41st Annual Graduate Student Symposium

University of South Florida College of Marine Science

January 31st, 2025

Abstract Booklet

UNIVERSITY OF SOUTH FLORIDA
College of MARINE SCIENCE

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GSS 2025 Schedule

Opening remarks and plenary speaker:

Location: STG115

9:00 am	**Opening remarks**	GSS Committee
9:05 am	**Dr. Patrick Schwing**	CMS alumni

Break: 9:30 – 9:45 am

Oral presentations:

9:45 am	Lydia Ruggles	Master's student with Dr. Brisbin
10:00 am	Bella Iannotta	Master's student with Drs. Luther & Schwing
10:15 am	Orion Scharton	Master's student with Dr. Liu
10:30 am	Bradley Nemeth	Master's student with Dr. Hu
10:45 am	Luis Sorinas	PhD candidate with Drs. Liu & Weisberg

Break: 11:00 – 11:15

11:15 am	Emma Graves	PhD student with Dr. Chappell
11:30 am	Haibo Xu	Postdoc with Dr. Liu
11:45 am	Felipe Stanchak	PhD student with Dr. Shevenell
12:00 pm	Beatriz Alejandra Aguilar	PhD student with Drs. Rosenheim & Romero

Lunch break: 12:30 – 1:30

Move from STG115 to MSL lounge for lunch.

Oral presentations:

Location: STG115

1:30 pm	Lyka Confesor	PhD student with Dr. Chappell
1:45 pm	Madjid Hadjal	Postdoc with Drs. Hu & Barnes
2:00 pm	Keyu Mao	PhD student with Dr. Hu
2:15 pm	Sebin John	Postdoc with Dr. Liu

Break: 2:30 – 3:00

Poster presentations: 3:00 – 4:30 pm

Location: MSL hallway, first floor

Dylan Halbeisen	PhD student with Dr. Conway
Emily Kaiser	PhD candidate with Dr. Shevenell
Christa Baranowski	Master's student with Dr. Chappell
Karsen Henwood	PhD student with Dr. Daly
Bostony Braoudakis	PhD candidate with Dr. Seibel
Samantha D'Angelo	Master's student with Dr. Liu
Arianna (Nina) Rodriguez	Research assistant with Dr. Breitbart
Siria Munoz Navarro	PhD student with Dr. Liu
Kennedy Quillen	PhD student with Dr. Stallings
Angelique Rosa Marín &	PhD student with Dr. Hallock Muller
Natalia López Figueroa	PhD student with Dr. Hallock Muller
Madeleine Lile-Delfino	High school intern with Dr. Breitbart

Plenary Speaker:

Patrick Schwing, PhD (2011)

Dr. Schwing is an Assistant Professor of Marine Science at Eckerd College. He is currently working on several ongoing projects addressing impacts from deep sea mining operations, oil spills, radioactivity, red tide and plastics to environments ranging from the coastal zone to the deep ocean. He began his graduate studies at the USF, CMS in 2007 and defended his Ph.D. in 2011. From 2012-2019, Dr. Schwing worked with the Center for Integrated Modeling and Analysis of Gulf Ecosystems (C-IMAGE) assessing impacts from the Deepwater Horizon Oil Spill, establishing long-term sedimentary records of the Ixtoc Oil Spill (1979) and producing Gulf of Mexico-wide environmental baselines.

Oral Presentation #1

Identifying B-Vitamin Requirements and Phycosphere Interactions for the HAB Forming Dinoflagellate, *Pyrodinium bahamense* var. *bahamense*

Lydia Ruggles, Lauren D'Amore, Cary B, Lopez, Margaret Mars Brisbin*

Pyrodinium bahamense is a saxitoxin-producing dinoflagellate in tropical and subtropical estuarine waters. *Pyrodinium* is an emerging HAB species in Florida estuaries, with blooms yet to be reliably forecast. Thus, factors not currently included in prediction models, such as micronutrient (i.e., vitamin) availability and biological interactions, may influence *Pyrodinium* bloom occurrence and intensity. As many HAB-forming dinoflagellates are auxotrophic for at least one B vitamin, we first evaluated which B vitamins *Pyrodinium* requires for growth and determined that *Pyrodinium* is a vitamin-B12 auxotroph. Next, since bacteria in the phycosphere are often able to fulfill algal B12 requirements, we co-cultured Pyrodinium with bacterial communities isolated from estuaries where *Pyrodinium* often blooms (Old Tampa Bay and Indian River Lagoon). Nanopore full-length 16S rRNA metabarcode sequencing confirmed that inoculated *Pyrodinium* cultures contained diverse and distinct bacterial communities representative of each estuary. The bacterial community from Indian River Lagoon restored some growth when B12 limitation was induced in *Pyrodinium* but neither inoculum restored growth to the same levels as media including B12, despite both inoculum bacterial communities containing putative B12-producing bacteria. Our results demonstrate that *Pyrodinium bahamense* must attain vitamin B12 from the environment to reach bloom levels but bacteria in the surrounding seawater may not provide this critical resource, hence implicating other B12 sources in estuaries where *Pyrodinium* blooms

Oral Presentation #2

Spatiotemporal Characterization of Sedimentary Phytopigments in the Southeastern Clarion Clipperton Zone: Establishing Baselines and Assessing Deep-Sea Mining Impacts

