



# SBIR



## **Small Business Innovation Research Program**

## **ABSTRACTS OF PHASE II AWARDS FOR FISCAL YEAR 2011**

**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 10 Phase I contracts for FY 2011. These awards are up to \$95,000 each, and totaling approximately \$1 million. 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 2011 (NOAA 2011-1)." 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 7 Phase II contracts in FY 2011 for a total of approximately \$2.5 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 169 proposals were received by DOC/NOAA in response to its FY 2011 solicitation. Internal and external scientists and/or engineers independently reviewed the proposals. With the funds available, only 10 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 2011 PHASE II AWARD WINNER

FIRM: WorldWinds, inc.  
1010 Gause Blvd., Suite 48  
Slidell, LA 70458-2940

AWARD: \$399,961

PHONE: 985-641-8661  
FAX: 985-288-6115  
E-MAIL: evalenti@worldwindsinc.com

PRINCIPAL INVESTIGATOR: Elizabeth Valenti, President/CEO

TITLE OF PROJECT: New NOAA-Derived Data Products for the  
TV Broadcast Market

SUBTOPIC NUMBER: 8.3.2D

### TECHNICAL ABSTRACT:

This Phase II SBIR will execute the research to commercialization process developed in Phase I, when WorldWinds, Inc. developed and implemented a procedure to showcase graphical NOAA products for on-air consumption by the general public. Through collaboration with Baron Services, Inc., of Huntsville, AL, the Phase I project developed a prototypical composite Blended Total Precipitable Water product that was ingested by Baron's OMNI and VIPIR commercial weather display packages. During the three week beta test period, a seven station beta test group was educated on the product's scientific merit and each station was updated daily as to the product's application. The process developed in Phase I: 1) prototypical product development, 2) education and training, and 3) on-air beta testing, will again be used in Phase II to introduce potential new data products to the television broadcast market. Several new Phase II candidate products have already been identified, including: bTPW Wind Analysis Overlay; Surface Wind Analysis; Merged Radar and Satellite Derived Rainfall Rate and Reflectivity; Drought Indices, Seasonal Forecasts, and Percent of Normal Precipitation; Great Lakes Sea Ice Analysis; Fire, Smoke, and Ash; Forecast Rainfall; Saharan Air Layer Satellite Analysis Schemes; Ocean Currents; Harmful Algae Blooms; and Emergency Response and Recovery.

### SUMMARY OF ANTICIPATED RESULTS:

The main objective for this work is to introduce new NOAA derived data products into the existing television broadcast supply stream through already established commercial weather display packages. Based on Phase I results, the team expects that visual enhancement, as well as filling of data void regions, will be necessary to meet the expectations of television viewers. Eleven potential new products are identified in this proposal. A reasonable expectation is to have 5-6 new NOAA derived products permanently embedded into Baron Services' OMNI and VIPIR commercial weather display systems. Additionally, as new satellite data sources become available in the future, they may be evaluated for inclusion into the TV broadcast data stream.

## FY 2011 PHASE II AWARD WINNER

FIRM: Codar Ocean Sensors, Ltd.  
1914 Plymouth Street  
Mountain View, CA 94043-1796

AWARD: \$399,992.01

PHONE: 408-773-8240 x18  
FAX: 408-773-0514  
E-MAIL: chad@codar.com

PRINCIPAL INVESTIGATOR: Chad Whelan, Project Manager

TITLE OF PROJECT: HF Radar Calibration with Automatic Identification System Ships of Opportunity

