

Current Status and the Future of the NOAA CORS Network

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Acknowledgements

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To our contributors for volunteering their geodetic stations, networks, time and efforts in coordination with NGS to make a robust contribution towards the NSRS.



National Geodetic Survey's Mission

To define, maintain and provide access to the **National Spatial Reference System (NSRS)** to meet our Nation's economic, social, and environmental needs.

OPUS: Online Positioning User Service
National Geodetic Survey

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OPUS now using ITRF2014 and GEOID18
The new ITRF2014 reference frame provides updated CORS positions and velocities. The new GEOID18 model provides improved orthometric heights.
Prefer the older? A legacy version of OPUS is available for a limited time.

Upload your data file.
Solve your GPS position & tie it to the National Spatial Reference System.
What is OPUS? FAQs

Choose File | No file chosen
* data file of dual-frequency GPS observations. [sample](#)

NONE

antenna - choosing wrong may degrade your accuracy.

0.000 meters above your mark.
antenna height of your antenna's reference point.

* email address - your solution will be sent here. [Privacy Act Statement](#)

Options to customize your solution.

Upload to Rapid-Static for data 15 min. - 2 hrs. | Upload to Static for data 2 hrs. - 48 hrs.

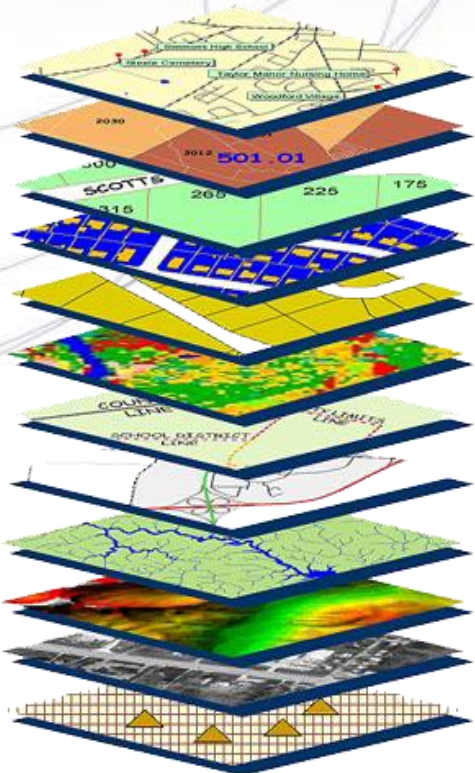
OPUS menu
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OPUS Today
as of 2019-09-13T10:20 EDT

Category	Count
Rapid-Static	150
Static	225

The National Spatial Reference System

- Official system of the US civilian government
 - Geodetic latitude, longitude, and height
 - Orthometric height
 - Geopotential
 - Acceleration of gravity, and deflection of the vertical
- Contains information about
 - Orientation and scale relative to international reference frames
 - Precise orbits of GPS satellites
 - Information derived from the continuously operating GPS/GNSS reference stations aka **CORS**

