
# SBIR

# Small Business Innovation Research Program

# ABSTRACTS OF AWARDS FOR FISCAL YEAR 2007

**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 11 Phase I contracts for FY 2007. These awards of up to $95,000 each, and totaling approximately $1 million, 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 2007 (NOAA 2007-1)." 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 6 Phase II contracts in FY 2007 for a total of approximately $2.2 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 149 proposals were received by DOC/NOAA in response to its FY 2007 solicitation. DOC/NOAA scientists and/or engineers independently reviewed the proposals. With the funds available, only 11 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 2007 PHASE I AWARD WINNER**


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|---|---|
| FIRM: | Systems Science Applications, Inc.<br>3 Trovita<br>Irvine, CA 92620 |
| AWARD: | $95,000 |
| PHONE: | 714-730-6858 |
| FAX: | none |
| E-MAIL: | fjobrien@cox.net |
| PRINCIPAL INVESTIGATOR: | Frank O'Brien, Systems Engineer |


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| TITLE OF PROJECT: | GeoTag: A New Archival Tag for the Improved Tracking of Marine Organisms |
| SUBTOPIC NUMBER: | 8.1.3 F-E |


TECHNICAL ABSTRACT:

Systems Science Applications proposes to design an archival tag that includes three new sensors: a magnetometer, accelerometer, and dual channel radiometer. The magnetometer will be corrected for pitch, roll, and transient accelerations by data from the accelerometer. The resulting vertical and horizontal magnetic intensity measurements will be combined with NOAA world magnetic maps to provide independent estimates of geolocation. The dual channel radiometer measurement of upwelling irradiance in two spectral bands will provide a good estimate of the chlorophyll concentration. This data will then be combined with satellite chlorophyll imagery to provide an additional independent estimate of geolocation. We believe that the addition of these two mechanisms will significantly improve tag geolocation accuracy. During Phase I we will develop a prototype of the new sensors and conduct computer simulations to quantify improvements to geolocation accuracy. We will also evaluate the new sensors and conduct computer simulations to quantify improvements to geolocation accuracy. We will also evaluate memory utilization, duty cycle, and data compression strategies to maximize tag life while minimizing power consumption. Finally, we will analyze the full set of tag hardware components and design the physical board layout to verify that the resulting tag will meet stated size, weight, power, and cost requirements before building and testing the new tag in Phase II.


SUMMARY OF ANTICIPATED RESULTS:

The addition of the magnetometer, accelerometer, and chlorophyll sensors to archival tags will dramatically improve geolocation accuracy of tracking of marine fish. At the completion of Phase I, we will have quantified these accuracy improvements and verified that the designed tag will meet stated size, weight, power, and cost requirements. We will have developed a preliminary design for tag circuitry including the physical board layout of the tag sensors, processor, memory, and battery. We will also have designed onboard algorithms for memory, duty cycle, and data compression as well as much of the post-recovery processing software.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | Desert Star Systems, LLC<br>3261 Imjin Road<br>Marina, CA 93933 |
| AWARD: | $79,689 |
| PHONE: | 831-384-8000 x117 |
| FAX: | 831-384-8062 |
| E-MAIL: | mf@desertstar.com |
| PRINCIPAL INVESTIGATOR: | Marco Flagg, Chief Engineer & CEO |


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| TITLE OF PROJECT: | SeaTag: Design and Manufacture of a Family of Modular Archival Tag |
| SUBTOPIC NUMBER: | 8.1.3 F-E |


TECHNICAL ABSTRACT:

Small archival tags are a potentially powerful resource management tool. Yet, limited selection and high cost diminishes the technology's suitability for widespread studies.

This proposal introduces a modular architecture for archival tag. SeaTag provides a rich and expandable sensing and data transmission/retrieval capability, while using the economies of scale of a modular product line to substantially reduce per-unit cost.

The accelerated Phase I effort will build on our company's internal research to design and deliver a quantity (20 units) of small experimental archival tags that offer 'unlimited life' through solar power augmentation, improved geo location through earth magnetic field measurements and additional sensing capabilities including acceleration and light color.

