



GCOOS BOARD and MEMBERS' MEETING

Gulfport, Mississippi

17-19 APRIL 2023

17 April 2023 - Closed Board Meeting

Meeting notes – Chris Simoniello

Attendance: Board: In-person: Dave Driver, Antonietta Quigg (flight delay—arrived a little late), Pat Hogan, Stephan Howden, Kate Hubbard, Kirsten Larsen, Bill Lingsch, Joe Swaykos, Nan Walker, Tom Wissing, Jan van Smirren, Kim Yates

Attendance: Board: Virtual: Sara Graves, Nick Shay

In-Person: Other: Carl Gouldman, Gerhard Kuska, Susan (IOOS), Kristen Yarincik, Jorge Brenner, Jen Vreeland, Chris Simoniello, Felimon Gayanilo,

Joe motion to accept agenda; Bill second, all in favor

Welcome/ Purpose

Bylaws Update Discussion and Vote

Do bylaws need to be amended to balance federal/state gov requirement on board?

Should academia folks who work at state universities be eligible for state government positions on the board? (e.g., USM, U AL); Stephan asked if related to GOMA existence-- diluted state candidates for GCOOS; Joe says our bylaws pre-date GOMA; Pat-does it matter how we move people; Stephan thinks better to have another government person knowledgeable about state and federal policy than move academics; Kim says-ok not having it be a requirement but better to have at least 1 state rep from each GoM state w/o growing the board too much; Sara—we don't carry .gov on email address so trying to include state university in state gov category is too confusing; Dave says it does not sound like we want to move academics to state/fed gov; Joe thinks more practical to have room to remove requirement but still have goal to get more state/fed gov participation;

Article 4, section 4.1; BOD 17 people; academia 3, OE, 4, private sector 5, Gov, 5—at least two from non-federal gov (need to strike last part—non-fed gov) to be in compliance and remain flexible; Bill thinks intent is to keep representation across 5 states; Stephan says can give voters guidance with elections—goal is for regional/sector balance; Gerhard-another mechanism—had an election and now want to bring someone on board---keep certain number of board-appointed spots open—12 elected board

positions and up to six board-appointed positions for a prescribed period of time; Kim likes as way to engage international folks.

International board representative: should we designate in bylaws a dedicated board position for international rep? Consider Gerhard's recommendation for board appointed rep? Jorge—case for international participation; CIGOM—initial collaboration but does not have to be someone from this group; Joe asked if international member is ex officio or if can vote; Carl does not know but does not think one vote could sway enough to be a problem; Pat says could have two international—one Mexico and one Cuba so don't have even number of board members; how do we break a board tie? Gerhard says in 12 yrs, never a tie; Stephan asked if someone appointed for a year, can they then run the following election? So, if appointed someone, now at 18 BOD members, do you keep at 18 in the following election or go back to 17 BOD? MARACOOS can serve 2 consecutive terms, some appointed 1, 2 or 3 yrs; Nan, can invite international but non-voting; Kim-DEIA issue—we can do it as invitation but gives bad flavor if invite for first time but don't give same privileges as other board members—perception issue; maybe invite as GCOOS members first; not initially as BOD unless give all rights within the law; Carl says ex officio makes sense as a first approach; Sara—what does a board nomination look like? Hard to tell who someone was or where they were from—need an election template; Carl-Don't have dedicated international board spot; maybe MOU instead; to run for board you have to be a rep of a GCOOS member organization; do we have any international GCOOS member organizations? Once have those, can draw from them to get voting board members; Kim—can we add as discretionary invited (BOD) members in the future? Jorge—GoM LME working with folks now; gathering data but not funded to share; Brian Zelenski—also working on this; (Old GCOOS MOUs with Mexico...SEMARNAT? Others too.

IOOS regulations—we can use some of our budget to fund international projects; NERACOOS does with Canada; we can discuss further; Jorge can work with Mexican colleagues and put together budget; talk with Brian and see what can be done for Y3 funding/budgets; bring up on next telecon to discuss;

Kristen—people seem to be hesitant about adding anyone now; build relationships first, then decide about adding new international members; look into how GLOS and NERACOOS have worked with internationals; internationally funded partners on UGOS—PAT QUESTION—what can we learn from them—ask tomorrow during UGOS panel discussion; Jan-Mexican sector is extremely active now—a lot of important work—anything we can do to be more fully engaged we should do now; easiest way is to have ex officio board member, non-voting; bylaws article 3—GCOOS member organization; just invite who we want and move on; Stephan—opening door for resentment—picking one group over another; don't pick individual, pick organization? Jan—draft a clause for the bylaws to have ex officio international member and be done with it; can we pay travel for that? Do other RAs have international members on board? GLOS does; NERACOOS does; not sure about others; Kim says investigate how others are doing before deciding; ACTION: investigate what other RAs doing before vote to decide on bylaws—GLOS, MARACOOS, maybe also check to see if AOOS and others have—create a work group to figure out details—ACTION—create group—Kim, Joe, Bill, Jan;

Kate—do we need strategic plan for long-term and short-term international engagement? Align with Buildout Plan.

Also need to revisit state vs federal government reps in BOD; Kirsten—5 government reps on Board, with language that states “at least two of which must be from non-federal government” she proposes

striking the last part (at least two from non-federal) Joe says adopt revision as by Kirsten; Dave second. Gerhard say “up to five or no more than five” to retain flexibility; Tom—maybe read a certain percentage of board must be gov groups; so if don’t fill amount, you have flexibility. All in favor; none opposed; Joe—need someone to go into bylaw and change text. Who?

Last time, a lot of talk about election process, vet candidates before ballots cast, Sara raised issue about a nominee not vetted; came to agreement about what to do, but it never got implemented; ACTION JORGE—draft revision to bylaws stating Board candidates will be vetted by board before ballot goes live.

Issue—international travel, clearance for government buildings, permit to work with Cuba.

