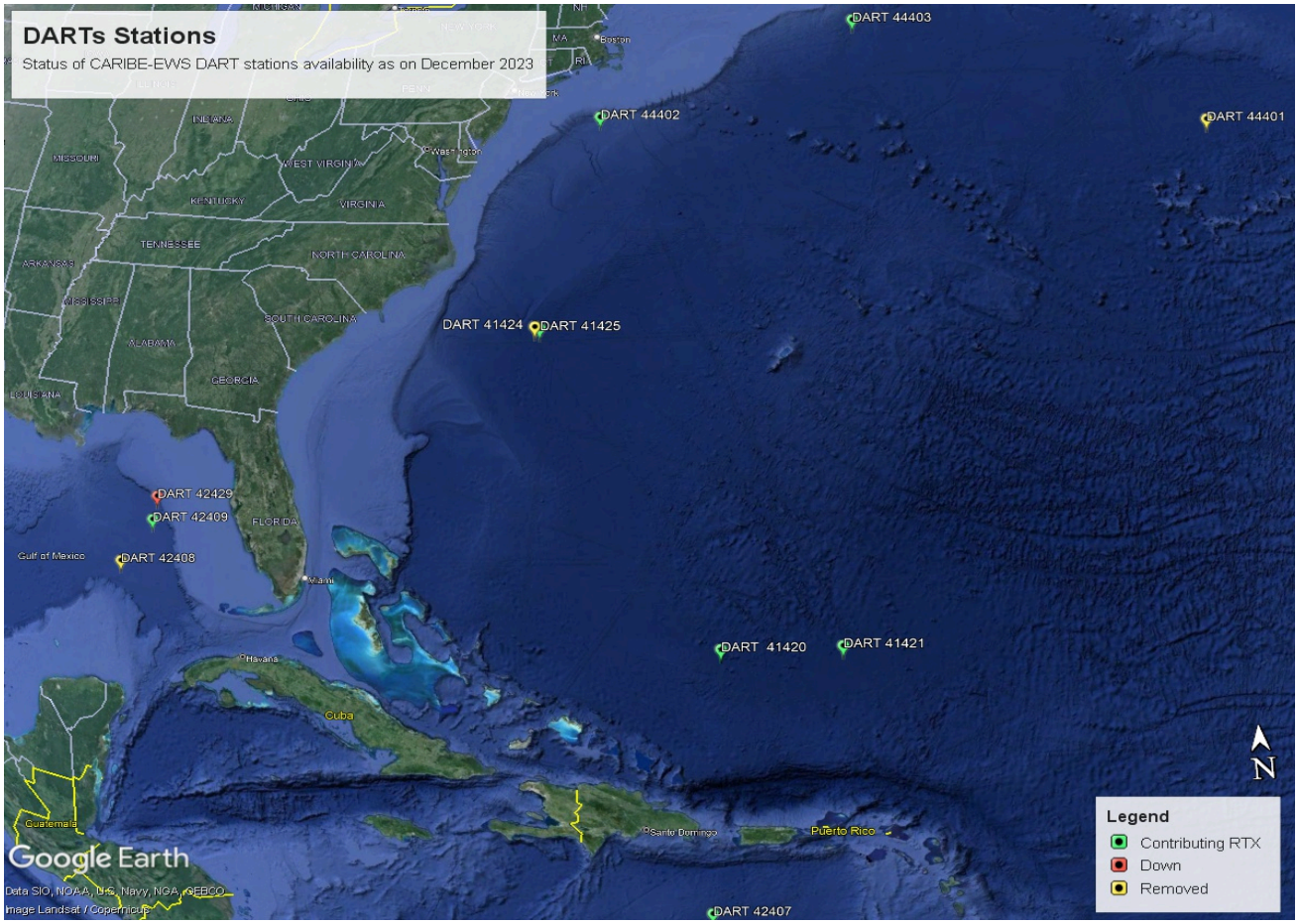


Figure 4. Map of DART stations for December 2023.

