SBIR

Small Business Innovation Research Program

ABSTRACTS OF AWARDS FOR FISCAL YEAR 2012

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

INTRODUCTION

The Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), through the Small Business Innovation Research (SBIR) program, awarded 8 Phase I contracts for FY 2012. These awards are up to $95,000 each, and totaling approximately $760,000. The awards are for a six-month effort to demonstrate the feasibility of innovative approaches to the research topics identified in the "DOC/NOAA SBIR Program Solicitation for FY 2012 (NOAA 2012-1)." Abstracts of the successful Phase I proposals submitted under this solicitation, and brief comments on their anticipated results are provided in this publication.

In Phase II, funding is provided for projects that are most promising after Phase I is completed. These awards can be for up to $400,000 each and for two years. The DOC/NOAA awarded a total of 5 Phase II contracts in FY 2012 for a total of approximately $1.9 million. Abstracts of successful Phase II proposals and comments on their anticipated results are also provided in this publication.

The SBIR program is highly competitive. A total of 139 proposals were received by DOC/NOAA in response to its FY 2012 solicitation. Internal and external scientists and/or engineers independently reviewed the proposals. With the funds available, only 8 were selected for an award. Final selection was based upon the results of the reviews, relative importance to DOC/NOAA needs, relationship to on-going research, and potential for commercialization.

FY 2012 PHASE I AWARD WINNER

FIRM:	Sunburst Sensors, LLC 1226 W. Broadway Missoula, MT 598023915
AWARD:	$94,998
PHONE:	406-532-3246
FAX:	406-532-3247
E-MAIL:	jim@sunburstsensors.com
PRINCIPAL INVESTIGATOR:	James C. Beck, MSME, President/CEO

TITLE OF PROJECT:	Development of a Long Term pH and pCO_2 Lagrangian Drifter
SUBTOPIC NUMBER:	8.3.1C

TECHNICAL ABSTRACT:

Quantifying oceanic CO_2 uptake and ocean acidification and understanding their impact on global climate and ocean ecology are key goals of NOAA's climate change research programs. NOAA's request for *Development of a long-term Langrangian pH and pCO_2 drifter* aims to address these goals by developing technology that measures both pCO_2 and pH that can be widely deployed in the world's oceans.

Sunburst Sensors proposes to develop an innovative pH and pCO_2 prototype sensor based on the patented technology of its SAMI sensors. We will determine the feasibility of a new compact, cost-effective sensor design that can reliably measure both quantities with the required accuracy and precision.

We will investigate two innovations that will significantly simplify and reduce the cost of our current sensors. First, we will combine the optics and flow cell using microfluidics techniques, resulting in a compact, inexpensive, modular sensor. Second, we will use a single reagent for both pCO_2 and pH measurements in a single system.

Phase I will culminate with a design based on the success of these innovations. This design will be refined and integrated into a surface float with satellite telemetry and become available as a commercial product in Phase II.

SUMMARY OF ANTICIPATED RESULTS:

This research will result in a design for new compact, cost-effective sensor designs that can reliable measure both pH and pCO_2 with the required accuracy and precision for oceanographic carbon cycle research.

FY 2012 PHASE I AWARD WINNER

FIRM:	Mercury Science, Inc. 4802 Glendarion Drive Durham, NC 27713-8025
AWARD:	$95,000
PHONE:	866-861-5836
FAX:	407-982-7502
E-MAIL:	tom@mercuryscience.com
PRINCIPAL INVESTIGATOR:	Thomas Stewart, President

TITLE OF PROJECT:	Porous Membrane Electrode for Quantitative Detection of Toxins
SUBTOPIC NUMBER:	8.1.6N

TECHNICAL ABSTRACT:

There is a need for a simple, portable, quantitative method to monitor the presence of Harmful Algal Blooms. Electrochemical detection offers some advantages for analysis, but traditional sensors are not practical for routine field use. Adapting colorimetric immunoassays on porous, flow-through electrodes can provide a means for rapid, low-cost, portable quantitative environmental analysis.

