Gulf of Mexico Coastal Ocean Observing System (GCOOS):

Data Management System

(as of 2022-10-01)

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1. Overview

The *Gulf of Mexico Coastal Ocean Observing System* (GCOOS), a *Regional Coastal Ocean Observing System* (RCOOS) nested in a National Backbone of coastal observations, developed and maintains a centralized repository (hereafter referred to as the *Portal*). The *Portal* was designed and deployed to aggregate and disseminate the region's near real-time oceanographic data to provide timely information about the environment of the United States portion of the Gulf of Mexico and its estuaries to assist decision-makers, including researchers, government managers, industry, military, educators, emergency responders, and the general public. Currently, the data are from voluntary local (regional) data providers and federal observing facilities in the Gulf of Mexico.

The development and continuing maintenance of the *Portal* is part of the U.S. NOAA *Integrated Ocean Observing System* (IOOS), which is the U.S contribution to the international *Global Ocean Observing System* (GOOS) and the *Global Earth Observation System of Systems* (GEOSS). The GCOOS Data Management System was designed, built, and configured to conform to the protocols, standards, and best practices promulgated by U.S. IOOS Program Office with guidance and expertise from the *Interagency Ocean Observation Committee* (IOOC).

The *Portal* and supplemental data repositories to support GCOOS goals and objectives, such as the *Hypoxia-Nutrient Data Portal* (nutrients.gcoos.org), were developed to facilitate the sharing of data, model outputs, and related products for the benefit of all stakeholders. The data in the *Portal* is licensed under the *Creative Commons 0* or CC0 (https://creativecommons.org/publicdomain/zero/1.0/), giving data users free access to the data in GCOOS data servers. GCOOS encourages users to cite data downloaded from any of the GCOOS facilities.

Citation:

Gulf of Mexico Coastal Ocean Observing System (GCOOS) Data Portal. Texas A&M University, Texas, USA. https://data.gcoos.org/.

These information systems support GCOOS's primary mission to establish a sustained observing system for the Gulf of Mexico and provide observations and products needed by users in this region for:

- Detecting and predicting climate variability and consequences,
- Preserving and restoring healthy marine ecosystems,
- Ensuring human health,
- Managing resources,
- Facilitating safe and efficient marine transportation,
- Enhancing national security, and
- Predicting and mitigating coastal hazards.

The deployed and operational version of the *Portal* is an automated computerized network-accessible data collection and delivery system. These data sources are maintained under various data standards and archival schemas. The Portal serves as the interface to these data, model outputs, and products via automated standards-based machine-to-machine (M2M) service interfaces through web-based human-accessible graphical user interfaces (i.e., HTML standards). The same set of services provides features that facilitate interoperability with other regional data systems and the federal backbone comprised of systems typified by, but not limited to, that of the *National Data Buoy Center* (NDBC).

2. Local Data Nodes and Data Sources

GCOOS does not own or operate any observing system assets. GCOOS collects data from over 1,625 sensors located at 264 non-federal and 159 federal stations. Figure 2.1 shows the percentage of sensors by parameter type. Figure 2.2 shows the participating platforms by data provider. Table 2.1 is a list of non-federal (also known as Local Data Nodes or LDN) stations and the parameters being observed. Table 2.2 is a list of federal station and the parameters measured.

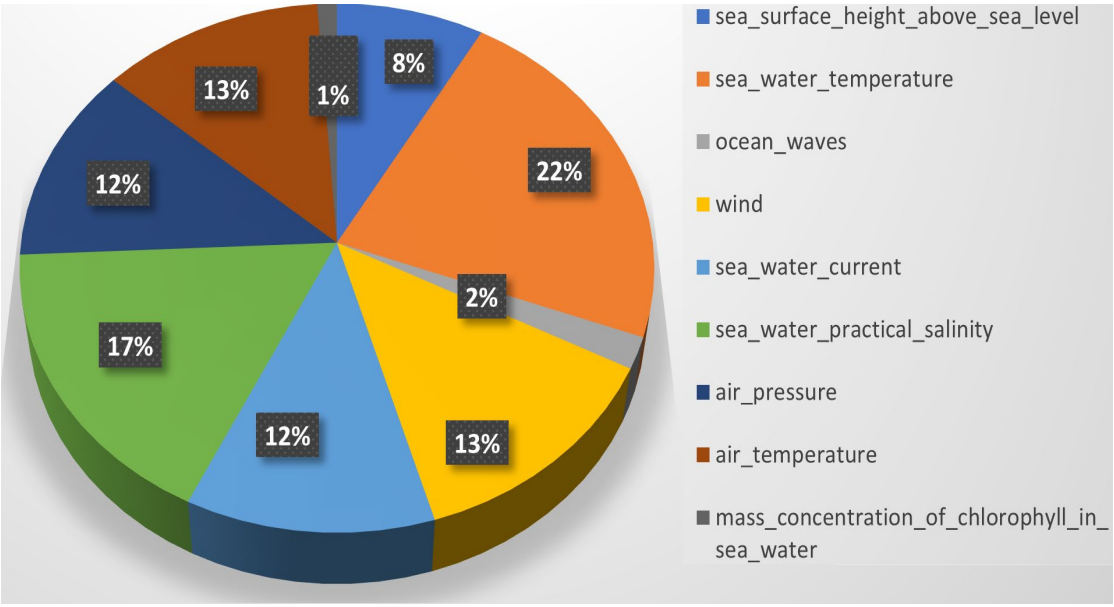

Figure 2.1. Percentage of sensors by parameter type.

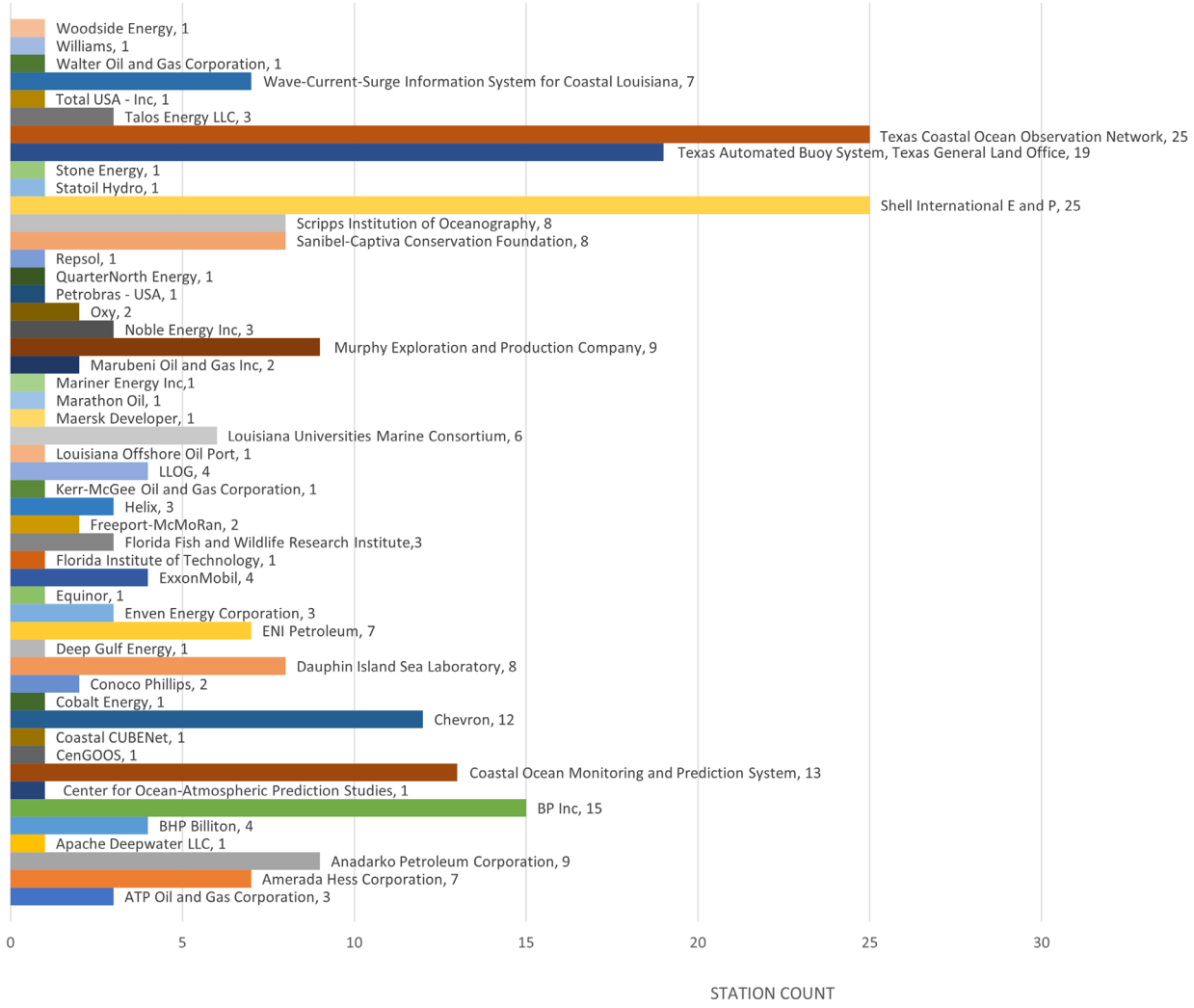

Figure 2.2. Stations per data provider.

Table 2.1. List of Local Data Node stations (non-federal assets).

Data Source	Platform/Station	Lat	Lon	Observation(s)
ATP Oil and Gas Corporation (ATP)	42381 - Innovator - Mississippi Canyon 711	28.2210	-89.6150	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42391 - Titan - Mississippi Canyon 941	28.0340	-89.1010	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42869 – Ocean Confidence – Mississippi Canyon 305#2	28.6950 {mobile}	-87.9310 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Amerada Hess Corporation (Amerada Hess)	42878 – Noble Paul Romano – Mississippi Canyon 725	28.2460 {mobile}	-88.9280 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42879 - Ocean BlackRhino - GC512	27.4760	-90.5590	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42892.1 - Ocean Baroness - Garden Banks 386	27.5990 {mobile}	-92.2980 {mobile}	sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42917 - Discoverer Inspiration - Garden Banks 200	27.7805 {mobile}	-92.7410 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42919 - Stenna Forth - Garden Canyon 469	28.2600 {mobile}	-88.8850 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42935 – Tubular Bells SPAR – Green Canyon 724	28.2350 {mobile}	-88.9950 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42401 - Stampede TLP - Green Canyon 468	27.509	-90.556	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Anadarko Petroleum Corporation (Anadarko)	42370 - Holstein - Green Canyon 645	27.3220	-90.5360	air_temperature, air_pressure, dew_point_temperature, sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity

	42373 – Boomvang – East Breaks 643	27.3540	-94.6250	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42374 - Horn Mountain - Mississippi Canyon 126 and 127	28.8660	-88.0560	sea_water_temperature,sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity
	42377 - Constitution - Green Canyon 680	27.2930	-90.9680	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42379 - Marco Polo - Green Canyon 608	27.3620	-90.1810	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42382 - Gunnison - Garden Banks 668	27.3040	-93.5380	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42398 – Lucius SPAR –Keathley Canyon 857	26.1320	-92.0400	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42399 – Heidelberg – Green Canyon 860	26.1320	-92.0400	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42904 - Independence Hub - Mississippi Canyon 920	28.0850 {mobile}	-87.9860 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Apache Deepwater LLC (Apache)	42938 – Ocean Onyx – Mississippi Canyon 674	28.2570 {mobile}	-89.2740 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
BHP Billiton (BHP)	42393 – Shenzi TLP – Green Canyon 653	27.3010	-90.1350	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42871 – GSF CR Luigs – Green Canyon 653	27.3310 {mobile}	-89.8780 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42897 – GSF Development Driller 1 –	27.3550 {mobile}	-89.7970 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

	DeSoto Canyon 726			
	42932 – Deepwater Invictus – Green Canyon 609	27.3700 {mobile}	-90.1450 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
BP Inc (BP)	42369 – Mad Dog Spar – Green Canyon 782	27.2070	-90.2830	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, air_temperature, sea_water_practical_salinity
	42375 - Na Kika - Mississippi Canyon 474	28.5210	-88.2890	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, sea_water_temperature, sea_water_practical_salinity
	42376 – Marlin TPL – Viosca Knoll 915	29.1080	87.9440	air_pressure, air_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_temperature, sea_water_practical_salinity
	42853 – West Capricorn – Green Canyon 562	28.4440 {mobile}	-88.2770 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42865 – Ocean Black Hornet – Green Canyon 822	28.1778 {mobile}	-88.4643 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42868 - Discoverer Enterprise - Mississippi Canyon 777	28.2140 {mobile}	-88.5190 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42872 – Deepwater Horizon	28.7380 {mobile}	-88.3660 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42880 – West Auriga – Green Canyon 824	27.2189 {mobile}	-90.0469 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

	42885 – GSF Development Driller II – Mississippi Canyon 727#2	28.2490 {mobile}	-88.8280 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42887 - Thunder Horse PDQ- Mississippi Canyon 821	28.1477 {mobile}	-88.5478 {mobile}	air_temperature, dew_point_temperature, sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, air_temperature, sea_water_practical_salinity
	42893 – ENSCO DS-3 – Green Canyon 825	27.1460 {mobile}	-90.3190 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42907 – Ocean Black Lion – Green Canyon 512	27.1537 {mobile}	-90.3098 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42908 - West Sirius - Keathley Canyon 57	26.9090 {mobile}	-93.3050 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42916 - Development Driller III - GreenCanyon 743	28.4450 {mobile}	-88.2770 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42920 – ENSCO DS-4 – Keathly Canyon 93	26.8650 {mobile}	-93.6610 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Center for Ocean-Atmospheric Prediction Studies (COAPS)	Tower No. N7	29.6619	-84.3731	sea_water_temperature, air_temperature, air_pressure, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust, dew_point_temperature
Chevron (Chevron)	42371 – Typhoon – Green Canyon 237	27.7320	-91.1110	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42372 - Genesis SPAR- Green Canyon 205A	27.7800	-90.5180	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42385 - Blind Faith - Mississippi Canyon 696	28.3400	-88.2660	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