Phase II builds on this foundation to develop a selection of complementary tags, some providing data on individual animals, others monitoring population groups and their environment. Acoustic networking technology will boost data recovery rates and enable a very small & inexpensive tag.


SUMMARY OF ANTICIPATED RESULTS:

The work will result in a product line of affordable 'micro observation stations' for wide area research enabled through the use of the ARGOS satellite transmitter system and acoustic networking. These stations will include stand-alone and networked tags along with an observation capability for untagged animals. Overall, the product line will enhance data recovery rates, enable the tagging of smaller animals and provide low-cost tags to support larger tagging programs.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | Green Eyes, LLC<br>28034 Holly Road<br>Easton, MD 21601 |
| AWARD: | $93,294.95 |
| PHONE: | 410-829-5601 |
| FAX: | 410-820-8241 |
| E-MAIL: | vince@greeneyesobserving.com |
| PRINCIPAL INVESTIGATOR: | Vincent M. Kelly, Director |


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| TITLE OF PROJECT: | Development of a Coastal Long-term Autonomous Self-calibrating Profiler (CLASP) |
| SUBTOPIC NUMBER: | 8.1.4 N-E |


TECHNICAL ABSTRACT:

Green Eyes, LLC will demonstrate the feasibility of a Coastal Long-term Automated Self-calibration Profiler (CLASP) system capable of operating autonomously for one year without servicing. CLASP will be configured to incorporate wireless two-way communications for automated data dissemination and remote control. Two major innovations are required to develop such a system.

1. Automated bio-fouling control and sensor cleaning, and
2. Automated multi-sensor and multi-instrument calibration

To meet these objectives, we will construct a computer controlled modular system based on an automated gas and liquid handling manifold with closed loop circuits for bio-fouling control and cleaning and open loop circuits for calibration and sampling. A proportioning pump for the autonomous creation of working concentration standards will also be provided. The initial system will collect data on Temperature, Salinity, pH, Dissolved Oxygen, and Chlorophyll, but its design will allow for expansion. CLASP will be equipped to defend itself against extreme weather and ice.


SUMMARY OF ANTICIPATED RESULTS:

This study will produce a Coastal Autonomous Self-calibrating Profiler (CLASP) test bed that demonstrates the feasibility of a system with 1) a one year service interval, 2) autonomous system and sensor cleaning and maintenance, 3) autonomous and adaptive profiling, 4) automated data acquisition, and 5) remote control capability. The Phase I system will monitor the following variables: temperature, salinity, pH, dissolved oxygen, and fluorometric chlorophyll.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | Kona Blue Water Farms, LLC<br>P.O. Box 4239<br>Kailua-Kona, HI 96745-4239 |
| AWARD: | $94,937 |
| PHONE: | 808-331-1188 x209 |
| FAX: | 808-331-8689 |
| E-MAIL: | Federico@kona-blue.com |
| PRINCIPAL INVESTIGATOR: | Federico Rotman, Senior Biologist/Hatchery Manager |


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| TITLE OF PROJECT: | Improved Giant Grouper Hatchery Methods Open Opportunities for Open Ocean Aquaculture and Fishery Enhancement |
| SUBTOPIC NUMBER: | 8.1.8 SG-E |


TECHNICAL ABSTRACT:

Giant Grouper (*E. lanceolatus*) is one of the most desirable marine fish in the world. Its robust nature, tremendous growth rate, superb quality flesh and high value make it ideal for open ocean aquaculture. This species has also been heavily overfished throughout its range. Hatcheries could supplement commercial and recreational fisheries through stock enhancement, and also aid grouper fishery management and biological research.

Commercial-scale hatchery culture of Giant Grouper has proven challenging. Taiwanese mesocosm-based hatcheries are inconsistent, and lack scalability. Most SE Asian grouper farms rely on wild-caught fry. Larval rearing is primarily constrained by first feeding challenges and cannibalism.

We will test both natural and induced spawns in our mature broodstock. Larval rearing will compare a diet using solely our proprietary live feeds, or one combined with enriched rotifers. Two larval stocking densities will be evaluated. Optimum production strategies will be identified based on survival, growth, and size homogeneity.


