
**2017 Annual Gulf Coast Ecosystem Restoration Council
Report**

Texas RESTORE Centers of Excellence

(October 01, 2016 - September 30, 2017)

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I. Executive Summary

In January 2015, Texas Commission on Environmental Quality (TCEQ) competitively selected two consortia, the Texas A&M University Corpus Christi - Texas OneGulf Consortium and University of Houston (UofH) - Subsea Systems Institute.

The mission of the Texas OneGulf Center of Excellence is to gather and improve knowledge about the Gulf of Mexico to inform decision making around the challenges to environmental and economic sustainability of the Gulf of Mexico and its impact on the health and well-being of Texans and the nation. Texas OneGulf is designed with the capacity and flexibility to address all five focus disciplines denoted in Section 1605 of RESTORE. This Center has been awarded funding and has begun or completed activities on five projects. Highlights include: Completed and released first official Texas OneGulf Strategic Research and Action Plan (SRAP) project; Organized and convened Disaster Research Response (DR2) Workshop; Completed the sharing of and began use of templates and research protocols with multiple institutions; Completed 3-year plan to integrating Texas OneGulf DR2 program with other state and national DR2 programs to develop and advance initiatives identified; Completed the second round of glider missions; Three underserved datasets have been identified for Texas Knowledge Base project; Released Request for Proposal (RFP) to implement competitive grant program.

Subsea Systems Institute (SSI) is a collaborative endeavor focus on the translational engineering, validation science and appropriate policy towards maintaining the technological, economic and workforce leadership of the Gulf coast area in the realm of deepwater and ultra-deepwater hydrocarbon use. The SSI is addressing offshore energy development, including research and technology to improve the sustainable and safe development of energy resources in the Gulf of Mexico as its focus on one of the disciplines denoted in Section 1605 of RESTORE. This Center has been awarded funding and has begun or completed activities on seven projects. Highlights include: Commenced with the testing of thin-film Li ion batteries and thin-film supercapacitors; Commenced with the construction of the high-pressure apparatus for capacitor-battery testing at 5,000 psi; Developed physics based annular models; Completed the presentation of results to the SSI Technical Advisory Committee and prepared final report for the Marine Drilling Hazard Mitigation and Production Facility Monitoring using Seismic and Sonar Imaging project; Completed industry workshop and prototype Autonomous Underwater Vehicles (AUV) design modifications; Progress on a Finite Element Model of an Annular; Launched new project with the designing of sensor and gateway nodes for subsea environment communication.

II. Programmatic Elements

A. Award Recipient

As the Texas Governor's appointee to the RESTORE Council, Commissioner Toby Baker of the TCEQ has established Centers of Excellence in Texas in accordance with the requirements set forth in the RESTORE Act and U.S. Treasury regulations. TCEQ, on behalf of Commissioner Baker and the Governor, received

an award from Treasury on June 9, 2015 for \$4,036,238 that addresses all five disciplines denoted in Section 1605 of RESTORE (1605).

Annual TCEQ accomplishments include:

- completed subawarding process for three Proposal of Grant Activities to the Centers;
- monitored and reviewed deliverables of Centers;
- responded to inquiries from Centers;
- reviewed invoices and processed eligible expenditure reimbursements request; and
- generated and submitted required federal reporting,
- held End-of-Year meetings with Centers to discuss detail review of each project's progress,
- held meetings with Centers and Commissioner Baker for project overview of accomplishments and partner's involvement within projects.

B. Award Subrecipient(s)

Projects - Texas OneGulf Consortium

The nine participants in the Texas OneGulf Consortium include:

- Texas A&M University Harte Research Institute for Gulf of Mexico;
- Texas A&M University at Galveston;
- University of Houston Law Center;
- Texas A&M University Center for Translational Environmental Health Research (CTEHR);
- Gulf of Mexico Coastal Ocean Observing Regional Association (GCOOS);
- University of Texas Medical Branch at Galveston (UTMB);
- Texas A&M University Geochemical and Environmental Research Group (GERG);
- University of Texas Brownsville (Rio Grande Valley); and
- Texas State University the Meadows Center for Water and the Environment.