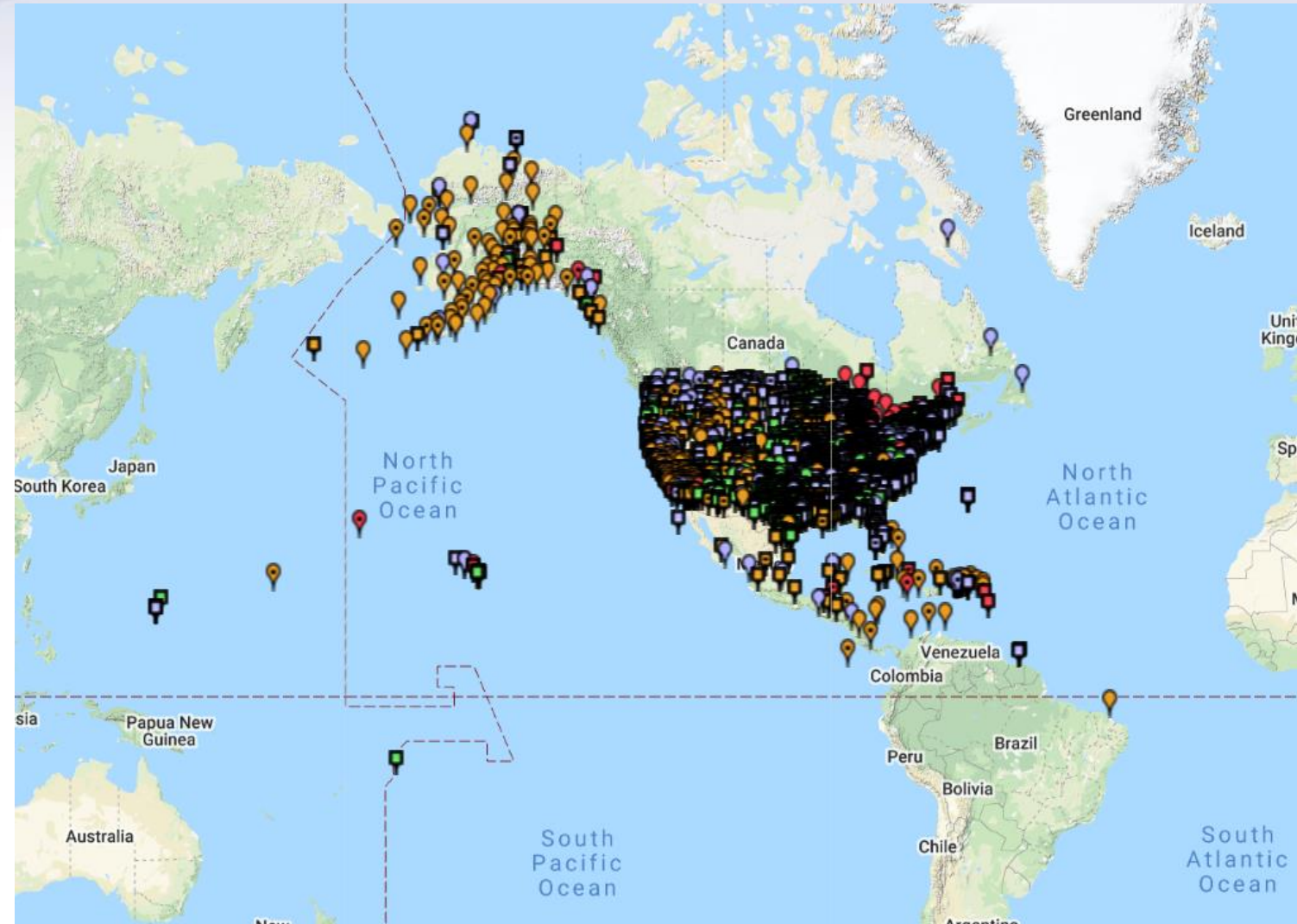


Guiding Principles for Continuously Operating Reference Stations (CORS)