IOOS Program Office Updates and IRA Discussion (Carl Gouldman, Director, IOOS)

NOAA FY22-26 Strategic Goals from Rick Spinrad; 18 months to 6 yrs timeline depending on elections! Build a Climate Ready Nation; Make Equity Central to NOAAs Mission, Accelerate Growth in an Information-based Blue Economy; Carl slides budget—IOOS Enacted and President’s Budget FY17-2024.

2023 \$42.5M; expecting same in 2024; does not include other sources of funding—disaster relief, Bipartisan Infrastructure Law...; Inflation reduction act--\$3.3B for NOAA over 4 yrs—coastal communities and climate resilience (\$4.6B for NOAA);

Community Special project (Congressional directed) six total projects administered by IOOS for FY23; Prov 3 (Flood inundation mapping 4.5M; prov 11 coastal and ocean obs (7.3M), Pov 12 (ROP 1.8M)—Northeast/NH getting tons of money from this); Inflation reduction Act—coastal, economic, and climate resilience \$3.3B—community planning for extreme weather/climate (\$2.6B of this) for natural resources that sustain coastal and marine resource dependent communities; support marine fishery and marine mammal stock assessments; Carl can’t talk much more beyond that; amt of money not guaranteed; having to work to keep in IOOS; Jorge question—is this opportunity to launch IOOS Marine Life activities? If we can do noncompetitive approach for IOOS RAs—we’ll have more leeway to draft proposal process—allow RAs to choose priorities for each RA plus collective ideas across regions; i.e., Data Assembly Center for MBON related projects; Carl slide—looking forward-funding Five categories from RA NOFO, BIL, COM, Marine Life, OTT...IOOS looking at multiple types of funding, timelines and how better to communicate to RAs;

Walt Musial—NREL Offshore Wind Renewable Energy, Best Practices, Data Needs and Opportunities, Offshore Wind Lead, National Renewable Energy Laboratory (Virtual)

NREL—dedicated to renewable E research for DOE; ~3,000 employees; based in CO; campus is net zero; four groups working: renewable power; sustainable transportation, energy efficiency, energy systems integration; wind falls under renewable power group—offshore wind, land-based wind, distributed wind, system integration and manufacturing; Industry and designers have range of tool needs to adapt to technology as evolves; grid plan stability and power system reliance—use electrons to make some sort of fuel and cybersecurity that goes with it—relying on weather to determine large part of E supply; need more info/data for this; must analyze—what’s driving this is economics—wind and solar lowest cost E on grid; offshore wind a little more expensive but still better; jobs, economic development, supply chains around this are important as move to new regions like GoM, CA, Great Lakes... environmental science—what are accumulative impacts? Space issues, mitigate env impacts as go; Life cycle phases and data needs of an offshore wind project (see slide)—planning site assessment and permitting, design,

transport & installation, O&M, life extension reworking, decommissioning; need better info on hurricanes to decide turbine design; turbines to withstand extreme weather and unique loading; frequency and severity of weather events for planning, siting, operations; Hub height (150 m) wind speed obs are insufficient right now to validate WRF models; hurricane characteristics veer, shear, gust factors are largely unknown, mesoscale/microscale modeling needs data validation; site specific extreme waves on OCS are needed for design basis; Nick—has group thought about rapid intensifiers? Storms/hurricanes—in Sanibel Isl now—severely damaged by H. Ian—huge impact on design of wind farms—improve tracking models to understand probability of severe storm hitting; hurricane research moving from can we characterize event from single 3 sec gust? Need more sophisticated models; Why 150 m level for wind? Walt said where think Hub height will be on turbines now being built (15 meg turbines); sea state going into this as well but wind most important info needs for turbine; Jan-academic, industry partners—how do these work? Cooperative research agreements with partners—NREL does not get appropriated funds -gets from DOE or other agencies and groups that want to pay for services; Pat says site selection has already occurred in the GoM; construction will start soon; do turbines already have ability to withstand hurricanes? Future and current markets...what is the timeline? Continuing to evolve turbine design—better understanding as go; models for tracking external conditions are also improving as we go; Dave -oil industry working on design criteria for years-extreme wind, waves, currents for platform design over many years; Walt says substructure for wind turbine similar to that used for oil and gas platform—site specific design; but turbine itself not covered by oil and gas design—more horizontally loaded—two sets of standards –international standards for wind energy and API developed for oil and gas; Tom—asked how DOE managing data on impacts in ocean in GoM—Walt says through partners and coastal centers doing research; Tom asked which in GoM working with? Doesn't sound like any yet—Governor of LA? Spoken with developers—scoping out lease areas, BOEM; looking into setting up own satellite facilities near ocean; Stephan-lack of LIDAR data—is there a way to put on buoys and uncrewed systems? Is Walt involved in getting more LIDAR measurements this way? DOE sponsors two LIDAR buoys—they get moved around—currently in Pacific; East coast buoys by NYCERDA (?), also private companies that don't share data, Shell for GoM data—not very comprehensive database that working from—most critical aspect of understanding energy potential; Kim—using criteria from oil and gas, any consideration trying to retrofit old platforms to use for wind energy? Walt says looked at but does not seem to be feasible b/c not designed to carry high horizontal loads; more cost effective to build new foundation? What recommendations can he make for ways GCOOS can support? What are unique things an RA like GCOOS can provide? Walt says need more wind resource measurements closer to shore; assessment of hurricanes in a much deeper dive; understand the risk and costs of developing in GoM—need to reduce uncertainty; measurements on hurricane conditions—mesoscale models; model actual hurricane to look at microscale information; Jorge---data from ocean gliders—finer scale data to inform microscale modeling; Carl—going forward, how do we maximize coordination for maximum effect? Walt has list of data and info needs—but we need highest resolution physical models and certainly not yet coupled to biological systems—Carl knows gaps in maturity in our operational systems—how do we sort out data gaps we can resolve? On land, a lot of obs, offshore very sparse—rely more on models—if can't validate models, in the dark so need enough obs to validate; have capabilities to make models very good if we can get data to validate; data sharing is another area need to improve across Walt's community of partners; Carl plea—try to work with GCOOS and other RAs—our mandate is support all federal agencies working in federal space ...Walt will follow up with Carl to discuss how RAs might better support; June 1-2 workshop at Argon (?) in Chicago—extreme event—primarily

hurricanes—anyone from GCOOS interested in joining? Gerhard—wants to talk more with Walt—data sharing agreements formal and in development to ingest all the data—including LIDAR data—challenge—info among host of partners and enabling them to use IOOS existing pathways, mechanisms for sharing; we had to set up new processes to get money out to community—we do everyday and can help...data assembly centers, data housing etc—ways we can help across the entire process; bring folks together, leverage existing pathways, tools development...many ways to support; Walt and Gerhard will follow up; Walt will send presentation so we have on record.

