

2010

Coastal Bend Workshop on Streaming Atmospheric and Oceanographic Environmental Data



Conrad Blucher Institute

Texas A&M University – Corpus Christi

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SUMMARY

This document reports the work that took place prior, during and after the Friday August 27, 2010 Coastal Bend Workshop on Streaming Atmospheric and Oceanographic Environmental Data. The workshop was organized by the Conrad Blucher Institute and the Corpus Christi Weather Forecast Office and took place in the Conrad Blucher Institute conference room at Texas A&M University–Corpus Christi.

The Texas Coastal Bend is one of the most instrumented coastal areas in the world, and the City of Corpus Christi benefits from freely available wireless network access. While access to atmospheric and oceanic environmental data is satisfactory, there are still substantial gaps in data availability, and improvements are needed in the delivery of this information to users. The workshop and this report aim at identifying such gaps and possible solutions. The workshop included presentations and workgroup sessions. Participants also provided input prior to the workshop and contributed to this document after the workshop. The recommendations in this report are a result of the collective work of the participants facilitated by the authors.

Important gaps identified include lack of current measurements in Matagorda Bay impacting navigational safety and a need for official NOAA PORTS systems for both Corpus Christi Bay and Matagorda Bay to improve standards and overall navigational safety. Very little data is collected nearshore and offshore in the Gulf of Mexico. An offshore strategy is needed and could include platforms of opportunity, buoys or collaboration to access oil platforms. Nearshore observations of water quality and other observables should take advantage of the new Sentinel platforms. Other gaps include the lack of a compiled record of environmental information for the disposal of rubble after a hurricane or other emergencies.

Other general recommendations include making the data available at higher spatial and temporal resolutions, more consistency in the formatting of the data to make it easier to use, adding geotags to help establish a real-time GIS system and building user focused websites aggregating the diverse data sets that users consult to make decisions. A Coastal Bend water sports page was recommended and is presently developed by workshop participants. Environmental data is increasingly accessed on mobile devices and the new smart phones and iPads® provide great opportunity to develop new geospatially referenced applications for emergency, operational and recreational users.

TABLE OF CONTENTS

- I. SUMMARY
- II. INTRODUCTION
- III. WORKSHOP ORGANIZATION
- IV. WORKGROUP SESSIONS
 - 1. DATA USERS
 - 2. DATA PROVIDERS
 - 3. TECHNOLOGY
 - 4. EMERGENCIES
 - 5. SUPPORT OF OPERATIONS
 - 6. RECREATIONAL USERS
- V. CONCLUSION AND RECOMMENDATIONS
- VI. APPENDIX
 - A. PRESENTATION LINKS
 - B. TCOON NETWORK
 - C. TABS NETWORK
 - D. CCWFO COVERAGE AREA MAP
 - E. PARTICIPANTS LIST
 - F. WORKSHOP PICTURES

II. INTRODUCTION

The Coastal Bend Workshop on Streaming Atmospheric and Oceanographic Environmental Data took place on Friday August 27, 2010, and brought together members of the Texas Coastal Bend community. The goals of the workshop and this report are to provide information to the participants about data and real-time predictions in the Coastal Bend, discuss existing gaps and limitations and make recommendations and coordinate what can be done next. During the workshop, users and providers of real-time environmental data identified the most useful information, potential gaps, methods for providing and presenting the data and platforms used to assess data. Discussions included how to help interested developers build new applications and how to use/present the data and identify new services/businesses.

Prior to the meeting, each participant provided input on identifying what data their company or themselves used or provided, potential gaps in the data, and the technologies and platforms they used or wished were developed. The workshop was focused on discussions within the participants, so powerpoint presentations were not used with the goal to emphasize free-flowing ideas and discussions during and after oral presentations. Presenters used web links which are listed in Appendix A. This report starts with the list of workshop presentations and continues with an account of the workgroup sessions. Information gathered prior to the workshop as well as input from workshop participants are also included in this report. The report concludes with what the authors have identified as the most important recommendations made by the workshop participants.