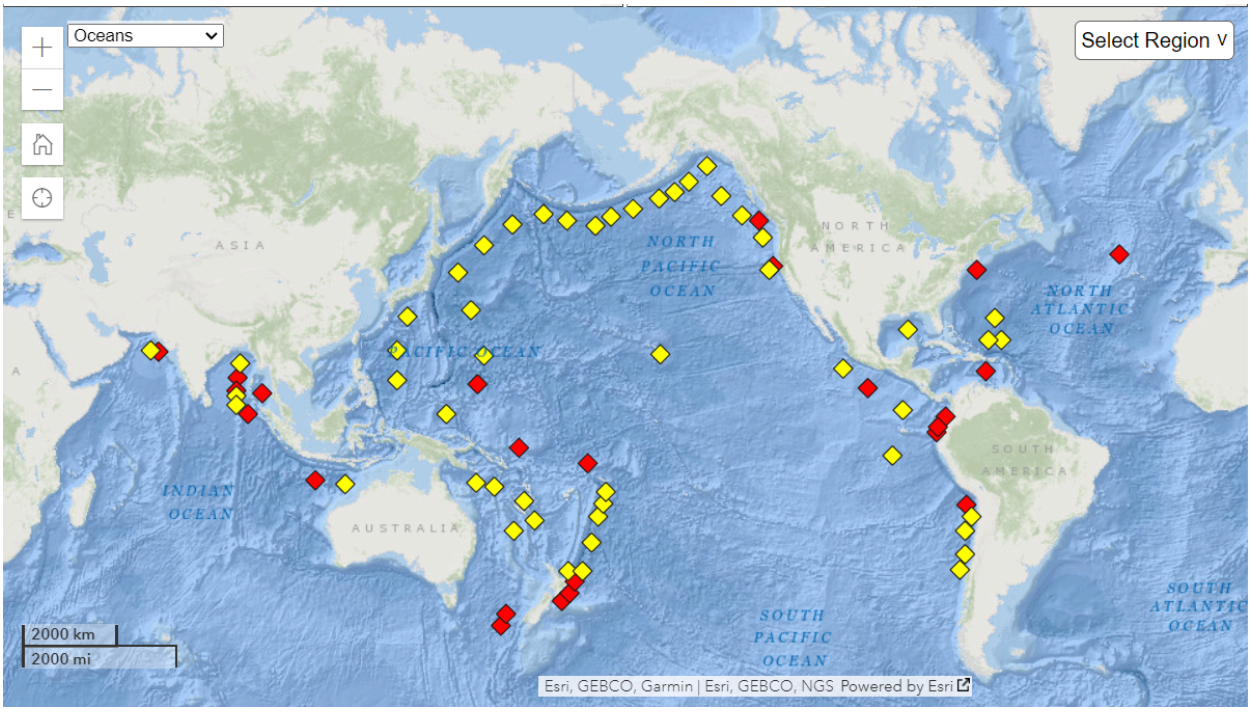
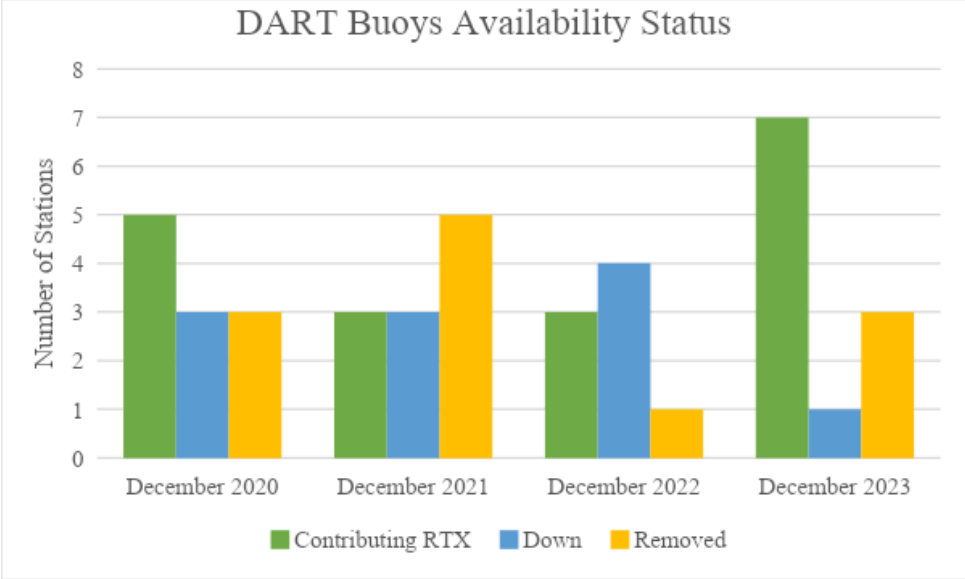