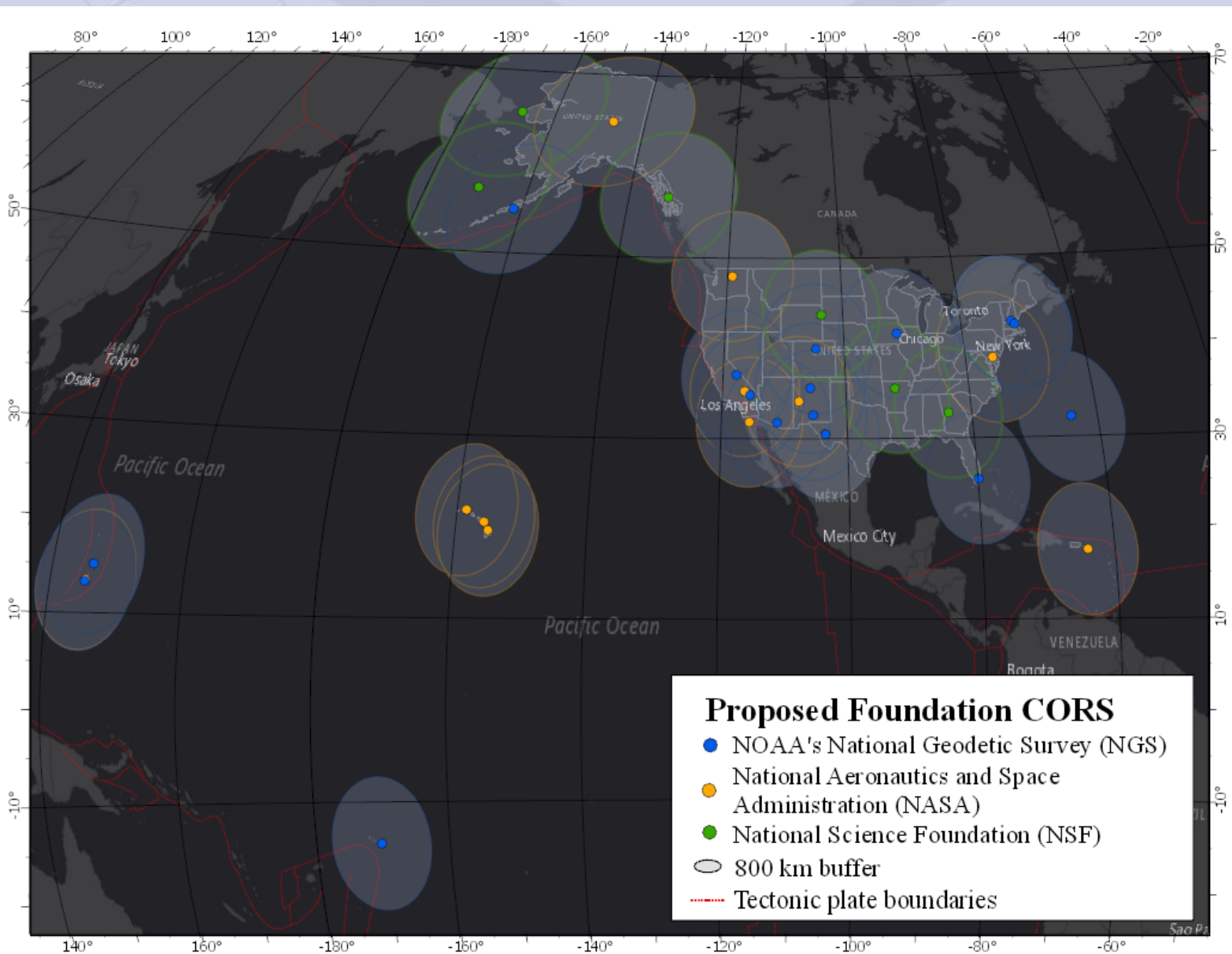
- **CORS** a major component of NSRS.
- The International Earth Rotation and Reference Systems Service (**IERS**) International Terrestrial Reference System (**ITRF**) will continue to be the worldwide standard reference system.
- NGS will continue to support the **ITRF** through International GNSS Service (**IGS**) reference sites with the **Foundation CORS** network
- The NSRS will continue to be defined in relation to the **ITRF**.

The NOAA CORS Network (NCN)

~1900 continuous stations
from more than 200
organizations which provide
GPS or GNSS data
consisting of carrier phase
and code range
measurements in support of
three dimensional positioning
down to millimeters



The NOAA Foundation CORS Network (FCN)



U.S. Federal Partners	GNSS Site ID	Location	Existing IGS or ITRF Site
National Science Foundation (NSF)	AB09	Wales, AK	
	AB51	Petersburg, AK	
	ATQK	Atkasuk, AK	
	P043	New Castle, WY	
	P777	Dennard, AR	
Existing Sites	P804	The Rock, GA	
	Program: Network of the Americas (NOTA)		
NSF Existing Sites	CN11	Pedro Cay, Jamaica	
	Program: COCONet	SAN0	San Andres Island, Colombia
National Aeronautics and Space Administration (NASA)	BREW	Brewster, WA	ITRF
	CRO1	St. Croix, VI	ITRF
	FAIR	Fairbanks, AK	IGS
	TBD	Greenbelt, MD	IGS/ITRF
Existing Sites	GUAM	Dededo, Guam	IGS
	Program: Global GNSS Network (GNN)		
NOAA- National Geodetic Survey (NGS)	HAL1	Haleakala, HI	IGS/ITRF
	KOKB	Kauai, HI	IGS/ITRF
	MDO1	McDonald Observatory, TX	ITRF
	MKEA	Mauna Kea, HI	IGS/ITRF
	MONP	Mount Laguna, CA	IGS/ITRF
	PIE1	Pie Town, NM	IGS/ITRF
	ASPA	Pago Pago, American Samoa	IGS
	BRSB	St. George, Bermuda	
Existing and New Sites	CNMR	Saipan, Northern Mariana Islands	IGS
	CORB	Woodford, VA	
	FLF1	Richmond, FL	Proposed IGS/ITRF
	GUUG	Mangilao, Guam	IGS/ITRF
	TMG2	Boulder, CO	Proposed IGS
	Program: NOAA CORS Network		
	WES2	Westford, MA	IGS/ITRF
	NEW	Apache Point, NM	ITRF
	NEW	Fort Davis, TX	ITRF
	NEW	Fort Irwin, CA	ITRF
NEW	Hancock, NH	ITRF	
NEW	Los Alamos, NM	ITRF	
NEW	Kitt Peak, AZ	ITRF	
NEW	Owens Valley, CA	ITRF	
NEW	Cold Bay, AK	ITRF	
NEW	North Liberty, IA	ITRF	