This concept will be demonstrated in Phase I with a novel conductive, porous-membrane immunosensor for domoic acid. Antibodies will be attached to the electrode surface for capture of domoic acid and domoic acid-horseradish peroxidase conjugate. The immunoassay response will be measure using hydrogen peroxide and 3,3,5,5-tetramethylbenzidine as the enzyme comparison of the sample signal to a calibration curve. The porous design of the electrode allows assays to be performed quickly, simply and accurately.

Phase I will focus on:
1. Production of conductive, porous membranes with a layer of antibody attached to the conductive surface.
2. Demonstration of electrochemical detection of domoic acid using these membranes.
Phase II will incorporate the prototype membrane electrode and assay into a portable, low-cost, automated potentiostat that will be designed.

SUMMARY OF ANTICIPATED RESULTS:

A novel porous electrode will be developed and adapted for use with immunoassays. Feasibility will be demonstrated by developing a quantitative assay for domoic acid. The electrodes will be used for rapid, onsite environmental analysis when paired with a portable, amperometric instrument similar to a blood glucose meter.

FY 2012 PHASE I AWARD WINNER

FIRM:	Boulder Environmental Sciences and Technology 4425 Hastings Drive Boulder, CO 80305-6614
AWARD:	$95,000
PHONE:	303-800-6210
FAX:	303-835-7190
E-MAIL:	marian.klein@boulderest.com
PRINCIPAL INVESTIGATOR:	Marian Klein, Ph.D.

TITLE OF PROJECT: Hyperspectral Microwave Sensor

SUBTOPIC NUMBER: 8.4.5D

TECHNICAL ABSTRACT:

Hyperspectral remote sensing in the microwave offers the opportunity to substantially improve the atmospheric information provided to numerical weather prediction data assimilation systems, enabling advancements in forecast skill.

This Phase I project proposes a numerical study leading to selection of optimal channels for a space borne hyperspectral sensor. Based on the recommendations from a numerical modeling, a potential hardware implementation will be proposed.

The Phase II project will aim to build a prototype of a hyperspectal sensor, based on the design developed in Phase I. The prototype sensor will be ground-based and will address the technological challenges in hardware, such as reduced radiometer noise levels, local oscillator stability, antenna design, optimization of filters block, power, volume and cost requirements. Successful realization of the sensor will have applications not only to satellite instrument advancement, but also in ground-based passive microwave remote sensing.

SUMMARY OF ANTICIPATED RESULTS:

A space-borne implementation of the hyperspectral microwave sensor offers the prospect of improving forecast skills of numerical weather prediction models, especially if its deployment will allow extensive spatial coverage and frequent temporal sampling. Renewable energy sources depend on a reliable weather forecast. Their production depends on current atmospheric conditions.

At the end of Phase I we will have a design for a potential hardware implementation of a hyperspectral microwave sensor. At the end of Phase II we expect to have a working prototype of a hyperspectral sensor for ground-based observations.

FY 2011 PHASE I AWARD WINNER

FIRM:	Polestar Technologies 220 Reservoir Street, Suite 3 Needham Heights, MA 02494-3133
AWARD:	$94,684
PHONE:	781-449-2284
FAX:	781-449-1072
E-MAIL:	rshashidhar@polestartech.com
PRINCIPAL INVESTIGATOR:	Ranganathan Shashidhar, Ph.D., Senior Vice President

TITLE OF PROJECT:	Dip and Read Nanosensor for Calcium Ion Measurement in Sea Water
SUBTOPIC NUMBER:	8.2.2R

TECHNICAL ABSTRACT:

The topic (8.2.2R) requires the capability for enabling high sensitive/high precision measurements of calcium concentrates in seawater. The proposal aims to demonstrate the feasibility of a novel high sensitive nanosensor that can be used to determine very low concentrations of calcium in seawater in the presence of large backgrounds calcium concentration. The sensor approach will use the benefits of nanotechnology to increase the dynamic range. It will also use the molecular recognition to achieve high sensor sensitivity and high specificity so that the measurements are not affected by other ions like magnesium. The calcium ion would bind the sensor element and the event will be transducted into an electronic signal, which can be measured by a hand held unit to be developed in Phase II. Phase I results are expected to demonstrate a calcium detection sensitivity of a few µM in the presence of mM concentrations of calcium in salt water.

