SBIR

Small Business Innovation Research Program

ABSTRACTS OF AWARDS FOR FISCAL YEAR 2015

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 19 Phase I contracts for FY 2015. These awards are up to $95,000 each, and totaling approximately $1,805,000. 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 2015 (NOAA 2015-1)." Abstracts of the successful Phase I proposals submitted under this solicitation, and brief comments on their anticipated results are provided in this publication.

The SBIR program is highly competitive. A total of 80 proposals were received by DOC/NOAA in response to its FY 2015 solicitation. Internal and external scientists and/or engineers independently reviewed the proposals. With the funds available, 19 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.

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 10 Phase II contracts in FY 2015 for a total of approximately $4 million. Abstracts of successful Phase II proposals and comments on their anticipated results are also provided in this publication.

FY 2015 PHASE I AWARD WINNER

FIRM:	Arete Associates 1550 Crystal Dr, Suite 703 Arlington, VA 22202
AWARD:	$94,951.79
PHONE:	703-413-0290
E-MAIL:	contracts@arete.com
PRINCIPAL INVESTIGATOR:	Dr. Clayton R. Chinn

TITLE OF PROJECT:	Coastal Eyes, a Multi-Mission Topographic, Current Retrieval and Debris Mapping Sensor System
SUBTOPIC NUMBER:	8.3.2D

TECHNICAL ABSTRACT:

Areté Associates proposes the Coastal Eyes, a multi-mission sensor system to respond to NOAA's core mission objectives for coastal emergency management measurements to map land and surface water topography over coastal, waterways and fresh water regions; surface (fresh and oceans) currents, debris detections and storm surges. Areté will develop a responsive, cost-effective sensor solution, which will sue enabling algorithms developed by Areté to meet this need. Coastal Eyes includes an innovative 3D SAR processor that uses a COTS Synthetic Aperture Radar (SAR) for topographic measurements over wide-swaths; the current retrieval capability of Areté's RiverEye and the commercial Remote Ocean Current Imaging System (ROCIS). Coastal Eyes also integrates the Pushbroom Imaging Littoral LIDAR (PILLS), a compact LIDAR developed by Areté, witch a Standard SAR, and with a real-time processor to produce a responsive solution to quickly provide actionable results to the user.

SUMMARY OF ANTICIPATED RESULTS:

Phase 1 will produce a preliminary system design for the Coastal Eyes sensor system, estimates for feasibility and cost for fabrication of a prototype, operational and installation requirements, a performance model or Coastal Eyes, a Phase 2 plan to produce and demonstrate a prototype system, and a commercialization application study.

FY 2015 PHASE I AWARD WINNER

FIRM:	Bio-waves, Inc. 364 2nd Street, Suite #3 Encinitas, CA 92024
AWARD:	$94,801.00
PHONE:	760-452-2575
E-MAIL:	Thomas.f.norris@bio-waves.net
PRINCIPAL INVESTIGATOR:	Thomas F. Norris

TITLE OF PROJECT:	The X-3D Array: An Affordable Three Dimensional, High Speed, Towed Hydrophone Array
SUBTOPIC NUMBER:	8.2.1F

TECHNICAL ABSTRACT:

We proposed to test, design, and modify an existing 'X-Array' tetrahedral (3-D) hydrophone array prototype and design with the ultimate goal of developing a production prototype called the 'X-3D Array'. We will analyze field data collected previously from the first prototype, conduct hydrodynamic modeling of the array design, and research possible torque imbalances in the tow-cable, and use this information to make the necessary design changes to resolve the noise and twisting issues identified in the first prototype. We will then conduct field tests of the new X-3D Array to ensure it is meeting the necessary technical and operational specifications, such as towing it at 10 knots. We will consider the materials and fabrication processes throughout this process so that a production prototype will be ready for Phase II. We have chosen this accelerated approach because an initial prototype already exists. We have assembled a team of world renowned technical experts from the Scripps Institution of Oceanography's Marine Physical Lab. Desert Star Systems LLC will provide guidance on the commercialization aspects of this effort. Bio-Waves Inc., a small business specializing in passive acoustic technologies, will oversee the project management and field testing aspects of the effort.

SUMMARY OF ANTICIPATED RESULTS:

We anticipate development of a field tested production X-3D prototype that will be ready for additional testing and commercialization in Phase II. We will provide a report that summarizes any issues encountered and how these were resolved and provide recommendations for any issues that remain. We expect that the X-3D Array will have numerous application beyond monitoring sounds from marine mammals, such as searching for pingers (e.g. from tagged fish), locating transponders (e.g. from oceanographic instrumentation and even black boxes from downed airplanes).

FY 2015 PHASE I AWARD WINNER

FIRM:	Catalina Sea Ranch, LLC 820 South Seaside Ave. Terminal Island, CA 90731
AWARD:	$95,000.00
PHONE:	316-993-1486
E-MAIL:	Kelly@catalinasearanch.com
PRINCIPAL INVESTIGATOR:	Kelly Stromberg

TITLE OF PROJECT:	Development of Genetics-based Selective Breeding Protocols for Improvement of the Mediterranean Mussel, *Mytilus* galloprovincialis, and Advancement of Aquaculture
SUBTOPIC NUMBER:	8.1.1F

TECHNICAL ABSTRACT:

The problem this proposal seeks to remedy has positive and profound ramifications for the advancement of aquaculture. The aquaculture industry lags in genetically based selective breeding programs when compared to terrestrial commercial crops. This perpetuates our nation's $11 billion dollar seafood deficit, puts U.S. aquaculture entrepreneurs at a disadvantage for success, and increases risk for bivalve crop degradation from climate change. Heterosis in bivalve crops have been documented in scientific literature, but studies remain scant and rarely address the genetic components of selection from breeding. To address this gap, a novel family line system will be developed within the emerging model organism *Mytilus galloprovincialis,* which will be used to generate the framework for a genetics based selective breeding protocol. Within this framework, there are three goals for Phase I: **1)** to establish genetically distinct family lines of blue mussels, focusing on desirable commercial characteristics, **2)** investigate genetics of viability and selection, and **3)** determine mutation rates and their impact on domesticates shellfish cultivars. These data will then be used (in Phases II/III) to develop genetic based selective breeding protocols. This research will provide immediate benefits to the U.S. economy, and have a long term global impact on a sustainable protein production from the sea.

SUMMARY OF ANTICIPATED RESULTS:

Phase I Deliverables:

- Generation of 30 families of F1 inbred lines, to be used in future scientific and commercial endeavors.
- Measured differential growth and survival rates among families.
- Mapped annotation of genes associated with growth and survival characteristics, and description of time of earliest possible detection in larval cohort.
- Inherent mutation rate of Southern California *Mytilus galloprovincialis.*
- Working 'blue-house' facilities on Catalina Island, ensuring future research for CSR and various scientific teams.

Phase II Deliverables:

- Simple commercial strategies and protocols for genetic based selective breeding programs for blue mussels, and shellfish in general.
- Byssal thread strength and shell robustness measurements between families and associated genetic profiles.
- Continued inbreeding in family lines, and Isolation of improved cultivars (strategy depending on mutation rate described in Phase I).