SUMMARY OF ANTICIPATED RESULTS:

Commercial-scale hatchery culture of Giant Grouper would allow Kona Blue to begin offshore culture of this native species in Hawaii. Eight cages might gross over $10 million p.a. Adaptation to other grouper species and other areas could see open ocean aquaculture expand significantly, to fulfill the promise. Hatcheries could also supplement commercial and recreational fisheries though stock enhancement, and also aid grouper fishery management and biological research.

**FY 2007 PHASE I AWARD WINNER**


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|---|---|
| FIRM: | Ocean Farm Technologies, Inc.<br>114 Higgins Road, N.<br>Searsmont, ME 04973 |
| AWARD: | $92,958 |
| PHONE: | 207-322-4322 |
| FAX: | 207-433-1300 |
| E-MAIL: | spage@oceanfarmtech.com |
| PRINCIPAL INVESTIGATOR: | Stephen H. Page, CEO |


TITLE OF PROJECT: Automation of Finfish Net Pen Operations

SUBTOPIC NUMBER: 8.1.14 SG-E


TECHNICAL ABSTRACT:

Ocean Farm Technologies, Inc. of Searsmont, Maine is proposing a NOAA Phase I SBIR feasibility study of an automated system for net pen manipulation to facilitate operations of proprietary AquaPod™ fish containment system. Automated manipulation of the AquaPod™ net pen will allow remote operation of mortality collection, cleaning, maintenance, inspection and harvesting operations. Human interaction with these operations will be reduced, and where human interaction is necessary the work can be done from the surface, reducing as much as possible the amount of scuba diving required. This feasibility study will include testing of prototype automation systems on a full sized AquaPod™ at a commercial fish farm, as well as analysis of costs of this system compared with existing submerged net pens and traditional suspended net pens systems.


SUMMARY OF ANTICIPATED RESULTS:

Labor intensive operations including scuba diving are a significant barrier to successful commercialization of offshore aquaculture. Development of automated systems to handle routine operations will increase the competitiveness of offshore aquaculture as well as increasing safety.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | ProSensing, Inc.<br>107 Sunderland Road<br>Amherst, MA 01002 |
| AWARD: | $94,673 |
| PHONE:<br>FAX:<br>E-MAIL: | 413-549-4402<br>413-549-5203<br>pazmany@prosensing.com |
| PRINCIPAL INVESTIGATOR: | Andrew Pazmany, Vice President for Engineering |


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| TITLE OF PROJECT: | Reconfigurable Scanning Millimeter-Wave Polarimetric Radar for Airborne Observations of Clouds |
| SUBTOPIC NUMBER: | 8.2.1. R-C |


TECHNICAL ABSTRACT:

This Phase I SBIR project describes our plan to develop a compact scanning polarimetric cloud radar for observations of sea spray from a variety of airborne platforms. Our effort will focus on the design of a compact, lightweight W-band polarimetric scanning radar system that will be suitable to operate onboard the NOAA P3 or NOAA/NASA Altair UAV aircraft. Phase I design activities will include developing a compact, pressurized RF unit enclosure, and designing miniaturized circuits of the radar intermediate frequency section in order to stay within the envelop of a available space, weight and power. We also plan to develop a high dynamic range data system based on a commercially available digital receiver hosted in a compact embedded PC. The resultant design will be considerably lighter and more compact than existing high power cloud radars, without sacrificing overall performance.


SUMMARY OF ANTICIPATED RESULTS:

Successful completion of Phase I and Phase II R&D will result in a versatile cloud radar design, suitable for deployment on a number of manned or unmanned research aircraft. When used with the lightweight CET scan head, this radar will provide researchers with a valuable tool capable of providing volume images of sea spray from an airborne platform.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | LBI, Inc.<br>973 North Road<br>Groton, CT 06340 |
| AWARD: | $95,000 |
| PHONE:<br>FAX:<br>E-MAIL: | 860-446-8058<br>860-446-8132<br>plegnos@lbicorp.com |
| PRINCIPAL INVESTIGATOR: | Peter J. Legnos, President |


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| TITLE OF PROJECT: | Air-Deployable Expendable Severe Environment Drifting Buoy (AXSEB) |
| SUBTOPIC NUMBER: | 8.2.3 C-C |