1-57790 General Operations of Center of Excellence project, principals Dr. Larry McKinney (Harte) and Dr. Jennifer Horney replaced by Dr. Cheryl Walker (CTEHR), awarded 10/19/15, Scope of Work – This project established a fully functional Center of Excellence (COE). Project addresses all five eligible disciplines denoted in 1605. Status of performance and annual accomplishments include:

- Established a fully functioning COE which includes adopting bylaws, operating agreements, annual Conflict of Interest statements, establish Texas OneGulf Science Advisory Committee, and enhance/update website (<http://www.texasonegulf.org/>); and

- Met the reporting requirements of the COE and continues to oversee the day-to-day operations and administration of the COE.
- Developed and implement a competitive grant program which includes:
 - Designing and initiating a grant portal function with webforms is 90% completed.
 - Completed establishment of grant administration and management system with Texas A&M University Sponsored Research Services.
 - Completed establishment of grant review system within the Texas OneGulf Management Team and Science Advisory Committee.
 - Completed first Request for Proposal (RFP) which resulted in approved projects. The proposal requested proposals for a Stakeholder Communication and Engagement Plan (http://www.texasonegulf.org/sites/default/files/onegulf_rfpcommunicationengagement_plan_final.pdf)
- Next step is to submit resulting RFP projects TCEQ for subawarding process within the Proposal of Grant Activities (PGA) guidelines

2-61593 Strategic Research and Action Plan project, principal Dr. Larry McKinney (Harte), awarded 01/07/2016, Scope of Work – This project is to develop a strategic planning process to address priority Gulf problems that would guide a grant process that fosters a science-based and solutions driven framework addressing the disciplines designated in the RESTORE Act. The project addresses all five 1605 eligible disciplines. Status of performance and annual accomplishments include:

- Completed the preparation of the 2017 Strategic Research and Action Plan (SRAP) through input gathering from Texas stakeholders by way of meetings and workshops.
- Posted the SRAP on the Texas OneGulf website (www.texasonegulf.org/).
- Completed SRAP under budget thus releasing about \$100,263 for next RFP. Savings were gained through efficiencies with stakeholder meetings and use of technology.
- Future SRAPs will come from an annual cycle of input and review to help ensure that the SRAP evolves with Texas OneGulf as a means of guiding future work plans and focus.

3-62428 Environmental, Human Health and Safety project, principals Dr. Larry McKinney (Harte) and Dr. Jennifer Horney replaced Dr. Cheryl Walker (CTEHR), awarded 02/25/2016, Scope of Work – This project will create for the first time an infrastructure to support disaster research response encompassing both environmental, human health and economic assessment capabilities that can be employed rapidly to assess the impact of disaster along the Texas Gulf coast in real-time. The project addresses the 1605 eligible discipline coastal and deltaic sustainability, restoration and protection, including solutions and technology that allow citizens to live in a safe and sustainable manner in a coastal delta in the Gulf Coast Region. Status of performance and annual accomplishments include:

- Completed organization and convened Disaster Research Repose (DR2) workshop to gather input and advise from stakeholders
- Created a disaster response and mitigation system by completing the sharing of and began the use of a series of templates and research protocols utilized by multiple institutions
- Engaged Texas OneGulf Network of Experts to provide support for the Texas DR2 program
- Completed 3-year plan to integrate Texas OneGulf DR2 program with other states and national DR2 programs

4-62971 Mechanisms Controlling Hypoxia – Glider Applications to Gulf of Mexico Hypoxic Zone Monitoring project, principals are Dr. Larry McKinney (Harte) and Dr. Anthony Knap (GERG), awarded 04/22/2016, Scope of Work – This project will gather and share unique data about hypoxia off the Texas coast to assist in the development of a scalable glider monitoring implementation plan for the Gulf of Mexico hypoxic zone. The project addresses the 1605 eligible discipline comprehensive observation, monitoring, and mapping of the Gulf of Mexico. Status of performance and annual accomplishments include

- Completed second round of glider missions in Phase II of environmental data collection from the coastal zone of Texas using Slocum ocean buoyancy gliders. A total of 46 days of glider data was collected.
- Disseminated all real-time data online and free of charge via the Gulf of Mexico Coastal Ocean Observing System (GCOOS) website: <http://www.gcoos.org> using the GANDALF glider data visualizer <http://gcoos2.tamu.edu/gandalf/>.
- Populated delayed-mode glider data collected as part of this project on website <http://tabs.gerg.tamu.edu/tceq>. Placed four files associated with missions 20, 21, 22, and 27.
- Requested an amendment to the final deliverable changing the due date from 08/31/2017 to 05/31/2018 due to unexpected volume of data received during glider missions.
- Next step is completing the map of hypoxic area and volume using data collected from all missions and generating the glider monitoring implementation plan for the DR2 program and place the remainder delayed-mode glider data on website for missions 25, 26, and 29.