FY 2015 PHASE I AWARD WINNER

FIRM:	Climate Forecast Applications Network, LLC 845 Spring St. NW #129 Atlanta, GA 30308
AWARD:	$94,849.06
PHONE:	404-803-2012
E-MAIL:	curry.judith@gmail.com
PRINCIPAL INVESTIGATOR:	Mark Jelinek

TITLE OF PROJECT:	Probabilistic subseasonal weather forecasts for the energy & agricultural sectors
SUBTOPIC NUMBER:	8.3.1C

TECHNICAL ABSTRACT:

The proposed research addresses Climate Adaptation and Mitigation: Probability Forecasts of Business Impact Variables from CFS2 Ensembles. Climate Forecast Applications Network (CFAN) develops innovative weather and climate forecast tools that support decision-oriented solutions for our clients. The focus of this proposal is on business-relevant subseasonal forecasts for the energy and agricultural sectors, including applications to renewable energy. Analysis of the reforecast library against observation and analyses enables predictability assessment of business-relevant variables by region, initial and target month, and enables predictability assessment and recent forecast errors to correct for model bias error to improve the shape of the ensemble distribution. A multi-model prediction system using the CFSv2 and ECMWF forecasts will be developed to exploit the advantages of each model using ensemble clustering techniques. A strategy for assessing confidence of each forecast is based on a comprehensive forecast evaluation, predictability assessment, and ensemble characteristics. A web-based dashboard system is designed to display and deliver the forecast information in a flexible manner to aid decision support integration. Commercial applications of the forecast products will be targeted at the energy and agricultural sectors in the U.S. and Asia.

SUMMARY OF ANTICIPATED RESULTS:

At the end of Phase II, the expected outcomes are innovations in ensemble interpretation and calibration suitable for subseasonal time scales that provide the basis for web based decision support tools for the Energy and Agricultural sectors. These solutions will find commercial markets with existing providers of weather/climate services looking to enhance their product offerings, as well as directly with key end user segments in the energy and agricultural sectors.

FY 2015 PHASE I AWARD WINNER

FIRM:	The Cultured Abalone Farm, LLC 9580 Dos Pueblos Canyon Road Goleta, CA 93117
AWARD:	$94,647.00
PHONE:	805-685-1956
E-MAIL:	dswezey@culturedabalone.com
PRINCIPAL INVESTIGATOR:	Dr. Daniel S. Swezey

TITLE OF PROJECT:	Developing Ocean Acidification Resistance in Commercial Red Abalone
SUBTOPIC NUMBER:	8.1.1.1F

TECHNICAL ABSTRACT:

It is now recognized that the pH of the world's oceans is becoming more acidic as a consequence of increasing atmospheric CO2. This process, termed "ocean acidification" (OA) will affect the aquaculture of marine shellfish. In order to maintain current levels of commercial mollusk production, the identification and commercialization of resilient shellfish strains will be required. Emerging evidence suggests that wild shellfish populations may be locally adapted to variable pH conditions along the California coast. Our firm will exploit this natural variation, carrying out research towards the development of an OA resistant strain of red abalone. We will also work to develop a reproducible commercial diet and feeding approach that conveys resistance to OA. These products may hold significant commercial and market potential, setting an example for efforts in other shellfish industries. Our proposed OA culture experiment will investigate the relative resilience of different abalone populations under OA, and the effects of varying maternal and juvenile diet. We will identify resilient strains using both growth observations and advanced genetic techniques in collaboration with partner researchers. Our work will identify the genetic signatures of resilience to OA and will provide a foundation for future selective breeding efforts.

SUMMARY OF ANTICIPATED RESULTS:

Our work will identify abalone strains that are resilient to OA, and generate an assessment of the portions of the red abalone genome that are affected by acidification stress. This will enable the detection of "resilience signatures" in rapidly growing individuals. These analyses will include an assessment of the genetic heritability of this resilience as the foundation for selective breeding efforts. We will also generate an initial assessment of dietary components that convey resilience to OA under commercial aquaculture settings with the goal of developing a feedsock for abalone that conveys OA resistance.

FY 2015 PHASE I AWARD WINNER

FIRM: Giner, Inc.
89 Rumford Avenue
Newton, MA 02466

AWARD: $94,996.00

PHONE: 781-529-0529
E-MAIL: cmittelsteadt@ginerinc.com

PRINCIPAL INVESTIGATOR: Avni A. Argun, Ph.D.

TITLE OF PROJECT: Rapid and Low-Cost Field Toxin Analysis to Monitor Harmful Algal Blooms

SUBTOPIC NUMBER: 8.1.2N

TECHNICAL ABSTRACT:

During the harmful algal blooms (HAB), marine algal toxins reach concentrations high enough to cause various neurological and gastrointestinal disorders through inhalation of the toxin or consumption of contaminated shellfish. Brevetoxins, produced by dinoflagellate Karenia brevis, are known to disrupt neurological processes to cause an illness called neurotoxic shellfish poisoning. The timely recognition of this toxin in marine environment is thus of great importance for human health. However, the toxic levels of brevetoxin are on the order of parts-per-billion (ppb), making its detection very difficult and costly using the current analytical methods and biological assays. Furthermore, the correlation of the brevetoxin levels with the amount of K. brevis is not straightforward, further complicating the assessment of conditions dangerous to humans. This project aims to develop a low-cost, handheld electrochemical sensor device that will enable measurement of brevetoxin levels with high sensitivity while lowering the field detection limits down to sub ppb levels via utilization of an analyte concentration method. An accurate assessment of sample toxicity will be demonstrated by combining the brevetoxin levels with toxic K. brevis cell amounts using a single detection platform that is simple.

SUMMARY OF ANTICIPATED RESULTS:

The proposed program will develop an electrochemical sensor device that would enable highly sensitive and selective measurement of brevetoxin and K. brevis cells in ocean water. Successful demonstration of this study will allow for on-site, near real-time monitoring of toxic conditions at low cost. The final handheld product will provide rapid and accurate toxicity information to coastal managers and fisheries for decisions related to beach closure and seafood safety.

FY 2015 PHASE I AWARD WINNER

FIRM: Innovative Imaging & Research Corp
Building 1103, Suite 140C
Stennis Space Center, MS 39529

AWARD: $95,000.00

PHONE: 228-688-2452
E-MAIL: mpagnutti@i2rcorp.com

PRINCIPAL INVESTIGATOR: Dr. Robert E. Ryan

TITLE OF PROJECT: VIIRS DNB HGS Radiometric Calibration Source

SUBTOPIC NUMBER: 8.4.3D

TECHNICAL ABSTRACT:

A new radiometric vicarious calibration approach for the Suomi NPP VIIRS Day/Night Band's (DNB) high gain stage (HGS) is proposed that will complement traditional, extended source, radiance-based calibrations, which are based on natural lunar illumination and not as accurate as desired. The proposed research will produce affordable, field-deployable, NIST-traceable point source lamps that can achieve HGS DNB radiance per pixel with a long-term, post-correction source stability of better than 1%. Using radiative transfer modeling and VIIRS DNB characteristics, the top-of-atmosphere absolute radiometric accuracy will be better than 5% under clear sky conditions. The artificial source's spectral distribution can be made similar to that of natural lunar illuminated scenes to ensure this new approach is compatible with ongoing lunar illumination-based vicarious radiometric calibrations. Other spectral distributions can also be produced if needed. To increase energy efficiency and reliability, the source will be remotely controlled and monitored. The source will only turn on during the VIIRS DNB site overpass, when observation conditions are optimal. Built-in lamp sensors will provide lamp health information and auxiliary sensors will provide site environmental conditions. This new approach should be applicable to other nighttime imagers and will help calibrate other point sources observed by VIIRS.

