SECOORA STAKEHOLDER MEETING POSTER and DIGITAL PRESENTATION
May 20, 2015, 1:15 PM – 2:15 PM
Location and Room: Hyatt Regency, River Terrace #3

PP# 1: A Coordinated West Florida Coastal Ocean Observing and Modeling System, Robert H. Weisberg, Yonggang Liu, Clifford R. Merz, and Lianyuan Zheng, College of Marine Science, University of South Florida, St. Petersburg, FL

A comprehensive coastal ocean observing and modeling system is maintained by USF off Florida's west coast. Long-term moorings collect ocean velocity, temperature and salinity across the water column, along with surface meteorological data. A high-frequency radar array consisting of three long-range CODAR and two median-range WERA systems, overlapping with each other and with the moorings, measures surface velocity and significant wave height. Complimentary observations also occasionally include autonomous underwater gliders, measuring water properties along planned transects. Coordinated with the observations is a West Florida Coastal Ocean Model (WFCOM) that extends from west of the Mississippi River Delta to south of the Florida Keys. WFCOM downscales from the deep ocean, across the continental shelf and into the estuaries by nesting the unstructured grid, FVCOM in the Gulf of Mexico HYCOM. Resolution varies from that of HYCOM in the nesting zone to as fine as 150m in the estuaries. Recent published applications of the coordinated observing and modeling system are for K. brevis HABs, gag grouper recruitment, harmful spill tracking and ecological consequences of the Deepwater Horizon incident. All of the observations (in near real time) and the model simulations (as daily, automated nowcasts/forecasts) are available to the general public on the internet (http://ocgweb.marine.usf.edu), through SECOORA and through NOAA.

PP# 2: Ocean acidification time-series mooring at Grays Reef National Marine Sanctuary, Scott Noakes, The University of Georgia, Athens, GA, Wei-Jun Cai and Janet Reimer, University of Delaware, Newark, DE.

Operation of the Grays Reef time-series mooring has been a multi-organization effort which has successfully collected high-resolution data since 2006. The mooring is located in the South Atlantic Bight offshore Georgia, USA and within the boundaries of Gray's Reef National Marine Sanctuary. It sits along the divide between the inner and middle shelf with water depths of 20 m. Water chemistry is primarily controlled by the middle shelf oceanic dynamics, but during heavy rain events, it can be affected by freshwater plumes coming from the numerous rivers along the Georgia and South Carolina coast. Temperature also plays a major role in the pCO2 variability with seasonal changes being apparent. During summer months, GRNMS acts as a CO2 source to the atmosphere while during winter months it is a CO2 sink. The benthic community at GRNMS has proven to be hardy enduring large seasonal swings of seawater CO2 and pH. Research planned for the sanctuary will be aimed at determining how these organisms cope with the seasonal changes and how they will adapt to rising seawater CO2 over time.

PP# 3: Surface current mapping offshore of North Carolina using high-frequency radar, M. Muglia, S. Haines and H. Seim, University of North Carolina at Chapel Hill, NC.

Surface currents offshore of North Carolina have been observed using high-frequency radar since 2003; two sites, at Duck, NC and Buxton, NC have operated since that time and a third

site, on Core Banks, was added in fall 2013. Typical coverage extends 175 km offshore of the coastline between Cape Lookout and the Virginia border and captures portions of the Gulf Stream and flows over the continental shelf. Recent work has focused on developing quality control (QC) measures to improve the measurements and on determination of Gulf Stream position and properties using the observations. QC has emphasized identification of outliers in the initial data generation steps to avoid erratic depictions of the flow. Gulf Stream characterization has emphasized analysis of radial velocities to maximize the spatial coverage possible. Examples of these efforts are demonstrated.

PP# 4: SkIO WERA HF-radar improvements, Dana Savidge, Julie Amft and Trent Moore, Skidaway Institute of Oceanography, University of Georgia, GA.

The SkIO WERA HF-radar group will report on recent important improvements in both hardware and software operations. First and foremost, we have accomplished significant upgrades to the physical installation at St Catherine's Island, originally installed in spring of 2006. New components will be detailed, and the resulting improvements in radar coverage will be demonstrated. In addition, several necessary adjustments have been made in processing, and a large backlog of archived data have been reprocessed to improve data accuracy and quality. The nature of these adjustments and reanalysis will be discussed.