	42386 - Tahiti - Green Canyon 641	27.3260	-90.7140	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42396 – Jack and St Malo FPU – Walker Ridge Block 758	26.2350	-91.2610	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42876 – Deepwater Conqueror 678	26.1651 {mobile}	-91.4358 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42888 – Rowan Relentless – Mississippi Canyon 84	28.3081 {mobile}	-88.2016 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42905 - Belford Dolphin - Green Canyon 561	27.3960 {mobile}	-90.3050 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42912 - Discoverer Clear Leader – Keathley Canyon 829	26.2080 {mobile}	-91.4430 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42926 – Discoverer India – Keathly canyon 770	26.2010 {mobile}	-92.8710 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42929 – Pacific Santa Ana – Keathley Canyon 10	26.9490 {mobile}	-93.4420 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42402 - Big Foot - Walker Ridge 29 A	26.9327	-90.5202	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Coastal CUBENet (CUBENet)	42067 - USM-R1	30.0498	-88.6833	air_temperature, air_pressure, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, relative_humidity, sea_water_practical_salinity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
Coastal Ocean Monitoring and Prediction	C10: Navy-2	27.1690	-82.9260	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity

System (COMPS)				
	C12: West Florida Central Buoy	27.4980	-83.7220	wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity, sea_water_temperature
	C13: West Florida South Buoy	26.0630	-83.0730	air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	EGK: Egmont Key, FL	27.6010	-82.7510	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity
	FHP: Fred Howard Park, FL	28.1530	-82.8010	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity
	NFB: Northwest Florida Bay, FL	25.0840	-81.0960	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity
	CPK: Campbell Park, FL	27.7650	-82.6490	wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity
	APK: Aripeka, FL	28.4330	-82.6670	sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity
	BCP: Big Carlos Pass, FL	26.4040	-81.8810	air_pressure, air_temperature, relative_humidity, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	SHP: Shell Point, FL	30.0600	-84.2910	air_pressure, air_temperature, relative_humidity, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	TAS: Tarpon Springs, FL	28.1560	-82.7580	sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity
	ANC: Anclote Gulf Park, FL	28.1930	-82.7890	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature
	ANM: Anna Maria, FL	27.5400	-82.7400	sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature

Central Gulf Ocean Observing System (CENGOOS)	42067.1 - USM3M02	30.04300	-88.64900	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity
Cobalt Energy (Cobalt)	42898 – Rowan Reliance – Keathly Canyon 129	27.0260 {mobile}	-92.2370 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Conoco Phillips (Conoco)	42368 - Magnolia - Garden Banks 783	27.2040	-92.203000	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42883 – Maersk Valiant – Alaminos Canyon 475	26.5150 {mobile}	-94.2120 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Dauphin Island Sea Laboratory (DISL)	WECP: West End, AL	30.0902	-88.2116	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_temperature
	BSCA: Station Bon Secour, LA	30.3288	-87.8293	air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity, sea_water_practical_salinity, sea_surface_height_above_sea_level, sea_surface_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_turbidity
	CATA: Cedar Point, AL	30.3085	-88.1395	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity
	DISL: Dauphin Island, AL	30.2513	-88.0778	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity
	KATA: Katrina Cut, AL	30.2583	-88.2131	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity

	MBLA: Middle Bay Light, AL	30.4367	-88.0117	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity
	PPTA: Perdido Pass, AL	30.2791	-87.5561	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity
	MHPA: Meaher Park, AL	30.6671	-87.9365	air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
Deep Gulf Energy (Deep Gulf)	42924 – ENSCO 8503 – Green Canyon 281	28.7850 {mobile}	-88.0890 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
ENI Petroleum (ENI)	42855 – ENSCO 8506 – Mississippi Canyon 772	28.2010 {mobile}	-88.766 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42866.1– Transocean Amirante – Mississippi Canyon 460	28.4910 {mobile}	-88.9970 {mobile}	sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42881 – Transocean Marianas – Atwater Valley 428	27.5540 {mobile}	-88.3610 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42896 – Sevan Louisiana – Mississippi Canyon 427	27.7070 {mobile}	-90.7860 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42909 - ENSCO 8500 - Walker Ridge 772	28.2010 {mobile}	-88.7520 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42921 - Deepwater Pathfinder - DeSoto Canyon 618#1	28.3540 {mobile}	-87.8200 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

	42892 - Saipem Santorini - Green Canyon 297	27.6789	-90.2881	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Enven Energy Corporation (Enven)	42362 - Brutus - Green Canyon 158	27.7950	-90.6480	air_pressure, air_temperature ,dew_point_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42383 - Neptune - Green Canyon 613	27.3700	-89.9240	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42384 – Prince TPL – Ewing Bank 1003	27.9930	-90.3260	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Equinor (Equinor)	42891 – West Vela – Mississippi Canyon 775	28.1930 {mobile}	-88.6100	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
ExxonMobil (Exxon)	42899 - Ocean Endeavor - Keathley Canyon 919	27.0660 {mobile}	-92.0600 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42930 – Deepwater Champion – Alaminos Canyon 65	26.9060 {mobile}	-94.9060 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42931 – Noble Bob Douglas – Green Canyon 895	27.6010 {mobile}	-91.3540 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42937 – Maersk Viking – Walker Ridge 584	28.7840 {mobile}	-88.2350 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Florida Fish and Wildlife Research Institute (FWRI)	FWRI OTB: Old Tampa Bay	27.9320	-82.6475	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust
	FWRI MTB: Middle Tampa Bay	27.6610	-82.5940	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	FWRI NPD: New Pass Dock	27.3338	-82.5794	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature

Florida Institute of Technology (FIT)	SIPF1 - Sebastian Inlet State Park North Jetty, FL	27.8620	-80.4450	water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_temperature, air_pressure
Freeport-McMoRan (Freeport)	42933 – Noble Sam Croft – Green Canyon 643	27.3330 {mobile}	-90.5990 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42939 – Noble Tom Madden – Mississippi Canyon 84	28.8590 {mobile}	-88.0440 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Helix (Helix)	42388 – Helix Producer 1 – Green Canyon 237	27.7300 {mobile}	-91.1090 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42859 – Discoverer 534 – Green Canyon 516	27.5140 {mobile}	-90.3760 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42901 – Q5000 –Green Canyon 683	27.7847 {mobile}	-91.9826 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Kerr-McGee Oil and Gas Corporation (Kerr-McGee)	42366 - Red Hawk - Garden Banks 877	27.1220	-91.9590	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
LLOG (LLOG)	42852 – WHO Dat FPS – Mississippi Canyon 547	28.5010 {mobile}	-89.7690 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42875 –Amos Runner - Mississippi Canyon 751	28.1540 {mobile}	-89.8360 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42894 – Noble Lorris Bouzigard - Mississippi Canyon 199	28.7700 {mobile}	-88.8340 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42940 – West Neptune – Keathley Canyon 829	27.6913 {mobile}	-91.1141 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Louisiana Offshore Oil Port (LOOP)	LOPL1: Louisiana Offshore Oil Port, LA	28.8850	-90.0250	air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
Louisiana Universities Marine Consortium (LUMCON)	101: LUMCON Marine Center, LA	29.2533	-90.6633	air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity, sea_water_practical_salinity, sea_water_temperature, wind_speed,

				wind_to_direction, wind_speed_of_gust, mass_concentration_of_chlorophyll_in_sea_water
	103: Western Lake Ponchartrain, LA	30.1889	-90.1683	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity
	102: Terrebonne Bay, LA	29.1870	-90.6093	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_temperature, relative_humidity, air_pressure, mass_concentration_of_oxygen_in_sea_water, mass_concentration_of_chlorophyll_in_sea_water
	105: Tambour Bay, LA	29.1874	-90.6654	sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust, air_temperature, relative_humidity
	104: MissRiver-Audobon	29.5526	-90.8070	sea_water_practical_salinity
	WISL1: Wisner Station at Port Fourchon, LA	29.1140	-90.1840	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust , sea_water_practical_salinity, air_pressure, air_temperature, relative_humidity, mass_concentration_of_oxygen_in_sea_water, mass_concentration_of_chlorophyll_in_sea_water
Maersk Developer (Maersk)	42915 - Maersk Developer - Mississippi Canyon 726	28.0100 {mobile}	-89.0430 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Marathon Oil (Marathon)	42911 - Ocean Monarch - Garden Banks 515#3	27.4640 {mobile}	-92.4330 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Mariner Energy Inc (Mariner)	42870 – Ocean America – Green Canyon 505	27.4580 {mobile}	-90.8840 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Marubeni Oil and Gas Inc (Marubeni)	42910 - Noble Driller - Green Canyon 113	27.8470 {mobile}	-90.7190 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42928 – DESCO 8505 – Mississippi Canyon 521	28.9330 {mobile}	-88.5750 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Murphy Exploration and Production Company (Murphy)	42360 - BW Pioneer buoy - C16471 - Walker Ridge 249	26.6890	-90.4590	sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
	42387 - Thunderhawk - Mississippi Canyon 734	28.2670	-88.3990	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

	42397 – Delta House FPU – Mississippi Canyon 254	28.7550	-88.2670	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42867 –Deep Seas – Keathley Canyon 785	28.1830 {mobile}	-88.6290 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42877 - Q4000 - EB602	27.3783	-94.4600	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42889 - Medusa - Mississippi Canyon 582	28.3940 {mobile}	-89.4650 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42890 - Front Runner - Green Canyon 338	27.6250 {mobile}	-90.4410 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42925 – ENSCO DS-5 – Mississippi Canyon 697	28.3010 {mobile}	-88.1270 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42934 – Pacific Sharav – Green Canyon 807	27.5375 {mobile}	-90.1653 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Noble Energy Inc (Noble Energy)	42854 – Atwood Condor – Green Canyon 199	27.7680 {mobile}	90.7980 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42860 – Atwood Advantage – Mississippi Canyon 40	27.9370 {mobile}	-90.0100 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42913 - ENSCO 8501 - Mississippi Canyon 038	28.5090 {mobile}	-88.0310 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Oxy (Oxy)	42884 – Ocean Blackhawk – KC 919	28.8930 {mobile}	-87.9843 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42936 – Rowan Resolute – MC387	26.0777 {mobile}	- {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Petrobras – USA (Petrobras)	42856 – Titanium Explorer – Walker Ridge 425	26.5200 {mobile}	-90.5310 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

Repsol (Repsol)	42903 – Rowan Renaissance – Keathly Canyon 686	26.3120 {mobile}	-92.6460 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
QuaterNorth Energy (QuaterNorth)	42866 - Faye Kozak - Mississippi Canyon 948	28.0161	-88.7519	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Sanibel-Captiva Conservation Foundation (SCCF-RECON)	SCCF RECON Gulf of Mexico	26.4344	-81.9647	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, relative_humidity, dew_point_temperature
	SCCF RECON Redfish Pass	26.5545	-82.1715	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, relative_humidity, dew_point_temperature
	SCCF RECON Shell Point	26.5254	-82.0031	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	SCCF RECON Fort Myers	26.6493	-81.8810	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, relative_humidity, dew_point_temperature
	SCCF RECON Beautiful Island	26.6955	-81.8138	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	SCCF RECON Blind Pass	26.4966	-82.1479	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	SCCF RECON McIntyre Creek	26.4645	-82.1044	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	SCCF RECON Tarpon Bay	26.4680	-82.0631	mass_concentration_of_chlorophyll_in_sea_water, mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
Scripps Institution of Oceanography	42099 - Offshore St. Petersburg, FL (144)	27.3400	-84.2750	sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_signifcant_to_direction, sea_surface_wave_significant_period

	42084 - Southwest Pass Entrance W, LA	28.9880	-89.6490	sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
	42091 - Trinity Shoal, LA	29.0870	-92.5060	sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
	42093 – Grand Isle Outer, LA	29.0167	-89.8324	sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_signifcant_to_direction, sea_surface_wave_significant_period
	42095 – Satan Shoal, FL	24.4072	-81.9668	sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_signifcant_to_direction, sea_surface_wave_significant_period
	42097 - Pulley Ridge, FL	25.7000	-83.6500	sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_signifcant_to_direction, sea_surface_wave_significant_period
	42098 - Egmont Channel Entrance, FL	27.5903	-82.9313	sea_water_temperature, air_temperature, air_pressure, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_signifcant_to_direction, sea_surface_wave_significant_period
Shell International E and P (Shell)	42361 - Auger - Garden Banks 426	27.5500	-92.4900	air_pressure, air_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, dew_point_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_temperature, sea_water_practical_salinity
	42363 - Mars - Mississippi Canyon 807	28.1600	-89.2200	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42364 - Ram-Powell - Viosca Knoll 936	29.0600	-88.0900	air_pressure, air_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, dew_point_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_temperature, sea_water_practical_salinity
	42365 - Ursa - Mississippi Canyon 809	28.2000	-89.1200	air_pressure, air_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, dew_point_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity

	42390 - Perdido Host - Alaminos Canyon 857	26.1290	-94.8980	air_pressure_at_mean_sea_level, air_temperature, dewPoint, sea_surface_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, Sea_water_practical_salinity
	42394 – Olympus TLP – Mississippi Canyon 807	28.1570 {mobile}	-89.2400 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, air_temperature, dew_point_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity
	42395 – Shell Alcyone Buoy – Walker Ridge 552	26.4040	-90.7920	air_pressure, air_temperature, dew_point_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
	42400 - Shell Appomattox - MC 437	28.5740	-87.9340	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42851 – Noble Globetrotter I – Mississippi Canyon 566	27.6024 {mobile}	-92.3091 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42858 – Stena IdeMAX – Atwater Valley 18	27.9620 {mobile}	-89.048 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42861 - Deepwater Nautilus - Mississippi Canyon 348	27.7310 {mobile}	-87.9240 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42862 – Noble Jim Thompson – Mississippi Canyon 984	27.5700 {mobile}	-92.3960 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42864 – Thalassa – Walker Ridge 464	28.0114 {mobile}	-89.0135 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42873 – Pontus – GB341	28.1939 {mobile}	-89.1769 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42877.1 – Cajun Express – Mississippi Canyon 762	28.1800 {mobile}	-89.2900 {mobile}	sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water _temperature, sea_water_practical_salinity