Isabella A. Iannotta, Patrick T. Schwing, Tristan S. Lam, Elisa Baldrighi, Javiera Rivera Lemeé, Patrick P. Downes, Bryan J. O'Malley*

Phytopigments on the seafloor are indicators of organic matter quality and the critical food source for abyssal benthic communities. As exploration for deep-sea nodule mining continues to emerge as a potential industry, studies addressing baseline conditions and the associated impacts of mining activities are crucial for understanding resulting ecological risks and uncertainties. This study examined the natural spatiotemporal variability of sedimentary phytopigments chlorophyll-a, phaeophytin in the NORI-D contract area of the Clarion-Clipperton Zone (CCZ), as well as the impact of a mining test on these parameters at varying levels of disturbance including direct effects and sedimentation from the generated plume. Baseline samples were collected in October-December 2020 and April-June 2021 from a Collector Test Area (CTA) and a Preservation Reference Zone (PRZ), and a final baseline campaign only in the CTA in August-September 2022. Results yielded higher and more variable chlorophyll-a concentrations in the PRZ compared to the CTA. Natural variations in sedimentary phytopigment values have been observed, where a decrease in chlorophyll-a is evident in August-September 2022. Samples collected after the mining test produced lower average sedimentary surface chlorophyll-a concentrations in collector track samples, indicating sediment removal, while the site located 200 meters from the track exhibited enriched chlorophyll-a concentrations compared to baseline values, suggesting a zone of influence for organic matter deposition from the plume generated by test-mining. Investigations of the natural variability of phytopigments in sediments and examining the spatial extent of post-disturbance effects provide valuable context for understanding the potential consequences of mining activities on benthic ecosystems.

Oral Presentation #3

Development of the East Florida Coastal Ocean Model (EFCOM)

Orion Scharton-Witmer, Yonggang Liu, Haibo Xu, Sebin John, Kaili Qiao*

Keywords: Ocean circulation, numerical modeling, FVCOM, East Florida Shelf

Florida's Atlantic coast has abundant resources in beaches, state parks, aquatic preserves, and wildlife refuges as well as densely populated coastal cities in low lying areas that are all subjected to natural disaster threats from the oceans. There is an urgent need for a high-resolution coastal ocean circulation model for this region. Based on the application of the Finite Volume Community Ocean Model (FVCOM), we develop an East Florida Coastal Ocean Model (EFCOM), downscaling from the deep ocean, across the continental shelf, and into the estuaries. It uses an unstructured grid with horizontal resolution varying from 3 kilometers at the open boundary to 30 meters in the estuaries and 30 sigma layers in the vertical direction. The model is configured for realistic simulation of ocean circulation with surface winds and heat fluxes from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Predictions (NCEP) North American Mesoscale (NAM) model, and river inflow data from the United States Geological Survey (USGS). On the open boundary, EFCOM is nested within the Global Hybrid Coordinate Model (HYCOM) for 3D velocity, temperature, salinity and sea level with added tides. The hindcast simulation is quantitatively evaluated against the observations of water levels, current velocities, temperature, and salinity from NOAA CO-OP stations. Preliminary results are promising. The EFCOM will be set up as a daily nowcast/forecast system providing important guidance information for navigation, flooding and inundation associated with storm surges, harmful algal blooms, and Sargassum inundations for this coastal region in the future.

Oral Presentation #4

Evaluating Spatiotemporal Trends in Reef Fish Environmental Preferences within the Gulf of Mexico to Characterize Species-Specific Climate Vulnerability

Jill Thorr, Steve Murawski*

Semi-enclosed seas present complex, inhomogeneous, and non-linear challenges to our ability to understand and predict climate impacts on fishes and fisheries. One such semi-enclosed sea is the Gulf of Mexico (GOM) which supports many economically and ecologically important fishes, but the geomorphology of the basin limits the spatial extent to which fishes can exhibit latitudinal and depth shifts to maintain optimal conditions. Therefore, GOM reef fish responses to climate-induced environmental changes are noisy and multidirectional, thus leading to ambiguous biomass shifts which have historically been interpreted as insignificant when the nuanced system is not thoroughly investigated. Here we use Southeast Area Monitoring and Assessment Program (SEAMAP) fall trawl surveys to assess spatial and environmental shifts in species biomasses within the GOM between 1987 to 2021. We compare species-specific niche shifts to trends in the overall environment to identify which species are altering their distributions to maintain their optimal conditions, and we identify species that are matching the overall rate of environmental change. Thus, enabling a more robust method to identify climate-vulnerable species. Our results indicate Adult Red Snapper (Lutjanus campechanus) and Adult Shoal Flounder (Syacium gunteri) closely track the overall rate of temperature change within the study domain. This study highlights the importance of evaluating nuanced species responses at both the single-species and multi-species levels in semi-enclosed seas where non-linear temperature gradients are present. Managers will be able to use these results to identify species of concern in relation to climate change under multiple climate scenarios.