GERHARD KUSKA: Supporting Communities and Partners in Offshore Wind Energy Development; challenges; Interagency—BOEM, NSF, NASA, EPA, MMC, Joint Chiefs of Staff, ONR, USACOE, USCG, USGS, US Dept of State; need to do better rolling out IOOS certification –gives credibility with external partners, what are some services RAs can provide to wind community? Storage, discoverability, accessibility, compliance, visualization; like blood in water for offshore wind in NE b/c smell money! Challenging to figure out where we belong; MARACOOS started with data storage—(not policy b/c want to remain policy neutral); want to provide data so they can make decisions; Offshore Development Alliance to deal with fisheries and wind—spun off the offshore science alliance; approached developers and said collecting data with moorings—gap filling in some cases—we’d like you to share—e.g., Shell agreed –drafted agreement and now data flowing; others, not so much; European developers not used to giving info away for free; Orstedt (Norway?) not willing to give away for free; every single site in organization has own leadership so have to convince each person in Orstedt with authority to share; challenging, at best; data collection and leveraging, QA/QC per federal stds, data sharing –two way, DM, data accessibility, decision tools, platforms of opportunity, community dialogue and more; some of the partners are willing to pay for services—we typically have lower cost and can be more flexible than others; need a menu/catalog of types of data, sensors, these data go into these products that these people use for these purposes...catalog to pick and choose where we plug in; Equinor/RPS one company working with; wind turbine effect on HFR issues—couple ways to solve; being written into NOAA or BOEM agreements (Brian Zelenski)—clauses being built into document that developer must mitigate negative impact on HFR measurements—no prescribed way to do; speed, pitch and yaw of turbine blade in real time can be provided to filter out turbine noise is one way; others say they will not provide b/c proprietary info==can work backwards to figure out what they’re doing; can deploy buoys to gather data; or can put out more radars; (issue outlined in Offshore Wind Terms and Conditions Operational Plan); currently 5 wind farms in NE, everyone else in construction phase; working on regional, standard way for RAs to share wind-related data—MARACOOS-currently has OTT proposal submitted to do this; regions can centralize in simple way so don’t have to duplicate efforts and deal with multiple standards; developers do not want 11 different discussions—they want one way to do it and simple way to access data! Challenges—NREL –need for wildlife data—who is collecting? Where will it go? Includes birds—ROPS interest in NE-2 RAs and 2 ROPs—in the end—MARACOOS was a stakeholder, not on steering committee—federal, state, NGO and offshore wind developers; not at the table and problematic; both BOEM and NREL gave initial grant and did not look to MARACOOS/IOOS for biological work; wanted second mechanism b/c needed to pass out money to subawards—exactly what RAs do! Need to get ahead of disconnect to head off and be in a position to provide support; Power purchasing agreements being written with developers to spend money in the state—need to be vigilant to talk with partners (e.g., Rutgers and Stony Brook) to make sure data sharing is agreed upon at front end of conversations; Stephan—other offshore industries like aqua culture—do they have similar issues for wildlife monitoring—sounds like efforts focused on offshore wind but is it coordinated for other industries?

Catalog being created of who doing what...biological, physical, metocean—NREL? Pat asked if Gerhard thinking about NCEI in all of this? NCEI brought together 3 former programs—archive but also other services; real time data not in NCEI mission; Carl—cradle to grave accessibility of information, products and services—need to be hand-in-hand but not always the case; IOOS glider assembly center—no cost effective archive so stripped down version of info which not maximizing utility; Kim—even within federal system, many different standards for metadata, data, etc; how can we make data from all federal partners accessible in one spot that otherwise would not make into federal places b/c people can't find or doesn't meet QA/QC—if of interest to federal partners, we can do; we need conversations with federal partners on more regular basis; we can: get data that is being collected, fill gaps, and find partnerships to collect data on someone else's dime; Nan—people are providing data for money—why do they want to come onboard with us when they can sell their own? Stephan—timing issue—does not have to be in real time for operations but still valuable in delayed mode; NOAA spending \$7M to buy Sairdron data; Gerhard says valuable but difficult to track who is using data to create value-added products;

GCOOS FLYER—What we Do: What Can We Do For You? (flyer—catalog/menu of products and services we can provide) Front/back—one side IOOS-wide benefit, one side RA-specific

Future of NGO vs TAMU Initial Discussion: Cost benefit b/c of TAMU overhead; pros and cons? Jan wants to review how we wish to conduct ourselves in future—next IOOS cycle; cost/benefit of TAMU vs NGO; Stephan—initial reason for NGO was for philanthropic opportunities; leaving TAMU—staff has good benefits—medical, retirement—have to add that as cost; MARACOOS is a hybrid—call Debra—painful process; took a lot of time, have to hire people, different cost structure; MARACOOS—have administrative services agreement with U. of DE; cost to go completely independent is a lot; when money comes in UDE provides grants management services, do risk assessment, payroll HR, legal fees, and pays very little—28% off campus rate and Gerhard gets 96% of that back; former MARACOOS board chair brokered the deal; they run the grants independently but money comes through MARACOOS; DM is contracted to RPS; IT security is included with them; Nan—have we talked with TAMU to negotiate IDC? Stephan—in the beginning, lots of talk about all the money that would flow through IOOS—never happened so not as much leverage to get university to agree to something now; Sara—takes a long time to think through all the details—compliance issues university covers, staff benefits, etc; take a lot of staff time to do leg work on this; Antonietta—does not have to be all or none—Galveston is branch campus; ways to do if run a different agreement with TAMU; A&M Research Foundation—private donations has a different rate process in place; talk with VPs office to see what willing to do; new leadership in office that values GCOOS if there are concerns; 20% of 50% IDC rate is paid for software used to run grants through; some for pre-and post-award contracts/grants people; IDC at TAMU is 52.5%; Gerhard says if have powerful representatives from congress—universities they care about—show support and would not look good if we left; politics can be potential supporter of what need to do; Kim—do Antonietta's first step—reach out to TAMU and talk about a better IDC before further discussion; Stephan—if board agrees, talk with TAMU, see if willing to negotiate, if so, negotiate; Action: Jorge, 1) alert Shari and dean and see if open to conversation; 2) prepare something for Board to review; 3) talk with Debra; Susan/Carl Action: looking into IPO ability to set a fixed rate for IDC in NOFO so that university has to accept; IOOS negotiated rate?