TECHNICAL ABSTRACT:

The proposed system is for a lightweight air-deployable expendable system capable of performing functions similar to existing ocean meteorological drifters, with the additional capability of maintaining station and/or repositioning itself on command. The system will keep station better by the sea anchor effect of the inactive tow motor, and has the ability to automatically regain station by towing when outside of the designated watch circle. The repositioning function is facilitated by commanding the AXSEB via satellite to tow to a designated geographic position. When towing the drag is reduced by towing the surface float underwater in line with the thermistor chain, in a sprint-and-drift fashion, thereby minimizing the propulsive energy necessary for the 72-hour towing period. This will decrease size and weight enabling a practicable configuration for air-deployability. This approach will also reduce the cost of the buoy.


SUMMARY OF ANTICIPATED RESULTS:

The Phase I work will demonstrate the feasibility of 1) the sprint-and-drift scheme in conserving energy for towing and 2) developing a system for a practicable air-droppable package. This technical approach will be demonstrated in Phase II through a simplistic low cost design which can be adapted for several commercial and scientific tasks.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | Mercury Science, Inc.<br>4802 Glendarion Drive<br>Durham, NC 27713 |
| AWARD: | $95,000 |
| PHONE: | 919-493-0688 |
| FAX: | 206-984-4980 |
| E-MAIL: | tom@mercuryscience.com |
| PRINCIPAL INVESTIGATOR: | Thomas N. Stewart, President |


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| TITLE OF PROJECT: | Multi-Zone Flow Through Membrane and Reagents For Onsite Detection of Domoic Acid |
| SUBTOPIC NUMBER: | 8.3.2 N-W |

TECHNICAL ABSTRACT:


There is a need for a simple, affordable method for measuring domoic acid in the field. This project will develop a rapid, onsite kit for domoic acid featuring a filter membrane that produces a readable color response without need for instrumentation. The filter membrane contains three or more zones with different assay characteristics in close proximity. These zones will indicate different concentrations of domoic acid by a variation in color intensity on the membrane. A modified inkjet printer will be used for the low cost production of immunoassay membranes.

Phase I will focus on:

1) Production of two or more anti-domoic acid antibodies with different detection limits.
2) Use of a modified inkjet printer to deposit controlled quantities of antibodies in precise zones on a membrane.
3) Demonstration of domoic acid detection on these membranes

Phase II will incorporate the membranes into a commercially available onsite test kit.


SUMMARY OF ANTICIPATED RESULTS:

Piezoelectric printing for the deposition of biologically active proteins on membranes will be used to develop a novel immunoassay method. The membrane will demonstrate the ability to be used in a non-instrumented assay for the detection of domoic acid in the field.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | Remote Sensing Solutions, Inc.<br>3179 Main Street, Unit 3<br>POB 1092<br>Barnstable, MA 02630-1105 |
| AWARD: | $94,653 |
| PHONE:<br>FAX:<br>E-MAIL: | 508-362-9400<br>508-413-2372<br>Carswell@rmss.us |
| PRINCIPAL INVESTIGATOR: | Dr. James R. Carswell, President |


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| TITLE OF PROJECT: | A Novel Internet-based Radar Digital Receiver And Processor (iRAP) System |
| SUBTOPIC NUMBER: | 8.3.5 E-W |


TECHNICAL ABSTRACT:

Dozens of popular radar systems are installed on all sizes of aircraft, however the fundamental capabilities of these radars can be defined using only a few parameters such as the pulse width, pulse rate and scan rate. Each radar has its unique interface to operator controls and displays but the input controls and outputs are fundamentally the same. This proposed research effort seeks to utilize this commonality to define and develop an iRAP that would allow numerous radar and other sensors to be interfaced with modern aircraft mission systems. This proposed research effort will develop the design for a flexible network-based radar signal processor that would: 1) provide a specific means of interfacing the WP-3D radars to the AAMPS MDS, 2) provide a generic means of interfacing instruments to the MDS and 3) enhance the capabilities of the AAMPS MDS as a package.