SUBTOPIC NUMBER: 8.4.1N

### TECHNICAL ABSTRACT:

Over 300 HF RADARs worldwide are producing ocean surface data that is used in oil spill response, search & rescue, vessel traffic management, and research. In the U.S. there are 100+ systems supplying real-time data to the Coast Guard, NOAA IOOS, OR&R and other operational groups. To provide the highest quality data to stakeholders, systems should be calibrated by measuring the receive antenna pattern. For the typical HF radar, this measurement is currently made with a portable transponder on a boat 1-2 km away. This method, while robust, is costly and limited by sea conditions. We demonstrated in Phase I that by associating AIS vessel identifications, which provide ship positions, with vessel radar echoes in HF radar data it is possible to reproduce the antenna pattern. The objective of Phase II research is to implement the method operationally. The prototype will consist of software to acquire AIS ship data and combine it with HF radar cross-spectra to produce antenna pattern measurements and their statistics. To accomplish this objective we will answer the remaining research questions from Phase I, expand the method to other operational HF radar bands (5, 25 and 42 MHz), and develop quantitative data quality metrics.

### SUMMARY OF ANTICIPATED RESULTS:

Prototype software which will collect HF RADAR receive antenna pattern data, monitor differences in real time between collected pattern data and pattern being used on site for data processing, warn of detected pattern changes and provide updated pattern for replacement.

## FY 2011 PHASE II AWARD WINNER

FIRM: ProFishent, Inc.  
17306 NE 26<sup>th</sup> Street  
Redmond, WA 98052-5848

AWARD: \$298,427

PHONE: 425-883-9896  
FAX: 425-869-5364  
E-MAIL: davidp@profishent.com

PRINCIPAL INVESTIGATOR: David B. Powell, Ph.D., Vice President, R&D

TITLE OF PROJECT: Natural Adjuvants to Enhance Efficacy of Viral Vaccines for Mariculture

SUBTOPIC NUMBER: 8.1.2F

### TECHNICAL ABSTRACT:

Marine aquaculture production now exceeds 20 million metric tons annually (FAO 2010) but viral diseases are still a major threat to the expansion of sustainable mariculture systems (National Marine Fisheries Service 2007). Pathogenic viruses continue to devastate many fish and shellfish operations every year (ICES Mariculture Committee 2004, Lightner 2011). To date, vaccines against aquatic animal viruses have generally provided poor protection, are too expensive, and/or must be injected intramuscularly (e.g., DNA vaccines). In response, we will expand and intensify development of innovative biological adjuvant systems initiated in our Phase I trials. We discovered that unique natural marine and terrestrial micro-structures bound to viral antigens can be delivered to gills and mucosal surfaces of salmon to boost specific immune responses against a viral pathogen. We use a nanotechnology-based dynamic light scattering laser instrument to verify attachment of viral antigens or DNA vaccines. Interferon-associated genes and specific antibody titers will be measured by quantitative PCR, ELISA, and virus neutralization tests. Needle-less, immersion immunizations with test formulations will be assessed in fish for safety and efficacy. Multiple, additional *in vivo* pathogen challenges will be conducted to evaluate new prototype vaccines for relative efficacy and commercialization potential in Phase III field trials.

### SUMMARY OF ANTICIPATED RESULTS:

Effective, immersion anti-viral vaccines could be a major boost to aquaculture sustainability, export market access, and profitability. We anticipate that this new platform technology will provide an economical, non-toxic, "micro-attachment" vaccine delivery system for enhanced infectious disease prevention and control. If successful, these treatments will promote an increased choice of cultured species, greater predictability of production for investment, and a substantial reduction in actual and perceived environmental impact. The growth of environmentally sustainable aquaculture systems will help the United States reduce huge seafood trade deficits (Nash 2004).

## FY 2011 PHASE II AWARD WINNER

FIRM: Droplet Measurement Technologies  
2545 Central Avenue  
Boulder, CO 80301-2865

AWARD: \$399,962

PHONE: 303-440-5576  
FAX: 303-440-1965  
E-MAIL: glkok@dropletmeasurement.com

PRINCIPAL INVESTIGATOR: Gregory L. Kok, Director of R & D

TITLE OF PROJECT: Aerosol Particle Spectrometer with Depolarization and Fluorescence (APSD-F)

SUBTOPIC NUMBER: 8.2.2C

### TECHNICAL ABSTRACT:

An operational optical particle counter will be built, extensively characterized and evaluated that measures the size and shape of aerosol particles with optical diameter from 0.1 to 10  $\mu\text{m}$ . This instrument will distinguish different species of dust and volcanic ash from other types of aerosol particles, and provide an estimate of the aerosol optical properties and produce compositional information related to a particle's refractive index and shape. Some types of biogenic and organic aerosols will also be identified from the measurements.