SUMMARY OF ANTICIPATED RESULTS:

The technology that will be developed during this SBIR project will enable radiometric calibration of the VIIRS DNB HGS to within 5%. Current methods yield accuracies closer to only 15% and rely on models that are not always tied to national standards. Potential commercial applications include calibration light sources and related services to both satellite and aerial imagery providers. Calibrated high spatial resolution night time aerial imagery can be used to produce accurate lighting surveys and lighting maps to municipalities and commercial property owners including lamp/bulb type identification.

FY 2015 PHASE I AWARD WINNER

FIRM: Intelligent Optical Systems, Inc.
2520 W. 237th Street
Torrance, CA 90505

AWARD: $94,954.43

PHONE: 424-263-6360
E-MAIL: sbirproposals@intopsys.com

PRINCIPAL INVESTIGATOR: Manal Beshay

TITLE OF PROJECT: Rapid Lateral Flow Assay for Field Detection of Brevetoxins

SUBTOPIC NUMBER: 8.1.2N

TECHNICAL ABSTRACT:

The bloom-forming algae *Karenia brevis* produces neurotoxins known as brevetoxins (PbTx) that can cause illness in humans and marine wildlife. During *K. brevis* blooms, also known as red tides, elevated levels of brevetoxins have been linked to massive bird, fish, and marine mammal kills. In addition, human consumption of brevetoxin contaminated shellfish leads to neurotoxic shellfish poisoning. The economic impact of *K. brevis* blooms in Florida alone has been estimated to be upwards of $30M/year. In collaboration with Dr. Leanne Flewelling of the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute, Intelligent Optical Systems, Inc. (IOS) proposes to develop a shore-side, portable, fast, cost-effective PbTx detection immunoassay using lateral flow assays (LFA). Coupling of detector antibodies to high quantum yield labeling technology will enhance assay sensitivity. With this beachside assay, unlike the current laboratory-based assays, NOAA can then implement routine coastal monitoring. In Phase I, IOS will evaluate the feasibility of developing a cost-effective lateral flow assay for the rapid detection of brevetoxins in seawater, with analysis made possible by the use of a portable test strip reader for fluorescent measurement that can be extended to shellfish testing in Phase II.

SUMMARY OF ANTICIPATED RESULTS:

In Phase I, IOS will explore the feasibility of developing a rapid lateral flow assay that will report brevetoxin levels as low as 0.3 ppb in seawater or lower. The assay will yield results in 10-15 min. in a variety of environmental conditions. Once successfully developed, this low-cost (per-sample cost $10 or less) beach side assay will immediately identify brevetoxins and contribute to routine coastal monitoring. The possibility of applying this assay to shellfish matrices would greatly increase potential commercial applications for state and federal agencies that routinely test for brevetoxin in shellfish in order to protect human health. Use with shellfish would require a homogenization and extraction step under laboratory conditions, but the assay would increase speed and reduce cost compared to existing testing methods.

FY 2015 PHASE I AWARD WINNER

FIRM:	Northwest Research Associates, Inc. 3380 Mitchell Lane Boulder, CO 80301
AWARD:	$94,935.00
PHONE:	303-415-9701
E-MAIL:	Lindsey@nwra.com
PRINCIPAL INVESTIGATOR:	Dr. Charles Lindsey

TITLE OF PROJECT:	Monitoring Active Region Development on the Far-Side of the Sun
SUBTOPIC NUMBER:	8.4.1W

TECHNICAL ABSTRACT:

Solar active regions have a major impact on space weather. Knowledge of active regions in the Sun's far hemisphere can improve forecasts of impending solar storms and future UV irradiance variations that negatively impact spacecraft, communications, and navigation facilities, thus making knowledge of active region locations and strengths of great benefit to society. We will use algorithms based on seismology of acoustic waves in the Sun to monitor the Sun's far hemisphere: computational seismic holography and time-distance tomography. We will develop a large-active-region discriminator, capable of partitioning seismic signatures into simple individual elements for the purpose of identifying and characterizing the far-side active regions. For the Phase I study, primary emphasis will be on validating the helioseismic assessment of the locations, strengths, and growth rates of active regions in the Sun's far hemisphere in terms of stability and consistency over a 5-year period. Based upon these results, we will develop plans for a Phase II project to make synoptic seismic monitoring of the Sun's far hemisphere a crucial role of helioseismic observatories in space weather forecasting in the twenty-first century.

SUMMARY OF ANTICIPATED RESULTS:

The study will result in a quantitative assessment of how well different methods of helioseismology and active region discriminators can determine the locations, strengths, and growth rates of active regions on the far side of the Sun. From this, a recommendation will be made about what technique(s) are worthy of further development.

FY 2015 PHASE I AWARD WINNER

FIRM:	Prescient Weather 200 Innovation Blvd, Suite 229 State College, PA 16803
AWARD:	$94,692.00
PHONE:	814-466-2231
E-MAIL:	info@prescientweather.com
PRINCIPAL INVESTIGATOR:	John A. Dutton

TITLE OF PROJECT:	Probability Forecasts of Business Impact Variables From CFS2 Ensembles
SUBTOPIC NUMBER:	8.3.1.C

TECHNICAL ABSTRACT:

The value of the subseasonal and seasonal probability forecasts of the National Weather Service (NWS) will be enhanced when the information about standard meteorological variables is converted into information about business impact variables such as degree days, wind and solar power potential, and end-of-season crop yield. Toward that goal, in Phase I we will identify a suite of such action variables for a broad range of industries and activities, develop algorithms to obtain probabilities about a representative sample of such variables from the NWS Climate Forecast System Version 2 (CSF2) forecasts, and develop methods for verifying forecasts about action variables. Computing the forecasts and verification over a historical period will provide an estimate of the skill of the forecasts of the impact variables.
The ongoing CFS2 forecasts can then be combined with forecast skill to show decision makers the expected consequences of acting at various predicted probabilities to seize opportunity or mitigate advedse events. This will lead in Phase II to web-based interactive decision advisory systems tailored to industries such as energy, agriculture, transportation, and insurance and finance that will allow their decision makers to assess alternative actions, reduce climate variability risk, and increase profits.

SUMMARY OF ANTICIPATED RESULTS:

This project will produce subseasonal and seasonal probability forecasts about the key business variables of major national industries that will assist decision-makers to meet the challenge of managing risk and opportunity on the scale of weeks to seasons, thereby increasing the return on the national investment in atmospheric observations, research, and computer forecasts.