PP# 5: Coastal Ocean Observing in the Straits of Florida using HF Radar: An Overview of Recent Work, M. R. Archer, Lynn K. Shay and J. Martinez-Pedraja, Upper Ocean Dynamics Laboratory, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL.

Within the Straits of Florida, the strongly sheared Florida Current interacts with waves and wind to produce a complex environment that is difficult to forecast, and makes *in situ* data collection at the ocean surface challenging. For these reasons, high frequency (HF) radar has proven to be a powerful tool for studying the surface currents in this region. Since 2003, the Upper Ocean Dynamics Laboratory has deployed WERA radars in phased array mode along the southeast Florida coastline to collect remote ocean surface current, wave and wind data. Operating at frequencies of 12 and 16 MHz, the radars collect data at 20-min intervals with a typical range of 80-km, and a horizontal resolution of 1.2 km. The ability of HF radar to map data over a two- dimensional area, in an operational long-term deployment, provides a unique dataset for analysis. We present an overview of recent work, including: (1) an evaluation of these remote measurements using data from an *in situ* mooring; (2) examination of how flow field kinematics are significantly altered during the passage of a frontal eddy; and (3) analysis of a near-inertial velocity signal in the anticyclonic shear zone that has not been previously addressed in the literature. These energetic fluctuations have important implications for cross-shelf exchange of water properties, and understanding their dynamics is vital for enhancing search and rescue operations and pollution mitigation. With ongoing support from SECOORA, we will continue to document and investigate the ocean circulation in this highly dynamic region.

PP# 6(DP# 1): An integrated ocean circulation, wave, atmosphere, and marine ecosystem prediction system for the South Atlantic Bight and Gulf of Mexico, Ruoying He, Joseph Zambon, George Xue, Zhigang Yao, Ethan Liu, North Carolina State University, Raleigh, NC.

An integrated nowcast/forecast modelling system covering the South Atlantic Bight and Gulf of Mexico (SABGOM) is in operation, utilizing sophisticated model coupling and parallel computing techniques. This three-dimensional, high resolution, prediction system provides a nowcast and an 84 h forecast of marine weather, ocean waves and circulation, and basic marine ecosystem

conditions to the public via a Google Map interface. The SABGOM system runs automatically daily and supports a series of user-defined online applications. Extensive model validations were performed online against in situ and satellite-observed ocean conditions, indicating the system is providing reliable nowcast/forecasts for the region.

PP# 7: **Modeling Bacteria Concentrations in Southwest Florida: Integrating Historic In Situ, Remotely Sensed and Coastal Observation System Data Sources**, Matthew Neet, Dan Ramage and Dwayne Porter, University of South Carolina, Arnold School of Public Health, Columbia, SC; Heath Kelsey and Adrian Jones, University of Maryland Center for Environmental Science, Integration and Application Network, Cambridge, MD.

This project builds upon a partnership between the University of South Carolina, University of Maryland Center for Environmental Science, and the Southeast Coastal Ocean Observing Regional Association in developing a mobile app and website (howsthebeach.org) providing stakeholders access to current estimates of bacteria levels in beach swimming waters. Recognizing stakeholder involvement is critical, during the summer of 2014, Florida (FL) researchers, public health officials, environmental scientists, etc. were invited to a conference call about plans for our initiative. A study area location and access to historical sampling data resulted from this call. County officials, NWS representatives, local scientists, etc. met at Mote Marine Lab in January 2015 to provide additional stakeholder buy-in. To provide bacteria estimates west of Sarasota, FL, 12 sampling sites were selected for the study area. Input and survival factors for bacteria concentration were collected, collated, and summarized from remote sensing platforms, coastal and ocean observing systems, and beach water quality sampling programs. Tide, wind, NEXRAD rainfall totals, dry day counts, rainfall intensity, rainfall delays, salinity, and water temperature data were synthesized from these various sources. In-situ (C-10 Gulf buoy) and modeling (HYCOM) data sources were used to collect salinity and water temperature values. Statistical models are being, and will be, developed using historical data to create prediction algorithms. These data are being used with the EPA's Virtual Beach (VB) toolset to develop statistical models for predictive coastal water quality assessments. Multiple linear regression (MLR) models are being created for each of the sample sites using roughly 82 variables. Model performance is being evaluated using BIC (Bayesian Information Criteria), Adjusted R-square, and Receiver Operator Characteristic (ROC) curves. For our initial study site on Lido Key, NEXRAD rainfall summaries, salinity, high tide, wind, and rainfall total delay are proving to be important indicators in our assessments. Once the algorithms are developed, new data will be uploaded and current bacteria forecasts will be presented. Forecasts will be displayed interactively for select beaches in the Sarasota area on both a website and mobile app.