III. WORKSHOP ORGANIZATION

The workshop consisted of presentations and workgroup breakout sessions. The Presentations were organized by dividing the speakers into three groups: Data Providers, Data Users and Technology. The presentations are listed below. Links to website used during the presentations are listed in Appendix A.

Data Providers' Presentations:

- Alex Tardy from the National Weather Service – Data available from NWS/CCWFO
- Scott Duff from the Conrad Blucher Institute (CBI) – Data available from CBI
- Norman Guinasso the director of the Geochemical and Environmental Research Group at TAMU – Data available from the Texas Automated Buoy System
- Ruth Mullins of TAMU – Mechanisms Controlling Hypoxia and related data

Data Users' Presentations:

- Mike Beavers from City Emergency Management – City of Corpus Christi use of environmental data
- Florence Tissot from Surfrider Foundation– Surfers use of data

Technology Presentations:

- Scott King from CBI – Example of new app for smart phones to access environmental data
- Rick Smith from CBI – Use of environmental data in GIS format
- James Davis from CBI – GCOOS work on standards to share environmental data and concept of web services
- Philippe Tissot from CBI – Design and implementation of real-time models
- Joe Holland of Los Alamos National Laboratory – Framework for combination of emergency data at a large scale

IV. WORKGROUP SESSIONS

Two sets of brainstorming sessions took place, one in the morning and one in the afternoon. During each session the participants divided themselves into three different workgroups. The discussions from the brainstorming groups and the presentations identified many problems, potential solutions and future projects to improve availability of streaming atmospheric, oceanographic and environmental data in the Coastal Bend. The morning session divided participants into workgroups to discuss gaps, problems, opportunities common to Data Users, Data Providers and Technology developers.

The afternoon brainstorming session consisted of workgroups split to discuss how streaming environmental data can be improved for specific situations in emergencies, support of operations and for recreational users.

1. DATA USERS

Identifying gaps in available data, how data could be better communicated and other tools that could help data users was discussed between the participants of the data user workgroup. Meteorologists use data from the Texas Coastal Ocean Observation Network (TCOON), Satellite, Meteorological Aviation Report (METAR), Radar (WSR-88D) and other specialized

data for warning and forecast operations. Local and state level GIS data related to emergency management aid the City of Corpus Christi's Emergency Operations. Participants of water recreational activities use data from NWS sites, Unisys Weather, UCAR, Windguru and NOAA.

PROBLEMS IDENTIFIED

GIS specialists discussed that reluctance to share data impedes gathering complete data sets. A lack of easy-to-use real-time data sets was also discussed. Emergency management users emphasized that, in the Coastal Bend, there is a deep gap in the availability of high resolution terrain/elevation data with information on environmental sensitivity. This type of data is presently non-existent and would be very important in emergency management to dispose of debris after a hurricane or other such emergency situations. The data is out there, but there are restrictions on data use. Representatives of the coast guards and pilots using data for navigation see major gaps in the availability of water currents measurements particularly for the intersection of the ship channel and the ICW in Matagorda Bay. The reliability of current measurements along the Corpus Christi ship channel was also discussed. The implementation of PORTS system with the related NOAA standard would improve the situation.

It was found that environmental data are not being utilized as part of teaching or class research projects. Research awareness and observations access need to be increased such that K-12 students become more aware of the potential and career opportunities. Surfers rely on information about the ocean currents which is presently not available for the nearshore. There is also the problem that there are many sources of data, but all available from different websites. It would be very convenient to find the data in one area so the users can access the data more easily. Also many times, the data is provided in the wrong format (text instead of graphs) for rapid use, and there is too much extraneous data that is not useful for the recreational decision making process. The need for a coastal water sports page identified during the workshop is presently (Fall 2010) being addressed by a group of workshop participants.

GOALS AND IDEAS

Educators would like to use the data that is available but would need some help on how to get started. Teachers could then use the data to inspire students in their career paths and inform parents.