Oral Presentation #5

Characterization of trace metals via optical proxies

Bradley Nemeth, Chuanmin Hu, Kristen Buck, Jennifer Cannizzaro*

Phytoplankton are a pivotal part of marine ecosystems, impacting marine food webs and carbon flux. However, when there are large algal blooms that occur such as Florida Red Tide, which is made up of the toxic dinoflagellate Karenia brevis, there can be numerous negative impacts to local ecology, economies and public health. Researchers have long sought to better understand the nutrient sources responsible for red tide bloom initiation and maintenance on the West Florida Shelf. Understanding the spatial and temporal distributions of trace metal concentrations (e.g., Fe, Cu, Co, Cd, and Mn) is also important given their role in cellular nutrient acquisition strategies. However, this is currently poorly understood. The goal here is to examine whether there exist relationships between trace metal concentrations and various optical proxies for phytoplankton, non-algal particulate material, and colored dissolved organic matter (CDOM) in surface waters using shipboard data collected on the West Florida Shelf in 2020-2023. If so, then satellite-derived optical proxies may potentially provide insight into the processes, including riverine discharge, and wind-driven sediment resuspension, that influence bloom dynamics.

Oral Presentation #6

Examining Phytoplankton Community Composition Through the Lens of Physical and Chemical Gradients in the Atlantic Sector of the Southern Ocean

Emma E. Graves, S.V. Einarsson, K.E. Powell, S.E. Fawcett, H. J. Forrer, S. A. Kranz, A.N. Knapp, R.K. Thomas, J.M. Rose, P. D. Chappell*

Marine phytoplankton are globally important components of major elemental cycles. Phytoplankton community composition is regulated by the biogeochemistry and physical conditions that affect productivity. In the Southern Ocean frontal zone, where physical factors change rapidly, and large nutrient concentration and stoichiometric gradients exist, phytoplankton community composition is particularly variable. To examine the factors that influence community composition, surface seawater was collected from southbound and northbound transects across the frontal system in the Atlantic sector of the Southern Ocean in Austral Spring. Sampling included the Subtropical and Subantarctic fronts, and the intermediate Subtropical, Subantarctic, Polar frontal, Antarctic, and Marginal Ice zones. Phytoplankton community composition was analyzed using multiple methods, including universal 18S and 16S metabarcoding, pigment-based CHEMTAX, and imaging-based Cytosense composition data. The analysis focused on eukaryotic phytoplankton community composition, which was found to strongly group by front or zone regardless of analytical methodology. Community composition shifts also correlated with salinity, temperature, and nutrient concentrations in the region studied.

Oral Presentation #7

Storm Surge and Coastal Inundation Nowcasts/Forecasts During Hurricanes Helene and Milton

Haibo Xu, Yonggang Liu, Kaili Qiao, Sebin John, Sieu-Cuong San, Robert H. Weisberg, Sherryl Gilbert, Steven A. Murawski, Gary T. Mitchum, Thomas K. Frazer*

A daily automated coastal water level (storm surge) nowcast/forecast guidance system has been developed by the USF Ocean Circulation Lab based on the West Florida Coastal Ocean Model (WFCOM) and the very high-resolution Tampa Bay Coastal Ocean Model (TBCOM). Both models are configured to perform realistic simulations of ocean circulation and water levels which are then combined with tide gauge observations to provide 3-day hindcasts and 3.5-day forecasts of coastal water level along the West Florida coast (http://ocgweb.marine.usf.edu/Models/SeaLevel/). The experimental product was maintained during the approach and passage of Hurricanes Helene and Milton, and provided critical storm surge forecasts to a broad suite of stakeholders including the public. The system successfully predicted the water level set-up and set-down along the west Florida coast three days in advance of each hurricane, with improved forecasts realized each day prior to landfall. The TBCOM-inundation forecast system was also activated during Hurricane Helene. This modeling system extends its dense grid onto the land, facilitating simulation of inundation and flooding associated with storm surge in coastal areas. During Hurricane Helene, areas of severe inundation were identified along the coastal periphery of Tampa Bay and forecasts were accessible two days in advance of landfall.

Oral Presentation #8

Testing the alkenone unsaturation index proxy for paleotemperature reconstructions in the SW Atlantic

Felipe Stanchak, Julie N. Richey, Amanda Gerotto, Amelia Shevenell, Marcia C. Bicego, Felipe A. Toledo, Michel M. de Mahiques, Renata H. Nagai*

The paleothermometer based on the alkenone unsaturation index (UK'37) is often used to reconstruct past sea surface temperatures (SST). In the SW Atlantic Ocean, however, a limited understanding of the seasonal and depth distribution of coccolithophores, which generates the UK'37 signal preserved in ocean sediments, hinders accurate estimates of past regional SSTs. We analyzed 45 core-top sediment samples from the continental shelf of the South Brazilian Bight (SBB, 23 °S to 28 °S) to assess regional spatial UK'37-SST gradients and improve SST estimates. The UK'37 data were converted to SST using six published paleotemperature equations and compared to modern observational SST data from the World Ocean Atlas (2018) data set. Data indicate that the UK'37 signal is produced during warmer months when regional episodic upwelling events occur over the inner-shelf and the nutricline shoals at the slope. Our core-top data shows that SST estimates derived from most calibration equations closely align with modern observed temperatures but are skewed toward warmer months associated with upwelling-derived nutrients. Our findings underscore the importance of considering regional and seasonal biases to improve the accuracy of paleotemperature reconstructions. Understanding the factors influencing the SBB UK'37 signal enables a more meaningful comparison between regional paleoceanographic studies, improving our understanding of past changes in the SW Atlantic Ocean and our ability to predict regional SST response to ongoing and future warming.