6-70739 Texas Knowledge Base project, principals Dr. Larry McKinney (Harte), Dr. James Gibeaut (Harte), and Dr. Matthew Howard (TAMU), awarded 01/18/2017, Scope of Work – This project will establish the Gulf of Mexico Coastal Ocean Observing System Regional Association's (GCOOS-RA) and Gulf of Mexico Research Initiative Information & Data Cooperative (GRIIDC) programs as part of the Texas OneGulf Knowledge Base (TOKB) information system. This system will provide decision-makers with the best available science and real-time data and information on which to make such decisions and act to the benefit of

Texas. TOKB will bring together extensive, complementary and well-maintained online information systems for marine science, oceanographic and related data currently available from the Gulf of Mexico.

The project addresses all five 1605 eligible disciplines. Status of performance and annual accomplishments include:

- Completed outline and started to prepare for feedback and input from end-user communities
- Identified three underserved datasets that are being prepared to be served through a prototype system
- Next step is to develop a strategic plan to integrate the data from GCOOS and GRIIDC for accessibility 24/7 that is available to researchers and public along with implement priority action items from the strategic plan based on funding availability.

Projects - Subsea Systems Institute

The Subsea Systems Institute is a collaboration between the University of Houston, Rice University, and National Aeronautics and Space Administration (NASA)/Johnson Space Center. The Subsea Systems Institute (SSI) is located on the University of Houston campus in Houston, TX. Currently the center is staffed by a Director and a Program Manager.

Dr. Ramanan Krishnamoorti, serves as Director of SSI and Center of Excellence Principle Investigator (PI). He provides day-to-day leadership for the institute including external relations with industry and government institutions. Airica Rollins is the recently appointed Program Manager with responsibility for the administration of the research projects. Charles McConnell (Rice) and Dr. Kamlesh Lulla (NASA-JSC) are the Co-PIs and provide institutional support to the Director.

All projects address the eligible discipline denoted in Section 1605 of RESTORE as offshore energy development, including research and technology to improve the sustainable and safe development of energy resources in the Gulf of Mexico.

1-57794 General Operations of the Center of Excellence, principal is Dr. Ramanan Krishnamoorti (UofH) and took over the Director's duties from William Maddock, awarded 10/05/15, Scope of Work – This project tasks are to establish a fully functional Center of Excellence (COE). Status of performance and annual accomplishments include:

- Completed the Request for Proposal (RFP) process for the second round of projects
- Two projects were awarded and began their mobilization
- Completed amendment to project to increase funding through December 2017

- Continued ongoing monitoring of existing projects and reporting requirements

2-62404 Remote High Power for Subsea Emergencies project, principals are Dr. Ramanan Krishnamoorti (UofH), Dr. James Tour (Rice), and Dr. Haleh Ardebili (UofH), awarded 05/03/2016, Scope of Work – This project will directly address one of the critical failures that occurred during the Deepwater Horizon disaster by designing nanoporous NiF₂ (NP-NF)-based supercapacitors to reliably provide power to a blind shear ram. The project is to develop a combination of two new technologies using batteries and high-power supercapacitors for subsea applications including the control pod for a subsea blowout preventer. Status of performance and annual accomplishments include:

- Completed the design and fabrication of high power, high voltage nanoporous nickel fluoride (NP-NF) thin-film supercapacitors.
- Completed the design and fabricate high capacity, thin-film Li ion batteries.
- Completed enhancing the charge-discharge performance and the battery life to handle high cycles number.
- Commenced with the construction of the high-pressure apparatus for capacitor-battery testing at 5,000 psi for testing under subsea environment.
- The next step is the integrated testing of nanoporous thin-film supercapacitors with thin- film Li ion batteries and include tests under subsea environmental pressure conditions.