The size, shape, refractive index and some compositional information of particles is derived from the measurement of light scattered in multiple directions, depolarization of the scattered light by aspherical particles, and the fluorescence by some species of biogenic and organic aerosols when excited by the 405 nm source laser.

The size, weight and power of the instrument will be optimized to facilitate operation on a wide variety of ground-based, airborne and ship-borne measurement platforms, including unmanned aerial vehicles.

### SUMMARY OF ANTICIPATED RESULTS:

The Phase II activities will result in a fully operational, well-characterized aerosol particle size and shape analyzer. The measurement size range will be 0.1-10 microns covering a majority of the accumulation and coarse mode aerosols. In addition to the measurements of particle size and shape, particle fluorescence will also be measured allowing identification of particles with a biological origin. Comparison of the measured aerosol parameters will allow classification into particles originating from pollution, windblown dust, volcanic ash, urban dust, and biological origins.

## FY 2011 PHASE II AWARD WINNER

FIRM: Riverside Technology, Inc.  
2950 East Harmony Road, Suite 390  
Fort Collins, CO 80528

AWARD: \$400,000

PHONE: 970-484-7573  
FAX: 970-484-7593  
E-MAIL: steve.malers@riverside.com

PRINCIPAL INVESTIGATOR: Steve A. Malers, Senior Systems Engineer

TITLE OF PROJECT: Climate Information Management Toolkit (CIMT)

SUBTOPIC NUMBER: 8.2.2C

### TECHNICAL ABSTRACT:

The SBIR solicitation expressed the need for tools to process data from disparate sources in various formats and generate drought-relevant data products. NIDIS also recognizes a need to span organizational boundaries to provide access to integrated drought information for use in water management. The Phase I SBIR project resulted in prototype Climate Information Management Toolkit (CIMT) software that automates data collection, processing, and product generation. Phase II will focus on enhancing the prototype CIMT to a production level suitable for application by local water organizations and NIDIS. Riverside's relationship with local, regional, and state organizations in Colorado allows for a bottom-up application of these tools, while coordinating with NIDIS pilot projects and agency efforts to meet national goals. Specific tasks include: improved implementation of existing web services, enabling new web services for important local data sets, implementing tools to compute water supply indices and triggers, and enhancing tools to consider climate change in data products. Stakeholders in the water community will have access to these tools, which can be integrated with the NIDIS Drought Portal. Riverside's track-record with stakeholders, technical expertise, and ability to integrate with ongoing efforts provides an opportunity to demonstrate NIDIS efforts at the local level.

### SUMMARY OF ANTICIPATED RESULTS:

This project will directly benefit water organizations through improved tools and data products related to drought and water supply. Implementations at a local level will be consistent with NIDIS pilot projects and will allow transfer to other regions, and implementation on the NIDIS portal. Riverside will develop additional expertise related to data, drought, and climate change, which will be parlayed into additional commercial opportunities.