SUMMARY OF ANTICIPATED RESULTS:

The sensor package is envisaged as a simple dip and read unit. The sensor part can be plugged into the electronic read out part which will be a hand held unit. The ability to detect very small amounts of calcium concentrates in the presence of a large background concentration of calcium in the sea water will be very useful for monitoring the calcification rate in reef-building corals and in other calcifying marine organism like crustose coralline algae.

FY 2012 PHASE I AWARD WINNER

FIRM:	Propagation Research Associates, Inc. 1275 Kennestone Circle, Suite 100 Marietta, GA 30066
AWARD:	$95,000
PHONE:	770-795-8181
FAX:	678-384-3401
E-MAIL:	contracts@pra-corp.com
PRINCIPAL INVESTIGATOR:	Bonnie Valant-Spaight, Senior Scientist

TITLE OF PROJECT:	Reducing Impact of Severe Space Weather on Global Positioning System (GPS) Satellite Users
SUBTOPIC NUMBER:	8.4.4W

TECHNICAL ABSTRACT:

Propagation Research Associates, Inc., (PRA) proposes to utilize its unique capabilities in atmospheric effects characterization and GPS signal processing to develop algorithms that nowcast ionospheric scintillation at GPS frequencies. To this end, PRA proposes to partner with the Jet Propulsion Laboratory to use real-time GPS data to create a map of ionospheric scintillation parameters over the United States. These maps will be used in conjunction with a simulated software receiver to nowcast scintillation impacts on GPS devices. PRA will then design a specification product, using input from various GPS user communities, to communicate the scintillation impacts in a format that is both easily understood and allows the user to access as much or as little detail about the impacts as he or she desire. In Phase II, PRA will develop a prototype real-time nowcast product for the United States, including Alaska. PRA will also investigate using and expanded set of real-time GPA data to enlarge the nowcast to areas outside the U.S. The possibility of forecasting scintillation effects using existing SWPC nowcast and forecast software products will also be investigated.

SUMMARY OF ANTICIPATED RESULTS:

The PRA GPS scintillation effects nowcast will allow members of the general public to learn in real-time when space weather conditions are affecting the accuracy and availability of GPS position, navigation, and timing services. This work will also investigate the possibility of forecasting ionispheric scintillation effects on GPS signals.

FY 2012 PHASE I AWARD WINNER

FIRM:	Zeigler Brothers, Inc. 400 Gardners Station Road P.O. Box 95 Gardners, PA 17324
AWARD:	$95,000
PHONE:	717-677-6181
FAX:	717-677-6826
E-MAIL:	info@zeiglerfeed.com
PRINCIPAL INVESTIGATOR:	Scott Snyder, Ph. D., Animal Nutritionist

TITLE OF PROJECT:	Development of manufacturing technology for the practical application of specialized and environmentally sensitive nutrients, enzymes, immune-stimulating compounds and biologics to aquafeeds
SUBTOPIC NUMBER:	8.2.3F

TECHNICAL ABSTRACT:

Zeigler Bros., Inc. (ZBI) has teamed with Harrisvaccines, Inc. (HV) to develop a new aquafeed manufacturing platform for the practical application of underutilized feed additives. These include enzymes, immune-stimulating compounds and biologics that require specialized protection to ensure they are delivered to the animal as viable compounds. ZBI pioneered microparticle feeds and will use this technology to manufacture inclusion particles capable of stabilizing these underutilized additives. RNA interference (RANi) is a promising, emerging technology that has demonstrated a range of applications in aquaculture as an antiviral/immune-stimulating compound. It is proposed that double-stranded RNA (dsRNA) constitute the RNAi effector molecules that provide that antiviral effect. Furthermore, RNA provides and environmentally sensitive model that has a pre-existing base for molecular assays for detection. HV can produce large-scale amounts of RNA that make a commercially feasible feed additive and they have shown that these RNA molecules can protect against lethal White Spot Syndrome Virus (WSSV) challenge. The immediate impact from a successful Phase I project will be the first candidate orally delivered molecular WSSV vaccine for clinical trial. With subsequent Phase II funding ZBI and HV will qualify this platform for effectiveness in controlling other aquaculture diseases, reducing effluents and increasing nutrient utilization.

SUMMARY OF ANTICIPATED RESULTS:

- Aquafeed manufacturing platform for incorporating underutilized feed additives.
- Candidate WSSV oral vaccine for shrimp.
- New products that will improve the environmental sustainability and competitiveness of US marine aquaculture

FY 2012 PHASE I AWARD WINNER

FIRM:	Dehlsen Associates, LLC 101 E. Victoria Street, Suite F Santa Barbara, CA 93101
AWARD:	$95,000
PHONE:	805-845-7575
FAX:	805-845-7266
E-MAIL:	afleming@ecomerittech.com
PRINCIPAL INVESTIGATOR:	Alexander Fleming, Vice President of Engineering

TITLE OF PROJECT:	Siting for Marine Hydrokinetic Devices by Means of a Self-Propulsion Glider
SUBTOPIC NUMBER:	8.1.2SG

TECHNICAL ABSTRACT:

Dehlsen Associates, LLC (DA) founders have a long history with renewable energy, establishing both Clipper Windpower and Zond Systems (now GE Wind). DA's Aquantis C-Plane is designed to provide 4MW per platform in ocean currents with a target cost of energy of 0.08 $/kWh by means of off-the-shelf, highly reliable components. Though previous ADCP sampling was performed in partnership with Florida Atlantic University from 2000-2002, these results offer low resolution 15-min averages, insufficient for the design. Finer spatial and temporal resolution data is required in order to outline turbulence characteristics, wave orbital distribution with depth, and also quantify concerns of potentially harmful events such as internal waves, hurricane surge, and eddies for stability and blade design. A stationary, real-time data acquisition system will be installed in May at the Navy SFOMF offshore Dania Beach to collect this necessary resource data. The proposed mobile glider would be used for commercial siting by: characterizing regions with high flow rates, providing environmental data in these regions, and would be correlated with fish finders and parametric sub-bottom profilers would be used to characterize the resource and site environmental conditions.

SUMMARY OF ANTICIPATED RESULTS:

The anticipated results of this Phase I will: outline a methodology for performing data analysis is the resource data collected at the stationary site (to be installed May 2012); determine a suitable glider (mobile site) option and concept of operations for determining a commercial site locations; outline a methodology for performing Measure-Correlate-Predict (MCP) analyses with a stationary and mobile site; determine appropriate sensor packages for the glider for acquiring environmental data for the commercial site; and correlate with Cost of Energy (COE) models and spatial planning efforts.

FY 2012 PHASE I AWARD WINNER

FIRM:	RE Vision Consulting, LLC 6630 14th Street Sacramento, CA 95831
AWARD:	$95,000
PHONE:	916-977-3970
FAX:	
E-MAIL:	mirko@re-vision.net
PRINCIPAL INVESTIGATOR:	Mirko Previsic, Principal

TITLE OF PROJECT:	GIS based Techno-Economic Site Assessment Tool
SUBTOPIC NUMBER:	8.1.3SG

TECHNICAL ABSTRACT:

In order to site marine renewable projects a wide range of stakeholders will need to understand the driving considerations for siting projects in certain areas. Marine renewable energy sources include; (1) wave energy, (2) offshore wind, (3) ocean current, and (4) ocean thermal energy conversion. These resources are stimated to be able to provide a significant portion of the US national demand for electricity and hence are strategically important.