3-62406 A Model-Based Real-Time Annular Blowout Preventer (BOP) Monitoring System project, principals are Dr. Ramanan Krishnamoorti (UofH), Dr. Matthew Francheck (UofH), and Matthew Brake (Rice), awarded 05/03/2016, Scope of Work – This project will develop a rigorous analytical approach to systematic BOP monitoring using an adaptive model-based real-time strategy, and then to validate/demonstrate the approach on a small-scale BOP annular health monitoring testbed. The program will focus on real time health and risk assessment (monitoring) of annular BOPs. A blowout preventer is a large specialized mechanical device used to seal, control, and monitor oil and gas wells to prevent the uncontrolled release (blowout) of crude oil and/or natural gas from a well. This project will produce a BOP Monitoring System capable of self-integration whereby it learns the specific BOP thereby enabling accurate estimations of BOP health. Status of performance and annual accomplishments include:

- Completed the development of reduced order physics based model for fluid power transmission lines
- Completed the development of reduced order physics based model for annular BOP fluid power circuit
- Completed the development of 3-D finite element model of an annular elastomer in the BOP

- The next step is completing Task 1 Milestones Develop 3-D dynamic meshing model of the annular model and extract a low dimension model of the annular elastomer in the BOP along with Task 2 Information Synthesis and Experimental Validation. Process requested amendment to extend the final deliverable from 08/25/2017 to 12/31/2017

4-62408 Marine Drilling Hazard Mitigation and Production Facility Monitoring using Seismic and Sonar Imaging project, principals are Dr. Ramanan Krishnamoorti (UofH) and Dr. Robert Stewart (UofH), awarded 05/03/2016, Scope of Work – This project will develop a proof-of-concept monitoring system for the early detection and assessment of drilling or production problems. It will inform about the design and capability of a full field system which will contribute substantially toward the safety and efficacy of deep-water operations. The tasks for this project were to host an industry workshop and investigate the application of seismic instrumentation for monitoring of the integrity of drilling and production system using Distributed Acoustic Systems (DAS), Sonar, and Ocean-bottom seismometers (OBS). Status of performance and annual accomplishments include:

- Completed hosting industry workshop
- Completed report of the laboratory results
- Completed final report
- Presented preliminary results to Subsea Systems Institute’s Technical Advisory Board in January 2017
- The next step to this project is being completed under 7-74785 Hazard Mitigation and Facility Monitoring Program: Fiber-Optic Seismic Systems

5-62412 Autonomous Underwater Vehicles (AUV) for Subsea Energy Applications project, principals are Dr. Ramanan Krishnamoorti (UofH) and Dr. Fathi Ghorbel (Rice), awarded 06/08/2016, Scope of Work – Develop an AUV prototype that will be highly maneuverable in tight spaces, can hold station vertically, can perform docking, and will be capable of autonomous manipulation. The final goal of the project is to establish a sound and comprehensive program in autonomous AUVs for subsea energy applications with engagement and endorsement of major operators. This project is broken into two programs. Program 1 is to organize a workshop to engage industry in over-viewing the state of the art of AUV technology and build a collaborative relationship with operators in subsea energy applications to define the new challenges of subsea AUVs. Program 2 is to build an updated, more functional and more robust version of the Rice University RiSYS Lab swimming robot prototype and for it to be tested at NASA’s Neutral Buoyancy Lab. Status of performance and annual accomplishments include:

- Completed coordination and conducting industry workshop
- Completed updating prototype construction in the RiSYS lab
- Amended final due date deliverable from 04/28/2017 to 10/31/2017 due to delay of lower tier subaward milestones.

- The next step is testing updated prototype in at NASA's Neutral Buoyance Laboratory

6-74270 Stress Wave Assisted Communications in Subsea Environments project, principals are Dr. Ramanan Krishnamoorti (UofH), Dr. Miao Pan (UofH), Dr. Robert Stewart (UofH), Dr. Jiefu Chen (UofH), and Dr. Aijun Song (University of Alabama), awarded 06/30/2017, Scope of Work – Develop a novel stress waved based communication method for subsea applications. This method of communication will bypass most drawbacks of conventional communication techniques (i.e. radio, optical, and acoustic) and allow artificial structures such as pipelines to be used as robust, low loss communication conduits. Status of performance and annual accomplishments include:

- Launched designing sensor and gateway nodes task which is about a third of the way completed.
- The next step will be to integrate the stress wave and acoustic communications and develop the protocol stack for stress wave communication.