Smartphones and iPads® are now the tools selected by most users to access the data on the go. Hence, new software should be developed for iPad® and iPhone® to better access the data. Data providers should develop onshore and offshore strategies identifying instruments and equipment needs and possible platforms of opportunity. Instruments could be placed on oil rigs and wind farms; however, buoys measure currents more accurately than on platforms. The new sentinels of the coast presently being installed should provide good opportunities for nearshore measurements of water quality and other parameters. Information also needs to be provided in a

readily available format that works for the client, and definitions of terms need to be the same for all users.

2. DATA PROVIDERS

The data provider's workgroup discussed the main gaps, coordination of data, potential joint work and how to get there. Meteorologists provide digital weather forecasts in formats such as XML, KML, time series, text, graphics and notifications by email and cellular phones.

PROBLEMS IDENTIFIED

Gaps in meteorological data include gaps in the context of temporal resolution. The data for severe weather needs to be streamlined so forecasters can sort and display the data quickly based on users' thresholds. Data Providers discussed gaps in the delivery of data via website and interactive voice response systems (IVRS).

GOALS AND IDEAS

The National Weather Service would like to increase other agencies and users awareness of NWS products, services and data, and also wants to obtain new networking relationships and potential data from non-NWS providers to improve NWS operations. The NWS additionally needs to know what data is not being used and learn how to use data to its fullest extent. To improve verification of weather predictions, the NWS would like to do more quality control and have more comparisons between what NWS forecasts and what actually happens. The data providers and GIS specialists discussed participant's use of data and what data participants perceived as important. GeoRSS was discussed as a potential format to include location information for real time data streams. Real time GIS is an ultimate goal, so the user can look at a map and have it dynamically changing. Providers should add geotags to all of their data to help make real-time GIS possible.

3. TECHNOLOGY

The technology workgroup discussed what data are available, weaknesses in present delivery modes, new technologies that are underutilized and how data providers can help in the creation of new applications and delivery systems.

PROBLEMS IDENTIFIED

Computer Scientists find it difficult to integrate and combine data due to the heterogeneous data sources. They also need to conduct research to find the format consumers prefer, and which format would give the greatest benefit. Problems can occur with complex applications which are hard to use and easy for the user to misuse.

GOALS AND IDEAS

Computer Scientists are interested in knowing how and which data sources are being used. Some problems could be solved by utilizing graduate students funded through grants or even having students solve problems as part of their thesis or senior project before graduation. An important outcome of data streaming should be to predict what is going to happen in the future to figure out problems and emergencies before they occur. Users' needs are sometimes addressed by new technologies and software while new software often generates new uses. As new usage and new technology are linked, it is important to develop new applications while including regular feedback between users and developers. The workshop recommends such frequent interactions for the Coastal Bend, and a group of workshop data providers and users is developing interactively developing a Coastal Bend water sports page to test this concept.

4. EMERGENCIES

The emergencies group examined streaming environmental data for natural disasters with a focus on hurricanes.

PROBLEMS IDENTIFIED

Emergency Managers need high resolution data to know where areas are going to be hit, so they can determine where and what state resources are needed. This requires both better models and better accessibility of the information in a GIS type format or other type of high spatial resolution output. Environmental information in a GIS format would help find locations to place post hurricane debris.

GOALS AND IDEAS

Emergency Management emphasized the need for enterprise-wide datasets related to the environment and the need for a location where the data will be served to regional data users. If the Emergency Management was to receive real time aerial feed to show damage of the storms, then people affected by the storm could be found faster, and a disaster outline could be submitted quickly to FEMA. Data can currently be used in models of things such as weather and infrastructure. Hazard designs and infrastructure should be developed in-depth sometime in the future.

5. SUPPORT OF OPERATIONS

Navigation, Coastal Engineering, construction and maintenance were explored by the support of operations group.