FY 2015 PHASE I AWARD WINNER

FIRM: Proteus Technologies, LLC
1040 Old Spanish Trail, Suite 7
Slidell, LA 70458

AWARD: $95,000.00

PHONE: 985-231-2222
E-MAIL: sean@proteustechnology.com

PRINCIPAL INVESTIGATOR: Sean Griffin

TITLE OF PROJECT: Stable, Towed, Volumetric Hydrophone Array

SUBTOPIC NUMBER: 8.2.1F

TECHNICAL ABSTRACT:

Detecting the presence of marine mammals is paramount in lessening man's impact on the environment as we search the oceans for natural resources. Most human operations in oceans use high powered acoustic sources that can disturb, disrupt, main or kill marine mammals. The ability to detect, identify and locate marine mammals is critical during these operations to mitigate harm. Passive acoustics has been found to be a highly reliable method to detect marine mammals but work is required to improve the process of locating them and decrease the system cost. There is significant literature on detection of marine mammals but little is available on systems that can determine bearing and range especially over the broad spectrum of marine mammal phonation. Such systems exist in expensive military hardware but low cost methods are required due to the economics that drive marine mammal detection. Low noise and highly sensitive systems are required to detect and locate marine mammals at the farthest range possible thus providing the widest coverage. The government has imposed regulations requiring marine mammal detection when ocean operations may harm the animals, so there is a significant need for low cost, real-time, high performance, reliable, towed passive acoustic system.

SUMMARY OF ANTICIPATED RESULTS:

Proteus's anticipated results are that we can provide a stable, towed, volumetric hydrophone array prototype at the end of the Phase I effort. The design will be capable of cost effective fabrication. The array will be capable of providing acoustic data that will detect and be capable of being used to calculate the bearing to a marine mammal.

FY 2015 PHASE I AWARD WINNER

FIRM:	Almeria Analytics 75 Spring Rd Rio Rancho, NM 87124
AWARD:	$94,992.00
PHONE:	505-603-4959
E-MAIL:	fernandezsj01@aol.com
PRINCIPAL INVESTIGATOR:	Steven Fernandez

TITLE OF PROJECT: Commercial Verde

SUBTOPIC NUMBER: 8.5.1

TECHNICAL ABSTRACT:

Public and commercial application of NOAA developed products such as climate observations, weather products, and datasets are underutilized by public decision makers, infrastructure asset owners, or the public. Communities realize the risk posed by increases in storm intensity, flooding, and heat waves. However, communities lack understandable models targets to stakeholder questions that are affordable, on-demand, interactive, and understandable. Almeria Analytics' (AA) in partnership with Street Legal Industries (SLI) propose a system based on the Visualizing Energy Resources Dynamically on Earth (VERDE) system. AA principals are inventors of VERDE (developed over the last decade at DOE's Oak Ridge National Laboratory) and AA is obtaining licenses for the VERDE patents to be available early in the Phase I period of performance.

VERDE combines situation awareness and modeling to provide a web-streaming platform based on open geospatial standards and issues look-ahead forecasts and analysis. Phase I deliverables include establishing the feasibility of the service simultaneously to workstations, smartphones and tablets. The Website in Phase I will gather requirements from user focus groups and demonstrate technical feasibility. Phase II objectives will include communication of critical analytic data to University of Tennessee partners and identified new desirable functions for the Phase II deliverable.

FY 2015 PHASE I AWARD WINNER

FIRM:	Amethyst Research 123 Case Circle Ardmore, OK 73401
AWARD:	$94,994.50
PHONE:	580-657-2575
E-MAIL:	admin@amethystresearch.com
PRINCIPAL INVESTIGATOR:	Dr. Weerasinghe Priyantha

TITLE OF PROJECT: Ultra High Sensitivity SWIR Methane Imaging Camera

SUBTOPIC NUMBER: 8.6.1X

TECHNICAL ABSTRACT:

Methane, is the third most prevalent greenhouse gas whose atmosphere concentration is currently over 1.7 ppm. Methane is about 21 times more potent when compared to CO2. Even though its concentration in the atmosphere is more than 200 times lower than carbon dioxide, methane is responsible for 20% of the greenhouse effect. The main natural resources for methane include wetlands, termites and the oceans. Natural sources create 36% of methane emissions. The main anthropogenic sources come from landfills, livestock farming, and in the production, transportation and use of fossil fuels accounting for 64% of the total. While the quantitative monitoring of methane levels is necessary, it is also critically important to directly identify the sources of methane, for example, such as leaks in pipelines, and also from drilling/fracking and other human activities. In this NOAA SBIR program, Amethyst Research proposes to develop a relatively inexpensive methane gas imaging camera that can be used for direct observation of methane gas/emissions. This camera will be high sensitivity, low power, low cost and light so it can be integrated onto UAV's platforms and hand held systems.

SUMMARY OF ANTICIPATED RESULTS:

The anticipated benefits of the proposed methane gas imaging sensor are sensitivity, low cost and low weight making this imaging system technology ideal for sensing and imaging a wide variety of trace gases, in both land-based and airborne measurements. These advantages will allow the technology to serve the dual markets of industrial and environmental detection and analysis. Examples of trace gases that can be measured include greenhouse gases and emissions from the burning of fossil fuels, and the release of chemical weapons. The important areas of public application include homeland security, industrial process control, and emission monitoring.

FY 2015 PHASE I AWARD WINNER

FIRM:	Chemled Technologies, LLC 574 Stone Hill Rd Orange, CT 06477
AWARD:	$95,000.00
PHONE:	203-847-3607
E-MAIL:	rs@chemled-technologies.com
PRINCIPAL INVESTIGATOR:	Radoslaw M. Sobczynski, Ph.D.

TITLE OF PROJECT:	Laser Sensor for Unattended, and Precise Determination of Calcium and Strontium in Seawater
SUBTOPIC NUMBER:	8.6.1X

TECHNICAL ABSTRACT:

The use of unattended floats, platforms, and drones addresses the immense challenge of cost-effectively characterizing the chemistry of the oceans. The proposed program strengthens this capability by demonstrating the feasibility of Laser Fluorescence Enhanced Flame Spectrophotometry (LFEFS) for the simultaneous and high precision measurement of calcium and strontium. These are key elements of the human food chain at risk due to ocean acidification. LFEFS offers ICP-AES-comparable precision with greater chemical selectivity and immunity to interference with compact and light weight design. The LFEFS innovation is enabled by the incorporation of the recently developed IPSSL (Intracavity Plasma Solid State Laser) platform. IPSSL is an atomic resonant wavelength laser with an embedded atomic standard. The resulting wavelength stability (ranging from 0.1 to 1 picometers) virtually eliminates wavelength drift and simplifies instrument design. High precision and signal-to-noise are promoted by (1) optical power levels sufficient to saturate the resonant transition eliminating quenching of exited atoms, and (2) operation based on ground state rather than excited state transitions. The beam can be electronically modulated for noise reduction, and no spectrometer is required.

Experimental IR&D results using IPSSL-Rb are supportive of proposal contentions. A successful program will result in products for immediate commercialization.

SUMMARY OF ANTICIPATED RESULTS:

Feasibility of the LFEFS chemical analytical method will be demonstrated for single element (calcium only) and multi-element (calcium and strontium simultaneously) calibrated concentration determinations. Feasibility of single-wavelength IPSSL-Ca and dual-wavelength IPSSL-Ca-Sr laser will also be demonstrated. The later will be patented, and both lasers will be commercialized through the company's manufacturing gate system.