	42882 – Noble Globetrotter II – AC772	26.1880 {mobile}	-94.7609 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42886 – Discoverer Spirit – Mississippi Canyon 762	28.1700 {mobile}	-89.2400 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42895 – Island Performer – Mississippi Canyon 730	28.2730 {mobile}	-88.6620 {mobile}	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	42902 – Deepwater Proteus - Green Canyon 392	28.6098 {mobile}	-87.9796 {mobile}	air_temperature, dew_point_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_temperature, sea_water_practical_salinity
	42906 – Poseidon- Mississippi Canyon 978	27.9778 {mobile}	-89.5007 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42922 – Noble Jim Day – Walker Ridge 508	26.4490 {mobile}	-90.7840 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42927 – Noble Bully I – Mississippi Canyon 567	28.4180 {mobile}	-88.0320 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	WDEL1 - Shell West Delta 143	28.6620	-89.5510	air_pressure, air_temperature, dew_point_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42403 - Vito - MC939	28.0256	-89.2092	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity
	CGCL1 - Cognac	28.791	-89.056	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity
Statoil Hydro (Statoil)	42914 - Discoverer Americas - Walker Ridge 160	26.8060 {mobile}	-90.5670 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Stone Energy (Stone)	42863 - Ocean Victory - Mississippi Canyon 26	28.9620 {mobile}	-88.6960 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Talos Energy LLC (Talos)	42857 – Noble Don Taylor – Mississippi Canyon 812	27.6910 {mobile}	-91.1140 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
	42918 - Noble Danny Adkins - Green Canyon 280	27.6910 {mobile}	-91.1140 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

	42923 - ENSCO 8502 - Green Canyon 237	27.7470 {mobile}	-91.0880 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Texas Automated Buoy System (TABS)	TABS B: GA-252	28.9818	-94.9186	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity
	TABS J: PS-1126	26.1914	-97.0507	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity
	TABS K: PI-745	26.2168	-96.4998	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity, wind_speed, wind_to_direction, wind_speed_of_gust
	TABS N: HI-A595	27.8903	-94.0367	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity, wind_speed, wind_to_direction, wind_speed_of_gust
	TABS V: HI-A389	27.8966	-93.5973	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity, wind_speed, wind_to_direction, wind_speed_of_gust
	TABS D: TABS D	27.9396	-96.8429	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	TABS F: TABS F	28.8425	-94.2433	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	TABS R: TABS R	29.6350	-93.6417	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	TABS W: TABS W	28.3507	-96.0058	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
	TABS A: TABS A	29.5325	-93.8116	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature

	TABS C: TABS C	28.8116	-94.7433	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	TABS E:TABS E	27.3383	-97.1000	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	TABS G:TABS G	29.5500	-93.4666	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	TABS H: TABS H	27.8674	-96.5433	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, air_temperature, relative_humidity, sea_water_practical_salinity, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure
	TABS L:TABS L	28.0416	-94.1166	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	TABS M: TABS M	28.1921	-94.191	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	TABS P: TABS P	29.1662	-92.7365	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	TABS X:TABS X	27.0660	-96.3383	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, air_pressure, air_temperature, relative_humidity, sea_water_practical_salinity, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period
Texas Coastal Ocean Observation Network (TCOON)	146: MANERR Station 2 (Copano East): MANERR Station 2 (Copano East)	28.1323	-97.0344	sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_practical_salinity, air_pressure, air_temperature, mass_concentration_of_oxygen_in_sea_water, relative_humidity
	003: Rincon del San Jose (87778121): Rincon del San Jose; Potrero Lopeno SW, TX	26.8015	-97.4706	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	005: Packery Channel (87757921): Packery Channel, TX	27.6346	-97.2370	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	006: Ingleside (87752831): Port Ingleside, TX	27.8217	-97.2040	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	009: Port Aransas	27.8398	-97.0727	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed,

	(87752371): Port Aransas, TX			wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	013: S. Bird Island (87761391): South Bird Island, TX	27.4847	-97.3181	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	031: Seadrift (87730371): Seadrift, TX	28.4073	-96.7122	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	057: Port O'Connor (87737011): Matagorda Bay; Port O'Connor, TX	28.4460	-96.3961	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	068: Baffin Bay (87766041): Baffin Bay; Point of Rocks, TX	27.2970	-97.4049	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	518: Rollover Pass (87709711): Rollover Pass, TX	29.5150	-94.5133	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	524: Port Arthur (87704751): Port Arthur, TX	29.8672	-93.9310	sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature
	127: Bahia Grande Water Quality Station 1: Bahia Grande Water Quality Station 1	28.2598	-96.7737	sea_water_temperature, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	072: SALT01 (Nueces Bay, Texas): SALT01 (Nueces Bay, Texas)	27.8392	-97.4440	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	074: SALT03 (Nueces Bay, Texas): SALT03 (Nueces Bay, Texas)	27.8515	-97.4820	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	147: MANERR Station 3 (Copano West): MANERR Station 3 (Copano West)	28.0840	-97.2009	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	148: MANERR Station 4 (Aransas Bay): MANERR Station 4 (Aransas Bay)	27.9798	-97.0288	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water

	149: MANERR Station 5 (Port Aransas): MANERR Station 5 (Port Aransas)	27.8383	-97.0503	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	170: National Park Service - Baffin Bay: National Park Service - Baffin Bay	27.2970	-97.4049	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	171: National Park Service - Bird Island: National Park Service - Bird Island	27.4847	-97.3181	sea_water_temperature, sea_water_practical_salinity, mass_concentration_of_oxygen_in_sea_water
	041: Nueces Delta 1: Nueces Delta 1	27.8896	-97.5916	sea_water_practical_salinity
	042: Nueces Delta 2: Nueces Delta 2	27.8888	-97.5696	sea_water_temperature, sea_water_practical_salinity
	043: Nueces Delta 3: Nueces Delta 3	27.8838	-97.5332	sea_water_temperature, sea_water_practical_salinity
	076: SALT05 (Nueces River, Texas): SALT05 (Nueces River, Texas)	27.8918	-97.6104	sea_water_temperature, sea_water_practical_salinity
	079: SALT08: SALT08	27.8708	-97.5177	sea_water_temperature, sea_water_practical_salinity
Total USA – Inc (Total USA)	42367 – Matterhorn TLP – Mississippi Canyon 243	28.7420	-88.8260	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Walter Oil and Gas Corporation (Walter)	42900 – Ocean Saratoga – Mississippi Canyon 583	28.3600 {mobile}	-89.4230 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity
Wave-Current-Surge Information System for Coastal Louisiana (WAVCIS)	CSI03: Marsh Island, LA	29.4412	-92.0613	sea_surface_height_above_sea_level, sea_water_temperature, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity
	CSI06: South Timbalier Block 52, LA	28.8667	-90.4833	sea_surface_height_above_sea_level, sea_water_temperature, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity

	CSI09: Grand Isle Blocks	29.1015	-89.9782	sea_surface_height_above_sea_level, sea_water_temperature , sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity
	CSI05: Isle Dernieres, LA	29.0533	-90.5333	sea_surface_height_above_sea_level, sea_water_temperature, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity
	CSI10A: Fieldwood Energy, LLC site SS91	28.9192	-90.7744	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature
	CSI15: Ship Shoal blocks 114A	28.8332	-90.8320	sea_surface_height_above_sea_level, sea_water_temperature, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity
	CSI16: Chevron MP41M platform	29.4012	-89.0355	sea_surface_height_above_sea_level, sea_water_temperature, sea_surface_wave_mean_ height, sea_surface_wave_ signifcant _to_direction, sea_surface_wave_significant_period, wind_speed, wind_to_direction, wind_speed_of_gust, air_pressure, air_temperature, relative_humidity, sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity
Williams (Williams)	42380 - Devil's Tower - Mississippi Canyon 773	28.2090	-88.7370	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_practical_salinity, sea_water_temperature
Woodside Energy (Woodside)	42874 – Deepwater Asgard – Atwater Valley 23	27.8811 {mobile}	-90.6650 {mobile}	sea_water_speed, upward_sea_water_velocity, direction_of_sea_water_velocity, sea_water_temperature, sea_water_practical_salinity

Table 2.2. List of federal assets that GCOOS is also aggregating data.

Data Source	Platform/Station	Lat	Lon	Observation(s)
Everglades National Park (ENP)	BDVF1: Broad River, FL	25.4780	-80.9890	sea_water_practical_salinity, sea_water_temperature
	BNKF1: Butternut Key, FL	25.0870	-80.5190	sea_water_practical_salinity, sea_water_temperature
	BOBF1: Bob Allen, FL	25.0270	-80.6810	sea_water_practical_salinity, sea_water_temperature

	BWSF1: Blackwater Sound, FL	25.1780	-80.4380	sea_water_practical_salinity, sea_water_temperature
	CANF1: Cane Patch, FL	25.4220	80.9420	sea_water_practical_salinity, sea_water_temperature
	CNBF1: Cannon Bay, FL	25.7020	-81.1860	sea_water_practical_salinity, sea_water_temperature
	CWAF1: Clear Water Pass, FL	25.2970	-81.0130	sea_water_practical_salinity, sea_water_temperature
	DKKF1: Duck Key, FL	25.1800	-80.4900	sea_water_practical_salinity, sea_water_temperature
	GBIF1: Gunboat Island, FL	25.3780	-81.0290	sea_water_practical_salinity, sea_water_temperature
	GKYF1: Garden Key, FL	24.6272	-82.8722	sea_surface_height_above_ sea_level
	HCEF1: Highway Creek, FL	25.2540	-80.4440	sea_water_practical_salinity, sea_water_temperature
	JKYF1: Johnson Key, FL	25.0530	-80.9040	sea_water_practical_salinity, sea_water_temperature
	LBRF1: Broad River Lower, FL	25.4840	-81.1330	sea_water_practical_salinity, sea_water_temperature
	LBSF1: Little Blackwater, FL	25.2140	-80.4320	sea_water_practical_salinity, sea_water_temperature
	LMDF1: Little Madeira, FL	25.1760	-80.6330	sea_water_practical_salinity, sea_water_temperature
	LMRF1: Lostmans River, FL	25.5560	-81.1690	sea_water_practical_salinity, sea_water_temperature
	LRIF1: Lane River, FL	25.2840	-80.8940	sea_water_practical_salinity, sea_water_temperature
	LRKF1: Little Rabbit Key, FL	24.9820	-80.8260	sea_water_practical_salinity, sea_water_temperature
	LSNF1: Long Sound, FL	25.2350	-80.4570	sea_water_practical_salinity, sea_water_temperature
	MUKF1: Murray Key, FL	25.1060	-80.9420	sea_water_practical_salinity, sea_water_temperature
	PKYF1: Peterson Key, FL	24.9180	-80.7470	sea_water_practical_salinity, sea_water_temperature
	TCVF1: Trout Cove, FL	25.2130	-80.5330	sea_water_practical_salinity, sea_water_temperature
	TPEF1: Tarpon Bay East, FL	25.4100	-80.9640	sea_water_practical_salinity, sea_water_temperature
	TRRF1: Taylor River, FL	25.2170	-80.650	sea_water_practical_salinity, sea_water_temperature
	WIWF1: Willy Willy, FL	25.5870	-81.0440	sea_water_practical_salinity, sea_water_temperature
	WPLF1: Watson Place, FL	25.7100	-81.2490	sea_water_practical_salinity, sea_water_temperature
	WWEF1: White Water - West, FL	25.2320	-80.9380	sea_water_practical_salinity, sea_water_temperature
	GBTF1: Garfield Bight, FL	25.1670	-80.8010	sea_water_practical_salinity, sea_water_temperature
	WRBF1: Whipray Basin, FL	25.0720	-80.7350	sea_water_practical_salinity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
National Data Buoy Center, NOAA	42001: 42001 - MID GULF 180 nm South of Southwest Pass, LA	25.8880	-89.6580	air_pressure, air_temperature, sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42002: 42002 - W GULF 207 NM East of Brownsville, TX	26.0910	-93.7580	air_pressure, air_temperature, sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust

	42003: 42003 - E GULF 262 nm South of Panama City, FL	26.0070	-85.6480	air_pressure, air_temperature, sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42020: 42020 - Corpus Christi, TX 50NM Southeast of Corpus Christi, TX	26.9680	-96.6940	air_pressure, air_temperature, sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42036: 42036 - W. TAMPA 106NM West Northwest of Tampa, FL	28.5000	-84.5170	air_pressure, air_temperature, sea_water_speed, sea_water_to_direction, upward_sea_water_velocity, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42012: 42012 - Orange Beach AL Buoy	30.0650	-87.5550	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42019: 42019 - Freeport, TX 60 NM South of Freeport, TX	27.9070	-95.3530	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42035: 42035 - GALVESTON 22NM East of Galveston, TX	29.2320	-94.4130	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42039: 42039 - PENSACOLA - 115NM East Southeast of Pensacola, FL	28.7390	-86.0060	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42055: 42055 - Bay of Campeche	22.2030	-94.0000	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42056: 42056 - Yucatan Basin	19.8020	-84.8570	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42057: 42057 - Western Caribbean	17.0020	-81.5010	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	FWYF1: FWYF1 - Fowey Rocks, FL	25.5910	-80.0970	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	PTAT2: PTAT2 - Port Aransas, TX	27.8260	-97.0510	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	SAUF1: SAUF1 - St. Augustine, FL	29.8570	-81.2650	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	SGOF1: SGOF1 - Tyndall AFB Tower C (N4), FL	29.4080	-84.8580	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	VENF1: VENF1 - Venice, FL	27.0720	-82.4530	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	BURL1: BURL1 - Southwest Pass, LA	28.9060	-89.4290	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	CDRF1: CDRF1 - Cedar Key, FL	29.1360	-83.0290	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	KTNF1: KTNF1 - Keaton Beach, FL	29.8190	-83.5930	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust

	PLSF1: PLSF1 - Pulaski Shoal Light, FL	24.6930	-82.7730	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	SANF1: SANF1 - Sand Key, FL	24.4560	-81.8770	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	SMKF1: SMKF1 - Sombrero Key, FL	24.6280	-81.1120	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	SRST2: SRST2 - Sabine Pass, TX	29.6830	-94.0330	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	42007: 42007 - BILOXI 22 nm South-Southeast of Biloxi, MS {re-established, 2010}	30.0900	-88.7690	wind_speed, wind_to_direction, wind_speed_of_gust
National Estuarine Research Reserve System, NOAA	apaebmet: East Bay	29.7909	-84.8834	air_pressure, air_temperature, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust
	gndcrmet: Crooked Bayou	30.3592	-88.4200	air_pressure, air_temperature, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust
	marcemet: Copano East	28.1323	-97.0344	air_pressure, air_temperature, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust
	rkbuhmet: Upper Henderson Creek	26.0501	-81.7017	air_pressure, air_temperature, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust
	wkbshmet: Safe Harbor Met Station	30.4212	-87.8285	air_pressure, air_temperature, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust
	gtmpcmet: Pellicer Creek	29.6577	-81.2327	air_pressure, air_temperature, relative_humidity, wind_speed, wind_to_direction, wind_speed_of_gust
	gtmpcwq: Pellicer Creek	29.6671	-81.2574	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	apacpwq: Cat Point	29.7021	-84.8802	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	apadbwq: Dry Bar	29.6747	-85.0583	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	apaebwq: East Bay Bottom	29.7858	-84.8752	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	apaeswq: East Bay Surface	29.8580	-84.8752	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	gndbcwq: Bayou Cumbest	30.3836	-88.4364	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	gndbhwq: Bayou Heron	30.4178	-88.4054	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	gndblwq: Bangs Lake	30.3571	-88.4629	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	gtmfmwq: Fort Matanzas	29.7370	-81.2459	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature

	gtmpiwq: Pine Island	30.0508	-81.3674	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	gtmsswq: San Sebastian	29.8688	-81.3074	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	marabwq: Aransas Bay	27.9798	-97.0287	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	marcewq: Copano Bay East	28.1323	-97.0344	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	marcwwq: Copano Bay West	28.0841	-97.2009	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	marmbwq: Mesquite Bay	28.1384	-96.8285	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	marscwq: Ship Channel	27.8383	-97.0503	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	rkbfbwq: Fakahatchee Bay	25.8922	-81.4770	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	rkbfuwq: Faka Union Bay	25.9005	-81.5159	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	rkblhwq: Lower Henderson Creek	26.0257	-81.7332	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	rkbmbwq: Middle Blackwater River	25.9343	-81.5946	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	wkbfrwq: Fish River	30.4162	-87.8228	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	wkbmbwq: Middle Bay	30.3900	-87.8177	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	wkbmrwq: Magnolia River	30.3900	-87.8177	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	wkbwbwq: Weeks Bay	30.3808	-87.832	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_turbidity, sea_water_temperature
	gndpcwq: Point Aux Chenes Bay	30.3486	-88.4185	mass_concentration_of_oxygen_in_sea_water, sea_water_practical_salinity, sea_water_temperature
National Ocean Service, NOAA	8778490: Port Mansfield, TX	26.5546	-97.4221	air_pressure, air_temperature
	8737048: Mobile State Docks, AL	30.7083	-88.0433	air_pressure, air_temperature, sea_water_practical_salinity, sea_surface_height_above_sea_level, sea_water_temperature
	8764314: Eugene Istans, North of, LA	29.2675	-91.3839	air_pressure, air_temperature, sea_water_practical_salinity,

				sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8770613: Morgans Point, TX	29.6817	-94.985	air_pressure, air_temperature, sea_water_practical_salinity, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8770777: Manchester, TX	29.7263	-95.2658	air_pressure, air_temperature, sea_surface_height_above_sea_level
	8771450: Galveston Pier 21, TX	29.3100	-94.7933	air_pressure, air_temperature, sea_surface_height_above_sea_level
	8774513: Copano Bay, TX	28.1183	-97.0217	air_pressure, air_temperature, sea_surface_height_above_sea_level
	8767816: Lake Charles, LA	30.2236	-93.2217	air_pressure, air_temperature, sea_surface_height_above_sea_level,
	8724580: Key West, FL	24.5557	-81.8079	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature
	8726384: Port Manatee, FL	27.6387	-82.5621	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature
	8723970: Vaca Key, FL	24.7117	-81.1050	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8725110: Naples, FL	26.1317	-81.8075	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8725520: Fort Myers, FL	26.6477	-81.8712	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8726520: St. Petersburg, FL	27.7606	-82.6269	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8726724: Clearwater Beach, FL	27.9783	-82.8317	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8728690: Apalachicola, FL	29.7267	-84.9817	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8729108: Panama City, FL	30.1523	-85.6669	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8729840: Pensacola, FL	30.4044	-87.2112	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust

	8736897: Coast Guard Sector Mobile, AL	30.6483	-88.0583	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8747437: Bay Waveland Yacht Club, MS	30.3264	-89.3258	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8761305: Shell Beach, LA	29.8681	-89.6732	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8761927: New Canal, LA	30.0272	-90.1134	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8762482: Bayou Gauche, LA	29.7886	-90.4202	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8764227: Amerada Pass, LA	29.4496	-91.3381	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8768094: Calcasieu Pass, LA	29.7682	-93.3429	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8770570: Sabine Pass North, TX	29.7284	-93.8701	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8771013: Eagle Point, TX	29.4800	-94.9183	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8772447: USCG Freeport, TX	28.9433	-95.3025	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8774770: Rockport, TX	28.0217	-97.0467	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8775870: Malaquite Beach (Corpus Christi), TX	27.5800	-97.2167	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8779770: Port Isabel, TX	26.0600	-97.2150	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8720030: Fernandina Beach, FL	30.6717	-81.4650	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust

	8720218: Mayport (Bar Pilots Dock), FL	30.3967	-81.4300	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8721604: Trident Pier, FL	28.4158	-80.5931	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8722670: Lake Worth Pier, FL	26.6117	-80.0333	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8723214: Virginia Key, FL	25.7314	-80.1618	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8726607: Old Port Tampa, FL	27.8578	-82.5527	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8727520: Cedar Key, FL	29.1350	-83.0317	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8729210: Panama City Beach, FL	30.2133	-85.8783	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8735180: Dauphin Island, AL	30.2500	-88.0750	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8760721: Pilottown, LA	29.1783	-89.2583	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8760922: Pilots Station East, SW Pass, LA	28.9322	-89.4075	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8761724: Grand Isle, LA	29.2633	-89.9567	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8764044: Berwick, LA	29.6675	-91.2376	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8766072: Freshwater Canal Locks, LA	29.5550	-92.3050	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8770733: Lynchburg Landing, TX	29.7650	-95.0780	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8770808: High Island, TX	29.5930	-94.3900	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8770822: Texas Point, Sabine Pass, TX	29.6893	-93.8418	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust,
	8770971: Rollover Pass, TX	29.5150	-94.5130	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8771341: Galveston Bay Entrance, North Jetty, TX	29.3573	-94.7248	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust

	8771486: Galveston Railroad Bridge, TX	29.3020	-94.8970	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8720625: Racy Point, St Johns River, FL	29.8017	-81.5483	sea_surface_height_above_sea_level
	8775296: Uss Lexington, TX	27.8120	-97.3900	air_pressure, air_temperature, sea_surface_height_above_sea_level, sea_water_temperature,
	8771972: San Luis Pass, TX	29.0950	-95.1133	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8772985: Sargent, TX	28.7720	-95.6170	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8773037: Seadrift, TX	28.4080	-96.7120	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8773146: East Matagorda, TX	28.7100	-95.9130	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8773259: Port Lavaca, TX	28.6400	-96.5950	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8774230: Aransas Wildlife Refuge, TX	28.2280	-96.7950	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8775237: Port Aransas, TX	27.8383	-97.0733	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8775283: Port Ingleside, Corpus Christi Bay, TX	27.8220	-97.2030	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8775792: Packery Channel, TX	27.6333	-97.2367	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8776604: Baffin Bay, TX	27.2950	-97.4050	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8779280: Realitos Peninsula, TX	26.2622	-97.2854	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8779748: South Padre Island Coast Guard Station, TX	26.0770	-97.1770	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8720357: I-295 Bridge, St Johns River, FL	30.1917	-81.6917	air_pressure, air_temperature, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust, sea_surface_height_above_sea_level
	8734673: Fort Morgan, AL	30.2283	-88.0250	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8741003: Petit Bois Island, MS	30.2133	-88.5000	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8741094: Range A rear, Pascagoula, MS	30.3433	-88.5117	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust

	8741501: Dock C, Pascagoula, MS	30.3550	-88.5667	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8776139: S. Bird Island, TX	27.4800	-97.3220	air_pressure, air_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8770475: Port Arthur, TX	29.8667	-93.9300	air_pressure, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8775244: Nueces Bay, TX	27.8328	-97.4859	air_pressure, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust, sea_water_temperature
	8777812: Rincon Del San Jose, TX	26.8250	-97.4917	air_pressure, sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	mc0101: Atchfalaya Bar Channel, LA	29.3183	-91.4297	sea_water_speed, sea_water_to_direction, upward_sea_water_velocity
	8720219: Dames Point, FL	30.3867	-81.5583	sea_surface_height_above_sea_level
	8726667: Mckay Bay Entrance, FL	27.9133	-82.425	sea_surface_height_above_sea_level
	8732828: Weeks Bay, AL	30.4167	-87.825	sea_surface_height_above_sea_level
	8735391: Dog River Bridge, AL	30.5652	-88.088	sea_surface_height_above_sea_level
	8735523: East Fowl River Bridge, AL	30.4437	-88.1139	sea_surface_height_above_sea_level
	8737138: Chickasaw Creek, AL	30.7819	-88.0736	sea_surface_height_above_sea_level
	8738043: West Fowl River Bridge, AL	30.3766	-88.1586	sea_surface_height_above_sea_level
	8739803: Bayou La Batre Bridge, AL	30.4057	-88.2477	sea_surface_height_above_sea_level
	8740166: Grand Bay Nerr, Mississippi Sound, MS	30.4120	-88.4020	sea_surface_height_above_sea_level
	8741533: Pascagoula Noaa Lab, MS	30.3679	-88.563	sea_surface_height_above_sea_level
	8761955: Carrollton, LA	29.9329	-90.1355	sea_surface_height_above_sea_level
	8762075: Port Fourchon, LA	29.1142	-90.1992	sea_surface_height_above_sea_level
	8767961: Bulk Terminal, LA	30.1903	-93.3007	sea_surface_height_above_sea_level
	8770520: Rainbow Bridge, TX	29.9800	-93.8817	sea_surface_height_above_sea_level
	8741041: Dock E. Port of Pascagoula, MS	30.3477	-88.5054	sea_surface_height_above_sea_level, sea_water_temperature
	8773701: Port Oconnor, TX	28.4517	-96.3883	sea_surface_height_above_sea_level, wind_speed, wind_to_direction, wind_speed_of_gust
	8726669: Berth 223 Met, FL	27.9172	-82.4438	wind_speed, wind_to_direction, wind_speed_of_gust
	8726673: Seabulk, Tampa, FL	27.9233	-82.445	wind_speed, wind_to_direction, wind_speed_of_gust

	8726679: East Bay Causeway, FL	27.9289	-82.4258	wind_speed, wind_to_direction, wind_speed_of_gust
	8779749 - SPI Brazos Santiago TX	26.0670	-97.1550	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8772471 - Freeport SPIP TX	28.9360	-95.2940	air_pressure, air_temperature, sea_water_temperature, wind_speed, wind_to_direction, wind_speed_of_gust
	8726694: TPA Cruise Terminal 2, Tampa, FL	27.9333	-82.4333	wind_speed, wind_to_direction, wind_speed_of_gust

The following is a list of observations listed in Tables 2.1 and 2.2, referenced to the CF-standard names.

Table 2.3. GCOOS parameter labels as CF-standard names and link to definition.

Parameter	Definition
wind_speed; wind_speed_of_gust; wind_to_direction	https://mmisw.org/ont/cf/parameter/wind_speed; https://mmisw.org/ont/cf/parameter/wind_speed_of_gust; https://mmisw.org/ont/cf/parameter/wind_to_direction
air_pressure	https://mmisw.org/ont/cf/parameter/air_pressure
air_temperature	https://mmisw.org/ont/cf/parameter/air_temperature
sea_water_temperature	https://mmisw.org/ont/cf/parameter/sea_water_temperature
relative_humidity	https://mmisw.org/ont/cf/parameter/relative_humidity
sea_water_practical_salinity	https://mmisw.org/ont/cf/parameter/sea_water_practical_salinity
sea_water_speed; upward_sea_water_velocity; direction_of_sea_water_velocity	https://mmisw.org/ont/cf/parameter/sea_water_speed; https://mmisw.org/ont/cf/parameter/upward_sea_water_velocity; https://mmisw.org/ont/cf/parameter/direction_of_sea_water_velocity
sea_surface_height_above_sea_level	https://mmisw.org/ont/cf/parameter/sea_surface_height_above_sea_level
sea_surface_wave_mean_ height; sea_surface_wave_ signifcant _to_direction; sea_surface_wave_significant_period	https://mmisw.org/ont/cf/parameter/sea_surface_wave_mean_height; https://mmisw.org/ont/cf/parameter/sea_surface_wave_significant_to_direction; https://mmisw.org/ont/cf/parameter/sea_surface_wave_significant_period
mass_concentration_of_chlorophyll_in_sea_water	https://mmisw.org/ont/cf/parameter/mass_concentration_of_chlorophyll_in_sea_water
mass_concentration_of_phytoplankto_expressed_as_chlorophyll_in_sea_water	https://mmisw.org/ont/cf/parameter/mass_concentration_of_phytoplankton_expressed_as_chlorophyll_in_sea_water
dew_point_temperature	https://mmisw.org/ont/cf/parameter/dew_point_temperature
mass_concentration_of_oxygen_in_sea_water	https://mmisw.org/ont/cf/parameter/mass_concentration_of_oxygen_in_sea_water
sea_water_turbidity	https://mmisw.org/ont/cf/parameter/sea_water_turbidity

3. Network and Communication

The *Gulf of Mexico Coastal and Ocean Observing System* (GCOOS) Data Portal is a distributed resource network and part of a more extensive network of GCOOS RA resources (Figure 3.1). GCOOS network has since migrated to cloud infrastructure but maintains IT services from the Texas A&M University (TAMU), College Station, and Texas A&M University-Corpus Christi facilities. It comprises several independent virtual and physical servers hosted at a cloud provider (Digital Oceans), TAMU in College Station, and TAMU Corpus Christi.