Figure 5. Originally developed by NOAA, as part of the U.S. National Tsunami Hazard Mitigation Program (NTHMP), the DART® Project was an effort to maintain and improve the capability for the early detection and real-time reporting of tsunamis in the open ocean.[1] December 15, 2023. Stations in yellow are operational and those in red non-operational.



Graph 5. DART Buoys availability status December 2020 – December 2023.

[1] https://www.ndbc.noaa.gov/dart/dart.shtml

Appendix List

- Appendix A: Sea Level Station List and Status 2022

Appendix A: Sea Level Stations December 2023

Station name	**Barometric Pressure**	**Country**	**Status[2]**
Blowing Point		Anguilla	Contributing RTX
Road Bay		Anguilla	Planned
Barbuda		Antigua and Barbuda	Down
Parham (Camp Blizard), Antigua		Antigua and Barbuda	Down
Oranjestad		Aruba	Down
Settlement Point		Bahamas	Contributing RTX
Lee Stocking Island, Exuma		Bahamas	Existing
Matthew Town, Inagua		Bahamas	Existing
Nassau Harbour, New Providence		Bahamas	Existing
Treasure Cay, Abaco		Bahamas	Existing
Bridgetown Port		Barbados	Down
Port St. Charles		Barbados	Down
Pelican Fort		Barbados	Removed
Conset Bay		Barbados	Contributing RTX
Speightstown		Barbados	Contributing RTX
Carrie Bow Cay		Belize	Contributing RTX
Belize City		Belize	Planned
Belize		Belize	Removed

[2] Contributing Stations are being received at PTWC, integrated into Tide Tool and are available on the IOC Sea Level Monitoring Facility. DART stations are also available through the NOAA National Data Buoy Center.

Port of Belize		Belize	Down
St. Georges Cruise Pier		Bermuda	Down
St. Georges Island / Esso Pier		Bermuda	Contributing RTX
Bermuda Biological Station		Bermuda	Down
Bermuda Somerset		Bermuda	Contributing RTX
Porto do Forno	Yes	Brazil	Contributing RTX
Arraial do Cabo	Yes	Brazil	Down
Belém	Yes	Brazil	Contributing RTX
Porto de Belém	Yes	Brazil	Contributing RTX
Fortaleza	Yes	Brazil	Contributing RTX
Porto de Mucuripe	Yes	Brazil	Contributing RTX
Imbituba	Yes	Brazil	Contributing RTX
Imbituba 2	Yes	Brazil	Contributing RTX
Porto de Imbituba	Yes	Brazil	Down
Porto de Santana	Yes	Brazil	Down
Salvador	Yes	Brazil	Contributing RTX
Capitania dos Portos	Yes	Brazil	Down
Road Town Harbor, Tortola		British Virgin Islands	Down
Cayman Brac		Cayman Islands	Existing
George Town		Cayman Islands	Down
Gun Bay		Cayman Islands	Contributing RTX
Little Cayman		Cayman Islands	Down
Ballenas		Colombia	Contributing RTX
Cartagena		Colombia	Contributing RTX
San Andres		Colombia	Contributing RTX