SUMMARY OF ANTICIPATED RESULTS:

The RSS staff has significant experience developing radars and radar interfaces, and is particularly knowledgeable about the NOAA WP-3D radar sensors, having developed the IWRAP radar, a system to provide researchers on the ground with real-time processed data from the WP-3D tail and lower fuselage radars and having designed the AAMPS MDS. RSS anticipates realizing an innovative design of an iRAP system that will allow integration of aircraft radar systems with the AAMPS and MDS. iRAP will serve as a commercially available, adaptable interface tool for any radar; not only functioning as a digital receiver and data processor, but also allowing the instrument's conversion to a node on the network.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | ProSensing, Inc.<br>107 Sunderland Road<br>Amherst, MA 01002 |
| AWARD: | $94,946 |
| PHONE:<br>FAX:<br>E-MAIL: | 413-549-4402<br>413-549-5203<br>popstefanija@prosensing.com |
| PRINCIPAL INVESTIGATOR: | Ivan PopStefanija, Vice-President |


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| TITLE OF PROJECT: | Low-Cost Integrated Multi-Channel Microwave Radiometer Receivers for Hurricane Surface Wind Structure Measurement |
| SUBTOPIC NUMBER: | 8.3.7 R-W |


TECHNICAL ABSTRACT:

This proposal describes the development of low-cost, microwave integrated circuit receivers for a synthetic aperture Hurricane Imaging Radiometer (HIRad). The HIRad system, designed to generate high resolution ocean surface wind speed data in a push-broom imaging mode, will provide a variety of benefits, including improved hurricane model initialization and detection of fine-scale storm structure. HIRad, a synthetic aperture radiometer, will require ten (10) high performance receiver channels, which must be compact, and low cost in design. During Phase I, we propose to design and build a prototype, integrated circuit receiver, with integrated COLFET and ambient loads, allowing continuous receiver calibration. In addition, we plan to develop a system integration plan for assembly of the complete HIRad system in Phase II, using receivers built by ProSensing, together with a government supplied antenna and data processor.


SUMMARY OF ANTICIPATED RESULTS:

Successful completion of Phase I and Phase II R&D will result in the construction of the Hurricane Imaging Radiometer (HIRad) that will provide high resolution (on the order of 500 n) images of ocean surface wind speed and column integrated rain rate over a swath width of 10 km or more. Data from this instrument will help improve initialization of hurricane forecast models.

**FY 2007 PHASE I AWARD WINNER**


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| FIRM: | Salo IT Solutions, Inc.<br>1313 5th Street SE<br>Minneapolis, MN 55414-4504 |
| AWARD: | $94,796 |
| PHONE: | 612-605-6896 |
| FAX: | none |
| E-MAIL: | salo@saloits.com |
| PRINCIPAL INVESTIGATOR: | Timothy J. Salo, President |


TITLE OF PROJECT: ALERT-2 Protocol Development

SUBTOPIC NUMBER: 8.3.10 W-W


TECHNICAL ABSTRACT:

Salo IT Solutions, Inc. (SaloITS) will design and implement the ALERT-2 protocol, a next-generation suite of network protocols that will provide enhanced services for Automated Flood Warning Systems (AFWSs). The focus of this Phase I project is to create and develop a consensus within the ALERT community in support of an ALERT-2 Requirements Specification document and an ALERT-2 Protocol Specification document. The Requirements Specification will record the unmet needs that a next-generation protocol for automated flood warning systems should address. Its audience will primarily be users and operators of ALERT systems. Its purpose is to provide a benchmark against which the ALERT-2 Protocol Specification can be evaluated. The Protocol Specification will be a technical document that will be mostly of interest to vendors, and perhaps a few technically sophisticated users and operators.


SUMMARY OF ANTICIPATED RESULTS:

This Phase I project will create, and develop support within the ALERT community for, a requirements specification and a protocol specification for the ALERT-2 protocol, a next-generation protocol for automated flood warning systems. This work will demonstrate the technical feasibility of, and provide a solid foundation for, a future project that will develop software that implements these protocols.