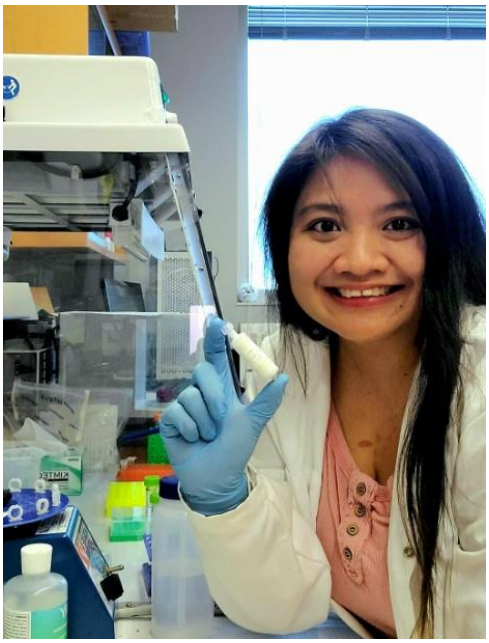
Oral Presentation #9

The Root of the (Organic) Matter: Mangrove Formation of Belowground Biomass

Aguilar, A., Rosenheim, B., & Romero, I.*

Mangrove ecosystems provide important services such as habitat for marine life, coastal stabilization, and carbon storage. Nevertheless, these ecosystems have been under threat due to infrastructure development, reducing them in area and functionality. Restoration efforts have been conducted to regenerate mangrove forest in the past decades, but assessment of restoration success is limited to a short term and usually focused on aboveground mangrove biomass. Given that belowground mangrove biomass stores 5 times more carbon than the aboveground biomass, it is important to give special attention to this component. My project is focused on the characterization and quantification of different components of the belowground biomass materials. By combining different methods in order to divide by size and chemical composition, I used different size sieves to separate material type and the furnace to determine chemical composition of the samples. Gaining more insight into the differences between reference sites which have not been restored and restored sites will let us understand the natural succession of the systems. We predict that the older the site, the more similar belowground biomass composition will be to the reference site.

Oral Presentation #10



Seasonal Trichodesmium Clade Patterns on the Oligotrophic West Florida Shelf

Lyka Confesor, Angela Knapp, Kristen Buck, Salvarotre Capara, Caitlyn Parente, Rene Boiteau, Tim Conway, Hannah Hunt. Joseph Tamborski, Andrew Lindgren, Christopher Smith, Eric Webb, P. Dreux Chappell*

The marine diazotrophic cyanobacterium Trichodesmium fixes both carbon dioxide (CO2) and dinitrogen gas (N2) and plays an essential role in ocean productivity by relieving nitrogen (N) limitation in oligotrophic environments. The West Florida Shelf (WFS) in the Gulf of Mexico is a coastal oligotrophic region with low inorganic nutrient concentrations that nonetheless often supports a multitude of phytoplankton blooms, including Trichodesmium. Two major Trichodesmium clades, T. erythraeum and T. thiebautii, are observed in waters along the WFS, with prior work suggesting that these taxa occupy distinct niches, with T. Thiebautii as the more oceanic clade. How clade distributions differ with different seasons and are influenced by macro- and micro-nutrient concentrations remains of interest. This work offers additional analysis of Trichodesmium clade's niche distribution from two recent cruises targeting the dry and wet seasons on the shelf. Molecular and nutrient samples were collected on two cruises in 2023, one in February (dry season) and one in July (wet season), both sampled offshore low salinity plumes likely originating from loop current interactions with northern Gulf rivers. Trichodesmium clade gene abundance was assessed using a quantitative PCR method targeting the rnpB gene. Gene abundances were compared with a suite of physicochemical data (chlorophyll, temperature, salinity, and nutrients) for significant trends. Preliminary analysis indicates that typical geospatial clade distributions are observed in the dry season but are inconsistent during the wet season.

Oral Presentation #11

Those floating materials in the northern Adriatic Sea: observations from satellites

Madjid Hadjal, Brian B. Barnes, Lin Qi, Karlis Mikelsons, Menghua Wang, Chuanmin Hu*

Surface aggregations of unknown materials have been observed in satellite images in summer 2024 in the northern Adriatic Sea (NAS), Italy. Historically, both mucilage events and red Noctiluca scintillans (RNS) events have been reported in the NAS, both causing various issues to fisheries and tourism. While the current effort in monitoring of the region is through monthly in situ sampling, this study aims to provide a synoptic view of the various floating materials using satellite imagery between 1972 and 2024 through spectral analysis. Large-scale mucilage features were found during summer in a total of 10 years, from 1988 to 2024. RNS features were detected during spring, with the earliest event captured in 1980 and subsequent events in 1989 and 1998. Since 1998, 12 RNS events have been observed, with surface areas ranging from a few km² (1998, 2014) to most of the NAS (2001, 2012, 2021). Similarly, duration ranged from one day to three months. Both mucilage and RNS were found on the western part of the NAS, near the River Po delta. In addition, pollen was also observed in the eastern NAS and near the Kvarner Islands, all during May and with a recent increasing trend. The environmental factors have also been analyzed to determine what could lead to the large events, yet this attempt did not result in any meaningful conclusion.