PP# 8(DP#2): An Integrated, Quasi-Operational 24/7 Nowcasting/Forecasting System for Nearshore Winds, Waves , 3D Baroclinic Circulation, Storm Surge, and Inundation, Y. Peter Sheng, Justin R. Davis, Vladimir A. Paramygin Coastal and Oceanographic Engineering Program University of Florida, Gainsville, FL.

A high resolution 24/7 forecasting system has been implemented for the Florida coastal waters comprising of four domains that cover the entire Florida coast. The forecasting system is based on coupling CH3D with SWAN model in the coastal domains, with open boundary conditions provided by the ROM-based SABGOM model used for salinity and flow and WaveWatch III for wave conditions at the open boundary. Products generated by the forecasting system consist of high- resolution water levels, wave conditions, three-dimensional salinity and currents. Forecasts are compared to a number of historical storms and real-time data including water level, salinity and currents for different domains yielding good comparisons. Model results are

distributed via a THREDDS server and limited visualization is available on SECOORA website. In-house visualization system and QAQC module are being implemented with some customized functionality already available and being used by the St. Johns River Water Management District. In addition, we present a super-efficient and accurate Rapid Forecasting System for storm surge and coastal flooding has been developed. During a real storm, the RFS uses rapid interpolation of storm surge and coastal flooding of a number of (~200) pre-determined "optimal" storms for a specific coastal region. The RFS is faster than the SLOSH forecast system. The RFS has been verified with observation along SW Florida and is being verified with data along SE Florida. The RFS can be readily extended throughout the US Gulf and Atlantic coasts.

PP# 9: Habitat Modeling For Fisheries Independent Trap Surveys, Roffer, M. A., Roffer's Ocean Fishing Forecasting Service, Inc.; Muhling, B., Princeton University and NOAA Geophysical Fluid Dynamics Laboratory, Pugliese, R., South Atlantic Fisheries Management Council, and Reichert, M., South Carolina Department of Natural Resources.

The objective of this IOOS – SECOORA research is to integrate oceanographic information into regional stock assessments and habitat characterizations by developing improved fisheries management tools for fisheries managers and policy makers that incorporate real-time oceanographic observations. Species specific habitat models were derived to determine if they would enhance the fish stock assessments for South Atlantic Fishery Management Council (SAFMC). Artificial neural networks were used to develop predictive habitat models for four economically and ecologically important species in the snapper-grouper complex managed by the SAFMC: black sea bass (Centropristis striata), gray triggerfish (Balistes capriscus), red porgy (Pagrus pagrus), and vermilion snapper (Rhomboplites aurorubens) derived from the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP, NOAA_NMFS, South Carolina Department of Natural Resources) fishery independent Chevron trap surveys from 1990-2008 . The relative importance of six variables (longitude, latitude, temperature, date, sample depth and salinity) related to the catch for each species and how they were used to develop probabilities of occurrence and how this information is likely to be incorporated in to the regional SouthEast Data, Assessment, and Review (SEDAR) process will be presented.

PP# 10: An end-to-end Workflow for Assessing Sea Surface Temperature, Salinity and Water Level Predicted by Coastal Ocean Models, Filipe Fernandes, Centro Universitário Monte Serrat, Santos, Brazil, Richard Signell, USGS, Vembu Subramanian and Debra Hernandez, SECOORA.