CORS Archive

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NOAA COMPREHENSIVE LARGE ARRAY-DATA STEWARDSHIP SYSTEM (CLASS)
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Please select a product to search » GO

SEARCH FOR DATA

- Environmental Data from Polar-orbiting Satellites
- Environmental Data from Geostationary Satellites
- Defense Meteorological Satellite Program (DMSP)
- Joint Polar Satellite System (JPSS)
- Sea Surface Temperature data (SST)
- RADARSAT
- Altimetry / Sea Surface Height Data (JASON)
- Global Navigation Satellite Systems (GNSS)**
- Other - Miscellaneous products in CLASS

NEWS

Attention JPSS Users! (6/18/20):
A number of legacy products generated since the launch of S-NPP have been replaced by the higher quality NOAA Enterprise products. CLASS has been receiving these newer products for over two years now. CLASS will no longer be receiving these legacy products after June 24, 2020. Please refer to the table [here](#) for a listing of legacy products and corresponding newer products. Please contact the [CLASS Helpdesk](#) with any questions or concerns.

Attention GOES-R users! (5/22/2020):
GOES-R series INST-CAL files are missing for the following dates: 02/22/20 to 04/02/20 and 04/14/20 to current. Nominal conditions of the return flow of the data has not been determined at this time. Contact the [CLASS Helpdesk](#) for any questions.

Attention AVHRR data users! (8/27/2019):

Since 2004, at-sampling CORS RINEX data (where available) is directly available online.

NGS only keeps 30 days of at-sampling data, then decimates to 30-second sampling rate online.

Data is free, but you must register!

CORS online **archive** repository at NOAA's CLASS

Multi-Year CORS Solution 2 (MYCS2)

As of September, 2019: You now have access to more accurate NOAA CORS Network station coordinates and velocities in both the national (NAD83) and international (ITRF) reference frames

What:

Robust coordinates and velocities in ITRF2014 and NAD83(2011) epoch 2010.00 (a within-realization update) for all NCN stations installed before 2014.

Modeled coordinates and velocities available for stations installed between 2014 and present.

GPS orbits match with ITRF2014.

Updated OPUS online positioning software uses these coordinates and velocities, and GEOID18.

How:

Two years of detailed quality control on all data collected by the NCN over 22 years (1995-2017).

A full network adjustment of 3050 stations, 1100 weeks of data for all NCN stations installed before 2014 (active and decommissioned), IGS, and NGA stations.

New CORS (<3 yrs old) have approximate coordinates and velocities “modeled” with OPUS-Net and HTDP (lower accuracy than the network solution).

Notable Events in 2020

- Discontinuance of the USCG DGPS service
- Impact of COVID-19 on CORS upgrades, installation, maintenance and repair
- Another delay implementing the modernized NSRS targeted for 2022
 - See Dru Smith's August 27th 2020 webinar at:
https://geodesy.noaa.gov/web/science_edu/webinar_series/2020-webinars.shtml