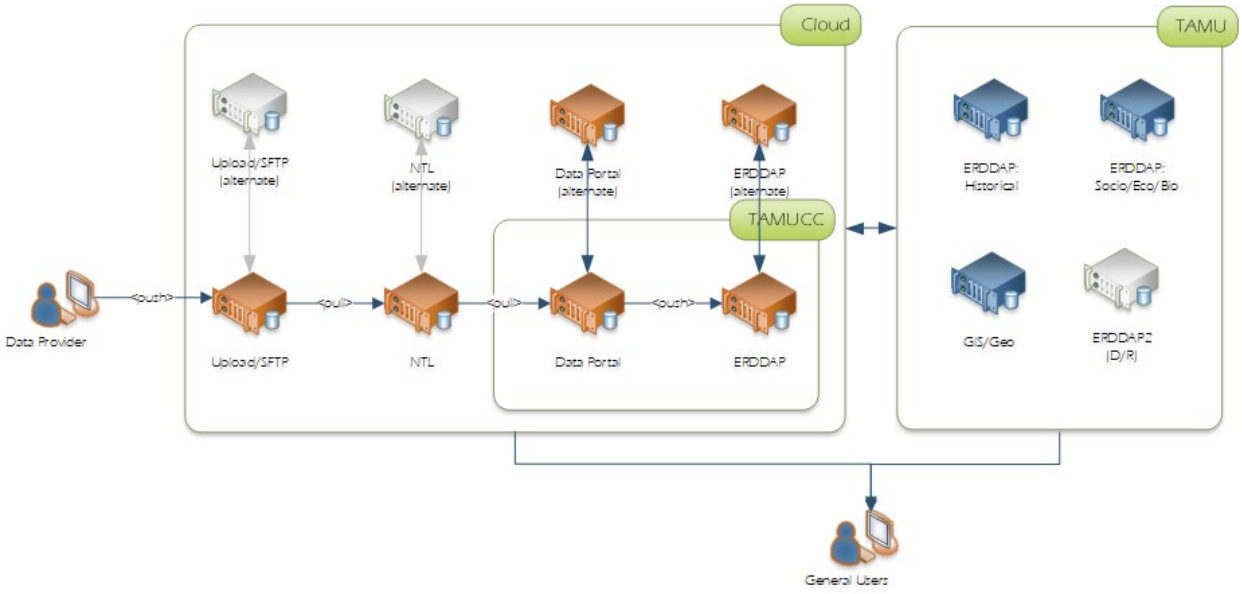

Figure 3.1. The Gulf of Mexico Coastal Ocean Observing System (GCOOS) distributed network.

GCOOS's physical computer and server assets reside in the state-of-the-art TAMU Dollar Data Center in 2017 and TAMUCC Data Center. The server based in Texas A&M University Corpus Christi (TAMUCC) Data Center serves as the primary production server. The alternate server is hosted on a cloud in cases where the network and communications from the cloud cyberinfrastructure are severed (see *Series 4. Disaster Management and Recovery*). The Information Technology Services (ITS) department of TAMUCC is one of many service departments of the University offering professional services to the enhancements and operations of the network and hardware infrastructure. It provides professional services to all staff and students and maintains

the Network and Operations Center (NOC) and 100Gbps network backbone on both campuses. The Data Center at the TAMUCC NOC provides n+1 cooling redundancy, n+1 power redundancy with a 250kVA Data Center class battery backup and generator, security access, and over 50+ IT professionals in support. The Data Center is 1,480 GFS with 925 GSF available for expansion, equipped with a 24x7 environmental monitoring and ECARO-25 fire suppression system. ITS also provide staff and project access to its scalable HP Gen8 and Gen9 Blades Hyper-V cluster for computing requirements and storage, and data backup services through it Quantum Scalar i6000 tape library.

The servers not within the TAMU and TAMUCC network are assessed separately and are required to follow the security protocols of TAMU System before they will be allowed to communicate directly with TAMU and TAMUCC GCOOS servers.

3.1. Primary Web Server

The primary HTTPS server (https://gcoos.org) that hosts the administrative and operational resources of the Regional Association of GCOOS is based on a cloud. *WordPress Content Management System* is employed to serve the pages. The server configuration is scaled as the need arises. The focus of the web server is to serve administration and organizational programs of GCOOS. The server specifications are:

Server	gcoos.org
Domain	gcoos.org (wpengine.com)
Alternate	gcoos.wpengine.com (35.231.16.51)
Purpose	Primary web server
Physical location	Google Server
Operating System	CentOS Linux 8
CPU	8-core Intel
Total Memory	1.6GB
Total Storage	3GB
Services	HTTPS
Contact Name	Josh Benson
Contact Email	benson@jokermedia.com

3.2. Primary Data Server

The primary GCOOS data server (https://data.gcoos.org/) that collates and distributes near-real-time data from local data nodes and other federal assets in the region remains a physical server hosted by TAMUCC Data Center. Data are collated, processed, QC-tagged, and served via GCOOS data endpoints (see Section 6).

NOTE: GCOOS discontinued the Open Geospatial Consortium Sensor Observing Services (OGC SOS) facility in 2018. The move was part of the strategy of NOAA IOOS to simplify the distribution of data to the community.

The following are the technical specifications and configuration of GCOOS Data Portal Server (https://data.gcoos.org):

Server	data.gcoos.org
Domain	data.gcoos.org
Alternate	64.71.82.19
Purpose	Web server for GCOOS Data
Physical location	TAMU CC Data Center
Operating System	Rocky Linux 9
CPU	Intel(R) Xeon(R) CPU E5-2667 v3 @ 3.20GHz
Total Memory	23GB
Total Storage	1TB
Services	HTTPS
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

3.3. Data Upload and SFTP Server

A dedicated server was established in 2018 to facilitate the data collection and delivery from data providers and control access to the services.

Server	uploads.gcoos.org
Domain	uploads.gcoos.org
Alternate	157.230.220.18
Purpose	Data delivery point for data providers
Physical location	DigitalOcean (NY)
Operating System	Ubuntu 20.x
CPU	Intel
Total Memory	8GB

Total Storage	660GB
Services	HTTP, SFTP
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

3.4. Application Servers for Supplemental Projects

GCOOS maintains independent virtual servers using the facilities of DigitalOcean. Some support GIS-related facilities remains with TAMU Data Center but will be migrated to the cloud for scalability of resources. All servers have CentOS Linux 7 or Ubuntu installed. CentOS will be faced-out in favor of Ubuntu or Rocky Linux.

The server specification for the support and supplemental services are:

Server	wq.gcoos.org
Domain	wq.gcoos.org
Alternate	167.99.124.52
Purpose	Web server for GCOOS Water Quality monitoring projects
Physical location	DigitalOcean (NY)
Operating System	Rocky Linux
CPU	Intel
Total Memory	4GB
Total Storage	80GB
Services	HTTPS, SFTP
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

Server	ntl.gcoos.org
Domain	ntl.gcoos.org
Alternate	142.93.246.198
Purpose	BSEE Notice to Lessees and Operators Data Repository
Physical location	DigitalOcean (NY)
Operating System	Rocky Linux
CPU	Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
Total Memory	8GB
Total Storage	400GB
Services	HTTPS, SFTP
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

Server	gulfhub.tamucc.edu
Domain	gulfhub.gcoos.edu
Alternate	172.28.82.11
Purpose	Data server for the GulfHub project
Physical location	TAMUCC Data Center
Operating System	CentOS Linux 7
CPU	Intel Xeon CPU E5-2667 v3 @ 3.20GHz
Total Memory	23GB
Total Storage	300GB
Services	HTTPS, SFTP
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

3.5. GIS Server

This server (gcoos3.tamu.edu) is used to generate and serve map products and serves as the host for the ArcGIS services. The products are served via Concrete5 CMS and accessible via a desktop computer or mobile devices. The services of this server will be migrated to the cloud cyberinfrastructure in 2021. The following is the technical specifications and configuration of gcoos3:

Server	gcoos3
Domain	tamu.edu
Alternate	165.91.85.7
Purpose	Primary server for creating and managing GIS Web services, applications, and data. It makes geographic information available to anyone with an Internet connection. All are available in WMS as well.
Physical location	Texas A&M University, College Station, TX
Operating System	CentOS 7.2
CPU	2 x 32GB Intel Xeon E5-2630 v3 @ 2.40GHz
Total Memory	64GB
Total Storage	1.2TB
Services	HTTP, WMS, WCS
Contact Name	DMAC
Contact Email	data@gcoos.org

The GCOOS geoportal server is a separate server with te following specification:

Server	geo.gcoos.org
Domain	gcoos.org

Alternate	67.207.88.241
Purpose	Geoportal server (GIS Data Catalog)
Physical location	DigitalOcean (NY)
Operating System	Ubuntu 16
CPU	Intel
Total Memory	31GB
Total Storage	350GB
Services	HTTPS
Contact Name	DMAC
Contact Email	data@gcoos.org

3.6. ERDDAP AND TDS

This is GCOOS' *Environmental Research Division's Data Access Program* (ERDDAP) and Thematic Real-time Environmental Distributed Data Services (THREDDS) data server or TDS. The following is the technical specifications and configuration of GCOOS ERDDAP servers:

Server	gcoos4
Domain	geos.tamu.edu
Alternate	165.91.85.11
Purpose	Server of ERDDAP for biological data
Physical location	Texas A&M University, College Station, TX
Operating System	Ubuntu Linux
CPU	2 x 32GB Intel Xeon E5-2630 v3 @ 2.40GHz
Total Memory	64GB
Total Storage	1.2TB
Services	HTTPS, OPeNDAP (ERDDAP & TDS)
Contact Name	DMAC
Contact Email	data@gcoos.org

Server	gcoos5
Domain	geos.tamu.edu
Alternate	192.168.122.1
Purpose	Server of ERDDAP for historical met data and TDS
Physical location	Texas A&M University, College Station, TX
Operating System	CentOS 7
CPU	40 x 64GB Intel Xeon E5-2640 v4 @ 2.40GHz
Total Memory	125GB
Total Storage	72TB
Services	HTTPS, OPeNDAP (ERDDAP & TDS)
Contact Name	DMAC
Contact Email	data@gcoos.org

Server	erddap.gcoos.org
Domain	erddap.gcoos.org
Alternate	64.227.10.0
Purpose	Primary ERDDAP server for near real-time data
Physical location	
Operating System	Ubuntu Linux
CPU	Intel
Total Memory	62GB
Total Storage	1.5TB
Services	HTTPS, SFTP, ERDDAP
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

Server	erddap2.gcoos.org
Domain	erddap2.gcoos.org
Alternate	161.35.136.100
Purpose	Development server for ERDDAP
Physical location	DigitalOcean
Operating System	Ubuntu LTS
CPU	Intel Xeon Gold 6140 CPU @ 2.30GHz
Total Memory	62GB
Total Storage	500GB
Services	HTTP, SFTP, ERDDAP
Contact Name	Felimon Gayanilo
Contact Email	felimon.gayanilo@tamucc.edu

4. Data Flow and Acquisition

The *Gulf of Mexico Coastal Ocean Observing System* (GCOOS) does not own or manage physical observing assets. Local Data Nodes (LDN) contribute data voluntarily, and as such, GCOOS is receiving data from heterogeneous sources and data types. These data types can be classified into four different categories (Figure 4.1): MODEM/GTS, SOS, WSDL and HTTP/TXT (Table 42.2 and 4.3). GCOOS developed modules to parse the data that comes in many formats. Constant monitoring is done to ensure that data flow from the LDN to the GCOOS remains uninterrupted. In cases where the data format is modified or interrupted for over seven days, LDNs notifies GCOOS to adjust the scripts accordingly.

Although it is assumed that LDNs follow stringent practices to ensure sensors are calibrated regularly, and data received from sensors are validated prior to data submission, GCOOS re-executes QA/QC test to all the data received to ensure uniformity of data quality. The HF Radar and glider data are managed directly by the HF Radar DAC (https://cordc.ucsd.edu/projects/mapping/maps/; see section 4.5 of this document) and Glider DAC (https://gliders.ioos.us; ; see section 4.6 of this document), respectively. GCOOS uses DAC's APIs to read and display processed data in GCOOS sites.

OGC SOS is no longer used to distribute data from GCOOS data portal, but continues to support submission via OGC SOS data endpoint from LDNs if they still maintain the instance.

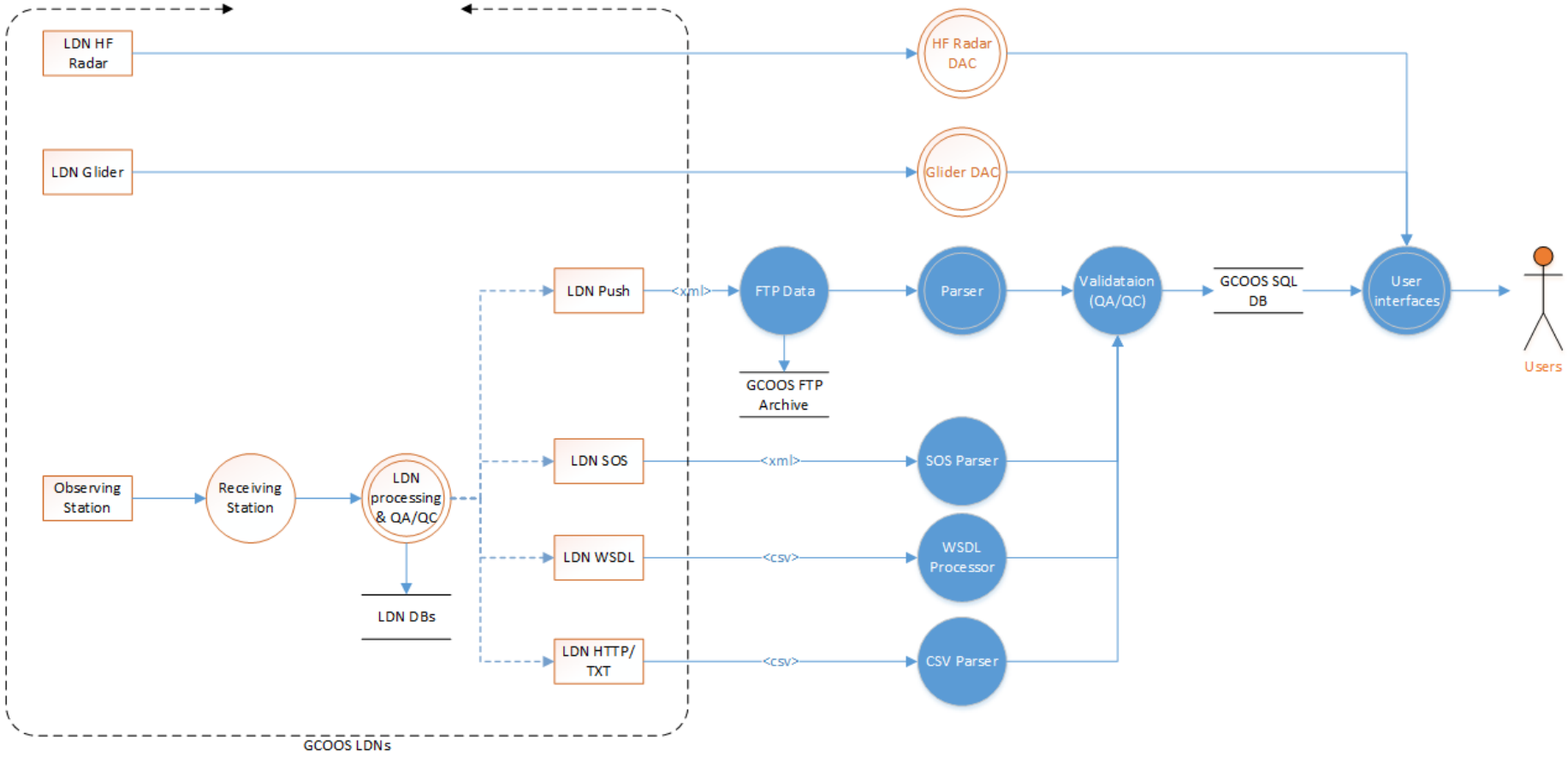

Figure 4.1. Data flow diagram that presents the data flow from data providers to the GCOOS Data Portal (see also Tables 4.2 and 4.3). Data from observing stations are processed before ingestion. GCOOS provides many interfaces to allow for easy extraction of data from its repository.