To assess the performance of ocean forecast models, simulations need to be compared with data. Finding what models and data exist at a certain point in time and space has historically been challenging because this information is held and distributed by numerous providers in different formats. Accessing data has been challenging because ocean models produce terabytes of information, is usually stored in binary data formats like HDF or NetCDF, while ocean observations are often stored in scientific data formats or in databases. To solve this problem, the Southeast Coastal Ocean Observing Regional Association (SECOORA) has been building a distributed information system based on standard IOOS-supported web services for discovery and access. An end-to-end (search-access-analyze-visualize) workflow for assessing SST, SSS, and SSH is shown in the poster. The time-series are sampled at every 30 min and the assessment is performed via linear Pearson correlations. The SSH is also compared to a mean surface bias, in order to access which models can be compared to a NAVD88 datum. The SECOORA skill score assessment uses automatic discoverable data to create weekly time-series of Sea Surface Temperature (SST), Sea Surface Salinity (SSS), and Sea Surface Height (SSH) comparisons of modeled and observed data. The data is acquired using OWSLib for

CSW Catalog access, Iris for ocean model access and pyoos for Sensor Observation Service data access. Analysis and visualization is done with Pandas (time-series) and Folium (interactive maps), and the entire workflow is shared as in IPython Notebooks.

PP# 11: SECOORA's Regional Coastal Ocean Observing System: Providing Marine Weather Data and Information Products for Marine Community, Debra Hernandez and Vembu Subramanian, SECOORA; Jennifer Dorton, University of North Carolina Wilmington, Dwayne Porter, Jeremy Cothran, Dan Ramage, University of South Carolina; Charlton Galvarino, Seccondcreek Consulting Inc.

Southeast Coastal Ocean Observing Regional Association (SECOORA) is implementing a cohesive Regional Coastal Ocean Observing System (RCOOS) for the southeast US as a regional 501(c) partner in the US Integrated Ocean Observing System (US IOOS®), which is the major funder of SECOORA activities. SECOORA, in collaboration with stakeholders such as National Weather Service (NWS) Weather Forecast Offices (WFOs), researchers, coastal zone resource and emergency managers and commercial entities has established US IOOS recommended standards-based data management technologies to facilitate efficient ways to integrate data from variety of coastal ocean and estuarine observing and monitoring programs. Marine weather and other information products are delivered via the SECOORA web site and data portal (http://secoora.org/data). For example, the Marine Weather Portal (http://secoora.org/data/marineweatherportal) application provides standardized, integrated marine weather information for coastal North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas. Development of the marine weather application was led by researchers at the University of NC-Wilmington, University of South Carolina and University of South Florida in partnership with WFOs in the southeast US including weather forecasters, data managers and stakeholders working with SECOORA member organizations. Users can also sign up for alerts and RSS feeds. In addition to the marine weather portal, SECOORA has also developed data and information products in the following thematic areas: Marine Operations; Coastal Hazards; Ecosystems, Water Quality, and Living Marine Resources; and Climate Change. In this poster we will present SECOORA's coastal ocean observing system capabilities and marine weather data and information products.

DP# 3: Real-Time Water Quality Monitoring at Clam Bayou, St. Petersburg, Florida, Mark E. Luther, Jeff Scudder, Dan Otis, Gerardo Toro-Farmer, and Frank Muller-Karger, University of South Florida College of Marine Science' 140 7th Ave S, Saint Petersburg FL 33701 USA; Mike Lizotte, YSI/Xylem; Ryan P. Moyer, Christina E. Powell, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 100 8th Ave SE, Saint Petersburg FL 33701 USA.

The Ocean Monitoring and Prediction Laboratory at the University of South Florida's College of Marine Science in partnership with YSI/Xylem have installed an atmospheric and water quality monitoring station at the USF Clam Bayou Marine Education Facility on Boca Ciega Bay in St. Petersburg, FL, as a component of the USF Coastal Ocean Monitoring and Prediction System (COMPS) for West Florida. Equipment at the station monitors atmospheric parameters (wind speed and direction, air temperature, relative humidity, barometric pressure and rainfall) and basic water quality parameters of Clam Bayou (water level, dissolved oxygen, salinity, water temperature, chlorophyll and CDOM fluorescence, pH, and turbidity). Parameter measurements from the station are transmitted by satellite and VHF radios to a central base station at USF's College of Marine Science in St. Petersburg. Processed data from the system are accessible via the internet on the COMPS web page (http://comps.marine.usf.edu). Monthly samples are collected and analyzed for calibration of bio-optical data by IMaRS and FWRI. Data from the

Clam Bayou site is used by the Florida Fish and Wildlife Conservation Commission, the City of Gulfport and the City of St. Petersburg to monitor storm runoff and associated nutrient loading to Boca Ciega Bay. The Clam Bayou site also is used in teacher training activities conducted by USF/CMS.

PP – Poster Presentation; DP – Digital Presentation