Jorge Directors Update: New projects: disaster supplement (~\$1.4M) , storm intensification research disaster supplement (~1.1M), Bipartisan infrastructure (1.069,000); Storm intensification data—fill gaps

in core data—glider work—18 missions; GERG, MML, USF, USM; also UGOS3 (CICESE, GERG, RU), MML (6 HAB), USF (4 HABs/hybrid), UTSA (1), CICESE (2 PMEX) data now to GTS), AOML Saildrone (2 eastern Gulf); New assets-HFR installed Galveston Bay, Sabine Lake; coming up soon FSU -Panama City, USM—spare to loan, LSU-PI Kevin Xu from Rep Garret Graves (\$5M for 6 radars); Glider-MMLS Slocum G3, SUM Slocum G3 and Oceanscout (2 H Supplemental funding), IFCB UA/DISL; international collaboration—gliders CICESE Seaglider data now flows GANDALF to Glider DAC to GTS; HFR OORCO Network of UABC/CIGOM is testing data transformation from LERA to HFRnet/CODAR reference system for interoperability; Biochemical—analyzing opportunities for CIGOM 6 yr biochemical database SGEO to ERDDAP—complimentary to MBON work; upcoming Ocean Tech Conf May 1-4 Houston; Oceans 2023 Gulf Coast Sept 25-28 Biloxi—GCOOS Ambassador of Offshore Wind local track, student sponsorship \$5,000 dinner with students on Sunday, 9/24 plus posters, IOOS A—booth with RAs—abstracts for OSW sessions: HFR interference, wildlife, townhall; ED needs: Challenges—TAMU project administration, new grants; needs-increase capacity on operations/technical—operations or technical director; GIS data tools (GIS product developer) Stephan—GoM insurance crisis, talk about coastal resiliency tied up with data, science and social issues—maybe something to do on a regional basis—NOAA has own economists and social scientists—any idea how to bring together what we do with these important stakeholder issues? Mark Ossler NOAA working on this—interagency group on coastal resilience—we need to articulate niche within this group about what we can do—what’s in water, where it’s going –work with them to support; how are decision matrices in communities being informed and in equitable way? IOOS core variables list should include more social science/engagement—do we need national MOU to do with Sea Grant and OCM more intentionally! Takes a lot of coordination.

Adjourn.

18 April 2023 - Open Board and Members Meeting at USM Campus

Meeting notes – Chris Simoniello

Kirsten & Jorge welcome

Board Election results: private sector open seat Dave reelected; academic Antonietta reelected; Government-2 seats-Kim Yates, Kirsten Larsen reelected; OE Joe, Sara, re-elected, Suraida Nanez James newly elected to board term will start at Fall meeting; (Action Chris: set up call with GCOOS OE board to touch base and bring Suraida on board).

Approve agenda for meeting: Joe moves to adopt, Kate second, all in favor.

Leila Hamden: Associate VP Research, Coastal Operations USM: welcome, friendship oak tree outside building; friendships made under that tree last a lifetime! USM coastal operations—goal today is to have USM continue being a partner with GCOOS and mission-pillars—understanding the oceans and coast; improving coastal resilience and supporting blue economy; small but mighty coast; Blue Economy Innovation District; USM Research Enterprise on the Coast—spans research USM, 6 research centers—Gulf Research Lab celebrating 75th anniversary this year; Gulf Blue Initiative—blue economic technology focus—Gulf Blue Navigator; strong federal partners at Stennis MS Gulf Coast—largest concentration of oceanographers in the world—history in defense offshore E, shipbuilding and observing systems; Roger F Wicker Center for Ocean Enterprise—focus on uncrewed maritime systems and blue technology

innovation; 5 startups in navigator program; ~20 private companies in Wicker Building, and partnerships with NOAA at GSI and Wicker Bldg; R/V Gilbert R. Mason—civil rights leader in MS—newest UNOLS vessel coming in 2024; Motto “Equal Access to the Sea”; focus Gulf, Caribbean and Atlantic;

Carl Gouldman: IPO Director: See notes for Carl from Monday closed board; priorities: Questions: Pat—interested in new modeling configurations for SE—will these be made available to the community—results will be openly available; building on COMT projects of past; call Derrick and Tracy in IPO to get answers to Pat’s modeling questions;

Kristen Yarincik, IOOS Association Executive Director: new initiatives offshore wind and marine carbon dioxide removal (mCDR)—NOPP proposal-UCAR-led, ARPA-E-SEA-CO2 industry day, Marine Life-Co-sponsoring NOPP forum; ongoing initiatives-NHABON, Coastal Climate Signal next steps, Reaching for the Clouds (RPS), Benefits of Ocean Observing Catalog (BOOC—Colgan/Middlebury Institute-lead to highlight success stories of ocean observations); Center for Blue Economy valuation study report now available online; challenges in FY2024 request: expect significant cuts in discretionary funding (to FY22 levels?); senate expect better than house but realistic levels for conferencing? What can we do—be prepared with concrete impact examples if cuts happen—make sure appropriations know what will be lost /consequences of decisions; IOOS Act up for reauthorization in 2025; HAB and Hypoxia research and control Act (HABHRCA) up for reauthorization; Weather Act re-authorization; Blue Carbon, NOAA Organic Act , other acts likely; question—leverage members to participate in congressional outreach to gain support for IOOS—share success stories;

Signing Ceremony: Jorge, Carl Recertification.