7-74785 Hazard Mitigation and Facility Monitoring Program: Fiber-Optic Seismic Systems project, principals are Dr. Ramanan Krishnamoorti (UofH), Dr. Robert Stewart (UofH), and Dr. Michael Ho (UofH), awarded 08/24/2017, Scope of Work – Develop a proof-of-concept marine, fiber-optic vibration sensing system, an instrumented flow loop for the lab and field. Along with associated analysis and interpretation methods, this system will provide learnings for improved subsea reservoir monitoring and production: The Instrumented and Intelligent Marine Oilfield. Industry support will come in the form of collaborations with Apache Corporation., Lawrence Berkeley National Laboratory, OptaSense, and Halliburton. Status of performance and annual accomplishments include:

- Launched early stages of build pipeline flow system task.
- The next step will be to measure responses of fiber-optic sensors using sonar and seismic sources in lab and analyze seismic records.

III. Financial Elements

A. Award Recipient

During this reporting period, TCEQ has drawn down funds and obligated project funding to the Centers:

- \$4,036,238 awarded from Treasury, TCEQ has drawn down \$1,475,869.31 (37%) for Center's expenditure reimbursement request
- \$1,767,855.78 of \$2,018,119 (88%) has been obligated to Texas A&M University Corpus Christi - Texas OneGulf
- \$1,944,842.74 of \$2,018,119 (96%) has been obligated to University of Houston - Subsea Systems Institute (SSI)
- TCEQ has no leverage funds

B. Award Subrecipient(s)

Center	Project	Awarded	Expended	Lower Tier Subawardee	Amount
Texas OneGulf	1-57790	\$468,506.00	\$251,773.25	Texas A&M (CTEHR)	\$167,036
Texas OneGulf	2-61593	\$139,041.78	\$139,041.78	N/A	\$0
				Texas A&M (CTEHR)	\$171,639
Texas OneGulf	3-62428	\$313,504.00	\$88,604.18	University of Texas (UTMB)	\$133,365
Texas OneGulf	4-62971	\$457,361.00	\$177,245.68	Texas A&M (GERG)	\$457,361
Texas OneGulf	6-70739	\$389,443.00	\$23,886.09	Texas A&M (GERG)	\$457,361
Subsea Systems Institute (SSI)	1-57794	\$647,438.00	\$527,067.70	N/A	\$0
SSI	2-62404	\$300,000.00	\$74,051.10	Rice University	\$150,000
SSI	3-62406	\$189,535.00	\$32,031.66	Rice University	\$99,330
SSI	4-62408	\$109,868.74	\$109,868.74	N/A	\$0
SSI	5-62412	\$100,000.00	\$52,299.13	Rice University	\$100,000
SSI	6-74270	\$300,000.00	\$0.00	University of Alabama	\$40,075
SSI	7-74785	\$298,001.00	\$0.00	N/A	\$0

IV. Gulf Coast Ecosystem Restoration Council Element

A. Leveraging Multipliers

Texas OneGulf Consortium

1-57790 Total other funds for this project is \$321,209 from the Harte Charitable Foundation and Harte Research Support Foundation to assist in with the important task of establishing the center and having it operational as soon as possible. The goal of Harte Research Institute (HRI) is to allow more money to be put toward research by providing additional funds that reduce the center's burden of administrative costs.

2-61593 Total other funds for this project is \$556,093. The Harte Charitable Foundation, Texas A&M University-Corpus Christi and Texas A&M University System have provided two years of funding to support strategic planning and synthesis. HRI has worked with these and other partners to provide \$300,000 for the triennial State of the Gulf Summit. Texas OneGulf will use the summit structure, which has been functioning since 2006, as the foundation for annual workshops, conferences and meetings that will be required for strategic plan development.

As a result of the momentum Texas OneGulf is gaining from this project, there has been more interest in restoring the Gulf of Mexico as a whole and new and separate projects are developing. For example, Texas OneGulf developed an international research workshop and report in collaboration with the Bureau of Energy Management (BOEM). The USA-Mexico Workshop to Coordinate Future Environmental Studies Related to Ocean Energy Management in the Gulf of Mexico identified gaps and set research priorities for the entire Gulf of Mexico coasts, not only the Texas coast. The BOEM is committed \$249,412 to the project and the Harte Research Support Foundation committed \$143,348 (\$60,000 from the Furgason Fellowship Endowment, \$50,000 from the National Academy of Science, non-profit, and \$33,348 in unrecovered indirect costs) for a total project cost of \$392,760.