**FY 2007 PHASE II AWARD WINNER**


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| FIRM: | Maine BioTek, Inc.<br>P.O. Box 408<br>259 Main Street<br>Winterport, ME 04496 |
| AWARD: | $300,000 |
| PHONE: | 207-223-4662 |
| FAX: | 207-223-4090 |
| E-MAIL: | sclouthier@hotmail.com |
| PRINCIPAL INVESTIGATOR: | Dr. Sharon Clouthier, President |


TITLE OF PROJECT: A Multivalent Bacterial Vaccine for Atlantic Cod

SUBTOPIC NUMBER: 8.1.11 SG


TECHNICAL ABSTRACT:

This SBIR Phase II project provides the scientific framework for development and ultimately commercialization of a multivalent vaccine for the prevention of disease caused by *Listonella anguillarum* and *Aeromonas salmonicida* of cultured Atlantic cod in North America. According to leading cod producers in the region, a multivalent bacterial vaccine is essential to their ability to produce and commercialize farmed cod as well as their ability to attract investment. The multivalent vaccine will have a far reaching positive influence on aquaculture, fisheries, and environmental management in North America, regional seafood markets and trade opportunities, coastal economic development and our supply of wholesome, high quality Atlantic cod. The Phase II work plan addresses five primary topics involved in the multivalent vaccine prototype development: (1) antigen synthesis, (2) vaccine formulation, (3) vaccine safety, (4) vaccine potency and (5) vaccine efficacy. Within this framework, we will optimize antigen production, identify the minimal effective vaccine dose and evaluate different modes of vaccine delivery. The deliverable product will be an efficacious multivalent vaccine prototype that after translational development, manufacturing and regulatory approval will be available to cod producers for the prevention of disease caused by *L. anguillarum* and *A. salmonicida.*


SUMMARY OF ANTICIPATED RESULTS:

The ultimate success of the project will be the construction of a safe, efficacious, multivalent *L. anguillarum* and *A. salmonicida* vaccine for farmed Atlantic cod. Maine BioTek, Inc. anticipates that the Phase II investigation will result in a prototype vaccine. By the end of Phase II, the vaccine will be ready for regulatory approval testing. The product will initially be marketed to the North American aquaculture industry for administration to farmed Atlantic cod. An efficacious multivalent *L. anguillarum* and *A. salmonicida* vaccine would provide a disease management tool that in combination with good fish health practices would ensure the growth and sustainability of the emerging Atlantic cod aquaculture industry in North America.

**FY 2007 PHASE II AWARD WINNER**


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| FIRM: | ProFishent, Inc.<br>17306 NE 26th Street<br>Redmond, WA 980525848 |
| AWARD: | $262,738 |
| PHONE: | 425-883-9896 |
| FAX: | 425-869-5364 |
| E-MAIL: | davidp@profishent.com |
| PRINCIPAL INVESTIGATOR: | Dr. David B. Powell, Vice President R&D |


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| TITLE OF PROJECT: | Nanotechnology Systems to Prevent Disease and Improve Healing of Aquatic Animals |
| SUBTOPIC NUMBER: | 8.1.11 SG |


TECHNICAL ABSTRACT:

Netting, tagging, transport, and vaccination of shrimp or fish often result in increased stress and infections caused by opportunistic pathogens. Damaged epidermis or cuticle provides a portal of entry to potentially deadly infective agents that bind preferentially to injured cells. Recent advances in nanotechnology and computer-assisted scanning instrumentation will be used to quantify progress toward developing economical, nanoparticle-based systems that effectively treat handling-associated skin lesions. In Phase I, we demonstrated that particles can be made to mimic the adherent properties of virulent pathogens that have developed their strategies for wound attachment over millions of years of evolution. After controlled descaleing of experimental fish, we will assess the ability of optimized particle treatments to reduce the frequency and severity of viral, bacterial, and fungal infections. Fluorescent coated particles will also be used to observe the precise attachment locations, as well as the binding effects of various coatings, using laser scanning and UV fluorescence microscopy. A duel targeted nanoparticle design should significantly reduce the development of viral, bacterial, and fungal diseases by competitively binding to both exposed injuries and pathogens present in treated water.