ACTION: Chris —follow up with participants and ask for photos to be shared-create folder where they can dump.

PANEL 1: Moderator: Sharon Mesick: Offshore Wind Renewable Energy:

Jim Kendall, BOEM Regional Director, New Orleans Office: previously 11 yrs in AK; already behind the curve for offshore wind energy; The Gulf is a Super Energy, multiple use basin; Mick Jagger—may not always get what you want but you get what you need; oil and gas—just over 2,000 leases in GoM, some old, some new—in March, issued 1.6M acres; a lot of activity over renewables but oil and gas not going away; by Sept 2023, LS 261 must be conducted; marine minerals program—Gulf coast a lot has to do with sand—access, evaluate, manage multiple use conflicts—pipeline exposure on beach, no sand, no coast no infrastructure; carbon sequestration bipartisan infrastructure law (BIL); in 2020 excitement on east coast for wind—task force meeting in 2021, a lot of conflict b/c near infrastructure of oil and gas infrastructure; leverage existing capabilities, hurricanes are major challenge; like oil & gas, 4 phases: planning & analysis, leasing phase, site assessment, construction & operations; looking at Galveston 1 area (~100K acres, Galveston 2, 97K acres, Lake Charles, ~102K acres; rationale—need about 100K acres for farm to be effective; proximity to shore; less than 10% moderate to high shrimping; reduced multiple conflicts (transportation, military fishing...); need metocean data/wind resources, geologic conditions, geotechnical surveys, hazard info, bio resources... some issues underwater noise, potential hydrodynamic impacts, electromagnetic fields produced by electrically charged objects; to address need social, economic, environmental, tribal and international components; need to accept that change and transitions are occurring now—ie., energy transition; need to map different activities tools, modeling, GIS, AI, static—dynamic spatial planning; cause and effect between activities and response; conventional

E, marine minerals, renewable E, carbon sequestration; fisheries, ecosystem services, transportation & shipping, recreation, defense/security; wind sail this year, expect steel in the water 5-6 yrs;

Gerhard Kuska, MARACOOS Ex Dir: Supporting Communities & Partners in Offshore Wind Energy Development; see notes from his talk yesterday; very time consuming to engage all the players and partners—needed people dedicated to do this;

Rafael Ramos, Woods Hole Grp, Regional Manager & Senior Oceanographer: Offshore Wind Renewable Energy and Data in the GoM; needs of data and downstream opportunities; what is the meaning of data? Offshore wind energy in the US—new industry compared to fisheries, 40MW under development—2 projects in operation, 2 under construction, 18 projects in permitting; significant country-wide potential—N. Atl (NY, NY, Connecticut, RI, MA); S. Atl (MD, VA, NC< SC), Pacific (CA, HI, OR), GoME, GoM, Lake Erie; Not the FL Atlantic or Gulf coasts shown on wind energy map—only US coast not included; general BOEM requirements—Permitting: BOEM,/BSEE, state waters, stakeholder requirements, operator requirements, certifying authority requirements; applicable ANSI/ACP Standards 2022 Edition—offshore compliance recommended practices, US floating wind systems recommended practices, US Offshore Wind Metocean Conditions Characterization (OCRP-3-202#), US recommended practices for geotechnical and geophysical investigations and design; recommended practices for submarine cables; need a clear strategy of data needed at different phases of wind development from planning to decommissioning; measured, modeled or combination? Real-time or forecast mode? Wind field properties—profile—Obs and metocean needs slide; offshore wind metocean conditions characterization (OCRP 3-202#)—numerical modelling data needs, different types of models, length of simulations (decades to months), etc...see Rafael slides; GCOOS support for OW development in the GoM—serve as a local public data repository (model and observational) and specialty studies (past and present); collaborate with operators to host & display non-confidential observational data from measuring programs; provide visualization platform for various data types including tracking of marine life (e.g., NERACOOS Mariners Dashboard); support/aid offshore measurement efforts (wind, wave, current, water quality, atm variables, etc.); provide/serve RT obs data for improvement of forecast models; liaise between OW operators and other industry stakeholders in the GoM (fisheries, O&G, shipping research centers...), provide measurements for accurate assessment of wind resources (PNNL Flidar Buoy), engage with OW operators to learn specific needs for the area).

DISCUSSION: Stephan—for offshore wind farms –will data sharing be at the same level as for other areas? Jim doesn't know; for wind that would be a worthwhile approach—think of like Stone Soup—better if everyone brings something to the table; Gerhard—developers have to mitigate impact of their work—can provide info on turbines, or collect additional data from moorings; going to have to share those data—still discussing pathways data will flow; Rafael—only proprietary data is LIDAR data—everything else for them is shareable—just a matter to organize where to host and informs them of process; Tony Knap-GERG—question about permitting—questions on East coast so far 5 turbines operating; 10 mile statute of state waters in TX—might that happen beforehand if want to go sooner than folks on east coast; Jim says nearshore is not BOEM; he can't speak to what TX might do; but he is aware of two areas offshore TX and one offshore Lafayette; Steve DiMarco—implied but not explicit is possible threat—workforce knowledgeable about what trying to do—change culture—data sharing—educate work force is a real need; Ocean Workforce Leadership OWLS training –must have work force leadership development to support wind energy; Jim—bottom line, if look at federal registry notice, it says a company could be eligible a certain monetary credit for investing in work force development; 50