4.1. MODEM

Some non-federal providers push data to GCOOS in NDBC's "MODEM" format with GCOOS file naming conventions. This format presents a low-barrier to entry for new data providers. The data on the GCOOS SFTP drop site are pushed to the primary server for processing. After processing, the files are archived on another folder for backup purposes. The MODEM formatted data are not W3C DOM (*Document Object Model*) compliance (see below) hence cannot be read as a regular XML file. Data files are first corrected to be DOM compliance by adding an outside tag to generate a single root XML, and parsed to extract the data to be stored on the primary database.

```
The following is an example of such file from the Everglades National Park, FL:

<?xml version="1.0" encoding="ISO-8859-1"?>
 <message>
  <station>BDVF1</station>
   <date>07/27/2012 17:00</date>
    <missing>-9999</missing>
     <met>
       <tp001>30.83</tp001>
       <wtmp1>30.83</wtmp1>
       <prec1>  0.0</prec1>
       <dp001>1.5</dp001>
       <fm64iii>830</fm64iii>
       <fm64xx>99</fm64xx>
       <fm64k1>7</fm64k1>
       <fm64k2>1</fm64k2>
       <sp001> 0.65</sp001>
       <tide1>12.8</tide1>
     </met>
 </message>
 <message>
  <station>BDVF1</station>
   <date>07/27/2012 17:06</date>
    <missing>-9999</missing>
     <met>
       <tide1>12.79</tide1>
     </met>
 </message>
 <message>
  <station>WWEF1</station>
   <date>07/27/2012 17:54</date>
    <missing>-9999</missing>
     <met>
       <tide1>10.35</tide1>
     </met>
 </message>
```

NOTE: Although this approach may be crude, this is the most reliable since it is not intrusive to the data providers and GCOOS on the other hand, can process or reprocess the data as required.

4.2. Web Services Description Language (WSDL)

The *Web Services Description Language* (WSDL) is supported by GCOOS to extract data from the *National Estuarine Research Reserve System* (NERRS) information system. The *Centralized Data Management Office* (CDMO) of NERRS has created several web services products to facilitate the extraction of real-time data from their databases.

```
Example of a PHP command to extract the latest single point data from station
_wkbmbwq_

$wsdl=new nusoap_client('https://cdmo.baruch.sc.edu/webservices2/requests.cfc?wsdl');
$wsdl->call('exportSingleParamXMLNew',array('tbl'=>'wkbmbwq','numrecs'=>'1',
'param'=>'Temp,Sal,DO_mgl,Turb,Depth'));
```

4.3. HTTP/TXT

GCOOS also allows LDNs to post data in TXT forms as an option in data extraction if all other options fail. This approach is discouraged due to the heterogeneity of the files. Individual modules need to be developed to extract data from TXT files given that no encoding standard can be imposed.

```
The following is an example of such output from TABS R Station:

7/28/2015 04:00:00    13.14   21.59   25.27    31.3    30.9
07/28/2015 04:30:00    15.91   19.67   25.30    39.0    30.8
07/28/2015 05:00:00    13.45   18.88   23.18    35.5    30.8
07/28/2015 05:30:00    15.91   15.73   22.37    45.3    30.7
07/28/2015 06:00:00    14.74   14.00   20.33    46.5    30.7
07/28/2015 06:30:00    15.91   12.36   20.15    52.2    30.6
07/28/2015 07:00:00    14.35    9.61   17.27    56.2    30.6
07/28/2015 07:30:00    15.48    6.79   16.90    66.3    30.5
07/28/2015 08:00:00    15.62    3.50   16.01    77.4    30.5
07/28/2015 08:30:00    19.10   -1.69   19.17    95.1    30.4
07/28/2015 09:00:00    19.46   -0.99   19.49    92.9    30.4
07/28/2015 09:30:00    19.21   -3.33   19.50    99.8    30.4
07/28/2015 10:00:00    18.78   -4.98   19.43   104.9    30.3
```

4.4. Binaries

Until most recently, GCOOS also receives data in binary format. This is most common with BSEE/NTL stations (Figure 4.2). The data received are in Teledyne or Nortek binary data formats. The data are parsed before ingesting to GCOOS data repositories. The archival of the BSEE/NTL data to NCEI will be through the data pipeline established with NCEI with the primary data server of GCOOS.

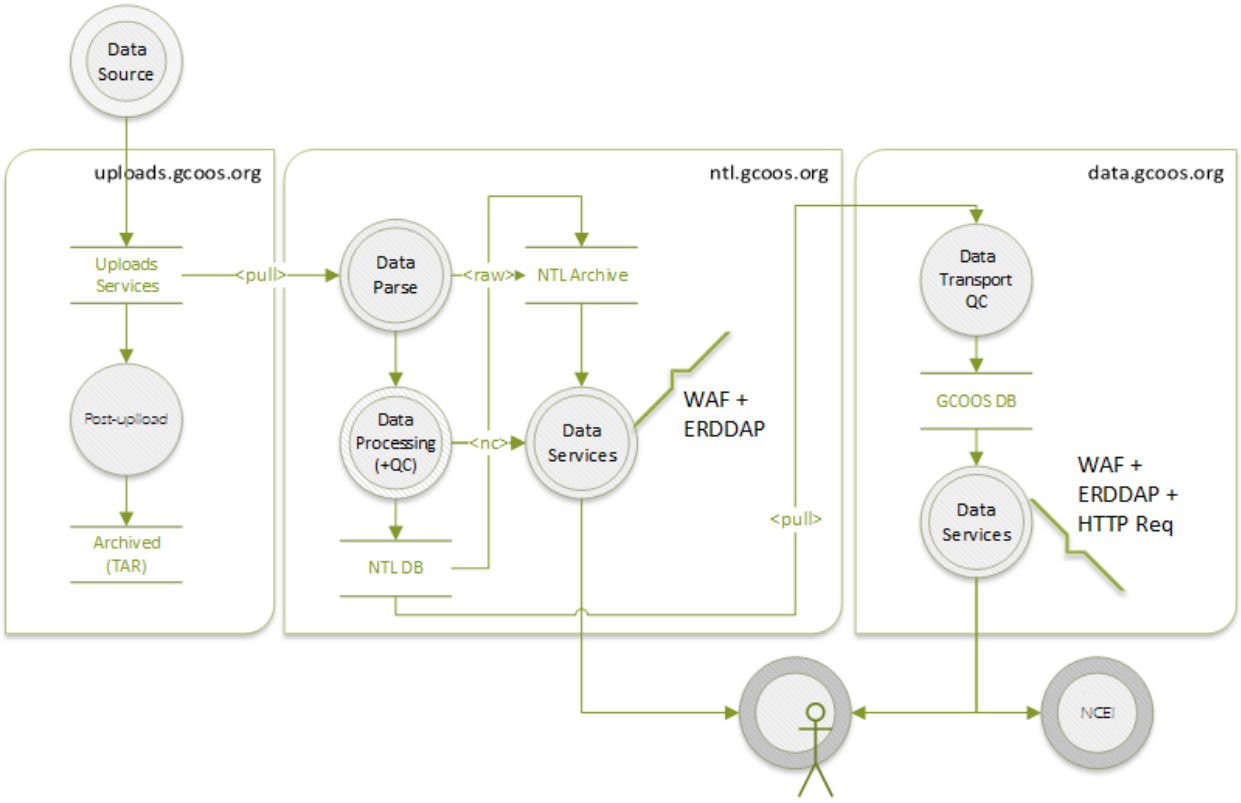

Figure 4.2. Data flow diagram for BSEE/NTL station data. Data are served from two synchronized servers.

4.5. HF Radar

All HF radar data go directly to the HF Radar Data Acquisition Center (DAC; https://hfrnet.ucsd.edu/thredds/catalog.html) which collates and QA/QC the data ingested (Figure 4.3.). GCOOS Data Portal uses the published API to retrieve processed data. Table 4.1. is a list of the radar stations in the Gulf of Mexico from the Local Data Nodes.

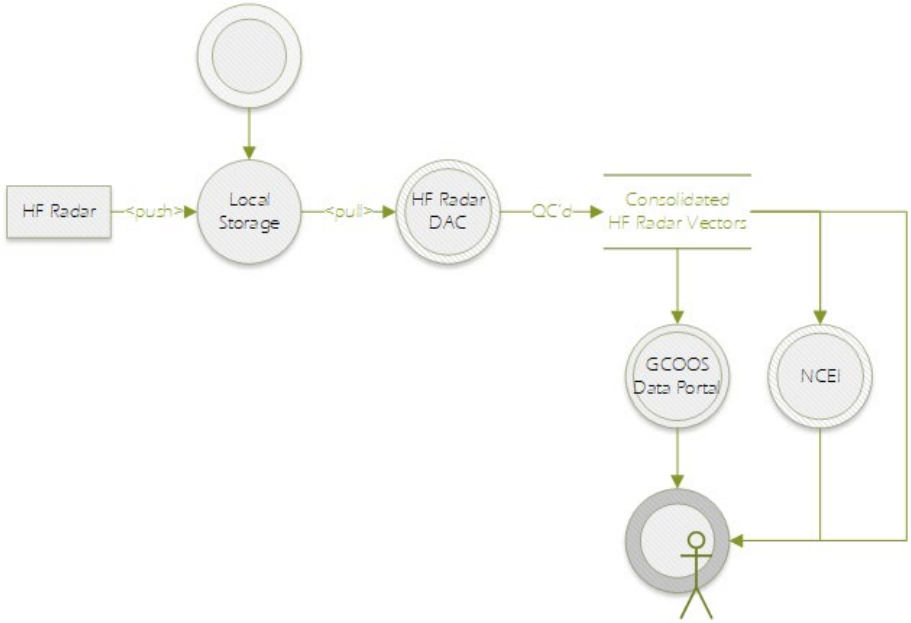

Figure 4.3. Data flow diagram that presents the data flow from HF Radar operators GCOOS clients.

Table 4.1. HF data sources in the Gulf of Mexico with GCOOS support.

Network	Description	Lat	Lon
TAMU	Padre Island, TX	27.4216	-97.3000
	Aransas Natinoal Wildlife Refuge	28.1114	-96.7935
	Matagorda Bay Nature Park	28.6044	-95.9613
	Surfside, TX	29.0077	-95.2155
	Rollover Pass, TX	29.5079	-94.4989
Fugro	Chevron Pipeline Facility, LA	29.1031	-90.1900
	Southwest Pass, LA	28.9320	-89.4064
USM	Silver Slipper Casino, MS	30.2392	-89.4239
	Pass Christian Yacht Club, MS	30.3114	-89.2447
	Gulfport Harbor Pier, MS	30.3478	-89.0870
	Singing River, MS	30.3339	-88.5686
	Orange Beach State Park, AL	30.2494	-87.6685
	Henderson Beach State Park, FL	30.3832	-86.4338

4.6 AUV/Glider Data

GCOOS offers several services free of charge to any glider operator who is interested in such services. These services include posting trajectories, plots and datasets on the GANDALF website (https://gandalf.gcoos.org/) and posting data to the IOOS National Glider DAC (NGDAC) which makes them: available to the public through IOOS ERDDAP/TDS servers, available via the Global Telecommunications System (GTS) and archived by the National Centers for Environmental Information (NCEI).

ERDDAP: https://data.ioos.us/gliders/erddap/info/index.html

TDS: https://data.ioos.us/gliders/thredds/catalog.html

Glider data take several forms. To reduce power consumption and telecommunication costs, near real-time data are sparse versions (~5%) of the full-resolution datasets. Delayed-mode full-resolution datasets are downloaded from the gliders after they have been recovered. Near real-time or delayed-mode data to be submitted to the NGDAC must be reformatted into individual vertical profiles following the NGDAC NetCDF File Format V2.0 conventions. This produces vertical profiles approximating those typically collected from a ship but positioned at the center of a glider's dive or climb. Alternatively, the full 3-D trajectory of the glider can be preserved by reformatting the data in compliance with NCEI's NetCDF trajectoryProfile V2.0. At present the NGDAC is primarily concerned with passing data to the GTS which is only interested in temperature, salinity and density. Other parameters, such as optical parameters can be included but they are not passed to the GTS. GCOOS only passes temperature, salinity and density to the GDAC, consequently NCEI is only archiving temperature, salinity and density (see https://github.com/ioos/ioosngdac/wiki/NGDAC-NetCDF-File-Format-Version-2 , and https://www.nodc.noaa.gov/data/formats/netcdf/v2.0/)

So far, GCOOS has only processed near real-time data. The data provider contacts GCOOS and opens access to the data. GCOOS assembles programmatic metadata from the data provider and registers the deployment with the NGDAC. Every

few hours, GCOOS pulls the data from the provider, transforms the data into engineering units, reformats the data and submits it to the NGDAC. When the deployment is complete GCOOS closes the deployment at the NGDAC. Once closed, NCEI will archive the trajectory and issue an acquisition number to GCOOS who relays it back to the data provider. Data can usually be obtained from the GANDALF website.

5. Data QA/QC

GCOOS strive to validate all data in the repository as a certified regional information coordinating entity. This can only be achieved through the application of good data stewardship practices throughout the data life cycle. Good data stewardship practices include the adoption and application of a Quality Assurance (QA) and Quality Control (QC) plan. In brief, QA consists of actions taken before data collection begins to assure the data have the best chance of being valid and free of defects. QC consists of actions taken after the data have been collected to identify and mitigate flaws.

