SBIR

Small Business Innovation Research Program

ABSTRACTS OF AWARDS FOR FISCAL YEAR 2005

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 34 Phase I contracts for FY 2005. These awards of up to $75,000 each, and totaling approximately $2.4 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 2005 (NOAA 2005-1)." Abstracts of the successful Phase I proposals submitted under this solicitation, and brief comments on their potential commercial applications 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 $300,000 each and for two years. The DOC/NOAA awarded a total of 12 Phase II contracts in FY 2005 for a total of approximately $3.4 million. Abstracts of successful Phase II proposals and comments on their commercial applications are also provided in this publication.

The SBIR program is highly competitive. A total of 147 proposals were received by DOC/NOAA in response to its FY 2005 solicitation. DOC/NOAA scientists and/or engineers independently reviewed the proposals. With the funds available, only 34 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 2005 PHASE I AWARD WINNER

FIRM:	Physical Sciences, Inc. 20 New England Business Center Andover, MA 01810-1077
AWARD:	$74,948
PHONE:	978-738-8247
FAX:	978-689-3232
E-MAIL:	chiang@psicorp.com
PRINCIPAL INVESTIGATOR:	Kophu Chiang, Principal Scientist

TITLE OF PROJECT: Nutrient Sensor for Observing Systems

SUBTOPIC NUMBER: 8.1.4N

TECHNICAL ABSTRACT:

Physical Sciences Inc. (PSI) will design an optical sensor to provide a cost-effective and ruggedized solution to the detection of nutrient loading for long deployment periods in the ocean environment. The proposed sensor is based on an existing instrument that has been already been developed and has demonstrated the usefulness of using optical methods to determine the nitrate, nitrite, bisulfide and bromide concentrations in the ocean. We propose an alternative optical configuration to provide improved performance both in terms of radiometric accuracy and suitability to the marine environment. Our strategy uses off-the-shelf video technology in conjunction with a number of proven dark mapping, averaging and correction techniques to yield reliable spectral information with high dynamic range. The application uses a single imaging sensor for simultaneous acquisition of excitation source and absorption spectra to provide a lower cost, more compact and rugged instrument which is self-calibrating and involves no moving parts.

POTENTIAL COMMERCIAL APPLICATIONS:

The proposed system should be of commercial interest to the scientific community, environmental and government agencies and those involved in water monitoring, as it offers a low cost, rugged, high performance alternative for large scale ocean monitoring and long term deployment.

FY 2005 PHASE I AWARD WINNER

FIRM:	Nature Diagnostics, Inc. 1700 Kraft Drive, Suite 1350 Blacksburg, VA 24060
AWARD:	$50,000
PHONE:	540-951-1164
FAX:	540-951-1165
E-MAIL:	sbennett@naturediagnosics.com
PRINCIPAL INVESTIGATOR:	Thomas Piccariello, Senior Research Scientist

TITLE OF PROJECT: Cost-Effective Manufacturing of a Novel Selective Algaecide for the Fresh-Water Aquaculture Industry.

SUBTOPIC NUMBER: 8.1.5SG

TECHNICAL ABSTRACT:

The cost-effective manufacturing of a novel algaecide against blue green algae in fresh-water aquaculture operations has great potential for controlling “off-flavor” problems in pond-raised catfish. The proposed natural-based algaecide has selective activity for blue-green algae as well as a more favorable environmental performance profile with little/no activity towards complimentary phytoplankton community of production ponds. However, the major hurdle in bringing this product to the market ahs been its cost of production. In order for the aquaculture industry to gain economic benefit from this safer and more selective algaecide, we propose to design and implement a low-cost, scaleable manufacturing synthesis method that produces an active product. Laboratory studies will be used to validate the efficiency and performance of this alternatively synthesized product relative to control samples. Our ability to manufacture a cost-effective, selective and environmentally-safer algaecide will improve the quality of aquaculture products for domestic catfish farmers.

POTENTIAL COMMERCIAL APPLICATIONS:

This technology has broader commercial application beyond aquaculture that include, benefits for water quality control in municipal water supplies, both public and private. In the short term, the successful production of this algaecide will provide catfish farmers with an effective yet affordable product to mitigate economic losses linked to blue green algae.