FY 2015 PHASE I AWARD WINNER

FIRM:	Industrial Economics 2067 Massachusetts Ave Cambridge, MA 02476
AWARD:	$93,812.83
PHONE:	617-354-0074
E-MAIL:	DHudgens@indecon.com
PRINCIPAL INVESTIGATOR:	Daniel E. Hudgens

TITLE OF PROJECT:	Supporting Local Decision Making through a Comprehensive Community Driven Data Tool
SUBTOPIC NUMBER:	8.5.1X

TECHNICAL ABSTRACT:

A central part of NOAA's mission is to develop and distribute scientific data, including large-scale climate, weather, marine, and coastal information for regional and national analysis. NOAA has also developed local data gathering tools on an as-needed basis. While these approaches demonstrate the power of local data collection, no existing tool meets the broad needs of environmental community groups leading such efforts. Significant challenges hinder both the collection and distribution of local-scale data, and aggregation into large-scale data sets. Our proposed method, community driven data (CD2) collection, assists decision makers and data collectors, with the goal of combining local information to create regional and national level data. We aim to research and design our CD2 application and demonstrate its feasibility to: (1) connect community groups with existing NOAA data sources relevant to decision making needs; (2) provide a platform for deploying new mobile collection forms, engaging the group members/volunteers, and standardizing the data prior to aggregation in a data warehouse; and (3) utilize a web-based portal for connecting subscribers to regional and national aggregations of collected data.

SUMMARY OF ANTICIPATED RESULTS:

For the Phase I effort, we plan to complete the feasibility assessment and design of the CD2 toolset. We expect to build relationships with data providers and community groups to obtain substantial information on stakeholder needs and identify individuals willing to comment on draft design proposals. Next, we will determine barriers and challenges both in terms of technology and use adoption as well as likely solutions to each and develop technical code in order to identify the best approach for development. We anticipate testing scenarios that can be used to guide the full Phase II prototype and initial application and preparing a final report summarizing the above research and associated requirements for follow-on development and product commercialization. Our target market for CD2 is through the sale of, or subscription service to, the regional and national data created through the application.

FY 2015 PHASE I AWARD WINNER

FIRM:	Mano Nanotechnologies 151 Willow Street Guilderland, NY 12180
AWARD:	$94,952.07
PHONE:	518-542-2395
E-MAIL:	jmanobianco@verizon.net
PRINCIPAL INVESTIGATOR:	John Manobianco

TITLE OF PROJECT:	GlobalSense: A New Atmospheric Observing System Featuring Innovative Airborne Probes
SUBTOPIC NUMBER:	8.6.1X

TECHNICAL ABSTRACT:

The underlying framework for modern-day weather forecasting is numerical weather prediction (NWP). Even the current and planned weather observing platforms leave gaps that are insufficient to meet the requirements of NWP. Mano Nanotechnologies, Inc. proposes a new environmental sensing system, known as “GlobalSense”, which will enable transformational forecast improvements by filing these critical data gaps and benefit a broad range of applications with sensitivity to atmospheric conditions.
The GlobalSense system features an ensemble of completely disposable, airborne probes, mechanisms to deploy probes, and receiver platforms to gather data from probes. The ultra-compact probes known as eMotes will leverage ongoing trends in component integration and miniaturization to provide low cost, wireless sensing capability and will function as passive drifters using no active propulsion or flight. eMotes will be designed to remain airborne and make measurements of temperature, humidity, pressure, and wind velocity for hours or longer depending on atmospheric conditions and deployment altitude.

The Phase I project objective is to design and simulate various elements of the GlobalSense system. Commercial modeling and design software will be used to optimize eMote mechanical and electrical architecture as well as address functional system specifications that resulted from previous tradeoff studies.

SUMMARY OF ANTICIPATED RESULTS:

The Phase I project will result in hardware and software designs for eMotes, receivers, and deployment mechanisms. Work in Phase I will focus on critical system/component functions and characteristic proof of concept to provide the foundation for prototype development and demonstration in Phase II. The GlobalSense value proposition for weather applications is improved forecasting that translates directly to economic and social benefits for a multitude of weather-sensitive sectors of the global economy. A GlobalSense system can have much broader commercial potential beyond traditional weather forecasting by measuring parameters of interest for air quality, greenhouse gas (climate change), surveillance, reconnaissance, and related applications.

FY 2015 PHASE I AWARD WINNER

FIRM:	Propagation Research Associates 1275 Kennestone Circle, Suite 100 Marietta, GA 30066
AWARD:	$95,000.00
PHONE:	770-795-8181
E-MAIL:	contracts@pra-corp.com
PRINCIPAL INVESTIGATOR:	Bonnie Valant-Spaight

TITLE OF PROJECT:	Novel Method for Ground-based GNSS Radio Occultation Measurement
SUBTOPIC NUMBER:	8.6.1X

TECHNICAL ABSTRACT:

Propagation Research Associates, Inc., (PRA) proposes to redesign our existing Enhanced Tropospheric Effects Compensation ground-based radio occultation (RO) measurement system, which was developed, prototyped, and demonstrated under previous SBIR contracts, for the purpose of optimizing cost and performance. Assimilation of space-based RO measurements into numerical weather models is a proven method for increasing model forecast skill. Development of ground-based RO has to this point been limited to mountaintop locations and airborne platforms. PRA's proposed system would be a novel approach to a ground-based radio occultation measurement. PRA's hardware will allow RO measurements from any land location at any altitude. In Phase I, we will focus on redesigning the data acquisition system, demonstrating parts of our design through an experiment, and optimizing the antenna performance. We will also expand the system design to collect other Global Navigation Satellite System constellation signals, such as the Russian GLONASS and European Galileo systems, in addition to the existing Global Positioning System (GPS) capability.

SUMMARY OF ANTICIPATED RESULTS:

By the end of Phase I, PRA expects to have a design for a commercially viable system for ground-based RO measurements. The benefits include vastly expanding the number of RO measurements for a specific location over current space-based methods, thus allowing improved forecasting for the location of interest.

FY 2015 PHASE I AWARD WINNER

FIRM:	Salo IT Solutions P.O. Box 141049 Minneapolis, MN 55414
AWARD:	$94,580.00
PHONE:	612-605-6896
E-MAIL:	salo@saloits.com
PRINCIPAL INVESTIGATOR:	Timothy J. Salo

TITLE OF PROJECT:	NOAA/eNvironmental Beacon (nBeacon) System
SUBTOPIC NUMBER:	8.5.1X

TECHNICAL ABSTRACT:

The nBeacon system will push localized, timely, relevant NOAA data products to public users' smartphones, tablets, and other mobile devices in a convenient, unobtrusive, accessible, easily understandable format. In essence, the nBeacon system will provide a new distribution channel for NOAA data products and services to the general public.

SUMMARY OF ANTICIPATED RESULTS:

The Phase I project will demonstrate the technical feasibility of the nBeacon System by developing prototypes of the Android user experience, which will display NOAA data products on the public users' smartphones, and of the nBeacon server, which will retrieve NOAA data products from NOAA servers and deliver them to public users' smartphones.