SUMMARY OF ANTICIPATED RESULTS:

Commercialization of this research in Phase III will result in a new platform technology using non-toxic nanoparticle products that will be applicable to both fresh-water and marine aquatic species. Proprietary nanoparticles will be combined with innovative coating compounds to stimulate epithelial cell covering and wound healing. These systems should also reduce infectivity by binding directly to pathogens. Unlike antifungal or antibiotic feed additives, the particles will be compatible with biological recirculation filter systems and environmentally benign. It should be possible to handle and raise a variety of aquatic species previously thought to be too susceptible to pathogens. This low-cost treatment system has the potential to solve the recurring problems of infections in fish or shrimp following stressful routine handling procedures.

**FY 2007 PHASE II AWARD WINNER**


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| FIRM: | Sunburst Sensors, LLC<br>1121 E. Broadway, Suite 114<br>Missoula, MT 59802-4908 |
| AWARD: | $399,980 |
| PHONE: | 406-532-3246 |
| FAX: | 406-543-2304 |
| E-MAIL: | jim@sunburstsensors.com |
| PRINCIPAL INVESTIGATOR: | James C. Beck, President |


TITLE OF PROJECT: A Multi-Parameter Inorganic Carbon Measurement System

SUBTOPIC NUMBER: 8.2.2 G


TECHNICAL ABSTRACT:

The rapid increase in atmospheric $CO_2$ over the past century has heightened concerns about climate change. The oceans are a very large $CO_2$ sink and a better understanding of ocean carbon cycling will help scientists improve climate models, as well as understand the consequences of ocean $CO_2$ acidification. Inorganic carbon parameters are commonly measured as part of ocean carbon cycle studies. DIC $A_T$ $pH_T$ and p $CO_2$ can all be measured on ships with excellent accuracy and precision. These individual parameter systems are often complex making data acquisition and analyses labor intensive and expensive. Sunburst Sensors in collaboration with Mike DeGrandpre at UM and Burke Hales at OSU, have developed a suite of shipboard instruments to measure all four quantities. Testing and refinement of these systems was performed in Phase I. In Phase II, Sunburst proposes to: 1) complete development of it's $A_T$ system, 2) develop an infrared based $pCO_2$-DIC system, and 3) develop a modular colorimetric system to measure $pH_T$-$pCO_2$-$A_T$. Extensive shipboard testing will allow the development of robust field-ready products that are easy to use and maintain, and deliver precise, accurate data. Commercialization of these multi-parameter systems will occur by the conclusion of the two year contract period.


SUMMARY OF ANTICIPATED RESULTS:

Two means of measuring total alkalinity, a segmented flow system and a mixing cell system, will be refined and the best system chosen for integration into a multiple parameter system. An IR based system to measure $pCO_2$-DIC will be developed and tested early in the contract period. Response time of the colorimetric $pCO_2$ system will be improved. A modular colorimetric system to measure $pH_T$-$pCO_2$-$A_T$ will be developed and tested. Both multi-parameter systems will be commercialized. Individual parameter systems may also be commercialized and find use in non-research markets.

**FY 2007 PHASE II AWARD WINNER**


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| FIRM: | Brechtel Manufacturing, Inc.<br>1789 Addison Way<br>Hayward, CA 94544-6900 |
| AWARD: | $400,000 |
| PHONE:<br>FAX:<br>E-MAIL: | 510-732-9723<br>510-732-9153<br>fredj@brechtel.com |
| PRINCIPAL INVESTIGATOR: | Fredrick J. Brechtel, VP Research |


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| TITLE OF PROJECT: | Development of a Compact Aerosol Instrumentation Suite for Unmanned Aerial Vehicles |
| SUBTOPIC NUMBER: | 8.2.13 R |


TECHNICAL ABSTRACT:

To assess the climate impacts of atmospheric aerosols, global datasets of aerosol properties including the number size distribution, chemical composition, and absorption coefficient are needed yet generally unavailable. Knowledge of the vertical distributions of these key properties is also required to properly model aerosol-climate feedbacks. We propose to develop a new aerosol measurement system, the Aerosol Counting Composition Absorption and Sizing System (ACCASS), capable of simultaneous observations of ambient total number concentrations, aerodynamic number size distributions, and chemical composition over the 0.1 to 10 micron diameter range. A prototype of the complete system will be fabricated, including miniature condensation particle counters, virtual impactors, cascade impactors and an absorption photometer. Model results from simulations of the instrument response to various input aerosol conditions, developed and tested during Phase I, will be used to optimize component design. Prototypes of the ACCASS subsystems will be bench-tested to assess their technical feasibility.