yrs of offshore experience can benefit—welding, shipboard obs, ocean obs—training field—drastic drop in number of people graduating in offshore energy development—need to repurpose and train for this field; Sharon invited Carl to respond—Carl loves idea, need all hands on desk for science, tech, trades to support this enterprise; working with NSF how to build more repeatable process for training; job placement workshop, build experiential learning ops at all ages; MTS will help work on some of these NSF and NOAA efforts to discuss—ID industry requirements & government needs; need experts at data assimilation, modeling, coding; Jim—how to get parents to support these jobs—kids AND parents need to outreach efforts—e.g., at PTA; Rafael—already experiencing shortage of qualified people in this industry; a lot of service companies are losing people to other industries—no pool of talent to fill vacancies; need to focus on new generation of oceanographers and engineers; Gerhard—plug for social sciences—understand what impacts are to community, bridge gaps in conflicts—struggle to find -people who can communicate and understand science; Philip Hoffman NOAA OE—data piece—massive growth in uncrewed systems platform—challenge—standards for individual instruments and data types—have for bathymetric data—IHO standard—not similar set of international standards for CTD data, or ADCP data, subsurface mineral activities-; WHOSE job is it to set international standards on uncrewed systems to know if data any good? (submit more abstracts to MTS in Biloxi); Rafael says he’s been asking that question for a long time—organization QARTOD—some standards but don’t cover all cases—just general guidance; he does not see any effort at any other level to do this work; for industry standards—a lot of variability in the way things done; have recently come to more uniform way to do things but problem remains—somebody needs to address; Jim—AOOS Shell drilled single hole in Chukchi Sea—millions of dollars to collect data; Shell pulled out and AOOS QA/QC to serve; Code—submitted an abstract of exactly this subject—need for standards across uncrewed systems—will get manufacturers, DMAC people in same room to discuss; Jim—biological scientist—appreciate value of indigenous knowledge—build tribal relations; ID what do you know that we can’ measure; Gerhard: challenges responding for calls to DEIA—don’t have the people or trained staff to engage and build relationships;

Member Presentations by Dr. Xinping Hu-OA, Brian Dzwonkowski, Lucy Flores (TX Beach Watch), Brent Koza (TGLO), Chunyan Li, Marcus Ogle and Sergio Jaramillo (Shell) and Laura Bowie (GOMA).

Brief update by Kerri Whilden, Fugro.

PANEL 2: UGOS: Moderator Rafael Ramos

Michael Feldman, Sr Program Manager, GRP: UGOS History and Goals: 2016 GRP Advisory Board, 2018 consensus study; established a standing committee, 3 rounds of funded projects—GulfCores (Steve DiMarco); GODEEP (Amy Bower WHOI), Eric Chassignet FSU); 3 individual consortia funded for over \$22M over next 5 yrs. Building on UGS 1 and 2 investment of \$12M across 15 projects; initiated a reorganization as a single UGOS Program...should have done this from the start! (NOTE: MBON having same challenge—should have done this from start—what can we learn from UGOS?); now have 6 working groups—stakeholder engagement (Tony) transition to ops (steve d) obs to support ocean prediction, applications, DM, model tools to improve prediction (see Michael’s slide; membership: executive committee—Jan and Felimon on this); this is last round of funding to UGOS, so what’s next?

Dr. Tony Knap, GERG: Working Group 1: Stakeholder Engagement (to coordinate UGOS to interact with industry and gov agency stakeholders and end-users to build connections and define services and products; with GulfCores—list of interested people—O&G, SAR, shipping, ER, wind energy, fisheries, NGO, short on regulatory folks...; do better with where/when eddies spin off LC b/c cause problems;

Dr. Scott Glenn, Rutgers University: Today (April 18 is his birthday and his daughter's and also Jill); Growing Government Stakeholder Engagement—mission to build connections and define services and products that are sustainable and meaningful; hurricane forecasting suite—what does present system look like? NOAA RTOFS 2.0—now run by NOAA; next year getting HAFS operational in 2023—hurricane forecasting; operational regional ocean forecast—readiness level 5 is almost ready for operational—East Coast Community Ocean Forecast System (ECOFS); West Coast Operational Forecast System (WCOFS); surface velocity model metrics-focus on essential ocean features (LC and LCEs); working with industry on metrics that matter—cut off current speeds-e.g., 2.2 knots no go; big data gaps between Yucatan and FL—Mexico, Cuba gaps, IOCARIBE—bridge CARICOOS and GCOOS—two UN decade program, co-design programs, have to help small island capacity in these regions; GoM one of best places to validate OSSEs, biggest data gap—northern tip S. Am to Mexico, Cuba, into GoM; how do we fill? Gliders and HFR; glider collaborations—Mexican gliders to the GTS; HFR Collaborations—Yucatan—UGOS1 across Yucatan; one of highest QA controlled data sets in the world—harmonization of HFR data; under-sampled Caribbean is affecting us in the GoM;

Dr. Steve DiMarco, GERG Steve says game-changing win from UGOS—life before the Yucatan HFR in place vs after! MASTR is a centralizing and integrating effort; MASTR integrates all UGOS working groups; 6 working groups-lessons learned, best practices are critical inputs to GrASE; GrASE (thru MASTR) mini-adaptive sampling test run—plan simultaneous deployment of multiple and varied obs platforms-technical and logistical challenges; glider, float drifter deployments Yucatan Channel, SE GoM; end-to-end demo collection to dissemination; MASTR serves 3 vital functions-maximize success of UGOS-reduce risk of equipment loss; provide “hot run time” dataset for simulation setup and implementation; and common data set for use by all consortia for analysis, model comparison and obs intercomparisons; Target: GoM Inflow region: obs from gliders, floats, drifters, HFR, background obs from Argo/CPIES/ROCI as available; numerical model coordination, use of NRL GHOST procedures; adjust timeline-Sept to Oct 2023o—coordinate with obs assets of multiple government agencies during 2023 hurricane season; target region—SE GoM and Yucatan to SW Cuba/NE Mexico/tip of Campeche—Cubans, Mexicans and US—a lot of paperwork! See Steve slide for MASTR timeline 2022-2024; 2024 GrASE (Great Assessment Sampling Experiment?) project implemented;