FY 2005 PHASE I AWARD WINNER

FIRM:	Troutlodge, Inc. P.O. Box 1290 Sumner, WA 98390-1290
AWARD:	$49,995
PHONE:	253-863-9463
FAX:	253-863-4715
E-MAIL:	parsons@troutlodge.com
PRINCIPAL INVESTIGATOR:	James E. Parsons, Vice President, Technical Services

TITLE OF PROJECT:	Metabolic and Physiological Response of Sablefish (*Anaplopoma fimbria*) to Variable Environmental Conditions
SUBTOPIC NUMBER:	8.1.5SG

TECHNICAL ABSTRACT:

Sablefish (black cod) is a promising species for marine aquaculture in Washington State because of strong demand, high prices, ease of culture from juvenile stage on, availability of large areas for commercial grow out and interest from commercial, tribal and fisheries cooperatives. But the physiological ecology of sablefish is only partially known, which hampers commercialization and the ability to forecast environmental effects. We propose to determine sablefish metabolic response to conditions of low oxygen and swift currents, similar to those found during late summer in available grow out areas in Washington State. This species lives in and adapts well to low dissolved oxygen, but he response to differing current velocities at varying oxygen tension is unknown. We will collect other data to construct a mass balance estimate of carbon and nitrogen use and discharge, similar to available for salmon budgets. These data will be used to alter existing mariculture impact software that is potentially very useful for eventual planning, permitting and coastal management.

POTENTIAL COMMERCIAL APPLICATIONS:

Results will allow appropriate site selection for commercial fish farms and the impact prediction model tools ill likely expedite the permitting process for commercial fish farms, Tribes and fishermen's coops presently interested in commercialization.

FY 2005 PHASE I AWARD WINNER

FIRM:	Dynaflow, Inc. 10621-J Iron Bridge Road Jessup, MD 20794-9381
AWARD:	$50,000
PHONE:	301-604-3688
FAX:	301-604-3689
E-MAIL:	gregl@dynaflow-inc.com
PRINCIPAL INVESTIGATOR:	Dr. Gregory Loraine, Research Scientist

TITLE OF PROJECT:	Cavitating Jets for Aquaculture Waste Treatment and Recycling
SUBTOPIC NUMBER:	8.1.6SG

TECHNICAL ABSTRACT:

Concentrated aquatic animal production facilities (CAAP) have recently fallen under new EPA effluent limitations. Compliance with these guidelines creates the opportunity to improve effluent and recycled water quality. Cavitation caused by our FYNAJETS and the collapse of micro-bubbles in water is a low energy, high efficiency method of applying thermal and mechanical stress and chemical oxidation to complex waste streams. DYNAJETS have been shown to reduce total suspended solids (TSS), increase dissolved oxygen (DO) levels, lower Total Organic Carbon (TOC) and Chemical Oxygen Demand (COD), depolymerize proteins, and reduce bacterial populations.

Phase I will demonstrate the feasibility of decreasing TSS and Biochemical Oxygen Demand (BOD), and increasing DO in effluent from flow-through CAAP. In addition, we will investigate the removal of ammonia, pathogens, parasites, and pharmaceuticals from recirculating systems. Phase II will optimize the configurations, add the high flux rate DYNAPERM filtration system, and conduct prototype testing.

POTENTIAL COMMERCIAL APPLICATIONS:

Treatment of flow-through aquaculture ponds, pretreatment of recirculating aquaculture ponds.

FY 2005 PHASE I AWARD WINNER

FIRM:	Aquaculture Systems Technologies, Inc. 108 Industrial Avenue Jefferson, LA 70121-2902
AWARD:	$49,990.50
PHONE:	504-837-5575
FAX:	504-837-5585
E-MAIL:	Douglas@beadfilters.com
PRINCIPAL INVESTIGATOR:	Douglas G. Drennan II, Managing Member

TITLE OF PROJECT:	Concurrent Clarification and Biological Nitrification/Denitrification in a Single Floating Bead Bioclarifier to Simplify Nitrogen Management in Recirculating Aquaculture Systems
SUBTOPIC NUMBER:	8.1.6SG

TECHNICAL ABSTRACT:

Commercial-scale marine aquaculture has the potential to balance the increasing demand for high-quality seafood products with the harvest capacity of our nation's oceans. However, water reuse in recirculating aquaculture systems (RAS) is limited by the accumulation of nitrate (NO_3), which is toxic to many species in high concentrations. Therefore, NO_3 removal by denitrification presents a pressing need for the aquaculture community. This project proposed to investigate the potential for using a single floating bead bioclarifier (FBB) to capture solids as well as nitrify and denitrify water in RAS. The sludge captured within the FBB will be used as a carbon source for denitrification. The volumetric rate of denitrification within FBB will be quantified based on filter backwash frequency and sludge retention time within the FBB. A computer model will then be created that will allow AST to size the FBB for a variety of both marine and fresh-water applications.

POTENTIAL COMMERCIAL APPLICATIONS:

Denitrification of marine recirculating systems for holding broodstock, fingerling production, grow-out and display.

FY 2005 PHASE I AWARD WINNER

FIRM:	Advanced BioNutrition Corporation Dobbin Road 6430-C Columbia, MD 21045
AWARD:	$49,996
PHONE:	410-730-8600
FAX:	410-730-9311
E-MAIL:	mharel@abn-corp.com
PRINCIPAL INVESTIGATOR:	Dr. Moti Harel, Director of Aquanutrition

TITLE OF PROJECT:	Natural and Sustainable Alternative for Fish Meal/Oil Usage in Atlantic Salmon Feeds
SUBTOPIC NUMBER:	8.1.10SG

TECHNICAL ABSTRACT:

The aquaculture industry currently consumes 70 percent of the global production of fish oil and 35 percent of total fishmeal. The salmon and trout fish farming sectors alone consume over one half of the world's fish oil. And if fish farming continues to grow at the current rate, then by 2010 the aquaculture industry could well be using all of the world's fish oil and half of its fishmeal. Therefore, economically viable alternatives to the use of marine ingredients need to be found and implemented quickly.

Successful industrial cultivation of algae to produce a clean and pollution free edible oil containing DHA has been recently achieved, and DHA-rich materials are now available for aquaculture feeds through Advanced BioNutrition Corporation (ABN). We propose that efficient utilization of algal based meals in fish diet could result in a very cost-effective alternative to fish meal and fish oil.

This Phase I study addresses two fundamental questions:

1. "Can both fish meal and fish oil be eliminated from the diet of a salmonid and replaced by algal meal?"
2. "Can the salmonid still maintain nutritionally significant levels of DHA, in the end product?"

POTENTIAL COMMERCIAL APPLICATIONS:

We expect to develop algal based feed formulation for the entire grow-out scale of Atlantic salmon. We anticipate that ABN replacement strategies based on algal DHA and ARA oils will enable a much higher degree of fish meal/oil replacement as compared to current attainable levels.

FY 2005 PHASE I AWARD WINNER

FIRM:	Montana Microbial Products 1830 Ronald Avenue Missoula, MT 59801
AWARD:	$49,953
PHONE:	406-544-1176
FAX:	406-829-04369
E-MAIL:	cbradley@montana.com
PRINCIPAL INVESTIGATOR:	Clifford Bradley, Founding Member

TITLE OF PROJECT:	Microbial Enhancement of Flax to Replace Fishmeal and Oil in Salmonid Diets
SUBTOPIC NUMBER:	8.1.10SG

TECHNICAL ABSTRACT:

Flax containing omega 3 fatty acids and relatively high protein content offers advantages as a potential source of plant protein and oil to replace fishmeal and oil in aquaculture feeds; reducing both pressure on marine fisheries and the principal source of contaminants in farmed fish.

MMP ahs used innovative fungal culture technology in separate processes to develop low cost, multi activity cellulose enzymes and to enhance protein content and nutritional quality of soybeans. Integrating these processes to convert fiber and increase protein and oil concentration of flax would overcome the principal barriers to using flax in aquaculture feeds. In Phase I, MMP will meet three objectives to demonstrate technical feasibility; 1) determine the best process design for integrating fiber conversion and nutritional enhancement; 2) develop enhanced flax that meets principal nutritional criteria for replacing fishmeal in salmonid diets; 3) test acceptance of enhanced flax in initial trout feeding trials

POTENTIAL COMMERCIAL APPLICATIONS:

Enhanced flax will compete with fishmeal in the $1 billion plus market for protein and oil ingredients in aquaculture feed. Initial target market is for salmonid feeds. MMP plans to manufacture and market microbially enhanced flax to companies that manufacture and market finished aquaculture feeds.