CORS Modernization Efforts

Blueprint for 2022 Part 3: Working in the Modernized NSRS

- Better access to the National Spatial Reference System

https://www.ngs.noaa.gov/PUBS_LIB/NOAA_TR_NOS_NGS_0067.pdf

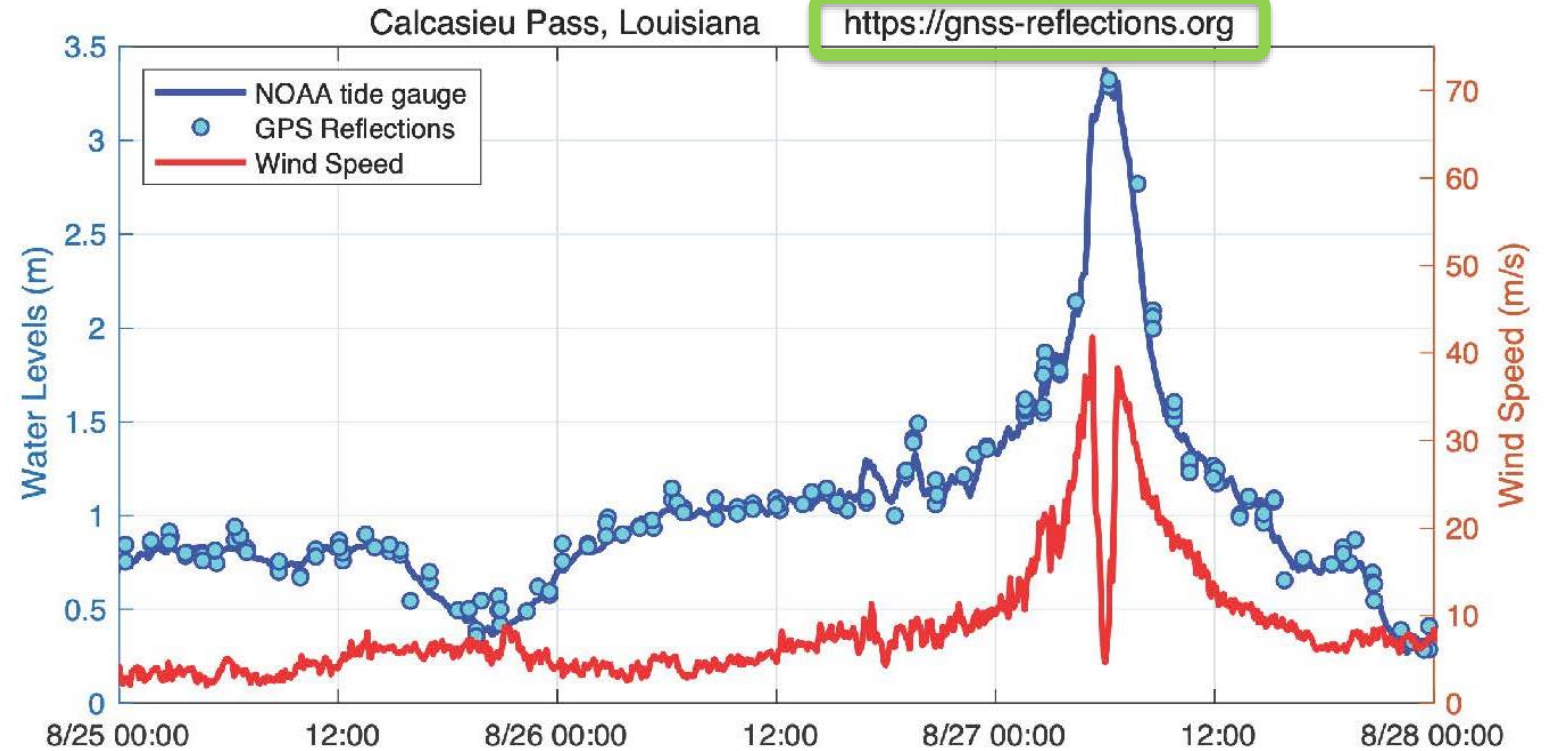
NOAA CORS Network Comprehensive Plan (writing in progress)

- Redesign the CORS website
- Improve OPUS' selection of CORS
- Quickly “repair” out-of-tolerance CORS
- Provide an OPUS CORS tracking tool
- Increase communications to community
- Better models of motion
- Automate

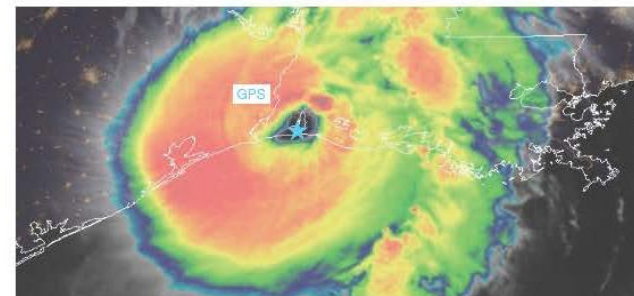
Cool and Fun Stuff

LSU-operated CORS
"CALC"

NOAA CO-OPS
"Sentinel" tide gauge
and weather station
platform



Water Levels Measured with Reflected GPS Signals During Hurricane Laura





Thank you