FY 2015 PHASE I AWARD WINNER

FIRM:	Southwest Sciences 15740 Pacheco Street, Suite E-11 Santa Fe, NM 87505
AWARD:	$95,000.00
PHONE:	505-984-1322
E-MAIL:	astanton@swsciences.com
PRINCIPAL INVESTIGATOR:	Dr. Joel A. Silver

TITLE OF PROJECT:	Portable high precision nitrogen gas analyzer for eddy covariance flux measurements
SUBTOPIC NUMBER:	8.6.1X

TECHNICAL ABSTRACT:

Recent theoretical studies of eddy flux correlation have suggested that the commonly used assumption of dry air having no net flux is erroneous and can lead to significant errors in reported observations. Presently, dry air density is calculated indirectly from measured temperature, pressure and relative humidity, all of which contribute to increased uncertainties in the result. If instead the density of nitrogen, which has no net vertical flux, was measured directly, the accuracy of eddy correlation measurements could be improved substantially. Southwest Sciences, Inc. proposes to develop a portable nitrogen analyzer that would be used in conjunction with sonic anemometers to greatly improve the performance of eddy covariance flux measurements. These studies are critical for characterizing the sinks and sources of greenhouse gases.

In Phase I, we will demonstrate the viability of a spectroscopic technique that can measure atmospheric nitrogen with high precision and time response, yet meet the needs of a portable field instrument. Critical tradeoffs in laser selection and analyzer design will be studied to determine the optimum operating configuration. The precision of the analyzer will be evaluated over the expected range of temperatures and pressures required for field operation.

SUMMARY OF ANTICIPATED RESULTS:

The Phase I research will determine the best possible configuration for a high precision nitrogen eddy flux analyzer, so as to lay the groundwork for building and demonstrating a field-deployable instrument that can provide improved data for understanding climate change. Such a commercial instrument may provide less costly instrumentation for measuring specific gases that are otherwise difficult to detect using more common absorption methods. Expanded market areas of this technology beyond environmental monitoring include applications in natural gas production and industrial process monitoring.

FY 2015 PHASE II AWARD WINNER

FIRM:	3SRM Inc. 965 Hao St. Honolulu, HI 96821
AWARD:	$399,865.00
PHONE:	808-373-3243
E-MAIL:	porterj005@hawaii.rr.com
PRINCIPAL INVESTIGATOR:	Dr. John N. Porter

TITLE OF PROJECT: A Stereo Camera System for Measuring Coastal Currents

SUBTOPIC NUMBER: 8.4.4W-P

TECHNICAL ABSTRACT:

Inexperienced swimmers are often unaware of the presence of treacherous rip currents and this leads to many drowning deaths each year. Even when signs are posted, the public probably does not clearly understand the danger. It would be more informative if the public were ale to maps of the location, speed, and direction of coastal currents. Ocean safety officials are using various methods to inform the public of these dangers but at this time they do not have an easy way to map out the location, speed, and direction of coastal currents. New sensors are needed to address this need. The goal of this Phase 2 project is to develop camera systems which will measure the location, speed, and direction of coastal currents. Three approaches will be developed including a cell phone application, a single camera system, and a stereo camera system. When mounted on a pan-tilt system (with accurate encoders), it will be possible to measure distant coastal currents in a quantitative manner. The data stream can also be made compatible with existing regional protocols.

SUMMARY OF ANTICIPATED RESULTS:

The 3SRM Inc. company will build, test, and demonstrate three imaging systems for measuring coastal currents. These consist of a cell phone application, a single camera system and a stereo system. As part of this effort a fast low cost micro-computer will be programmed for data collection and the data processing. At the end of the phase 2 effort, the first commercial version of the camera systems will be completed and ready for sales. During the Phase 2 project tests and validation measurements will be carried out in Hawaii during the first year. During the second year additional measurement will be carried out to the East and Gulf Coasts during periods of elevated surf. A variety of cases will be tested including 1) large and small surf, 2) regions with surface foam and no surface foam, and 3) windy and calm conditions. The results will be presented in a scientific paper and in a technology paper. Several meetings of ocean safety experts will be carried out to discuss new technologies and their utilization. The information gained from these meetings will guide the way in which the information is collected, presented and disseminated.

FY 2015 PHASE II AWARD WINNER

FIRM: Aerodyne Research, Inc.
45 Manning Road
Billerica, MA 01821

AWARD: $399,996.00

PHONE: 978-663-9500
E-MAIL: ddn@aerodyne.com

PRINCIPAL INVESTIGATOR: Dr. David Nelson

TITLE OF PROJECT: Ultra-High Precision Laser Isotope Monitor for 13CO2, CO180 and CO170

SUBTOPIC NUMBER: 8.3.1R,C

TECHNICAL ABSTRACT:

Greenhouse gas (GHG) emissions are primary drivers of global climate change. Hence there is a crucial need to quantify their sources and sinks. A powerful method to constrain source and sink strengths is the analysis of the relative proportions of isotopic variants of GHG's in atmospheric samples like those collected globally by NOAA's Cooperative Air Sampling Network. Measurements that are capable of informing climate science require extremely high precision. The standard technique, isotope ratio mass spectrometry (IRMS), is precise but is limited by laborious sample processing requirements, high capital cost, high maintenance and impracticality of field deployment. We avoid these limitations with an alternative method to measure the isotopic composition of the most important GHG: carbon dioxide. Using Tunable Infrared Laser Direct Absorption Spectroscopy (TILDAS), we demonstrate measurement precision at least as good as IRMS and exceeding that requested until Sub-Topic 8.3.1 for ō13C-CO2 (0.006 vs. 0.01‰_ and ō18O-CO2 (0.007 vs. 0.02‰). During Phase II we will produce and demonstrate a commercial instrument meeting this standard while measuring small discreet air samples (<60 ml). We rely on two innovations: a small volume, high vacuum optical cell and a rapid sample switching method promoting long term signal averaging, without measurement drift.

SUMMARY OF ANTICIPATED RESULTS:

The proposed instrument will have an immediate technical impact in several research fields that utilize isotope ratio mass spectrometry of CO2: atmospheric chemistry, ecology, climate science and geochemistry. This instrument, with equivalent or better precision and lower capital and operating costs than IRMS, will increase productivity and encourage wider use of CO2 isotope measurements, thus promoting commercialization within these research communities. Additional commercial opportunities exist in oil and gas prospecting (already in use) and in human breath analysis as a medical diagnostic. Development of this technology will also lead to additional laser isotope applications, including monitors for the clumped isotopes of CO2.

FY 2015 PHASE II AWARD WINNER

FIRM:	Boston Engineering Corporation 300 Bear Hill Road Waltham, MA 02451
AWARD:	$399,992.81
PHONE:	781-466-8010
E-MAIL:	mrufo@boston-engineering.com
PRINCIPAL INVESTIGATOR:	Michael Rufo

TITLE OF PROJECT:	Multipurpose Above Surface/Below Surface Expendable Dropsonde
SUBTOPIC NUMBER:	8.4.2W

TECHNICAL ABSTRACT:

There are currently no inexpensive, expendable air-deployed monitoring systems (Dropsondes) that measure atmospheric data and oceanographic as a function of depth. These are important data in predicting the intensity and path of hurricanes. Boston Engineering proposes to provide NOAA with a solution to this challenge with the Multi-Purpose Above Surface/Below Surface Expendable Dropsonde (MASED) proven feasible in Phase I. Our team will work closely with NOAA to develop the MASED to be able to conduct an aerial deployment at the end of the Phase II SBIR, collecting meteorological data during the aerial descent followed by 5 descent-ascent cycles collecting marine data to 200 meters depth. In addition to hurricane forecasting, the data will have general oceanographic applications, and the dropsonde can be fitted with a dissolved oxygen sensor that may be used to map areas of hypoxia, with application to fisheries and the fishing industry. In Phase II, Boston Engineering will design, test and refine MASED prototypes, and will demonstrate operation under actual conditions. Boston Engineering has developed a plan to carry the Phase II program to the commercial product level through a combination of licensing and manufacture and sale of products.