FY 2005 PHASE I AWARD WINNER

FIRM:	Management Sciences, Inc. 6022 Constitution Avenue, NE Albuquerque, NM 87110-5941
AWARD:	$74,942
PHONE: FAX: E-MAIL:	505-255-8611 505-268-6696 carl_stern@mgtsciences.com
PRINCIPAL INVESTIGATOR:	Dr. Carl Stern, Senior Research Scientist

TITLE OF PROJECT: A Submersible Video Recorder for Marine Biological Studies

SUBTOPIC NUMBER: 8.1.13F

TECHNICAL ABSTRACT:

We propose research to develop and demonstrate a deeply submersible video plankton recording system (ViPR) to perform image recording of plankton. The ViPR will apply artificial intelligence to 2-D or 3-D imaging using pattern recognition for a statistically reliable survey of plankton using two cameras, one for larger zooplankton and the other for microplankton. The ViPR computer will be PC compliant with a real-time operating system and a memory expandable to terabytes. It will also have processors to control the operation of the VPR, communications, and a new 3-D wavelet processing algorithm that will provide feature data to a Bayesian data fusion architecture that performs adaptive and trainable context based artificial intelligence to classify, identify and count plankton. The mono or stereo pattern recognition algorithms will process selected images from this sequence and combine each pair in such a way to classify, identify and count plankton populations with context data.

POTENTIAL COMMERCIAL APPLICATIONS:
The ViPR will be used by marine biologists, fisheries scientists and research organizations to gather accurate information about their marine ecology. Because of its trainable algorithms the ViPR will be useful for fish population studies, oceanographic research, marine archeology, and studies of dams and other submerged artifacts. Being autonomous and powered the ViPR will have use in monitoring undersea pipelines for leaks. The ViPR will find application in assessing damage to vessels.

FY 2005 PHASE I AWARD WINNER

FIRM:	Physical Sciences, Inc. 20 New England Business Center Andover, MA 01810-1077
AWARD:	$74,947
PHONE:	978-738-8171
FAX:	978-689-3232
E-MAIL:	Templeman@psicorp.com
PRINCIPAL INVESTIGATOR:	Charles Templeman, Principal Scientist

TITLE OF PROJECT: Submersible in Situ Grain Sizing Device

SUBTOPIC NUMBER: 8.1.14F

TECHNICAL ABSTRACT:

A novel, miniaturized optical sensor for in-situ monitoring of underwater sediment grain size is described. This device employs light scattering measurement techniques previously developed by Physical Sciences, Inc. (PSI) for the U.S. Navy in a compact, powerful tool for acquiring quantitative information on particle size. Combining this innovative, miniature and inexpensive technology with undersea sampling hardware suitable for towed sled or cable immersion will allow continuous demersal observation of sea floor sediment grain size. PSI has already demonstrated the use of chip-level COTS CCD array detectors for high-resolution particle size determination without expensive digital image analysis. This detection modality will be able to provide near-real-time particle size information with an instrument costing only hundreds, rather than thousands, of dollars and with an analysis package no larger than a 12 ox soda can.

POTENTIAL COMMERCIAL APPLICATIONS:

When the proposed project succeeds through Phase I, II, and III , a robust new technology will be available for determining the sediment grain size on the sea floor. While the current proposal is aimed at the expressed NOAA need in reference to fisheries and fish habitat investigation, it is likely that this technology will find widespread application to other sectors as well. Currently, PSI is working on similar particle size analysis sensors for aircraft fuel conditions assessment and hydraulic fluid condition assessment on submarines. Other applications could include virtually any liquid environment in which measurement of the particle size distribution of settled or suspended particulates is required.