Oral Presentation #12

Heat flux exchange on the West Florida Continental Shelf on the synoptic time scale. A case study from tropical cyclonic and cold fronts events

Luis Sorinas, Robert H. Weisberg, Yonggang Liu*

Individual synoptic events can rapidly remove substantial amounts of heat from the ocean. This is particularly relevant after the fall transition when the net surface heat flux is already negative, and any substantial heat flux removal leads to a notable decrease in temperature. In this study, we analyze over 24 years of moored buoy observations to assess the impact of 16 tropical cyclones (TC) and several cold fronts (CF) on air-sea heat exchange and subsequent changes in sea surface temperature (SST) and vertical temperature structure within the water column. The influence of TCs and CFs on radiative and turbulent heat fluxes differs markedly. For TCs, the dominant mechanism is a significant reduction in incoming shortwave radiation due to increased atmospheric absorption caused by convective cloud cover. In contrast, CFs have a minimal impact on radiative flux, primarily contributing through a slight increase in net longwave radiation. Both types of events, however, can significantly affect air-sea turbulent flux, though the dominant state variables driving this flux vary. For TCs, latent and sensible heat removal is primarily controlled by strong winds, while air-sea temperature and specific humidity gradients are weaker. Conversely, CFs typically feature weaker winds but larger air-sea gradients, which predominantly drive turbulent flux in these events. All events resulted in a well-mixed water column, with a reduction in depth-averaged temperature observed in most cases, except for TCs Eta and Hermine. The changes ranged from an increase of 0.2°C for TC Eta to a maximum decrease of 4°C for TC Wilma.

Oral Presentation #13

Brine shrimp cysts in the West Aral Sea from satellite observations

Keyu Mao, Lin Qi, Menghua Wang, Yao Yao, Ablatdiyn Musaev, Chuanmin Hu*

Brine shrimp cysts (BSC) are crucial components of hypersaline ecosystems and valuable resources in commercial aquaculture. The West Aral Sea (WAS) is known to be abundant in BSC, yet their spatial distribution patterns and temporal changes are difficult to assess through traditional field sampling. Here, we use the Sentinel-3 Ocean and Land Colour Instrument (OLCI) observations between 2016 and 2023 together with the customized algorithms to address this challenge. The developed deep-learning model successfully differentiates BSC image features from others, and BSC coverages in such features are quantified with a spectral unmixing model. Application of these models to all available OLCI images reveals distinct spatial distribution patterns of BSC as well as their seasonality and inter-annual changes. Most BSC are found in the west and south of the WAS, driven by the dominant north-easterly winds. Strong seasonality of BSC is found with September and October being the peak months, possibly driven by the inter-play between water temperature and chlorophyll-a concentration (an index for food availability). Total BSC abundance generally increased until 2020, after which a sharp decline occurred in 2021 with gradual rebound in subsequent years, mimicking the annual BSC harvest patterns. While the sharp decline might be explained by decreased temperature and increased salinity with inter-annual patterns modulated by both temperature and chlorophyll-a, further research is required to understand the mechanisms behind such changes.

Oral Presentation #14

A Coupled Physical-Biological Model of Karenia brevis on the West Florida Shelf: An Application to the 2018 Bloom Event

Sebin John, Yonggang Liu, Robert H. Weisberg, Katherine A. Hubbard, Zhengchen Zang, Yunfang Sun, Matthew J. Garrett, Yida Gao, Julie Koester, Celia Villac, Chuanmin Hu, Yao Yao, Haibo Xu, Kaili Qiao*

Blooms of the toxic dinoflagellate Karenia brevis occur almost annually on the west coast of Florida, killing fish and other marine life, threatening public health and adversely impacting local economies of Florida. Mitigating such effects requires improved forecast capabilities. Based on the West Florida Coastal Ocean Model (WFCOM) that downscales from the deep ocean, across the shelf, and into the estuaries using an unstructured grid, and that provides realistic hindcast simulation of ocean circulation, we implemented a biological model using the Generalized Ecosystem Module of the Finite Volume Community Model (FVCOM, v4.4.2). The model simulates an ecosystem of two phytoplankton taxa (K. brevis and diatoms), zooplankton, bacteria, and detritus. The K. brevis dynamics include growth, grazing, remineralization and excretion processes that may change with environmental conditions, such as light, temperature and nutrients. The coupled physical-biological model was applied to simulate the K. brevis bloom event in summer – fall of 2018 on the West Florida Shelf. The modeled K. brevis cell concentration patterns were compared with in situ observations of cell abundance and satellite imagery, and the preliminary results were encouraging. The coupled modeling explored a combination of K. brevis initial concentrations and putative offshore source locations as contributing to the major bloom that manifested on the West Florida coast in 2018. These studies demonstrate the dual importance of the coastal ocean circulation and the organism biology in determining bloom evolution. Continued testing and refinement will improve the coupled physical-biological model.