Constraints, involve a wide range of environmental and human use constraints as well as the sites economic attractiveness. Different spatial planning efforts have been aimed at addressing the marine spatial planning issues. One of the more prominent ones is the Multi-purpose Marines Cadastre (MMC).

What is missing with all these data-sets is the ability to determine a sites commercial potential in a meaningful way. While some of the data-sets provided in the MMC can be used by device developers to perform such studies, there is no adequate way to determine the commercial potential of deployment areas.

RE Vision is proposing to develop an easy to use GIS-based techno-economic scenario-modeling tool that allows users to characterize the commercial potential of a particular site or larger geographic areas. It will do so by utilizing the experience gained over the past decade in developing such scenarios for a wide range of clients. This toolbox development is a direct extension of past modeling efforts undertaken by the PI.

SUMMARY OF ANTICIPATED RESULTS:

The end-product will be a modeling tool that will allow a wide range of users to evaluate the commercial potential of Marine Renewable Energy site. Phase I will focus on developing a tool for wave energy conversion, while phase II will incorporate offshore wind, tidal, ocean current and river hydrokinetic technologies.

FY 2012 PHASE II AWARD WINNER

FIRM:	Prescient Weather Ltd. 200 Innovation Blvd. Suite 229 State College, PA 16803-6602
AWARD:	$398,185
PHONE:	814-466-2231
FAX:	814-234-5869
E-MAIL:	john.dutton@prescientweather.com
PRINCIPAL INVESTIGATOR:	John A. Dutton, President

TITLE OF PROJECT:	Client-Centered Calibration of the NOAA Climate Forecast System
SUBTOPIC NUMBER:	8.2.1C

TECHNICAL ABSTRACT:

Prescient Weather process five integrated Phase II tasks to increase the value of the NOAA Climate Forecast System and to assist the private sector in managing weather and climate risk and opportunity: The Phase II tasks are: (1) Develop an optimal WCS seasonal multi-model ensemble by calibrating and combining the NWS CFSv2, the ECMWF SFSv4, and the new National Multi-Model Ensemble (NMME) to create more skillful operational seasonal forecasts; (2) Develop an optimal WCS weekly forecast ensemble from the same models and then create an operational multi-model probability forecast; (3) Develop probability forecasts for impact variables critical in agriculture, energy, and renewable energy on the weekly, monthly, and seasonal scale; (4) Develop effective methods for combining probability forecasts, business models, and forecast performance statistics to enable users to act on the forecast with confidence in the consequences; (5) Complete and implement the Internet-based Seasonal and Subseasonal Prediction, Information, and Decision Support System (SSPIDSS) as the interactive workspace to support decision-making. The SSPIDSS implementation will focus on the client decision context, presenting a tier of probabilistic forecasts of meteorological and industry variables on the scale of seasons for long-range strategy, months and weeks for tactical adjustments, and days for immediate action.

SUMMARY OF ANTICIPATED RESULTS:

The Phase II accomplishments will bring notable innovation to the management of climate risk and opportunity with the aid of probability forecasts for periods of two to four weeks, months, and seasons. Operational products will (1) combine independent models into multi-models providing more skillful and reliable forecasts than are now available; (2) include probability forecasts of variables needed for business decisions in agriculture, energy, and renewable energy; (3) offer decision support based on a model of business response to climate variability that includes options for hedging and mitigating risk and incorporates the historical performance of the forecast system.