PROBLEMS IDENTIFIED

Live data is needed for vessels, and there is a gap in the data at Matagorda Bay ship channel where ocean current data is crucial. There are frequent problems at the intersection

between the Matagorda Bay Ship Channel and the ICW. A barge could run aground, be immobilized or sink followed or accompanied by a collision with a large ship. This would result in an accident with large environmental and economical impact. Equipment for the port of Corpus Christi is not at the standards of the other top 10 ports in the country. Bringing an official PORTS system to both locations would insure high quality information and good maintenance of the instrumentation; however, substantial funding will be needed to achieve this.

GOALS AND IDEAS

Pilots and Coast Guards would like to bring in a PORTS system with air gap and reliable current readings for Port Aransas and Ingleside with ideally a current meter just offshore of the Jetties and an air gap monitor placed at the Harbor Bridge. A current meter is highly needed for Matagorda Bay. A smartphone application should be developed to allow for accessing data portably for the pilots.

6. RECREATIONAL USERS

The recreational users group discussed streaming environmental data in the categories of fishing, surfing, windsurfing and beach visits.

PROBLEMS IDENTIFIED

Kitesurfers, Windsurfers and surfers discussed the relatively low spatial resolution of observation and forecast points. Viewing data at six-minute intervals is important to windsurfers and they would like more frequent updates. The need became apparent for more standards and conventions for providing data. Public websites should be informed of the raw data available. A water sports site for the coastal bay should be set up with the data outputted in multiple formats.

GOALS AND IDEAS

The kitesurfers, windsurfers and surfers want to encourage more data availability with a possible addition of a south bay station. In addition, they would like to provide input to data providers and application developers on how surfers use data and the challenges faced with, and how data is currently presented while understanding the options to access raw data. Live video could be used and archived to show conditions of the surf. A radio channel would also be a useful tool to provide information on currents and tides along with weather emergencies. A prototype for a Coastal Bend Watersports page is currently being developed through ongoing meetings of Recreational Users and Data Providers.

V. CONCLUSIONS AND RECOMMENDATIONS

The main recommendations issued from the work of the participants to the 2010 Coastal Bend Workshop on Streaming Atmospheric and Oceanographic Environmental Data are the following:

- All information systems used for operational and emergency management must be robust
- Main (pressing) data gaps identified:
 - Matagorda ship channel current measurements for navigation safety
 - Corpus Christi Bay bridge air gap for navigation safety
 - Environmental sensitivity information in GIS format to identify areas for the disposal of post-hurricane debris
- Official NOAA PORTS systems are needed for navigational safety and will insure high standards for data availability and quality, cost is however high
- Need for an onshore and offshore instrument strategy to fill data gaps both nearshore and deep offshore
 - Platforms of opportunity
 - Buoys
 - Add additional instrumentation to the sentinel platforms presently being installed along the Texas coast
- Users often need to get data from multiple sites
 - Development of users focused websites e.g. Coastal Bend Water sports page
- Consider adding live video and webcams for recreational users and emergency management
- Emphasize mobile platforms such as smart phones (lighter more portable) and potential use of geo-referencing for these platforms for fast access to the data
- Real time GIS is not there yet but adding geotags to all data streams will help make it possible
- Spatial and temporal resolution of data provided
 - The more data the better
 - More frequent update of data on the web
- Data should be of proper format and formatted consistently for users