SUMMARY OF ANTICIPATED RESULTS:

Today, hurricanes in the United States typically cause damages of $1 to $3 billion annually with an average death rate of 19.6 residents. The total cost of warning and emergency response to a typical year with three hurricanes is $787.5 million, representing some $0.5 million to $1 million per mile of coast ine. Hurricane Katrina which made landfall on the Gulf Coast of the United States in 2005 caused an estimated $96-125 billion in damage with economic losses potentially as high as $250 billion. The ability for the MASED system to collect atmospheric data and then subsea data for hurricanes will provide forecasters with data for better prediction of hurricane force. Current methods just measure the surface temperature of the ocean, which does not give data on the available oceanic energy the hurricane can build upon. The MASED approach provides data to calculate this energy, abased on underwater thermal gradients.

FY 2015 PHASE II AWARD WINNER

FIRM: Carr Astronautics
6404 Ivy Lane Suite 333
Greenbelt, MD 20770

AWARD: $391,283.40

PHONE: 301-220-7340
E-MAIL: rgillespie@carrastro.com

PRINCIPAL INVESTIGATOR: Robert Gillespie

TITLE OF PROJECT: New METSAT Display System for Weather-Ready Nation

SUBTOPIC NUMBER: 8.4.3.W-P

TECHNICAL ABSTRACT:

Phase II of the New METSAT Display project will produce a working beta version of the Earth Imaging product customized for NWS/NOAA as outlined in the Phase I proof of concept. This product will ingest imagery from a data source (in this case a web service of NOAA satellite imagery) and display it accurately on a globe of the Earth. Vector data such as roads, cities, towns, counties, states, etc. will be layered with the images. In addition other data—for example Radar imagery and forecast data—will be integrated with the satellite imagery. Users will be provided with an abundance of tools to localize and analyze the imagery and weather data. Imagery will be automatically ingested from a web service and provide real time data to users. Users will be able to select an area of interest and display the most recent, or archived data for that region. Users will be able to animate the available imagery in order to detect patters and weather developments in their chosen area of interest.

SUMMARY OF ANTICIPATED RESULTS:

Develop a beta version of the Earth Imaging Product which will be customized to meet NWS/NOAA needs for a New METSAT Display for weather.gov and other web assets. This customized product will be demonstrated to NOAA using NOAA image data. A full set of design and testing documentation will be written to support this development effort. Vector data and other weather data will be layered with the satellite imagery allowing users to localize the imagery and other data accurately and to use it to support decision making. It will be possible to animate the imagery to capture the dynamic pattern of weather formation.

FY 2015 PHASE II AWARD WINNER

FIRM: Dioxide Materials
3651 FAU Blvd
Boca Raton, FL 33431

AWARD: $400,000.00

PHONE: 561-613-1991
E-MAIL: Richard.ni@dioxidematerials.com

PRINCIPAL INVESTIGATOR: Zheng Richard Ni

TITLE OF PROJECT: SBIR Phase II: Optimized CO2 Gas Sensor for Autonomous Measurement of Ocean Carbon

SUBTOPIC NUMBER: 8.2.2R

TECHNICAL ABSTRACT:

The objective of the proposed work is to create low cost, low power sensors for autonomous measurement of ocean carbon. In our Phase I effort, we showed that Dioxide Materials' miniature CO2 sensors have the speed and sensitivity to meet NOAA's requirements for sensing ocean carbon. The objective of the proposed work is to further develop the sensors so that they can be used directly in NOAA's existing ocean carbon measurement system. Work incudes temperature compensation, so the devices can work in the Arctic, interface changes so the devices can communicate with NOAA's existing hardware, and other changes. At the end of the program we propose doing a field test at NOAA's location so we can verify performance for the intended application.

SUMMARY OF ANTICIPATED RESULTS:

If we are successful, we will allow NOAA to build systems that are smaller, lighter and require much less power.

FY 2015 PHASE II AWARD WINNER

FIRM:	Maine Fresh Sea Farms 256 Lower Round Pond Rd Bristol, ME 04539
AWARD:	$399,999.00
PHONE:	207-380-6478
E-MAIL:	mainefreshseafarms@gmail.com
PRINCIPAL INVESTIGATOR:	Peter Arnold

TITLE OF PROJECT:	The Development of Sustainable, Multi-seasonal, Multi-species, Marine Algal Aquaculture in Coastal Maine
SUBTOPIC NUMBER:	8.1.1F

TECHNICAL ABSTRACT:

Maine Fresh Sea Farms (MFSF) will build a multi-species, multi-season prototype farm with the goal of having crops of fresh sea vegetables available throughout the year. What isn't utilized fresh will be dried for longer-term storage and used in other products. Our team will gather data on water quality, nutrients, light levels, and hydrodynamics to assemble profiles of key parameters that determine optimum algal growth and evaluate factors that will be important for growing high quality sea vegetables. In addition to moving forward on the science of sea farming, we will build the necessary technology and expertise in handling, processing, and marketing to assure a clear path to commercialization. MFSF will continue our emphasis on sales of fresh sea vegetable to local and regional markets and more fully research these markets to identify all possible buyers and users. The results of this work will be requisite for the establishment of other farms.

SUMMARY OF ANTICIPATED RESULTS:

The anticipated results of this Phase II effort will be a prototype farm producing multiple species of sea vegetables over a year round growing season. The work will entail the collection of information about key variables that affect grown and the final conditions of the sea plants before harvest, optimal harvest and holding strategies and the identification of factors that might limit production. Mariculture along the coast of Maine has a valid claim to being truly organic and we will pursue certification for our production. We will have a clear path to the production of a number of products and have the technology in hand to move to full scale commercialization.

FY 2015 PHASE II AWARD WINNER

FIRM: Piasecki Aircraft Corporation
P.O. Box 360
2nd Street West
Essington, PA 19029

AWARD: $399,941.00

PHONE: 610-521-5700
E-MAIL: Geiger_br@piasecki.com

PRINCIPAL INVESTIGATOR: Dr. Brian Geiger

TITLE OF PROJECT: "Whimbrel" Unmanned Aircraft System-Borne Atmospheric and Sea Surface Temperature (SST) Sensing

SUBTOPIC NUMBER: 8.4.5R, W-P

TECHNICAL ABSTRACT:

Piasecki Aircraft (PiAC) proposes to continue development and testing efforts of the Whimbrel UAS, a low cost, expendable, air-deployed weather survey unmanned aircraft system. The Whimbrel UAS, a low cost, expendable, air-deployed weather survey unmanned aircraft system. The Whimbrel USA has been developed to support the Tropical Cyclone Boundary Layer mission requirements and contains sensors and data processing algorithms to measure temperature, pressure, humidity, wind vector, Sea Surface Temperature (SST), and sensible and latent heat flux. The Phase II effort will consist of a detailed design with updated stress, aerodynamics, and joint dynamic analyses from the Phase I effort. We will fabricate four prototypes for component and integrated system testing, culminating in a week long validation test effort at the Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) main site in the Southern Great Plans (SGP). We will perform 8 air launches to validate launch method reliability and aerodynamic performance (glide, ratio, power use) will be recorded for later analysis. The validation effort will make use of thee collection of reference sensors at the SGP site to document uncertainty ranges of the Whimbrel sensor suite.