----------Posters 3:00-4:30 pm in MSL ----------

Poster Presentation A

Physical and Biogeochemical Controls on the Distribution of Dissolved Nickel and its Isotopes in the Denmark Strait (GEOTRACES GApr16)

Dylan J. Halbeisen, Shun-Chung Yang, Xiaopeng Bian, Wen-Hsuan Liao, Adam Ross, Seth G. John, Rob Middag, Tim M. Conway*

Nickel (Ni) is an essential micronutrient involved in several phytoplankton metabolic pathways, making it an important mediator of the marine carbon and nitrogen cycles. To date, the international GEOTRACES program has established the large-scale distribution of dissolved Ni (dNi)1, identifying biological cycling and water mass mixing as the dominant controls, while slow regeneration and reversible scavenging may also be important2. Dissolved Ni isotope ratios (δ60Ni) are a powerful tracer that can be used to provide further insight into marine Ni cycling and interrogate the sources, sinks, and processes that control the marine distribution of Ni3. Globally, the deep ocean is characteristically homogenous with δ60Ni of +1.33±0.13‰, while surface waters can reach values up to +1.7‰ due to uptake of light dNi into phytoplankton4-6. Despite recent progress, few marine δ60Ni profiles exist, especially in the North Atlantic (only 25 depths across 7 profiles3,7). Here, we present δ60Ni data from Dutch GEOTRACES GApr16 in the Denmark Strait. These δ60Ni range from +1.12±0.07‰ to +1.62±0.08‰. The western portion of the Strait is characterized by the East Greenland Current (EGC) which transports Arctic-origin water southward along the shelf break, carrying elevated dNi/PO43- (14.28 nM/µM), elevated dNi (4.84 nM), and low δ60Ni (+1.20±0.06‰), indicative of a non-biotic source of isotopically low dNi. Together, these data suggest that the Arctic Ocean, likely supplemented via Summer Nordic seas and Fram Strait cryospheric melt, supplies a source of isotopically low dNi to the Denmark Strait and the North Atlantic.

Poster Presentation B

Warm Ocean Temperatures along the West Antarctic Peninsula Drove Regional Ice Retreat During the Last Deglaciation

Emily A Kaiser, Amelia E Shevenell, Amy Leventer, Imogen Browne, Kara Vadman, Brad Rosenheim, Scott Ishman*

The Antarctic Peninsula is one of the most rapidly warming regions on Earth, resulting in widespread outlet glacier acceleration and mass loss. Because observational records of atmospheric and oceanic warming are temporally limited, geological records are required to place modern retreat into a longer-term context. During the Last Glacial Maximum (23-19 ka), ice along the West Antarctic Peninsula (WAP) was grounded close to the shelf edge and retreated towards modern grounding line positions during the last deglaciation. Whereas oceanic heat is forcing WAP ice mass loss today, our knowledge of ocean temperatures and their influence on ice retreat during the last deglaciation is limited.

Here we present foraminifer stable isotope data and TEX86-based paleotemperature data from sediment cores containing deglacial sediments recovered from the Anvers/Hugo Trough which transverses the WAP continental shelf (~66° - 64°S). Our radiocarbon ages, in addition to recently published ages, suggest deglaciation of the outer to middle trough within ~600 years beginning at 16.4 ka. As ice was retreating, our multiproxy dataset suggests that ocean temperatures were nutrient-rich, and relatively warm. These data demonstrate widespread presence of relatively warm modified Circumpolar Deep Water (mCDW) on the WAP continental shelf during deglaciation. This period of warmth was accompanied by high diatom abundances, likely influenced by meltwater-driven stratification and earlier spring sea ice melt associated with high regional insolation. We hypothesize that atmospherically mediated retreat of glaciers via increased upwelling of relatively warm water masses occurred along the WAP during the last deglaciation, which provides insight into further ice mass loss expected with ongoing warming.

Poster Presentation C

Using rDNA sequencing to identify changes in phytoplankton community composition and diversity in response to the Piney Point (Tampa Bay, Florida) emergency wastewater discharge in 2021

Christa Baranowski, Natalie Sawaya, Makenzie Kerr, Grace Koziol, Mya Breitbart, Kristen Buck, and P. Dreux Chappell*

In early summer 2021, a leak in the phosphogypsum pond lining at Piney Point (Palmetto, Florida) introduced a large amount of nutrient-dense water into Tampa Bay, prompting an emergency response from researchers at the University of South Florida, College of Marine Science (USF CMS) to collect water samples across Tampa Bay over four months. Illumina amplicon sequencing targeting rDNA was used to assess the plankton community composition, generating Amplicon Sequence Variants (ASVs) that will be used for alpha and beta diversity analyses. Statistical programs designed for compositional high-throughput sequencing data will evaluate diversity metrics, while categorical metadata (e.g., location, date) and nutrient concentration measurements will be examined for potential correlations between diversity shifts and Piney Point discharges using multivariate analytical methods. This study will test two hypotheses: (1) plankton community composition and diversity shifted near the discharge site and diminished over time and distance, and (2) nutrient loading favored fast-growing, copiotrophic species. Expected findings include a higher relative abundance of copiotrophs near the source, decreasing with distance and time as nutrient levels decline. Non-metric multidimensional scaling (NMDS) and other ordination plots will be used to visualize significant correlations between Piney Point discharge and the alterations to Tampa Bay's plankton communities. These results could provide insight into the ecological and economic disruptions caused by the discharge, emphasizing the need for improved nutrient management and mitigation strategies in coastal ecosystems. Preliminary results show differences in plankton community composition and diversity between samples collected during discharge and four months post-discharge.