## FY 2011 PHASE II AWARD WINNER

FIRM: Ocean Approved, LLC  
188 Presumpscot Street  
Portland, ME 04103-5206

AWARD: \$300,000

PHONE: 207-409-6485  
E-MAIL: pdobbins@oceanapproved.com

PRINCIPAL INVESTIGATOR: Paul Dobbins, President

TITLE OF PROJECT: Development of Native Kelp Culture System  
Technologies to Support Sea Vegetable  
Aquaculture in new England Coastal Waters

SUBTOPIC NUMBER: 8.1.7SG

### TECHNICAL ABSTRACT:

This Phase II research expands Phase I research on *Saccharina latissima* and is to design and develop “seed” nursery methodologies for the development of commercial-scale production of juvenile kelp plants including *Alaria esculenta* and *Laminaria digitata*. The project objectives include:

1. Isolate and maintain cultures of New England species of *Alaria esculenta* and *laminaria digitata* to be used as “seed stock” for the production of juvenile plants.
2. Identify and develop the highest yield strains of *Saccharina latissima*, *Alaria esculenta* and *Laminaria digitata*.
3. Develop efficient, cost effective, and scalable production, transport, grow-out, and harvest methodologies with sufficient simplicity to accommodate participation of a medium skilled workforce.
4. Create a detailed protocol for culture maintenance and production of young kelp plants to facilitate transfer of the technology to other commercial entities and educational institutions.

This project is a collaborative effort between Ocean Approved, the University of Connecticut, and the Bridgeport Regional Aquaculture Science Technology Education Center, and supports the development of a new aquaculture sector, allowing the United States to participate in the US\$7 billion dollar cultivated sea vegetable market.

### SUMMARY OF ANTICIPATED RESULTS:

The anticipated results of the proposed research will be the continued development of nursery culture technologies and methodologies to aid in the creation of commercial-scale mass production culture system for cold-water kelp species including *Saccharina latissima*, *Alaria esculenta* and *Laminaria digitata*. Moving from wild harvesting to sustainable harvests from aquaculture operations is a critical commercialization step that allows Ocean Approved to meet the growing demand for its innovative fresh frozen kelp products and provides an important new sustainable vegetable source for U.S. consumers.

## FY 2011 PHASE II AWARD WINNER

FIRM: Oscilla Power, Inc.  
419 Wakara Way, Suite 207C  
Salt Lake City, UT 84108

AWARD: \$299,985

PHONE: 801-897-1221  
FAX: 801-618-4289  
E-MAIL: [nair@oscillapower.com](mailto:nair@oscillapower.com)

PRINCIPAL INVESTIGATOR: Balakrishnan Nair, CTO

TITLE OF PROJECT: Cost Competitive Wave Energy Without Moving Parts

SUBTOPIC NUMBER: 8.1.5SG

### TECHNICAL ABSTRACT:

Oscilla Power, Inc. (OPI) is developing a utility-scale wave energy harvester that is enabled by low cost and readily-available magnetostrictive alloys. This device, which utilizes no moving parts, has the potential to deliver predictable quantities of electric power to coastal utilities, industrial users, and remote facilities at costs competitive with coal or gas. The Phase I project demonstrated that required electromagnetic performance could be obtained through optimization of the power-take-off unit configuration. In the Phase II project, OPI will optimize, design and build a sea-worthy prototype that can produce enough power to recharge batteries needed for buoy-based measurement systems. OPI and its sub-contractor, the University of Washington Applied Physics Laboratory, will demonstrate this prototype in Puget Sound. The project will demonstrate the commercial viability of the device and enable scale up to kilowatt-class systems in Phase III.

### SUMMARY OF ANTICIPATED RESULTS:

Successful harvesting of energy from the ocean can help to relieve the load at the point of demand on some of the most heavily populated regions of the United States. In the Phase I Project, we demonstrated greater than 1 Tesla change per strain cycle in magnetic field in low-cost magnetostrictive alloy components by identifying optimal power take off unit configurations. In the Phase II Project, we will optimize, build and demonstrate a device in ocean waters at Puget Sound. By achieving this goal, we will significantly mitigate investor risk and facilitate successful Phase III fund raising towards utility scale device development and deployment. Successful development and demonstration of the magnetostrictive wave energy harvester can enable electricity production from the ocean at costs competitive with conventional approaches such as coal and natural gas.