FY 2012 PHASE II AWARD WINNER

FIRM:	PCCI, Inc. 300 N. Lee Street, Suite 201 Alexandria, VA 22314
AWARD:	$ 399,976.40
PHONE:	703-684-2060
FAX:	703-684-5343
E-MAIL:	thudon@pccii.com
PRINCIPAL INVESTIGATOR:	Robert M. Loesch, PE, Senior Engineer III

TITLE OF PROJECT: Multi-Occupant Flexible Hyperbaric Chamber

SUBTOPIC NUMBER: 8.1.3N,R

TECHNICAL ABSTRACT:

In Phase II, the PCCI Team will conduct the research and development required to extend the design of the multi-occupant, flexible, hyperbaric chamber to withstand an internal pressure of 165 feet of sea water (fsw), up from the 70 fsw design goal of the Phase I SBIR. This increased pressure rating will both benefit the NOAA Diving Program, by allowing treatment of divers to U.S. Navy Table 6A applications, and increase the commercialization potential of the resulting chamber design, since a 165 fsw chamber is of interest to the U.S. Navy, U.S. Coast Guard, and other organizations. In Phase II, we will also complete the design drawings and specifications for the chamber, acquire the materials for, and fabricate, a prototype of the multi-occupant, flexible, hyperbaric chamber which will then be tested to ensure the prototype can meet the requirements of the ASME Pressure Vessels for Human Occupancy National Standard (PVHO-1 and proposed Case JJ), and the U.S. Navy Diving and Hyperbaric Safety and Certification Standards. We anticipate the delivered prototype will become the first of three (minimum) pressure vessels that must remain intact during the prototype testing to meet the PVHO standards, giving PCCI a firm foundation for product commercialization.

SUMMARY OF ANTICIPATED RESULTS:

At the conclusion of this Phase II effort, PCCI will deliver a 100% complete design package, including AutoCAD drawings and material specifications, for a Multi-Occupant Flexible Hyperbaric Chamber that not only meets the original Phase I SBIR technical requirements, but extends the working pressure of the chamber up to 165 fsw. Additionally we have fabricated a prototype unit for testing to demonstrate compliance with the arduous requirements of PVHO-1 and the proposed Case JJ.

FY 2012 PHASE II AWARD WINNER

FIRM:	Peregrine Power LLC 27350 SW 95th Avenue Suite 3022 Wilsonville, OR 97070
AWARD:	$ 294,863
PHONE:	503-682-7001
FAX:	503-682-6014
E-MAIL:	bratliff@peregrinepower.com
PRINCIPAL INVESTIGATOR:	Brian Ratliff, Chief Technology Officer

TITLE OF PROJECT: Wave Energy Harvesting System

SUBTOPIC NUMBER: 8.1.2SG

TECHNICAL ABSTRACT:

Peregrine Power, LLC will develop a wave energy harvesting system for NOAA buoys. It will be entirely self-contained (no protruding elements), modular, scalable, and easily deployed. The system employs a unique, inertial mechanism that responds to acceleration forces created by waves. This mechanism will be combined with (1) a proprietary generator that is sensitive to very low levels of torque and has essentially no cogging torque to overcome and (2) an electronic power conditioning and management subsystem which can receive erratic power from intermittent water movement and produce regulated DC for charging batteries or other uses.

SUMMARY OF ANTICIPATED RESULTS:

The result will be that NOAA will have a highly versatile wave energy scavenging system that can be used on many different types of data buoys for charging batteries, thus minimizing the costly requirement of servicing batteries by ship. In addition, the scavenging system can be used by the Navy for military purposes, by the Coast Guard for thousands of navigation buoys and by civilian coastal defense authorities.