DISCUSSION: what can UGOS do for you? What are stakeholder connections that we can co-develop with GCOOS; what new or enhanced services and products can GCOOS & GCOS co-design and co-implement? What immediate next steps should we prioritize for collaboration? Carl—to the HFR video Scott showed—what does it mean? The HFR data was not assimilated into any of the model—simply validation for the models—shows something else going on in the area—if only look at model==you miss what's going on—shifting patterns along coast-models hugging coast entire time and not capturing steering features; “Bob W-Yucatan attached—pushed away from coast; when detached—flow back to coast) LC and eddies not captured accurately by models alone; Tom W any plan to engage more people to get more assets and is there a temporal approach to deploy all at once or over time? How do you get Cuban cooperation to work in EEZ when working on hurricanes in US; Tony says have connections and support from State Dept—HFR on Cabo de San Antonio—great HFR coverage DOC gave license, Cuba wanted; one of the Universities is stopping the work; for MASTR, idea is to test logistics—working across international boundaries; Room for people in room to participate in GrASE and MASTR—let Steve know; Tony Knap, “1 Gulf, 2 technologies, 3 countries, for the people”; Sergio-any hurricane prediction is good for him! Caribbean data—huge gap, all upstream very important—meandering of Caribbean current,

eddies—what plans are there to fill these gaps? United Nations Ocean Decade (IOCARIBE) needs to fill this—CARICOOS and GCOOS—hard place to operate-tropical Atlantic and Caribbean team supported by UN; tropical cyclone exemplar co-design there; try getting more gliders and floats in those areas; gliders—show 5 kn coming into Caribbean—can the gliders hold station in this? Will be advected downstream—use glider to go across, then current motion to advent glider; use Columbus countercurrent to come back from Cuban waters; subsurface currents in the models—Tony showed stuff we do not see at surface—submerged eddies 300-600 m with no expression at surface and other bottom currents—most models show currents ~ uniforms; almost anything going on in middle gets rectified by model; surface of models—easier—gets more complicated as go deeper—need velocity—subsurface 3D velocity field is needed; models don't even have some of right water masses as leave Yucatan; Rafael said looking at this with ADCP—vertical structure of eddies in GoM and try to classify to see if/how grow; Tony-stakeholder engagement—energy companies—how do we get to other sectors—regulatory and environmental—Jim Kendall—keep inviting to meetings and come visit! Biologists and chemists—how to reach out to them—Jim says persistence! Tell people what value you bring to them and what value they bring to you; stakeholder interest—would this presentation do well at other venues? Jim—nontraditional stakeholders—would have to be describing things in terms they understand; what is the LC, what are eddies, why do we care what's going on off the coast of Cuba; listening to others takes time—months to get buy-in with persistent engagement; Dick—engaged with UN Decade-has this presentation been given to them? Scott says pieces of this talk have been shared with UN but not all; maybe to Synop program? They do all the OSSEs—looking for regional experts to evaluate global ensemble of models; are there other groups besides UN Decade? Pat-what model metrics are being used after experiments to assess success of experiments? How will you assess model requirements from this? Pat proposes doing model runs in these areas with and without GrASE data as baseline; no one size fits all for engagement; Jan-stakeholder connections co-developed by GCOOS and UGOS—last year GCOOS partnered with CIGOM—interesting to learn how successful those webinars were—slots in GCOOS programming in future—should GCOOS do series of UGOS webinars—keep fresh; Rafael—do we see any groups that we can reach through GCOOS that will benefit from UGOS? UGOS team needs to outline what the information they are providing will support—link the information to applications to ID people /communities that would then benefit;

E.g., by having this information, we can improve this forecast that benefits this community—drill down to examples of how info can be applied for a particular purpose to a particular audience; 4 yrs to get something going; NAS funding will go away so we need to reach out—sargassum, fisheries, energy industry...LC powerful—need to find a way to engage people while have funding to make sure info gets used; joint industry product needed?

STEPHAN HOWDEN: Uncrewed Surface Vehicle for Autonomous Hypoxia Monitoring: Project Update; see slides; ITAR complication—international traffic in arms—depends on mode surface vehicle in whether in compliance or not; need to resolve; Robert Moorehead—ITAR is there a size limit on the vessel where you run into issue? Stephan has not seen language that addresses size limits; need a technology control plan; Andy—export control issue, not operational issue; did it prohibit ability to do work unattended? Plan was to use grad students who are foreign nationals that's where problem is; Sharon—is this a cost-effective way to collect data—who would operate this inside government—who in NOAA would take this on? Stephan has numbers on cost and ROI; better idea after project complete—analysis of whether will save money depends on approach gov takes—private company run them?

AOML buy a fleet of these? Force multiplier for bathymetry? If multiple uses within gov, then cost effectiveness is there; estimate of ops cost/day (not including data analysis) is ~\$3k/day. Cf R/V Pelican or Point Sur—more expensive but can do more from ship; if don't need full suite water analysis, good alternative; Andy—says rec was for four cruises /yr for oxygen measurements so this is an alternative to that;

Panel 3: Uncrewed Systems Opportunities in the GoM: Bill Lingsch Moderator.

Dr. Dick Crout, Uncrewed Systems and the Naval Research Laboratory; 7300 Ocean Sciences Division; UxS platforms—image flying seaglider (NRL building) 100-200 km out from catapult and becomes glider; glider with bioluminescence (BL) sensor (Bglider); bathyphotometer or UBAT –potential value in access denied areas); can do some station keeping; equates what going through now with uncrewed systems to what experienced with satellite altimetry in 1980-1990's to extrapolate info across vast areas that lacked information (SSH into models); assimilation of uncrewed data 200-1000m depth range; assimilated data into HYCOM; gliders not very efficient at measuring mesoscale circulation for daily assimilation; data are averaged 20-50 km scales therefore each glider contributes ~1CTD profile/day; satellite altimeter data !1000 per day, overwhelming glider measurements; gliders better for local battlespace time variability; multiple gliders resolve spatial scales; smart glider teams for rapid update of local analysis; Bill—collaboration—GHOST collaboration very successful;

Dexter Malley: Division Chief UMS Division; NOAA Uncrewed Systems 101; uncrewed underwater systems based in Gulfport; uncrewed aerial systems based in Lakeland, FL; UxS view of NOAA line offices and missions: NOS, OMAO, NESDIS, NMFS, plus two more; USV teams for nautical charting and marine commerce; national goal to complete mapping of the 3.4 million sq miles US EEZ by 2040; use for ship-based pelagic fish population surveys; measure ocean ecosystem parameters to improve fisheries management; MM management—survey whale, seals turtle populations in Pacific Isl aerially and with passive acoustics; whale and seal health and condition;