Santa Marta		Colombia	Contributing RTX
Capurganá		Colombia	Removed
Sapzurro		Colombia	Contributing RTX
Turbo		Colombia	Contributing RTX
Islas del Rosario		Colombia	Removed
Isla Naval		Colombia	Contributing RTX
Isla Fuerte		Colombia	Contributing RTX
Coveñas		Colombia	Contributing RTX
Puerto Estrella		Colombia	Down
Limón		Costa Rica	Contributing RTX
Cabo Cruz		Cuba	Existing
Cabo San Antonio - Morros de Piedra		Cuba	Existing
Gibara		Cuba	Existing
Isabela de Sagua		Cuba	Existing
Manzanillo		Cuba	Existing
Guantanamo		Cuba	Gap
Casilda		Cuba	Existing
Maisí		Cuba	Existing
Mariel Boca		Cuba	Existing
Bahia de la Habana		Cuba	Existing
Nuevitas Punta de Practicos		Cuba	Existing
Puerto Padre		Cuba	Existing
Nuevitas Bufaderos		Cuba	Existing
Siboney		Cuba	Existing
Santiago de Cuba		Cuba	Existing

Santa Cruz del Sur		Cuba	Existing
Carapachibey		Cuba	Existing
Cayo Loco		Cuba	Existing
Cayo Largo		Cuba	Existing
La Coloma		Cuba	Existing
Bullen Bay		Curacao	Contributing RTX
Marigot		Dominica	Down
Roseau		Dominica	Contributing RTX
Portsmouth		Dominica	Contributing RTX
Barahona		Dominican Republic	Contributing RTX
Puerto Caucedo/San Andres/Santo Domingo		Dominican Republic	Contributing RTX
Puerto Plata		Dominican Republic	Contributing RTX
Punta Cana		Dominican Republic	Contributing RTX
Bahía de Luperón		Dominican Republic	Gap
Bahía de Samaná		Dominican Republic	Gap
Bayahibe		Dominican Republic	Gap
Pedernales		Dominican Republic	Gap
Puerto de Santo Domingo		Dominican Republic	Removed
Ile Royale		French Guiana	Contributing RTX
Prickly Bay		Grenada	Contributing RTX
Sauteurs		Grenada	Planned
The Sisters Island		Grenada	Planned
Pointe à Pitre		Guadeloupe	Contributing RTX
Deshaies Harbour		Guadeloupe	Contributing RTX

La Désirade Island, Grande Anse Marina Harbour		Guadeloupe	Down
Puerto Barrios		Guatemala	Contributing RTX
Harbour Master Boathouse		Guyana	Existing
Market Place Georgetown		Guyana	Existing
Rosignol		Guyana	Existing
Parika		Guyana	Existing
Cap Haitien		Haiti	Contributing RTX
Jacmel		Haiti	Down
Port au Prince		Haiti	Down
Gonaives		Haiti	Planned
Port de Paix		Haiti	Planned
Jeremie		Haiti	Down
St. Louis du Sud		Haiti	Contributing RTX
Guanaja Island		Honduras	Existing
Omoa		Honduras	Existing
Puerto Cortes		Honduras	Down
Puerto De Castilla, Trujillo		Honduras	Down
Roatan N		Honduras	Existing
Punta Gorda Harbor, Roatan S		Honduras	Down
Tela Harbor		Honduras	Unknown
Utila Island		Honduras	Unknown
Cabotaje Harbor, La Ceiba		Honduras	Down
Cochino Pequeño		Honduras	Gap