VI. APPENDIX

A. PRESENTATION LINKS

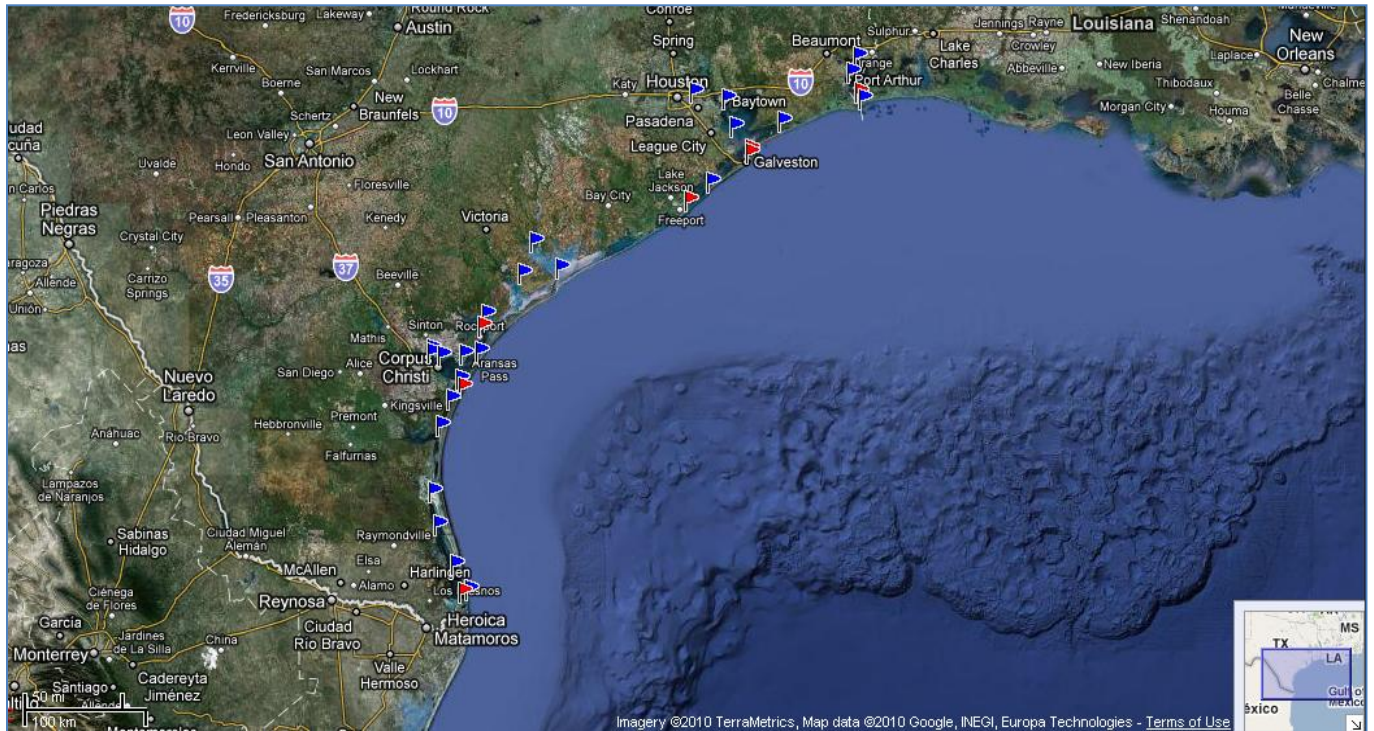
Coastal Bend Workshop on Streaming Atmospheric and Oceanographic Environmental Data

Presentations	Websites	Urls
Alex Tardy (NWS)	Information Sharing and Gathering	http://www.srh.noaa.gov/crp/?n=science
Scott Duff (CBI)	Main Lighthouse page; CBI data query page; TCOON on twitter	http://lighthouse.tamucc.edu/ http://lighthouse.tamucc.edu/pq http://twitter.com/perlpilot/tcoon
Norman Guinasso (TAMU)		http://tabs.gerg.tamu.edu/tglo http://tabs.gerg.tamu.edu/~norman/CoastalBend.ppsx
Mike Beavers (City of Corpus Christi)		http://cctexas.com/eoc/ http://www.cctexas.com/files/g8/BeforeDuringAfterStorm.pdf https://www.211texas.org/211/# http://www.cctexas.com/images/g8/Cat%205%20Slosh.jpg
Florence Tissot (Surfrider Foundation)		http://magicseaweed.com/ http://surfrider.org/coastalbend/asp/buoystideswatertemp.html
Mike Murphy (Windsurfers)	Bird Island; Packery Channel; Horace Caldwell Pier; CC Bay	http://dnr.cbi.tamucc.edu/overview/013 http://lighthouse.tamucc.edu/overview/005 http://lighthouse.tamucc.edu/overview/365 http://lighthouse.tamucc.edu/overview/108 http://www.sailflow.com/windandwhere.iws?regionID=147&regionProductID=29&timeoffset=0
Ruth Mullins (TAMU)	Mechanisms Controlling Hypoxia	http://hypoxia.tamu.edu http://icop.tamu.edu http://tabs.gerg.tamu.edu/hypox
Rick Smith (CBI)	GeoRSS; USGS Earthquake Center; NWS RSS Library; NOAA's nowCoast; KML Animation; Open Geospatial Consortium	http://www.georss.org http://earthquake.usgs.gov/ http://www.weather.gov/rss/ http://nowcoast.noaa.gov/ http://www.geowebguru.com/articles/166-animation-and-dynamic-updates-with-kml http://www.opengeospatial.org/standards
James Davis	GCOOS	http://www.gcoos.org