Good QA practice begins by choosing the appropriate sensor and instrument for the operating environment and the parameter to be measured and by selecting a deployment location and platform site which are free of structures and other obstructions which might interfere with or bias the measurements. Upon deployment and at each service visit the operator should verify and document that: the instrument settings are correctly set to achieve the desired sampling rates and behaviors (e.g., periodic burst sampling), the range of values expected to be encountered will be recorded with the desired numerical resolution, the most recent calibration factors are applied, the sensors are clean and functioning properly and the telecommunications system and power supplies are operating nominally. QC actions include: checking that data were recorded at the expected frequency and transmitted at the expected times, verifying that the data values have reasonable magnitudes and the expected variability, documenting which QC tests were made, assigning flag values to indicate the results of those test, inserting placeholders for missing values and, if desired, editing the data to repair defects or correct for sensor drift.

Documentation is vital to the production of quality data. Information that should be recorded includes: which sensors and instruments were used, where and when they were deployed, when and what maintenance was performed and what was the sensor condition at servicing and just prior to recalibration. Observing system operators typically produce and maintain log books, inventory lists and shipping logs to record and preserve this information.

5.1. Classification of data type based on delivery time

Real-time data are data which are available for use at the time the measurement was made, e.g., a vehicle speedometer. Some environmental sampling systems using cabled instruments or other continuous data telemetry methods to deliver data in real-time. The bulk of the data received by GCOOS are "near" real-time data. Near real-time data are data received some time after the measurement was made. The amount of time between the measurement and delivery to the shore side data systems ranges from seconds to one or more multiples of the sampling rate. For example, once each hour NDBC reports values that were measured sometime during the previous hour. GCOOS pulls data from NDBC each hour. The delay between when the measurement was made and when it becomes available through GCOOS servers depends on when the measurement was made, when NDBC posts the data and when GCOOS pulls the data, but typically this delay is less than two hours. As another example, autonomous profiling gliders collect data every few seconds but only transmit data to shore when they are at the surface which is typically about every 6 hours. GCOOS checks for new data every 6 hours so consequently, data can be up to 12 hours old when they first become available to the public. Real-time and near real-time data are useful in defining the current environmental conditions and are especially valuable for forecasting, search and rescue and response to environmental events (e.g., oil-spills). Delayed-mode data are data which first become available days, months or even years after collection. Examples are internally-recorded data from a moored instruments or the full-resolution data downloaded from an autonomous glider after recovery. Historical data are data that were collected years to decades ago. Delayed-mode and historical data are valuable for retrospective analyses and useful for the formation of long-term averages and climatologies.

5.2. Quality Assurance

GCOOS aggregates data from Federal and non-Federal ocean observing systems. Most of these systems were established and designed to satisfy their sponsor's mission requirements and put into operations long before GCOOS-RA came into existence so GCOOS-RA had no influence on the QA aspects of sensor selection,

platform site selection, and instrument settings. However, with the exception (by definition) of Citizen Scientist operations, we are confident that the non-federal and Federal providers employ professional scientists and engineers to design, deploy, document and maintain their observing systems. Because GCOOS-RA provides supplemental funding to most of the regional non-Federal data providers, GCOOS-RA has, or will soon have, contractual requirements with each of them requiring that they maintain their systems according to best data stewardship practices and to provide documentation to this effect upon demand.

5.3. Quality Control for Selected Near Real-time Data Streams

Although GCOOS-RA has limited influence over the selection, siting and maintenance of equipment, GCOOS has full control over the QC applied to all data aggregated and served though the GCOOS Data Portal. The list of non-Federal near real-time data streams currently aggregated by GCOOS is given in Table 2.1 and online at https://data.gcoos.org/ldn_list.php. The list of Federal stations is given in Table 2.2 and online at https://data.gcoos.org/fed_list.php

GCOOS has implemented the full suite of QARTOD procedures to all of its data in 2017, applying the QC guidance found in the U.S. IOOS Program Office's Quality Assurance of Real Time Oceanographic Data (QARTOD) manuals and will generate data flags using the flag definitions and encoding schema given in the Manual for Real-Time Oceanographic Data Quality Control Flags to the near real-time data served through the GCOOS Data Portal. The exceptions include: data collected by Citizen Scientists, numerical model output, satellite products, HF-Radar data, and Federal data.

Citizen Scientist data will not be served through ERDDAP services of the Data Portal. Citizen Scientist data are served through separate Citizen Scientist pages organized, with disclaimers, under the Products Portal. Model output from atmospheric or oceanic hindcasts/forecasts will not be subjected to QC but will be accompanied by disclaimers. Satellite data are not held by GCOOS; we rely on our satellite data providers to process and reprocess their level 2, 3 and 4 data in accordance with contemporary best practices and algorithms. HF-Radar QA/QC is

handled by the HF-Radar DAC which is GCOOS' source of these data. The IOOS National Glider DAC (NGDAC) will apply appropriate QC to glider data if and only if the QC flag attributes are omitted from the NetCDF files submitted to them. GCOOS currently has glider QA/QC performed by the NGDAC. Federal data are subjected to Federal QA/QC procedures (which are the basis of some of the QARTOD manuals). Federal QA/QC procedures are accepted as high-quality and sufficient.

Table 5.1 lists the near real-time parameters currently aggregated and served by the GCOOS Data Portal. GCOOS run the QC module to tag data as they become available. At a minimum GCOOS implements the “Required” and “Strongly-Recommended” tests found in the applicable QARTOD manuals. Currently, the GCOOS QC system perform the QARTOD required checks for timing/gap test, syntax test, gross range and climatology tests. Timing/gap tests include checks for valid timestamps and checks that data arrive when expected. Syntax tests check that the message blocks containing the data and the data themselves conform to the schema and are readable. Gross range checks and similarly, climatology checks, compare observed data to estimates of the maximum or minimum likely values for a given parameter. Currently, our range checks use single value Gulf-wide range limits. Except for gliders and mobile drilling platforms, the observation platforms locations are fixed and the required "location" tests are not made for fixed sites. The range limit values used for the gross limit checks are listed in Table 5.1. These limits were based on analyses of multi-decadal regional datasets, listed world extremes (atmospheric pressure) or inherent limits (pH, wind/current/wave direction, humidity). GCOOS is considering options for developing seasonal location-based range limits for the climatology tests. These ranges may be computed from near real-time data in our database or taken from gridded climatological data developed by NCEI (e.g., Gulf of Mexico Climatology) or Navy (e.g., GDEM-3) or NOAA. Our present quality control flags indicate the quality states of: 1 = good, 2 = untested, 3 = suspect and 4 = bad and 9 = missing value. Flag values accompanies all data served through GCOOS ERDDAP services.

The IOOS QARTOD page https://ioos.noaa.gov/project/qartod/ contains QA/QC manuals for a variety of parameters and information about the QARTOD

project. GCOOS developed their own codes developed under IOOS funding for community use found at https://github.com/asascience-open/QARTOD, and other similar open sourced codes.

Table 5.1. Acceptable range of values by parameter based on regional datasets, global extremes or inherent limits (e.g., pH, wind/current/wave direction or relative humidity).

Parameter	Acceptable Range	References
water temperature	-10 – 40 C	qartod_temperature_salinity_manual.pdf
air temperature	-10 – 50 C	USGS Field Manual (6.1 Temperature)
dew point	-10 – 50 C	USGS Field Manual (6.1 Temperature)
relative humidity	0 – 100%	To be determined
significant wave height	0 – 10 m	qartod_wave_data_manual.pdf
wave period	0 – 15 sec	qartod_wave_data_manual.pdf
wind direction	0 – 359 deg N	qartod_wind_manual.pdf
wind speed	0 – 75 m/sec	qartod_wind_manual.pdf
wind gust	0 – 75 m/sec	qartod_wind_manual.pdf
barometric pressure	870 – 1085 mbar	To be determined
salinity	0 – 50 PSU	qartod_temperature_salinity_manual.pdf
turbidity	0 – 1000 NTU	USGS Field Manual (6.7. Turbidity)
pH	0 – 14	USGS Field Manual (6.4. pH)
dissolved oxygen	0 – 15 mg/L	qartod_dissolved_oxygen_manual.pdf
phytoplankton concentration	0 – 1500 cells/L	PhytoplanktonManual_v1.0.pdf
water level	0 – 10 m	qartod_water_level_manual.pdf
current speed	0 – 180 cm/s	qartod_currents_manual.pdf
current direction	0 – 359 deg N	qartod_currents_manual.pdf
chlorophyll	0 – 50 mg/L	QARTODOceanOptics_v1.1_Final.pdf
fish abundance	TBD	To be determined

Table 5.2. QA/QC flags used for GCOOS data.

Flag Value	Meaning	Comment
1	Good	Data passed test
2	Untested	Data not tested or evaluated
3	Suspect	Measurement is questionable
4	Bad	Data failed test
9	Missing data	Data absent

5.4. Quality Control for Selected Historical Data

GCOOS has access to significant amounts of delayed-mode and historical data from various sources. This includes moored current meter data, CTD casts, biogeochemical data, delayed-mode autonomous glider data, fisheries and plankton data. GCOOS has slowly been migrating these datasets into NCEI NetCDF formats and serving them through the GCOOS ERDDAP servers (https://data.gcoos.org/erddap.php) and project-based ERDDAPs. GCOOS maintains a number of ERDDAP services, and of significance to the collection of historical data served is the GulfHub ERDDAP server (https://gulfhub-data2.gcoos.org/erddap/index.html) that has QC'd the BSEE data submitted to NOAA NDBC since 2005 using information and assistance of the private sectors that submitted those data. GCOOS has been delegated to receive those data since early 2021 and has been collecting and performing automated QC since 2020. These data are now served in GCOOS primary ERDDAP for near real-time data.

Based on first-hand knowledge we know some of some of the historical datasets have had significant QA/QC applied to them while others have had little or no QA/QC applied. The data are served in a separate server for a collection of all historical data in GCOOS holdings (https://gcoos5.geos.tamu.edu/erddap).

6. Data Access and Distribution

The *Gulf of Mexico Coastal Ocean Observing System* (GCOOS) Data Portal provides three means to extract data from its portal: (1) Direct Access, (2) ERDDAP, and (3) Web Accessible Folder (WAF). The OGC SOS was discontinued in 2019 due to various technical difficulties in maintaining the services.

6.1. Statement on Data Sharing

GCOOS will adhere to the directives for sharing environmental data and peer-reviewed publications expressed in version 3.0 of the NOAA document Data and Publication Sharing Directive for NOAA Grants, Cooperative Agreements and Contracts and will adhere with guidance, definitions, directives and requirements contained therein. In particular, with respect to near real-time environmental data, we will make such data and metadata available as soon as practical after the observation has been received by shore-side data systems. In most cases, this will be under 1 hour for regularly reporting observations, somewhat longer (e.g., 4 hours) for irregularly reporting systems such as gliders. All data served by GCOOS will be made independently understandable, visible, and accessible to the public without restriction and at no cost to the end-user or no more than the cost of reproduction.

Sharing Directive: https://nosc.noaa.gov/EDMC/documents/Data_Sharing_Directive_v3.0.pdf

6.2. Direct Data Access

Direct Access had been the preferred option in extracting data from repositories. Although the introduction of other options are becoming popular, Direct Access via a RESTfull approach remains popular to some sector of the community as it returns Comma Separated Values (CSV) the most common data format in the community.

6.2.1. Data Call Instructions to get Headers

The following is a direct call syntax to get headers for GCOOS assets:

Syntax

https://data.gcoos.org/get_gcoos_assets.php?source={1}&extension={2};

where

{1} optional: can either be a blank (default) to get all assets, 'federal' to get only federal assets or'non-federal' to list only non-federal assets.

{2} optional: default is *'false'* and can be equal to '*true*' to get additional platform information such URN, URL, URL for RSS feed, image and short text label of the platform.

Example:

To get all assets:

https://data.gcoos.org/get_gcoos_assets.php

To get all federal assets:

https://data.gcoos.org/get_gcoos_assets.php?source=federal

To get all non-federal assets:

https://data.gcoos.org/get_gcoos_assets.php?source=non-federal

To get all non-federal assets with additional platform data:

https://data.gcoos.org/get_gcoos_assets.php?source=non-federal&extension=true

6.2.2. Data Call Instructions to get Observation

The following is the syntax for direct data retrieval from GCOOS repository.

Syntax:

https://data.gcoos.org/get_gcoos_data.php?bbox={1}&start={2}&stop={3}&obs={4}&source={5}&fmt={6}&sortBy={7}&qc={8}

where:

{1} westlon,southlat,eastlon,northlat, where:

westlon = longitude of western edge of bounding box expressed as a floating point number

southlat = latitude of southern edge of bounding box expressed as a floating point number

eastlon = longitude of eastern edge of bounding box expressed as a floating point number

northlat = latitude of northern edge of bounding box expressed as a floating point number

{2} start date formatted as YYYY-MM-DDTHH:MM:SSZ

{3} stop date formatted as YYYY-MM-DDTHH:MM:SSZ

{4} observation to retrieve

air_pressure: for barometric readings
air_temperature: for air temperature readings
chlorophyll: for chlorophyll readings
current: for the ocean current data (speed, direction, meridional and zonal velocities)
do: for disolved oxygen and concentrations
relHumidity: relative humidity readings
salinity: for salintity measurements
turbidity: turbidity measurements
water_level: water level measurements
water_temperature: for water temperature data
waves: wave readings
winds: for winds (speed, direction and gust)

{5} data source which may either be: All, ADCP, COAPS, COMPS, CenGOOS, DISL, ENP, FWRI, LUMCON, NDBC, NERRS, NOS, SCCF RECON, TABS, TCOON, WAVCIS, SCRIPPS

{6} desired output format. Only CSV is currently supported.

{7} ascending sort order:

dates: sort the output by dates; provider: sort the ouput by data provider, then dates; or station: sort the output by the name of the station.

{8} QC flag: [NOTE: This feature is currently disabled until further notice.]

yes: QC flags will be exported with each data (1: good or pass; 2: not evaluated, not available or unknown; 3: questionable; 4: bad or failed; 9: missing data) no: this is the default and no QC flag will be exported

Example:

To access the water temperature data in the repository for all the Gulf region for the period November 01, 2008 (time: 00:00:00 UTC) to November 15, 2008 (23:59:59 UTC) and sorted by dates, the call should be:

https://data.gcoos.org/get_gcoos_data.php?bbox=-98.4,21.7,-80.5,31.0&start=2008-11-01T00:00:00Z&stop=2008-11-15T23:59:59Z&obs=water_temperature&source=All&fmt=csv&sortBy=dates&qc=yes

6.2.3. User Interactive Form

The Direct Access website (https://data.gcoos.org/directAccess.php) provides an interactive user interface (Figure 6.1) to define the coordinates or geographical space of interest, temporal coverage, specific observation, data source and output format. The inputs from this form will generate the proper syntax to extract the required data.