Swan Island		Honduras	Gap
Port Royal		Jamaica	Down
Montego Bay		Jamaica	Existing
Port Antonio		Jamaica	Existing
Discovery Bay, Jamaica		Jamaica	Gap
Alligator Pond		Jamaica	Gap
Fort de France Harbour		Martinique	Contributing RTX
Le Precheur Harbour		Martinique	Contributing RTX
Le Robert		Martinique	Contributing RTX
Alvarado	Yes	Mexico	Contributing RTX
Celestun		Mexico	Contributing RTX
Ciudad del Carmen	Yes	Mexico	Contributing RTX
Lerma Campeche		Mexico	Contributing RTX
Frontera		Mexico	Contributing RTX
Isla Mujeres	Yes	Mexico	Contributing RTX
Progreso	Yes	Mexico	Contributing RTX
Puerto Morelos, Q. R.	Yes	Mexico	Contributing RTX
Sanchez Magallanes	Yes	Mexico	Contributing RTX
Sisal		Mexico	Contributing RTX
Tuxpan	Yes	Mexico	Contributing RTX
Telchac		Mexico	Contributing RTX
Veracruz	Yes	Mexico	Contributing RTX
Little Bay		Montserrat	Planned
Corn Island		Nicaragua	Down
Blue Fields		Nicaragua	Gap
Puerto Bilwi		Nicaragua	Down

Puerto Cabezas		Nicaragua	Gap
Puerto El Bluff		Nicaragua	Down
El Porvenir		Panama	Contributing RTX
Bocas del Toro		Panama	Contributing RTX
Galeta Point		Panama	Existing
Limon Bay (replaced Coco Solo)		Panama	Existing
Aguadilla		Puerto Rico	Unknown
Arecibo		Puerto Rico	Contributing RTX
Culebra Island	Yes	Puerto Rico	Contributing RTX
Fajardo		Puerto Rico	Contributing RTX
Guayanilla		Puerto Rico	Contributing RTX
Isabel II, Vieques		Puerto Rico	Contributing RTX
La Esperanza, Vieques	Yes	Puerto Rico	Contributing RTX
Magueyes Island	Yes	Puerto Rico	Contributing RTX
Mayagüez	Yes	Puerto Rico	Contributing RTX
Mona Island	Yes	Puerto Rico	Contributing RTX
Salinas		Puerto Rico	Contributing RTX
San Juan	Yes	Puerto Rico	Contributing RTX
Yabucoa		Puerto Rico	Contributing RTX
Peñuelas		Puerto Rico	Removed
Caja de Muertos		Puerto Rico	Removed
Baseterre (Coast Guard Base)		St. Kitts & Nevis	Down
Dennery Harbour		St. Lucia	Contributing RTX
Soufriere		St. Lucia	Contributing RTX
Vieux Fort Bay		St. Lucia	Contributing RTX
Ganter's Bay		St. Lucia	Contributing RTX

Calliaqua (Coast Guard Base)		St. Vincent & the Grenadines	Contributing RTX
Chateau Bel-Air		St. Vincent & the Grenadines	Contributing RTX
Gustavia		St. Barthelemy	Planned
Saint Martin Island		St. Martin	Down
Cedros Bay		Trinidad and Tobago	Unknown
Charlotteville		Trinidad and Tobago	Unknown
Point Fortin		Trinidad and Tobago	Unknown
Port Of Spain		Trinidad and Tobago	Contributing RTX
Scarborough		Trinidad and Tobago	Down
Toco Trinidad		Trinidad and Tobago	Planned
Point Galeota		Trinidad and Tobago	Contributing RTX
Point a Pierre		Trinidad and Tobago	Planned
Grand Turk		Turks and Caicos	Down
Sapodilla Bay, Providenciales		Turks and Caicos	Contributing RTX
Charlotte Amalie, St. Thomas	Yes	USVI	Contributing RTX
Christiansted Harbor, St. Croix	Yes	USVI	Contributing RTX
Lameshur Bay, St. John	Yes	USVI	Contributing RTX
Lime Tree Bay, St. Croix	Yes	USVI	Contributing RTX
Aves Island		Venezuela	Gap
Punta Arenas, Margarita Island		Venezuela	Gap
La Guaira		Venezuela	Gap