3-62428 Total other funds for this project is \$215,406. A commitment to enhancing disaster resilience is one of the foundational elements of Texas OneGulf, with a focus on disaster preparedness, response and recovery issues. Texas OneGulf's participation in the Disaster Research Response Program will leverage staff, cohorts, and activities already supported by the CTEHR and Center in Environmental Toxicology (CET). This project continues to engage with other agencies and stakeholders active in this area of research and response. OneGulf's leadership has participated in meetings, conference calls, and workshops sponsored by the Council of State and Territorial Epidemiologists (CSTE), Centers for Disease Control and Prevention (CDC), National Association for

County and City Health Officials (NACCHO), Safe States Alliance, National Oceanic and Atmospheric Administration, and the National Institute of Environmental Health Sciences. These types of engagement efforts are making Texas OneGulf a recognized player in DR2 efforts and also ensures that this project contributes and learns from initiatives in this developing field of research and action.

The University of Texas Medical Branch (UTMB) has been actively engaged in advancing Texas OneGulf's goal of developing partnerships with first responders, emergency management agencies, the community, and public health providers. Mike Mastrangelo, UTMB Institutional Preparedness Officer and member of the Texas OneGulf Workgroup focused on developing an Emergency Management Partnership Network, has been working with the Regional Healthcare Preparedness Coalition and a variety of groups including first responders and industry to identify risk priorities for the Galveston/Houston area. He assisted with writing a proposal that was submitted in July 2017 to the Department of Homeland Security to conduct a Regional Resiliency Assessment Program. The proposed project addresses an existing gap in current preparedness and response plans for the Southeast Texas region regarding major chemical-related mass casualty incidents including chemical transportation and plant accidents, as well as terrorist attacks on those assets or facilities - or terrorists' use of chemicals as part of a coordinated attack.

The current top chemical priority risk for the region based on UTMB risk assessments of capacity to respond to a major release is Hydrogen Fluoride, which is used in large volumes in the Texas City area. To begin to assess the needs for improved capacity in dealing with a disaster of this magnitude, in 2016 UTMB worked with Lawrence Livermore National Lab and the National Weather Service on a modeling study to determine planning figures for the amount of Calcium Gluconate needed to treat patients in various scenarios (volumes similar to the 1987 Texas City release – and the volumes used at the Nevada Test Site in their 'Goldfish' experiments on the behavior of HF vapor clouds and mitigation strategies). In October of last year, they conducted an HF Preparedness Symposium/Community Tabletop/and Functional Exercise with Industry and response agency support.

With a number of long-standing partners, UTMB has also been engaged in establishing a Gulf Coast environmental health network as an organizing mechanism for a unified approach to disaster preparedness, response, and resiliency. Together with a number of Texas OneGulf partners, they developed and submitted a proposal to Texas OneGulf the aims of which are to: 1) provide a stakeholder analysis from existing sources of data and reports; 2) identify broad-based stakeholder perceptions of the issues and threats related to the Gulf, with special emphasis on policy- and decision-makers; 3) analyze the ability of Texas

OneGulf and the Texas OneGulf Network of Experts (TONE) to help address these issues; and 4) develop a communications and action plan for Texas OneGulf, based upon findings.

In July of 2016, the UTMB Institutional Review Board approved the UTMB Rapid Acquisition of Pre- and Post-Incident Disaster Data Protocol (IRB #16-0118; UT-RAPIDD), the primary objective of which was to establish the basis for future human subjects' research during or in the immediate aftermath of a natural or manmade disaster. This protocol has been shared with multiple institutions through the National Library of Medicine DR2 website. In August 2017, with pilot funding from the Office of the Governor and immediately prior to Hurricane Harvey's landfall, the CET initiated the Health Assessment of Residents at Risk of Exposures during a Disaster Event (HARRDE), a study to establish and test UT-RAPIDD's research protocols developed for use during a natural and/or manmade disaster and to develop a registry of biospecimens that could be used as baseline measures in assessing the human health impact of exposures sustained during a future event.

Dr. Croisant serves on the National Academies of Sciences, Engineering and Medicine Standing Committee on Medical and Public Health Research during Large-Scale Emergency Events. She assisted with planning and holding two meetings over Summer 2017 related to DR2. One focused on understanding the policy implications of work that was funded in the aftermath of Superstorm Sandy, and the second was focused on preparing for a rapid response to a future major offshore oil and/or gas spill.