FY 2012 PHASE II AWARD WINNER

FIRM:	Toyon Research Corporation 6800 Cortona Drive Goleta, CA 93117-3021
AWARD:	$400,000
PHONE:	805-968-6787
FAX:	805-685-8089
E-MAIL:	ksullivan@toyon.com
PRINCIPAL INVESTIGATOR:	Kevin J. Sullivan, Vice President, Senior Scientist

TITLE OF PROJECT: Program Estimating Whale Migration Statistics

SUBTOPIC NUMBER: 8.1.6F

TECHNICAL ABSTRACT:

Toyon proposes to develop a system that can automatically count the number of gray whales that pass nearby a shore-based installation. The system will be comprised of infrared cameras and a set of computers, which automatically scan the video for whale blows. We have implemented and tested such an algorithm using Matlab during Phase I and we propose to extend this algorithm to run in real time during Phase II. Each whale blow that is detected will be reported to an algorithm which infers the number of whales that are presented based on the number, location, and timing of blow detections. The inferencing algorithm will make use of published statistics collected on gray whale surfacing and breathing patterns, migration characteristics, and dive cycles. The system will operate using externally-provided power. Video footage will be archived including snapshots of whale blow detections. The system will be developed and tested at the Toyon facility in Goleta, CA - a short distance from a prime viewing location of the Gray Whale migration.

SUMMARY OF ANTICIPATED RESULTS:

We propose to deliver a system to NOAA at the end of this contract, which will be capable of counting the number of gray whales, which migrate past a shore-based facility. The system will store video from the cameras and still images of every whale blow that is detected for later viewing by biologists. Based on our initial experiments, we expect that the system will perform as well as, or better than, human observers seeking to perform the same function with binoculars. Furthermore, the system will be capable of counting whales twenty four hours a day as opposed to about ten hours or less that are available during the day in winter months (southern migration) for human observers. This research will also lay the foundation for a commercial product, which can be mounted on commercial, military, and recreational vessels, which will provide a warning when the vessel is on a collision course with a whale.

FY 2012 PHASE II AWARD WINNER

FIRM:	Remote Sensing Solutions, Inc. 3179 Main Street, Unit 3 PO Box 1092 Barnstable, MA 02630
AWARD:	$ 399,691
PHONE:	508.362.9400
FAX:	508.519.9175
E-MAIL:	carswell@remotesensingsolutions.com
PRINCIPAL INVESTIGATOR:	Dr. James R. Carswell, President

TITLE OF PROJECT:	A Single Aperture Dual-Wavelength Dual-Polarized Antenna for AWRAP
SUBTOPIC NUMBER:	8.3.4D

TECHNICAL ABSTRACT:

Severe weather impacts our daily lives, society and the world economy. From an average of $10B annual loss due to tropical cyclones since 1900 to $200B in the commercial shipping industry, which is threatened by severe ocean storms to the hundreds of lives and assets lost in the $20B recreational boating industry. In these cases and many more, accurate now casting and forecasting could prevent these losses and reduce risks. A key observation to improve our knowledge of the weather is the ocean surface vector wind.

The technology and product developed through this Phase II project will overcome current technology gaps preventing real-time measurements and mapping of ocean vector winds as well as the three-dimensional atmospheric winds within tropical cyclones and severe ocean storm environments. Specifically, this effort focused on designing a compact single aperture antenna that provides high resolution wide swath mapping of the atmosphere and ocean surface. Combined with the Advanced Wind and Rain Airborne Profiler (AWRAP) system, it would provide unprecedented airborne observational capability for tropical cyclones and severe ocean storm environments and imaging capabilities for search and rescue and homeland defense applications.

SUMMARY OF ANTICIPATED RESULTS:

The anticipated results from the Phase II effort is the development of a novel single aperture, Ku/C-band, dual-polarized antenna system and its deployment with the AWRAP system on the NOAA WP-3D aircraft. With a successful demonstration and high visibility through the NOAA hurricane field activities, significant opportunities will be available to develop a full commercial system based on this prototype to support the domestic and foreign efforts to collect real-time target observations of the atmospheric and oceanic environments in and around tropical cyclones and severe ocean storms. Interest in deploying this technology on the Global Hawk UAV and AVWATCH aircraft has already been expressed.