(CBI)		http://lighthouse.tamucc.edu/JamesDavis/SED
Philippe Tissot (CBI)	Real time data stations Corpus Christi; Water level prediction site; Site for Caller Times readers; Water temperature predictions; Corpus Christi Bay Navigational Dashboard	http://lighthouse.tamucc.edu/TCOON/HomePage http://lighthouse.tamucc.edu/Forecasts/WaterLevelForecasts http://lighthouse.tamucc.edu/Forecasts/PredictionsForPaper http://lighthouse.tamucc.edu/Forecasts/WaterTemperatureForecasts http://lighthouse.tamucc.edu/navigatoraid.php
Joe Holland (Los Alamos National Laboratory)		
Scott King (Computer Science)		http://www.sci.tamucc.edu/~sking/Workshop/King.html

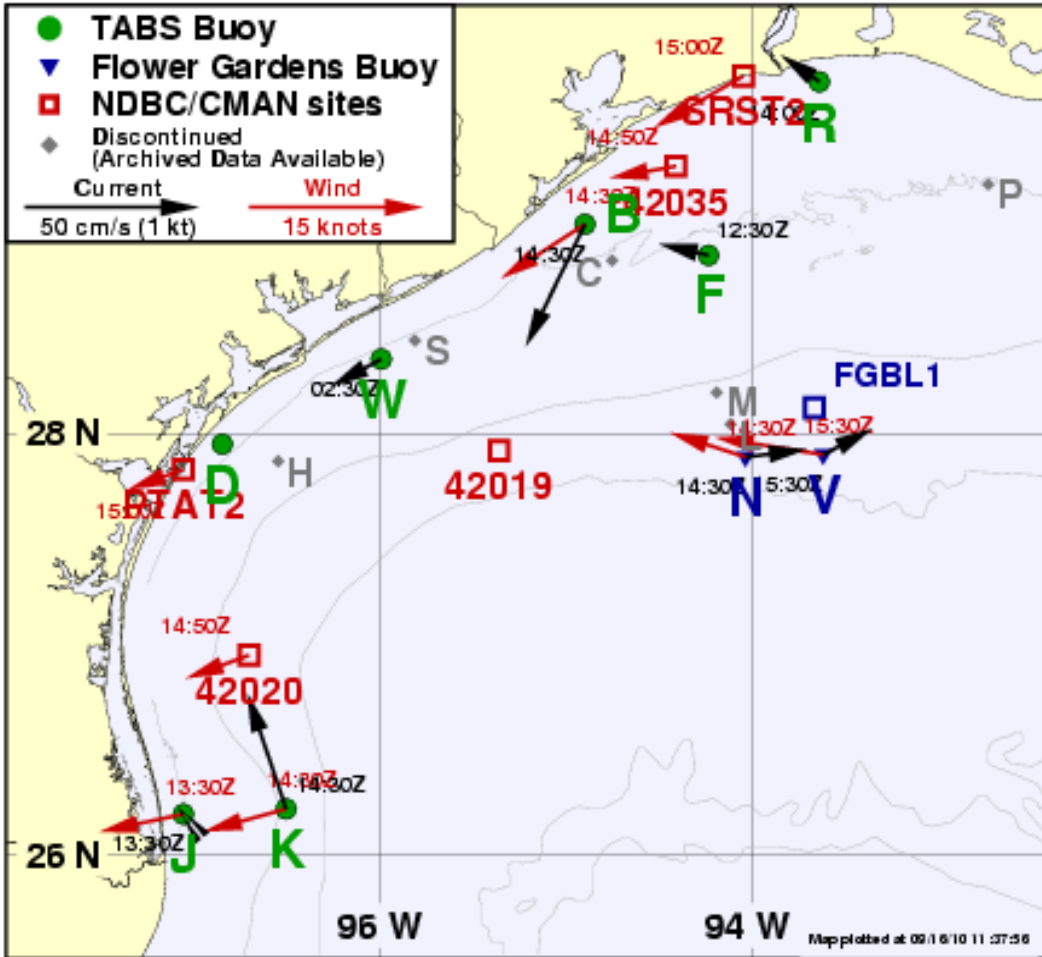
B. TCOON NETWORK

Texas Coastal Ocean Observation Network

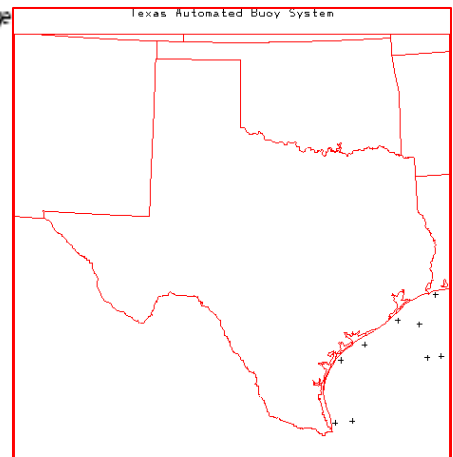


C. TABS NETWORK

Texas Automated Buoy System

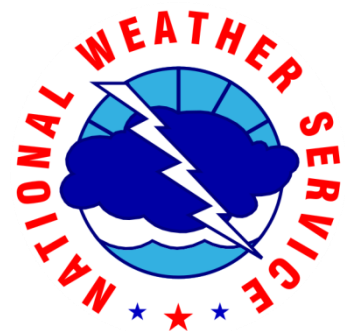
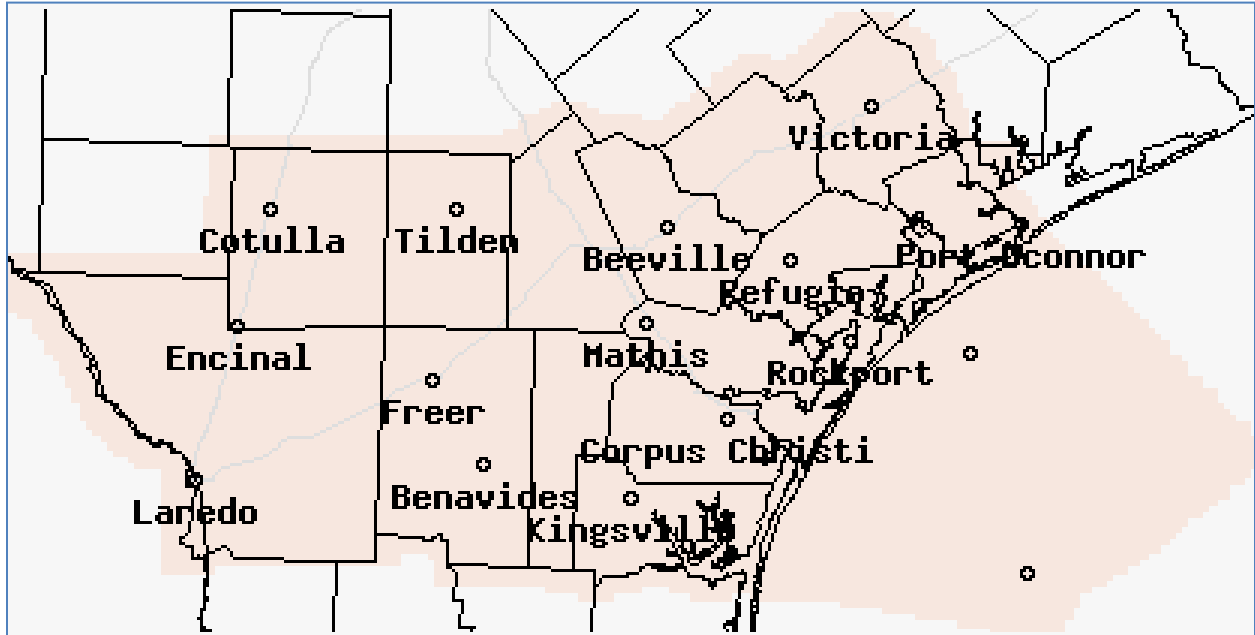