SUMMARY OF ANTICIPATED RESULTS:

The Aerosol Counting Composition Absorption and Sizing System (ACCASS) will provide a new, compact and low power suite of aerosol measurement technologies at significantly reduced cost and complexity over currently available systems. The ACCASS will find use in unmanned airborne missions, ground-based air quality monitoring studies, in medical applications, and in detection of bio-warfare agents.

**FY 2007 PHASE II AWARD WINNER**


| | |
|---|---|
| FIRM: | LBI, Inc.<br>973 North Road<br>Groton, CT 06340 |
| AWARD: | $400,000 |
| PHONE: | 860-446-8058 |
| FAX: | 860-446-8132 |
| E-MAIL: | plegnos@lbicorp.com |
| PRINCIPAL INVESTIGATOR: | Peter J. Legnos, President |


| | |
|---|---|
| TITLE OF PROJECT: | Inexpensive Airborne Expendable Ice Buoys (AXIB) Suitable for Marginal Ice Zone Deployment |
| SUBTOPIC NUMBER: | 8.3.8 E |

TECHNICAL ABSTRACT:


LBI, Inc. will provide complete development and certification of the Air-Droppable Expendable Ice Buoy (AXIB) to enable full operation mission utilization by the sponsor in polar environments. The AXIB is capable of being deployed by aircraft onto marginal ice and erecting itself to enable measurement of meteorological parameters such as temperature and barometric pressure at a two meter height above the ice. Stability is ensured by deployable legs and an ice anchor. Data is relayed by ARGOS communications. AXIB is stable in a waterbone mode and can withstand freeze/thaw cycles. Mission duration is enhanced by robust hull and stability in ice and water. The Phase II project will enable further refinement of the pre-prototype model developed in Phase I, incorporation of the sensor and electronics system, and testing and certification of the parachute package and ice anchor. Marketing and commercialization efforts will be pursued to ensure transition to full production and availability.


SUMMARY OF ANTICIPATED RESULTS:

A fully developed air-droppable ice buoy capable of long duration measurement of air temperature and pressure. LBI, Inc. will deliver three fully operational buoys to the sponsor at the end of the project.

**FY 2007 PHASE II AWARD WINNER**


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|---|---|
| FIRM: | Sutron Corporation<br>21300 Ridgetop Circle<br>Sterling, VA 20166 |
| AWARD: | $399,791 |
| PHONE: | 703-406-2800 |
| FAX: | 703-406-2163 |
| E-MAIL: | cbuchner@sutron.com |
| PRINCIPAL INVESTIGATOR: | Chris Buchner, Senior Engineer R&D |


TITLE OF PROJECT: The GOES DCP Command Receiver

SUBTOPIC NUMBER: 8.3.11 N


TECHNICAL ABSTRACT:

During Phase I, Sutron redesigned the GOES DCPI link to offer improved two-way communications to Data Collection Platforms (DCP). The Phase I work included detailed specifications for the link and preliminary designs for the implementing and designs in a new product. The redesigned link is called DCP Command and the new product designed is a DCP Command Receiver, a standalone device that can add two-way communications to DCPs.

The Phase II effort will develop functional prototypes of the DCP Command Receiver. During the development process, the prototypes will be tested in lab conditions to verify the characteristics and performance of the equipment. These tests will be run with simulated signals and noise sources allowing tests over a wide range of conditions. After lab tests, Sutron will run live satellite tests to verify the proper operation of the system through the satellites. These tests will validate that the equipment and system will operate in real-world conditions.

A total of 10 prototype systems will be fabricated.


SUMMARY OF ANTICIPATED RESULTS:

The Phase II work will solidify the specifications for the improved two-way link to DCPs and provide prototypes that can be used in Phase III. The potential commercial applications are: 1) add two-way communications to the GOES DCPs system to improve data recovery and allow remote management and configuration, 2) provide equipments that can be added to existing DCPs to add the two-way communications, 3) provide new DCPs with two-way communications integrated into a single unit.