Poster Presentation D

Zooplankton in the Cariaco Basin

Karsen Henwood, Kendra Daly*

The Cariaco Basin, off the northeast coast of Venezuela, is unique due to its anoxic character below about 250 to 300 meters. During the 21-year CARIACO time series, there was considerable research on the hydrography, sediment production and accumulation, and primary production in the basin as well as paleoclimate investigations using the well-preserved sediments. Despite the considerable observations and research taking place in the region, zooplankton in the area remains understudied. Using splits from 48 zooplankton samples taken between 2001 and 2003 in both the surface and anoxic layers, we will be analyzing spatial and temporal patterns of zooplankton abundance, biomass, and community structure. Additionally, we will be comparing these findings to trends in upwelling, chlorophyll biomass, and sediment trap data. Although previously believed that organisms did not inhabit anoxic waters, preliminary data, as well as studies from other regions, demonstrate that there are zooplankton that reside in those layers for some part of the day. There is also evidence of zooplankton participating in diel vertical migration moving in and out of the anoxic layer. The most abundant taxa observed year-round were copepods, however, other taxa, including cladocerans, amphipods, larvaceans, chaetognaths, doliolids, ostracods, and euphausiids were relatively abundant periodically.

Poster Presentation E

Oxygen supply capacities of Pacific benthic fish species, blackeye gobies (Rhinogobiops nicholsii) and bluebanded gobies (Lythrypnus dalli), increase at higher temperatures

Bostony Braoudakis, Alec Timpe, Brad Seibel*

Elevated seawater temperatures can disrupt the balance of oxygen supply and demand by decreasing oxygen solubility and increasing rates of metabolic processes. Climate change conditions can be particularly threatening to benthic, sedentary species that are unable to migrate and redistribute their populations to avoid areas with poor conditions. Blackeye gobies (Rhinogobiops nicholsii) and bluebanded gobies (Lythrypnus dalli) are Pacific benthic temperate reef fish species. This study used respirometry methods to investigate the oxygen supply capacity and its temperature sensitivity of these goby species collected in Santa Catalina island. Oxygen supply capacity was higher at warmer temperatures for both goby species. Blackeye gobies had higher mean oxygen supply capacities compared to those of the bluebanded gobies. Because these goby species exhibit limited large-scale movement and have relatively small home ranges, they may be susceptible to rising temperatures, although to different extents.

Poster Presentation F

Water Quality Response to Hurricane Debby as Measured by the Tampa Bay Observing Network (TBON)

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The Tampa Bay Observing Network (TBON) maintained by the Ocean Circulation Lab at the USF College of Marine Science is an observational array composed of five real-time water quality and meteorological stations mounted on U.S. Coast Guard range towers co-located with bottom mounted current meters in Middle and Lower Tampa Bay. TBON transmits real-time, continuous observations of water temperature, pH, specific conductivity, salinity, dissolved oxygen, chlorophyll a, phycoerythrin, turbidity and water depth along with air temperature, pressure, humidity and wind velocity. These efforts provide short – and long- term meteorological and water quality trends which combined with circulation can be used for management efforts to improve bay health and to help address resolution gaps in established sampling programs. Discrete sampling can miss intermediate changes and short-term trends in water quality due to diurnal or sub-monthly scale changes acute pollution events, or extreme weather events. As an example, TBON real-time data recorded the water quality response to the passage of Hurricane Debby (8/5/24) which delivered almost 15 inches of rain within a 48-hour period and up to 4 ft of storm surge to the Tampa Bay region. With observations made every 15 minutes, we were able to monitor expected shifts in the water temperature and salinity accompanying the measured storm surge at all stations, followed by an increase in chlorophyll a 5 – 7 days after the storm's passage.

Poster Presentation G

Evaluating Fish Egg Community Composition with Respect to Depth on the West Florida Shelf

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Understanding fish spawning patterns, locations, and egg distribution in the water column is crucial for managing fish populations. Over the past decade, genetic barcoding of fish eggs has expanded knowledge of spawning distributions and dynamics across the West Florida Shelf (WFS). The long-term Spawning Habitat & Early-life Linkages to Fisheries (SHELF) program, which uses genetic barcoding, aims to assess trends in fish spawning on the WFS. The program collects fish eggs with a continuous underway fish egg sampler (CUFES), which filters seawater at 3 meters depth while the research vessel is underway. This approach assumes that the species composition of eggs at this depth is representative of the entire water column, as most pelagic fish eggs rise to the surface due to their aqueous content compared to surrounding water. However, egg buoyancy may vary across species, and some eggs could settle deeper in the water column. To test this assumption, a multiple opening/closing net and environmental sensing system (MOCNESS) was used to collect samples at six depths (0-20 m, 21-40 m, 41-60 m, 61-80 m, 81-100 m, 101-130 m) at five stations. DNA barcoding was then used to analyze the eggs and assess whether species composition differed across depths. This study provides insights into spawning behaviors, egg distribution patterns, and potential biases in the SHELF monitoring program.