SUMMARY OF ANTICIPATED RESULTS:

The Whimbrel has been designed to be a low-cost UAS from the start. Typically, widespread use of an UAS for an expendable mission has up to now been impractical due to the high system cost. Through mass production techniques and avoidance of machined parts, the Whimbrel design targets a cost point that enables an increased use profile similar to how dropsondes are currently used. Compared to a dropsonde, the Whimbrel offers additional sensing time and the measurement of Sea Surface Temperature and heat fluxes, the latter, of which generally requires a platform capable of maneuvering or a very expensive sensor. The direct benefits of the Phase II effort will be verification of our performance and sensing accuracy claims made in Phase I.

FY 2015 PHASE II AWARD WINNER

FIRM:	Riverside Technology, Inc. 2950 East Harmony Road, Suite 390 Fort Collins, CO 80528
AWARD:	$399,998.00
PHONE:	970-484-7573
E-MAIL:	angi.connolly@riverside.com
PRINCIPAL INVESTIGATOR:	George F. Smith

TITLE OF PROJECT:	Increasing the Availability and Utility of Weather and Climate Data to Meet Decision Maker Needs
SUBTOPIC NUMBER:	8.4.1D

TECHNICAL ABSTRACT:

In Phase I, Riverside investigated the need for increased access to NCDC storm data using web Application Programming Interfaces (APIs) to connect severe weather and socioeconomic information. The focus of Phase I was to design and validate an architecture that specifies the methods through which the NCDC Storm data can be programmatically accessed, processed, and displayed in easy to use interfaces. Phase I market research verified the need for tools and software algorithms for accessing the NCDC data combined with socioeconomic data for the purpose of risk identification and assessment. We have designed a software product to move customers through the process of scoping and identifying climate-and weather-based risks to assets of interest. Through discussions with potential customers we have identified prospective markets for our proposed products. For Phase II, we have identified seven main objectives to create a commercially viable product. These objectives are: Refine Product Requirements, Develop User Interface, Develop API, Acquire Data, Incorporate Additional Datasets, Develop Workflow Framework, and Create Risk Assessment and Calculation Tools.

SUMMARY OF ANTICIPATED RESULTS:

The expected outcome of this project is a commercially viable software package that will meet the demands of our identified markets. The application will be used to increase environmental intelligence through access and visualization of NCDC storm data and other applicable data sources. Customers will be able to combine environmental and socioeconomic data to create new data products, and perform risk identification and analysis. The product will allow customers to identify assets at risk and then generate ‘what-if’ scenarios to help them create mitigation strategies to protect those assets. Initial development will focus on risk associated with severe weather events, but the intent is to expand the product to target broader markets such as agriculture and supply-chain dependent manufacturing companies.

FY 2015 PHASE II AWARD WINNER

FIRM:	Toyon Reseach Corporation 6800 Cortona Drive Goltea, CA 93117
AWARD:	$400,000.00
PHONE:	805-968-6787
E-MAIL:	abrown@toyon.com
PRINCIPAL INVESTIGATOR:	Andrew P. Brown, Ph.D.

TITLE OF PROJECT:	Automated Analysis of Fisheries Information from Digital Skills
SUBTOPIC NUMBER:	8.2.1F

TECHNICAL ABSTRACT:

Toyon proposes development of a system which performs automated analysis of images for fish population monitoring and fishing regulation enforcement application. The proposed system is capable of processing images collected from autonomous underwater vehicles (AUVs) and remotely operated vehicles (ROVs), as well as images collected using electronic monitoring (EM) cameras used to observe fish catches landed on the decks of vessels. The proposed software prototype will include functions for assisting humans in rapidly and consistently analyzing stereo images, including automation of 3D length measurement of fish, and assisting humans in fish counting and classification applications by cueing to fish locations in video image/data streams. The proposed system is based on advanced algorithms developed in Phase I, which will be optimized and implemented in real-time software with a convenient user interface in Phase II. The software prototype will be optimized for assisting NOAA scientists in AUV imagery analysis, and Toyon will support software integration and testing in collaboration with NOAA scientists in Phase II. The utility of the algorithms for EM applications will also be tested and demonstrated, and commercialization opportunities in the commercial fishing industry will be pursued in conjunction with deployment of EM systems.

SUMMARY OF ANTICIPATED RESULTS:

The proposed research and development will support the National Marine Fisheries Service (NMFS) in its mission of monitoring, regulating, and protecting fish populations and habitats to ensure sustainment of commercial and recreational resources, and to protect the environment. In particular, development of technology which provides automation for analysis of digital images collected by NMFS assets is proposed, to enable improved efficiency, accuracy, and consistency in performing monitoring and enforcement functions. The prototype system developed in Phase II will provide tangible benefits to NOAA scientists by assisting them in their field studies and research, and will facilitate demonstrations enabling transition into commercial fishing industry electronic monitoring applications.

FY 2015 PHASE II AWARD WINNER

FIRM: TRUNAV LLC
19437 Edgebrook Ln
Tinley Park, IL 60487

AWARD: $399,105.86

PHONE: 312-753-9431
E-MAIL: samer@trunav.net

PRINCIPAL INVESTIGATOR: Samer Khanafseh

TITLE OF PROJECT: Self-Contained Sub-Centimeter Positioning Platform

SUBTOPIC NUMBER: 8.1.2N

TECHNICAL ABSTRACT:

The goal of this project is to develop, prototype, and experimentally validate a new Differential Global Navigation Satellite System (DGNSS) capable of providing sub-centimeter positioning accuracy for quasi-static scientific, survey, and structural health monitoring application. The main feature of the proposed DGNSS solution is that it leverages publically available GNSS reference data from existing NOAA's Continuously Operational Reference Stations (CORS). Customized GNSS reference receiver networks or subscription services are not needed. Advanced filtering algorithms and error modeling techniques are developed to provide reliable and economical sub-centimeter accuracy for a variety of static and quasi-static scientific and commercial application. In Phase-II, TruNav will develop and implement new algorithms to make the system more robust to data outages, erroneous data, and even measurement faults. Positioning accuracy in kinematic applications will also be improved using advanced modeling and estimation techniques.

SUMMARY OF ANTICIPATED RESULTS:

The proposed system is directly applicable to monitoring slow vertical movement of NOAA's 200+ National Water Level Observation Network (NWLON) platforms, as well as easy positioning of new NWLON sites to cover current gap areas. It will also be directly useful in structural health monitoring systems for bridges and high rise buildings, for surveying, and will be a more cost effective alternative to Real-Time Kinematic (RTK) GNSS systems.