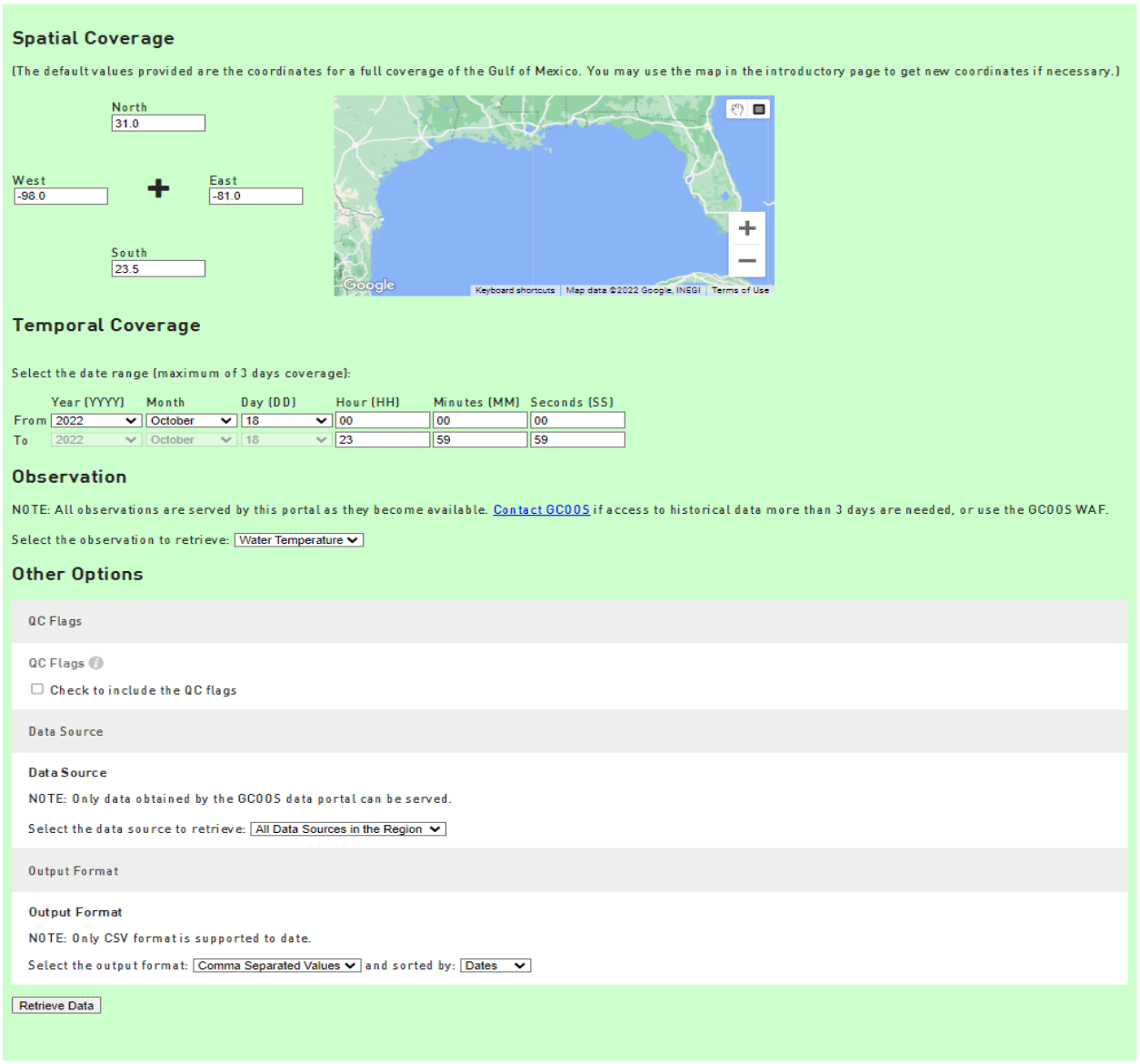

Figure 6.1. User interactive interface in GCOOS Data Portal to assist in the construction of the syntax to extract data.

6.4 ERDDAP/TDS

GCOOS maintains three primary *Environmental Research Division Data Access Protocol* (ERDDAP) servers, and a *Thematic Real-Time Environmental Distributed Data Services* (THREDDS) *Data Servers* (TDS):

- Oceanographic and Meteorological Historical Collection (https://gcoos5.geos.tamu.edu/erddap): This ERDDAP serves historical collectin of data in GCOOS holdings. This will also include allother data that data providers would like to serve to the public.
- Oceanographic and Meteorological Observing System (https://erddap.gcoos.org/erddap): This is the rimary server to serve near real-time metocean data.
- Biological and Socioeconmics (https://gcoos4.tamu.edu/erddap): This ERDDAP server serves biological data collections as well as socioeconomic data that are collected by GCOOS supplemental projects or shared freely by scientists and researchers in the region.

All GCOOS ERDDAP services are linked to the global system (http://erddap.com/) to make the data discoverable/findable. The services are also listed on ERDDAP sites.

GCOOS THREDDS (https://gcoos5.geos.tamu.edu/thredds/catalog.html) is used primarily to distribute the consolidated bathymetry of the Gulf of Mexico and repository of the latest forecast/nowcast model runs of the Texas-Luoisianna Shelve Model.

6.5. Web Accessible Folder (WAF)

In addition to *Direct Access* and *SOS* endpoints to access data from GCOOS Data Portal, GCOOS also maintains a *Web Accessible Folder* (WAF) to further promote data reuse. Files are summarized by observation on a monthly basis, as well as by platform or station. In addition to standard *Comma Separated Files* (CSV), monthly

station data presented in netCDF data format is also available. To support the growing number of catalogs, the GCOOS WAF also contains a folder with *SensorML2* files for all the stations it has in its inventory.

The folders also contain a SHA384SUM that contains the SHA-384 (*Secure Hash Algorithm*) cryptographic hash function results. The SHA384SUM file can be used by clients to validate the data downloaded from the GCOOS WAF.

The CSV files on the GCOOS WAF are generate monthly but the netCDF files that are used by *NOAA Centers for Environmental Information* (NCEI), are generated quarterly or as requested (Figure 6.2).

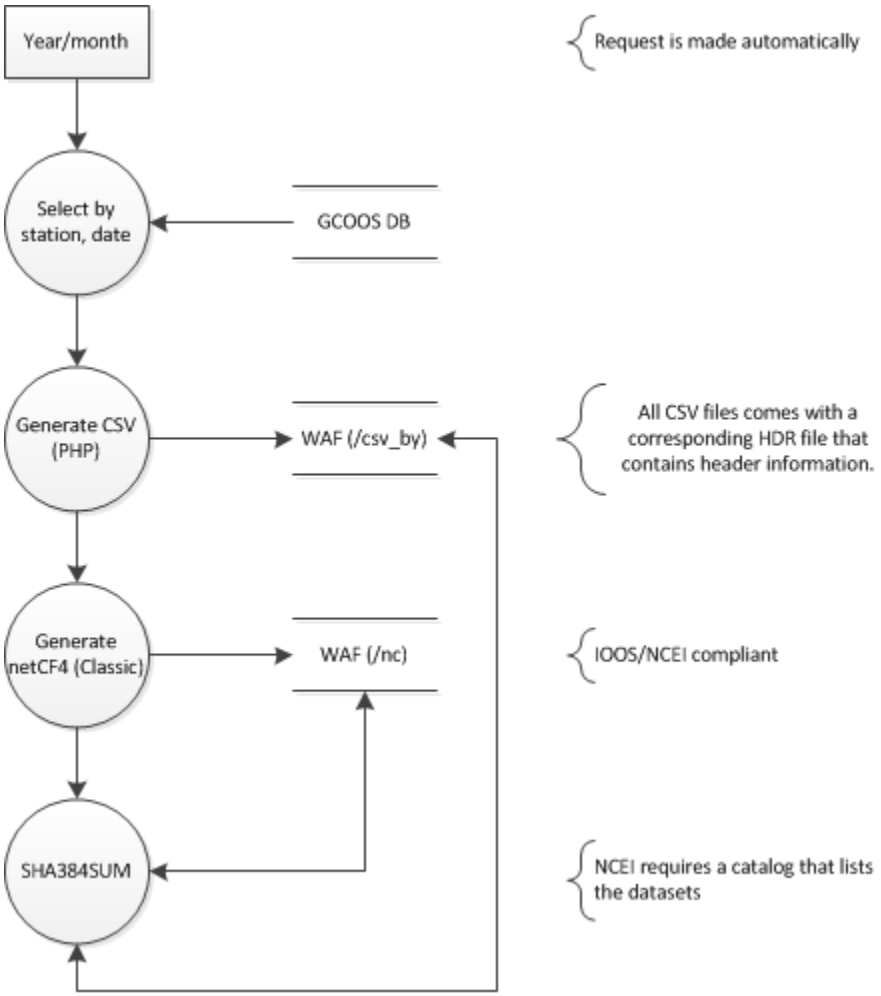

Figure 6.2. Data fFlow Diagram (DFD) in the generation of the files in the WAF.

The script to convert CSV files as generated from the GCOOS WAF (*https://data.gcoos.org/data/waf*) to a netCDF4 (Classic) in compliance to IOOS standard based on the NCEI recommendations at *https://sites.google.com/a/noaa.gov/ncei-ioos-archive/cookbook?pli=1#TOC-Providing-Data-Integrity* and in compliance with the *NODC Profile Orthogonal* specification at *https://www.nodc.noaa.gov/data/formats/netcdf/v1.1/profileOrthogonal.cdl*, are made available in *https://github.com/GCOOS/csv2nc*. The python codes published was designed for others who are also in the process of translating their data to comply with IOOS and NCEI requirements can use and follow the published codes.

7. Data Backup/Restore Strategy

The *Gulf of Mexico Coastal Ocean Observing System* (GCOOS) *Data Portal* maintains several levels of backup system to ensure high availability and fast recovery in cases of disaster. Figure 1 is a schematic diagram of the various level of backup-restore functions.

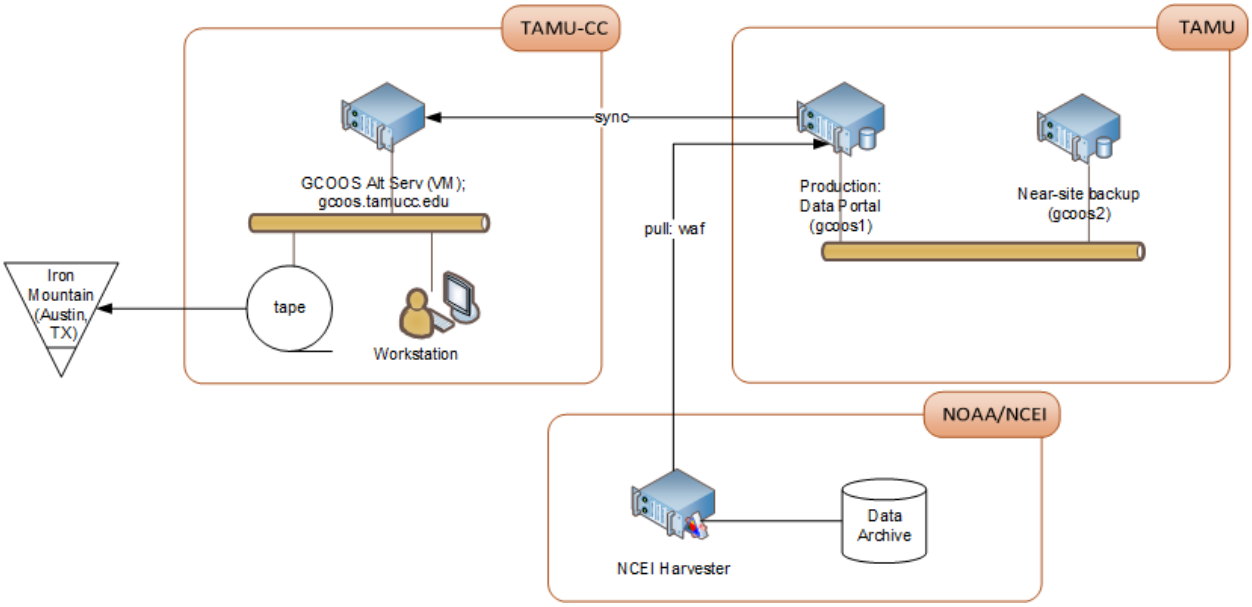

Figure 7.1. Schematic diagram of GCOOS backup system and restore points.

7.1. Level 1: Near-site Backup and Restore Point

Daily, monthly and annual backup of the primary database is made to *gcoos2* server that resides within the same network and physical location as that of *gcoos1* (primary data portal server).

7.2. Level 2: Off-Site Backup and Alternate Server

Daily synchronization (*CentOS RSYNC* and *postgreSQL Streaming Replication*) is made to GCOOS alternate server (*gcoos.tamucc.edu*) based in Corpus Christi, TX from the gcoos1 server in College Station, TX. This facility is also engaged if communication to the primary server is severed for whatever reason, or if the server needs to undergo maintenance. The domain, managed by *hover.com*, will roll-over to the alternate server, *gcoos.tamucc.edu* that ensures high-availability of GCOOS services.

7.3. Level 3: Off-Network Backup

Through the facilities of TAMU Corpus Christi, the GCOOS database is copied to a tape drive and stored at an offsite tape vault through the Iron Mountain (ironmountain.com) tape vaulting services. This is done quarterly or as needed.

7.4. Level 4: Long-term Archive

GCOOS maintains a *Web Accessible Folder* (WAF) that is also used as an endpoint from where *NOAA's National Centers for Environmental Information* (NCEI) use to pull data for the archive. To facilitate the harvest, GCOOS maintains two manifests of data, using SHA384SUM function of CentOS, that can be archived. The first, SHA384SUM_Complete, lists the SHA384 function results for all the files, while the second, SHA384_Archive, is used by NCEI that list the SHA-384 function results for files to archive for all files where LDNs expressed the desire to archive in NCEI.