FY 2005 PHASE I AWARD WINNER

FIRM:	Shaba Shellfish, Inc. 42 Old Mill Stream Road Sullivan, ME 04664-3632
AWARD:	$68,375
PHONE:	207-422-3521
FAX:	207-422-3521
E-MAIL:	kaiguier@prexar.com
PRINCIPAL INVESTIGATOR:	Shain Stanley, President

TITLE OF PROJECT:	Development of a Submersible Raft for Shellfish Aquaculture
SUBTOPIC NUMBER:	8.1.16F

TECHNICAL ABSTRACT:

We propose the development of a full-scale, unique, mussel producing aquaculture platform that can remain fully submerged for the entire benthic stage of the mussel growth cycle. Our experimental mussel growing concept is unique in that it is designed to be fully submersible, unlike conventional surface mussel rafts currently being used that are subject to the ravages of wind, heavy seas, and ice flows, among other disadvantages. Our apparatus remains well below hazards on the surface. Our proposed raft stays submerged at the 10 to 15 foot level and is only brought to the surface for occasional services, or to harvest mature, marketable mussels. We are striving to create technology that is logistically, environmentally and economically feasible, which will help to reduce multiple-use conflicts, and which will lead to economic opportunity in the aquaculture sector.

POTENTIAL COMMERCIAL APPLICATIONS:

The successful completion of Phase I will pave the way for expanded Phase II research aimed at commercialization of our submersible rafts. Potential commercial applications include increased availability of potential raft sites both inshore and offshore because of lessened multiple conflicts, as well as manufacturing and sales of the submersible rafts (for which we have patent pending).

FY 2005 PHASE I AWARD WINNER

FIRM:	Ocean Farm Technologies, LLC 114 Higgins Road, N. Searsmont, ME 04973-3731
AWARD:	$74,737
PHONE:	207-322-4322
FAX:	207-342-5471
E-MAIL:	spage@pivot.net
PRINCIPAL INVESTIGATOR:	Stephen H. Page, General Manager, CEO

TITLE OF PROJECT:	Development of a Method for Fish Transfer and Harvest from Submerged Net Pens
SUBTOPIC NUMBER:	8.1.16F

TECHNICAL ABSTRACT:

Successful commercialization of open ocean finfish aquaculture will depend on developing new, presently unavailable methods of transferring and harvesting fish from submerged containment structures. Ocean Farm Technologies, LLC will conduct research on developing a method to safely and efficiently transfer and harvest fish from submerged pens, using the patent pending AquaPod™ containment system as a platform. Phase I will involve scale model feasibility studies of several fish transfer methods using facilities at the University of Maine Center for Cooperative Aquaculture Rwswarch (CCAR) in Franklin, Maine. Analysis will include real time video monitoring of fish behavior, feeding activity and measurement of stress indicators in fish being transferred. Results of this study will be used to determine the economic and operational feasibility of implementing the fish transfer technology on a commercial scale, and if feasible, to design a full-scale fish transfer system for Phase II.

POTENTIAL COMMERCIAL APPLICATIONS:

Harvesting and fish transfer for submersible offshore finfish aquaculture containment structures which are affordable, operationally safe, and efficient will eliminate a substantial barrier to investment in and expansion of this industry. A successful system will have a domestic and foreign market, which will grow for many years.

FY 2005 PHASE I AWARD WINNER

FIRM:	Snapperfarm, Inc. P.O. Box 685 Culebra, PR 00775
AWARD:	$58,480
PHONE:	787-548-6134
FAX:	787-742-0641
E-MAIL:	brian@snapperfarm.com
PRINCIPAL INVESTIGATOR:	Brian O'Hanlon, President and COO

TITLE OF PROJECT: Development of Effective and Low-Cost Predator Exclusion Devices for Offshore Aquaculture Facilities in the United States EEZ

SUBTOPIC NUMBER: 8.1.16F

TECHNICAL ABSTRACT:

Mariculture will be a significant global industry for food fish production. The United States lags behind other nations in the use of aquaculture to meet the growing demand for food fish in the global marketplace. Sustainable, offshore aquaculture will alleviate many problems currently faced by near shore marine aquaculture operations, such as pollution and navigational/recreational conflicts while preserving aesthetic values. Offshore aquaculture is the Exclusive Economic Zone (EEZ) in the United States most practical approach to meeting the growing demand. Recently two pioneering offshore aquaculture companies, Snapperfarm, Inc. in Puerto Rico and AquaSense, LLC in the Bahamas have experienced major problems with sharks that have nearly put them out of business. Snapperfarm's main goal of this Phase I project is to overcome a major obstacle for offshore aquaculture development by creating simple, economically viable systems for predator exclusion. Different predator nets and an electronic shark deterrent system will be tested in Phase I. Phase II can expand on the work done in Phase I by refining the predator nets to make them more effective and less expensive, and to refine the electronic shark deterrent system to make a robust, powerful unit that can be wired into a grid to protect a wide area around the farm. The development of an effective, economically viable solution to this problem will reduce one of the many risks faced by offshore aquaculture ventures.

POTENTIAL COMMERCIAL APPLICATIONS:

Practical, off the shelf predator exclusion systems will become available to current and future offshore aquaculture ventures thereby reducing one of the many risks associated with doing business in this harsh environment. This, along with other recent developments will likely spur rapid growth of the offshore aquaculture industry in the U.S.

FY 2005 PHASE I AWARD WINNER

FIRM:	Atmospheric Observing Systems, Inc. 1930 Central Avenue, Suite A Boulder, CO 80301
AWARD:	$75,000
PHONE:	303-443-3389
FAX:	303-440-3328
EMAIL:	jim@aosinc.net
PRINCIPAL INVESTIGATOR:	Dr. James R. Smith, President

PROJECT TITLE: The Oceanic CO_2 Monitor

SUBTOPIC NUMBER: 8.2.2G

TECHNICAL ABSTRACT:

Robust instrumentation is needed to map the distribution of Delta p(CO_2) for the ocean's surface. Accuracies must be 2 ppm for water and 0.2ppm for the atmosphere. We are proposing to customize an AOS NonDispersive InfraRed analyzer to measure Delta p(CO_2) autonomously from ships. Calibration will be referred to the WMO scale of dry mole fraction, and possible artifacts will be tracked by observational protocols. For Phase I, AOS will build and test the prototype analyzer with a commercial equilibrator in the laboratory. A full plan will be proposed for Phase II to include: (i) development of the full Delta p(CO_2) system into a portable, compact product that is easy to install and maintain, (ii) observational protocols that merge diagnostics with the data stream to allow evaluation/reevaluation of the observations, and (iii) multiple deployments on ships to make certain that measurements of Delta p(CO_2) are being measured properly with objective errors.

POTENTIAL COMMERCIAL APPLICATIONS:

Precision monitoring instrumentation for p(CO_2) of the ocean's surface and atmosphere.

FY 2005 PHASE I AWARD WINNER

FIRM:	Ceilings Unlimited 1074 Cold Springs Road Santa Barbara, CA 93108-1011
AWARD:	$75,000
PHONE:	805-565-4143
FAX:	413-521-5435
EMAIL:	Patrick@pictureworks.net
PRINCIPAL INVESTIGATOR:	Patrick Gregston, Producer
PROJECT TITLE:	NOAA Premium TV Program
SUBTOPIC NUMBER:	8.2.4G

TECHNICAL ABSTRACT:

Ceilings Unlimited proposes to develop a popular entertainment television show ("The Program") for climate education and outreach. The Program will integrate NOAA assets in near real-time in a localizable broadcast entertainment vehicle that increases public awareness and consciousness of NOAA and its climate services.

Ceilings Unlimited will systematically investigate and explore creative options to identify real instances and projected circumstances of the impact of NOAA's suite of climate services and products, survey the intellectual superstars for characterization and opportunities for dramatization, seek appropriate talent and distribution partnerships as well as investigate breakthrough technologies in information presentation, localization, and interactivity.

The proposed research is to find the right combination of the communications goals, scientific expertise, and climate services of NOAA, with the actors, writers, concept and distribution channel for a successful, prime-time television program on a major network.