Texas A&M, UTMB, and colleagues at the University of Pennsylvania plan to assess the needs for education of healthcare and public health practitioners, risk managers, and policy-makers related to environmental health and medicine in response to a marine oil spill. Based on a Letter of Intent, UTMB received approval to submit a full application for Informed Risk Reduction of Oil Spills (IRROS) in response to Risk-Based Evaluations to Support Public Health Response to the Next Oil Spill, Gulf Research Program, and National Academies of Sciences, Engineering, and Medicine. The full proposal was submitted June 28, 2017 and is currently pending.

6-70739 Total other funds for this project is \$143,976. The Harte Research Support Foundation and a grant from Gulf of Mexico Alliance have provided two years of funding to support the Texas OneGulf Knowledge Base system.

This project is utilizing underserved datasets which are datasets of significant value that are difficult to use for one or more reasons. For example, a dataset may not be available online or if it is available online it may be in an obscure location. Data can be difficult to use if it is in an inconvenient format such as those used by

some environmental sampling systems. Data use can be improved when data are transformed into preferred formats with complete metadata and served through systems that support both human and machine access.

Two such datasets were identified by Texas Knowledge Base-Gulf of Mexico Coastal Ocean Observing System (TKB-GCOOS) and steps have been taken to improve their usability and to prototype a system to serve them. The first is the LATEX dataset which contains 696 current meter records, 1650 hydrographic profiles and associated water samples collected off the Texas-Louisiana shelf in 1992-1994 by the Department of Oceanography at Texas A&M University for the U.S. Minerals Management Service. This dataset is difficult to find online. The current meter records contain current speed and direction and temperature and salinity. The hydrographic dataset contains vertical profiles of temperature, salinity, water clarity and chlorophyll. The datasets are in ascii and NetCDF but do not adhere to metadata content and encoding standards established in 2015 by the National Centers for Environmental Information (NCEI). TKB-GCOOS has transformed the hydrographic profile data from non-compliant NetCDF formats into fully-compliant standardized formats using NCEI's profile feature type. See <https://www.nodc.noaa.gov/data/formats/netcdf/v2.0/>. The current meter data will be processed next and the associated biogeochemical data (dissolved oxygen, chlorophyll pigments and nutrients) will be processed after that. All data will soon appear in the new TKB ERDDAP server.

The second underserved dataset consists of underway environmental observations made from the R/V Manta which is a NOAA-owned research vessel based at Texas A&M University at Galveston. The vessel is used for work at the Flower Garden Banks National Marine Sanctuary (FGBNMS) and along the Texas and Texas-Louisiana shelf. Some of these cruises were to deploy gliders for Texas OneGulf studies. In 2015, an automated underway sampling system was installed on the R/V Manta. Whenever the vessel is underway the system continuously measures marine meteorological data (winds, atmospheric pressure, air temperature); near-surface oceanographic data (temperature, salinity, dissolved oxygen, pH); and navigation data (speed, course over ground, heading). Fifty-two datasets were produced between January-2015 and Sept-2017. While the system is regularly maintained and a human is assigned to periodic data inspection and backups, there are no provisions for making these data available online. They are available upon request, if you know who to ask, but only in unprocessed original formats.

The TKB-GCOOS met with representatives of Texas A&M University at College Station and Texas A&M University at Galveston and agreed to transform the datasets from the R/V Manta into convenient standards-based formats and host them on the TKB computers along with maps, charts, and plots of the data for public access. Processed data will be submitted to NCEI. TKB-GCOOS has copies

of the 52 datasets in-hand and has started to process the navigation data. See the following list of cruises and associated ship track lines.

Coordination between RESTORE Centers of Excellence

Texas OneGulf has played a leading role in establishing coordination between both designated and presumptive COE's. There is a monthly call between the Centers hosted by Florida RESTORE Act Centers of Excellence Program (FLRACEP), where the focus has been on joint research activities.

The Gulf Restoration Science Programs Ad Hoc Coordination Forum, hosted by the NOAA RESTORE Science Program, provides a venue for all Gulf science programs to come together to develop common data management, share funding opportunities and look for synergies and activities that can be shared. The Texas OneGulf Executive Director participates in the monthly call and attends events like Gulf of Mexico Oil Spill and Ecosystem Science Conference (GOMOSEs). These face to face meetings serve to enhance coordination and joint actions, reduce duplication and afford opportunities to leverage individual actions.