Andy Ziegweid: Ocean Aero; VP Ocean Data Triton AUSV sailing, station keeping, diving; ~800 lbs, 14 ft long; FGBNMS expansion initiative, mesophotic reef so need info deeper than divers go; equipped with multi aperture side-scan sonar or multibeam with SVP; true color Lidar and multispectral fluorescence (TCLMF) imager; sonardyne down, Nortek up—mobile ocean wave observations and forecasts—directional waves, with current profiling for O&G; trials with HESS for hurricane visual inspections;

Bob Currier: Data science knows no boundaries! GANDALF Global AUV...Data Fusing (name changed make sure use correct one!); STS support the science; upcoming UCS and floats—Sea Explorer, Seatrac SP-48, OceaAero's Triton, Seatrec infinite float; need to standardize IOOS-compliant netCDF with vendors so they do the heavy lifting; topic of upcoming conference session to discuss with vendors, NOAA, RAs and operators;

DISCUSSION: Brent Koza, TGLO—technology to get out and survey after hurricanes, where oil is—have considered this project in nearshore? TX aging infrastructure—Andy-yes—vehicle is readily maintained can be stationed anywhere on coast, can launch from boat ramp; good in bays and harbors—in nearshore as long as not too shallow; many ops are line of site; Jorge-data assimilation-issue of data assimilation does it also affect the work we do at IOOS and bring into the DAC? Dick-did not expect to have to look at data and be able to parse it out—how do you combine all these data? Need a group with ideas to discuss; get internal waves in system, if get four profiles/day, don't see internal waves; Carl-

Bob—love suggestion that we should be clearer about standards and ask for it—he can ask for from office; to Andy—how do we do that without making private sector mad? Andy—ongoing saga throughout career-add metadata to a dumb sensor...data format is often critical—first thing is having widely accepted standards—NOAA, Navy—what is net CDF requirement-starting point for them to implement; once we have standards, manufacturers can deal with; Bob—agrees—iterative and collaborative process with manufacturers, DMAC team, RAs, etc—get agreement on compliant netCDF; tech surge idea is good—all busy—when vendors see that some produce compliant files, they will get orders and others will scramble to catch up; Jen Bowers NCEI—NOAA working with Navy driving standards AVSI Cathy Evans working on this very initiative; Sharon CENOTE act of 2018-NOAA working with Navy—data exchange standards—find on NOAA website in future, prototypical XML—a lot of socialization going on for metadata; who moves data through hard drive vs cloud—different-need non-proprietary standard that can be used by someone; many need same data in different formats so info must be exchangeable to different users; need to make sure closing loop on all data types for highest resolution; Bill—co-regulations—challenges that might be coming up with all different types of systems going in water-what role can GCOOS play in conversations—diverse board with unique perspectives—should RAs be involved in FAA-like discussions about water side of this? Dexter—NOAA WG trying to put policy together for UxS; draft version submitted to NOAA line offices, coast guard, international operators—how they're functioning with their regulations—getting tight to operate some uncrewed systems; don't want something bad to happen where USCG clamps down like FAA; once a good draft in place, would like industry and IOOS partners to review before going forward; Andy—regulations really don't exist here, take away from another conference—US is like wild west; operating under best practices but now coming out of other working groups—first step is to classify types of assets—what's a vehicle, vessel or drone? Under 24', not a vessel, are you carrying diesel? Who is at fault when something happens? Operator? RAs can standardize CONOPS—standardized mission plans for operators; get everyone on same page; go to place for operators, where are EEZ boundaries, changes in rules across state boundaries, POCs for various questions, overall support for operations; Dexter-different coast guard districts have their own interpretations;

JORGE: ED UPDATE see Jorge slides: new GCOOS voting members and new GCOOS individual members; Action: add these new members to the GCOOS website; ORION IFCB Tool—<http://orion.gcoos.org>; Python IFCB toolkit; HABscope V2—trained 3 taxa: *K. brevis*; *P. bahamense* and *A. monilatum*;

Adjourn.

19 April 2023 - Closed Board Meeting

Meeting notes – Stephan Howden, Board Secretary

Feedback on yesterday.

Jorge - for me the meeting was a success, working with the GCOOS team etc. Exciting to see response from friends and members. All of the good conversations and shared insights.

Jan - thought better meeting. Really good presenters. Liked the quick lightning talks.

Joe - nice to see the members.

Carl - SECOORA has started PI lightning talks at a restaurant over drinks.

Bill - like lightning talks.

Gerhard - Using the SECOORA lightning talk model for the next board meeting.

Carl was asked about how he thought it went compared to other RA meetings. The Maritime Alliance builds in 45 min networking breaks.

Gerhard - good to see how other RA's do their meetings. Could look at agendas for other RAs and see how they run things. Looking for ways to lure new partners and get them interested.

Bill - thinks we could cold have gotten on WLOX (local news outlet).

Ideas shared about ice breaker before or evening after open meetings to continue conversations. Gerhard mentioned that they have a sponsored evening that works well.

Kim - one person asked her what does the BOD do? Maybe add a statement at the beginning of the open meeting what the BOD do. Noticed that about 20% people left by the time Jorge gave his presentation and maybe it should be at the beginning. How do we sell adding observing assets in EEZ helps them as well as us.

Jorge - NOAA has MOU with Cuba for meteorology and some other scientific issues including hydrographic data/surveys.

Alyssa - afternoon panels had zero diversity. Think about diversity in all aspects of meetings, etc.

Jan - felt like we were preaching to the choir a bit yesterday. HSRP always has a stakeholder.

Kim mentioned a conversation with someone who works on dredging who looks at forecasts every day and didn't know that GCOOS exists or what it does.

Water level sensors that SECOORA uses \$5k. ASVPA.

Action Items

- Reform DEIA committee need some men.
- Think about diversity in meetings.

Adjourn.