POTENTIAL COMMERCIAL APPLICATIONS:

Prime-time broadcast or cable television show

FY 2005 PHASE I AWARD WINNER

FIRM:	Atmospheric Observing Systems, Inc. 1930 Central Avenue, Suite A Boulder, CO 80301
AWARD:	$75,000
PHONE: FAX: EMAIL:	303-443-3389 303-440-3328 jim@aosinc.net
PRINCIPAL INVESTIGATOR:	Dr. James R. Smith, President

PROJECT TITLE:	Flask Sampling Instrumentation for Trace Species of the Atmosphere
SUBTOPIC NUMBER:	8.2.5R

TECHNICAL ABSTRACT:

Atmospheric Observing Systems has substantial experience in the design, testing and manufacturing of glass flask packages for CCGG/CMDL. AOS is proposing to expand its business to manufacture packages for the CAMP/CMDL program as well. For Phase I, AOS will build two prototype flask packages for CAMP that are operationally the same as CCGG's Programmable Flask Package. They will have either metal or glass flasks and will tested for CAMP's target species (halocarbons). Electronics will be made the same for both the CCGG and CAMP units. CMDL will be asked to use its analysis stations to verify the chemical fidelity of various stages of the two prototypes. For Phase II-III, AOS will manufacture the best package and use it to sample CAMP's target species from a wide range of platforms. This new flask package will be integrated into AOS's product line and marketed worldwide with its in-situ analyzer systems.

POTENTIAL COMMERCIAL APPLICATIONS:

Precision monitoring instrumentation for trace species of the atmosphere and artificial environments. Commercialization of discrete flask and continuous in-situ instrumentations as a single detection system. Verification of adherence to international treaties.

FY 2005 PHASE I AWARD WINNER

FIRM:	Droplet Measurement Technologies, Inc. 5710 Flatiron Parkway, Suite B Boulder, CO 80301-2892
AWARD:	$74,770.83
PHONE:	303-440-5576
FAX:	303-440-1965
EMAIL:	glkok@dropletmeasurement.com
PRINCIPAL INVESTIGATOR:	Gregory L. Kok, President

PROJECT TITLE: A Lightweight, Low-Power, Autonomous Single Particle Aerosol Nephelometer

SUBTOPIC NUMBER: 8.2.6R

TECHNICAL ABSTRACT:

An advanced single particle spectrometer (ASPN) will be developed that will be deployable on fixed, mobile or airborne measurement platforms. Particle size measurement will be from 0.15 to 5 µm. Light scattering will be used as the analytical technique to size particles. The unit will have an open cavity design to avoid changing the nature of the particles due to drying or loss of volatile material. The ASPN will operate autonomously for extended periods of time and can be interrogated remotely to ascertain system status and download data. The capability of remote interrogation is an additional feature not found in any commercially available instrument. The Phase I activity will be a proof of concept study that combining a detailed analysis of the optical and electronic systems with a laboratory validation of the optical design. The deliverable will be a detailed analysis that demonstrates the viability of the optical, electrical and mechanical designs, as well as test data.

POTENTIAL COMMERCIAL APPLICATIONS:

Air quality monitoring in remote or hazardous locations. Air quality monitoring on commercial transports such as buses, trucks or subways. Vertical profiling of particle properties from commercial airlines or UAVs.

FY 2005 PHASE I AWARD WINNER

FIRM:	Irradiance, Inc. 41 Laurel Drive Lincoln, MA 01773-4510
AWARD:	$75,000
PHONE:	781-259-1134
FAX:	781-259-1134
EMAIL:	eckern@earthlink.net
PRINCIPAL INVESTIGATOR:	Dr. Edward C. Kern, Jr., President

PROJECT TITLE: Predictive Modeling of Solar Insolation in the Marine Environment for Solar Power System Applications

SUBTOPIC NUMBER: 8.3.1W

TECHNICAL ABSTRACT:

We aim to develop analytic tools and instruments to improve performance predictions for photovoltaic power systems on buoys. Using these capabilities, we can design more powerful and reliable power systems and provide NDBC more power to operate offshore data buoys and serve the Nation with enhanced observations of the marine environment. Present day buoy power systems are feasible because they use redundant PV panels spread around a full 360-degree azimuth; the dynamics of buoy motions and solar energy geometry have not been integrated in a single predictive performance model. In Phase I we will compile and analyze existing maritime solar resource data sets and integrate buoy motion and solar resource models; in Phase II we will develop instrumentation and experiments to validate models, and test new PV power system designs. This work is key to producing more energy for data acquisition, processing, and telemetry for future buoy instrumentation payloads.