The Texas OneGulf Executive Director serves on the Friends Board of the Florida Institute of Oceanography, providing additional opportunities for coordination of COE funding. This Board also acts as part of the Florida COE Management Team and provides review and approval for funding FLRACEP projects. The management team looks for opportunities to minimize duplication and promote coordinated research.

Subsea Systems Institute

The Subsea Systems Institute (SSI) currently has a contract with the State of Texas Governor's Office (OOG) to make available certain grant funds to assist the center in its mission.

2-62404 Total other funds for this project is \$44,351.

Dr. James Tour will supervise the work to be done on the 22-month project at Rice as delineated in the Statement of Work (SOW) and proposal. His annualized salary is \$129,272.00. His contribution to the project over the 22 months will be 1 month each year.

3-62406 Total other funds for this project is \$46,281.

Dr. Matthew Franchek, with an annualized salary of \$279,600, will dedicate 1 month effort to manage the UH portion of the work. Dr. Matthew Brake will supervise the work to be done on the 22-month project at Rice as delineated in the SOW with less than 1 month of his salary towards the project.

4-62408 Total other funds for this project is \$54,663.

Dr. Rob Stewart, with an annualized salary of \$281,856.00, will dedicate .6 month in the summer (20%) and .5-month academic time (6%) to manage the

work. Jiming Bao with an annualized salary of \$137,592.00, will dedicate .4-month summer (13%) and .5-month academic time (6%) to work on the project. Use of a testbed, which is a Transocean test facility, is made available to this project at no cost. The approximate market value for access to this test equipment is \$10,000 per year.

5-62412 Total other funds for this project is \$36,378.

Dr. Fathi Gorbel oversees the statistical analyses, data management, and be responsible for reporting the project's results. The use of an existing prototype AUV represents an in-kind contribution (Estimated amount \$10,000.00).

The Subsea Systems Institute has secured the grant with the Office of the Texas Governor (OOG). The following activities have taken place under the award from the OOG:

- Research Programs: This includes research programs that have not been included in the programs funded by Treasury RESTORE Act Centers of Excellence. These programs are in the following categories:
 - Programs identified through the Treasury RESTORE Act Centers of Excellence grant award process, but not funded by Treasury RESTORE Act Centers of Excellence, which are identified as valuable research topics that meet the SSI objectives;
 - Research topics that are identified through SSI engagement with industry or the government that meet SSI objectives including safety, risk mitigation and improved reliability.
- The following Research Programs have been launched:
 - Pilot project to develop new computational methods for hydrocarbon behavior in a marine riser.
 - The Principal Investigator on this project is Dr. Andrea Prosperetti (UH). This project has undertaken a theoretical and computational study of the character of hydrocarbons that are inadvertently introduced into a marine riser. This issue has been discussed with industry and the need for new methods and understanding has been identified in order to establish improved operating procedures. Current project status includes a newly developed algorithm and has been successfully applied to a set of equations. This work may be extended through programs to be awarded by the Bureau of Safety and Environmental Enforcement (BSEE) and the Gulf Research Program (GRP). The value of the pilot program is \$50,000.
 - Demonstration project with industry partner The Jukes Group, to develop improved manufacturing and testing methods to predict the performance of API pipe flanges under a combination of loading conditions.
 - The Principal Investigator on this project is Dr. Gangbing Song (UH). This work will improve the leak performance of pipe flanges, as is a major topic for operators. In September

- 2017, a meeting was held with industry operators to engage in discussions to focus the testing of the flange in a way that would most benefit the industry and make improvements to industry standards. Ultimately, the goal is to extend this early work into a Joint Industry Project (JIP) with those operators engaged in the discussions. The second phase would be supported by industry funding. The cost of this demonstration project is \$32,000.
- Development project of High Power Density Fault Tolerant Subsea Drives with Advanced Circuit Breaker to support the ongoing development of the power requirements for subsea equipment.
 - The Principal Investigator on this project is Dr. Kaushik Rajashekara (UH). The first year of this project will be supported by the grant funds. There are a number of technology components to this program:
 - The development of advanced power converter topologies using high frequency magnetics to reduce the footprint of subsea and down-hole drive systems:
 - Real-time simulation of the entire subsea system to evaluate the harmonics, to study the effects of long distance cable capacities and voltage stability.
 - The project also targets development of a novel solid-state DC circuit breaker and connector suitable for subsea systems.
 - The project launched in September 2017 and personnel laboratory have been established. A database is currently being developed. The cost for the first year of research project is \$148,000.