Poster Presentation H

Coastal water level variability along the Gulf of Mexico and the Western Atlantic Coast

Siria Munoz, Yonggang Liu*

Tide gauge records of 13 years (2010 – 2022) are analyzed for coastal water level variability in the northern Gulf of Mexico and along the western Atlantic coast. Cumulative power spectral analysis is performed together with tidal harmonic analysis. Along the northern Gulf of Mexico, tidal cycles are dominated by the diurnal tides with about 40% of the total variance and an amplitude of about 13 cm. Synoptic weather and intra-seasonal frequency bands account for about 30%. Annual and semiannual cycles account for only about 12 and 10 percent of total variance, respectively. On the West Florida Shelf, 70% – 80% of the total variance is in tidal cycles, dominated by the semidiurnal tides (50% – 60% variance) with an amplitude of 17 – 24 cm. Synoptic weather and intra-seasonal frequency bands account for about 13% – 15% of the total variance. Annual and semiannual cycles account for only 5% – 8% of the variance, mostly on annual cycles. In contrast, the water level variation on the west Atlantic coast is mostly on tidal cycles (with 80% – 90% total variance), dominated by the semidiurnal tides with the largest amplitude of 100 cm at Fort Pulaski, Georgia.

Poster Presentation J

Let There Be Light: Using Agrobacterium-Mediated Transformation Techniques to Produce Bioluminescence in Plants

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Bioluminescence is a natural phenomenon widely observed in marine organisms that enables the emission of light and holds great potential biotechnology. This study evaluated the functionality of an optimized bioluminescent pathway derived from the fungus Neonothopanus nambi, which includes the genes HispS, H3H, Luz and CPH, expressed in plants through agroinfiltration in Nicotiana benthamiana and the floral dip method in Arabidopsis thaliana. In N. benthamiana, the transient expression of the pathway was assessed at 48 and 72 hours post-agroinfiltration. The plants exhibited efficient light emission, with no visual differences in intensity between the two time points, highlighting the rapid activation and functionality of the system. Conversely, in A. thaliana, the stable integration of the transgene resulted in persistent bioluminescence in both young plants and flowering plants. A homogeneous light pattern was observed in young plants, while specific localization in flowers and stems was evident in flowering plants, suggesting spatiotemporal regulation influenced by plant development. These findings, inspired by the natural luminescence of marine organisms, highlight the cross-kingdom potential of bioluminescence as a tool for both terrestrial and aquatic systems. Genetic engineering of light-emitting pathways could revolutionize marine monitoring technologies, enabling real-time environmental assessment and tracking of ecological changes in marine ecosystems. Future studies should address the regulatory mechanisms that influence the intensity and distribution of bioluminescence, as well as its implementation in agriculturally, industrially, and ecologically relevant species.

Poster Presentation K

Revealing Hidden Patterns: A Cross-Ecosystem Synthesis of Crypsis Ecology

Kennedy Quillen, Dr. Chris Stallings*

Crypsis is a collection of evolved adaptations that allow organisms to blend into their surroundings and evade detection. It plays a crucial role in shaping predator-prey dynamics and survival across various ecosystems. However, research on crypsis often focuses on specific species or habitats, which limits broader ecological insights. Here, I propose a comprehensive literature review using the Web of Science to investigate the ecology of crypsis across all documented ecosystems. The review will explore the mechanisms of crypsis (e.g., auditory, chemical, visual) and examine the diversity, distribution, and ecological roles of cryptic taxa. By synthesizing the existing literature, the review aims to enhance our understanding of crypsis in different ecosystems and serve as a valuable resource for scientists and habitat managers to inform future research and guide conservation efforts. Gaining insights into the ecology of crypsis across ecosystems could be vital for predicting species behavior and assessing how environmental changes affect predator-prey dynamics and survival, especially for species that have evolved to thrive in specific habitats.

Poster Presentation L

Linking Cassiopea Blooms to foraminiferal assemblages: Identifying Effective Bioindicators for Jobos Bay National Estuarine Research Reserve, Puerto Rico

Angelique Rosa Marín*, Natalia López Figueroa*, Xiomara Cruz De León, Wigmali Guzmán Echevarría, Andrea Acevedo Colón, Tania Vega Roldán, Darma Ramos Negrón and Pamela Hallock

Bioindicators reflect environmental conditions through their abundance, assemblage structure, or ecological function, providing quantifiable metrics to assess ecosystem health. Identifying low-cost, high-impact bioindicators is critical for environmental monitoring and effective management-action plans, particularly in vulnerable ecosystems like Jobos Bay National Estuarine Research Reserve (JBNERR). This coastal plain estuary in Puerto Rico, characterized by unique hydrology dominated by groundwater and periodic river runoff, faces pressures from anthropogenic activity, climate variability, and sea-level rise. This study evaluates foraminiferal assemblages and Cassiopea jellyfish as potential bioindicators for JBNERR, combining the well-established use of benthic foraminifera as indicators of environmental parameters with the emerging application of Cassiopea to track nutrient enrichment. Cassiopea distributions were estimated via photo annotation using Biigle. Sediment samples were collected in triplicates to examine foraminiferal functional groups and to quantify calcium carbonate and organic matter. Sediment analysis revealed mud dominance in most sites, fine sand near offshore cays, and coarse to medium sands in anthropogenically impacted areas. Organic carbon and calcium carbonate levels were highest near mangroves and offshore cays. Foraminiferal assemblages varied by impact level. High-impact sites were dominated by opportunistic taxa (Ammonia, Cibroelphidium, and Bolivina), while low-impact sites showed a higher abundance of smaller miliolids such as Quinqueloculina and Triloculina. Cassiopea was absent in low-impact control sites but present in moderately and highly impacted areas. The presence of Cassiopea blooms alongside opportunistic foraminifera taxa highlights their potential as complementary bioindicators, offering a powerful tool for monitoring ecosystem health in JBNERR.