Bathymetric contours shown for these depths (meters): 20, 50, 200, 2000, 3500
 The vectors on the map point toward the direction that the currents or winds are flowing and represent the average for the last three hours of the available data.
 The date and time at each station indicates the end of the three-hour average.



D. NATIONAL WEATHER SERVICE

Corpus Christi Coverage Area



E. PARTICIPANTS LIST

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F. WORKSHOP PICTURES

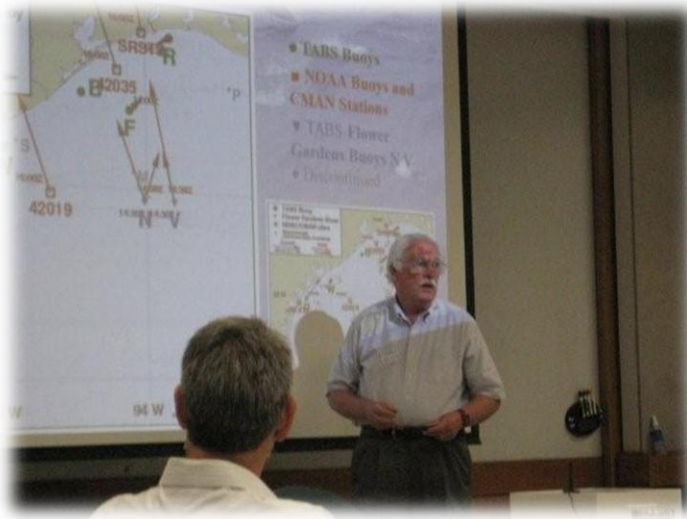
Dr. Gary Jeffress
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Florence Tissot
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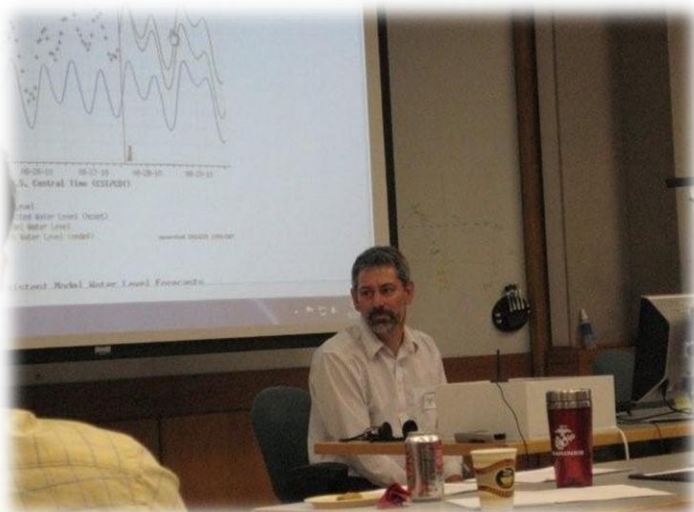


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Conrad Blucher Institute



BRAINSTORMING SESSIONS



Emergencies





Support of Operations



Recreational Users