POTENTIAL COMMERCIAL APPLICATIONS:

Power system design tools and services to the offshore data buoy community; instrumentation for observing offshore solar energy resources, power systems for data buoys.

FY 2005 PHASE I AWARD WINNER

FIRM:	Albido Corporation 19 Leaming Road Colorado Springs, CO 80906-4209
AWARD:	$74,859.93
PHONE:	719-540-8504
FAX:	719-540-8855
EMAIL:	fred@gnadinger.com
PRINCIPAL INVESTIGATOR:	Dr. Fred Gnadinger, President and CEO

PROJECT TITLE: NOAA Weather Radio (NWR) Broadcast Simulator

SUBTOPIC NUMBER: 8.3.2W

TECHNICAL ABSTRACT:

Complex and expensive instrumentation is currently required to test the NOAA Weather Radio (NWR) receivers because of their unique characteristics. There is a critical need for a small, portable, dedicated broadcast simulator specifically designed to evaluate NWR system performance. This SBIR Phase I project covers the research directed toward designing, prototyping, and establishing the feasibility of such an all-in-one testing tool, a NWR Broadcast Simulator. This simulator automatically performs comprehensive measurements for testing the performance of the NOAA Weather Radio (NWR) receivers and assessing compliance with the Public Alert Standard CEA-2009. In Phase I a prototype of a NWR Broadcast Simulator will be built and tested to establish proof-of principle. In Phase II a fully engineered simulator will be built, characterized and delivered to NOAA and potential commercialization partners.

POTENTIAL COMMERCIAL APPLICATIONS

The NWR Broadcast Simulator will be market and sold in collaboration with one or more strategic partners to any company selling weather radios and other emergency radio equipment, for example Radio Shack or Target. Another market segment is the Weather Radio manufacturers who will use it as a test system.

FY 2005 PHASE I AWARD WINNER

FIRM:	Intelligent Optical Systems, Inc. 2520 W. 237th Street Torrance, CA 90505-5217
AWARD:	$74,995
PHONE:	310-530-7130 extension 144
FAX:	310-530-7417
EMAIL:	srao@intopsys.com
PRINCIPAL INVESTIGATOR:	Srivatsa Venkatasubbarao, Senior Scientist

PROJECT TITLE: In-Field Detection Kit for Algal Bloom Toxins

SUBTOPIC NUMBER: 8.3.3N

TECHNICAL ABSTRACT:

Intelligent Optical Systems will develop an accurate, inexpensive, rapid, and quantitative device for the detection of harmful algal bloom toxins and toxigenic organisms. The device will be ideally suited for field use, and will provide information about multiple toxins in less than a few minutes. This portable device will obviate the need for laborious, time-consuming, and expensive laboratory testing, and will allow decision makers to expeditiously identify the presence of toxins and warn about possible health hazards resulting from these toxins. During Phase I, we will design, construct, calibrate, and test the device, and prove its ability to detect toxins of interest to NOAA. From these tests, we will determine the analytical performance of the device. In Phase II, we will optimize the device performance and build a prototype for field-testing. Successful completion of the Phase I and II objectives will result in a device suitable for product development.

POTENTIAL COMMERCIAL APPLICATIONS:

The applications for this device are in monitoring for toxins and toxigenic species. Other applications may include in vitro diagnostics, biomanufacturing, and water quality monitoring applications.

FY 2005 PHASE I AWARD WINNER

FIRM:	Lynntech, Inc. 7607 Eastmark Drive, Suite 102 College Station, TX 77845
AWARD:	$75,000
PHONE:	979-693-0017
FAX:	979-764-5794
EMAIL:	season.wong@lynntech.com
PRINCIPAL INVESTIGATOR:	Season Wong, Research Scientist

PROJECT TITLE: In-Field Device for the Autonomous Detection of Harmful Algal Bloom Toxigenic Species and Toxins

SUBTOPIC NUMBER: 8.3.3N

TECHNICAL ABSTRACT:

Harmful algal blooms (HABs) cost the U.S. economy ~$50 million per year. Early detection of blooms and a rapid response by state and federal resource managers are the most effective ways to mitigate the impacts of HABs. However, methods for detecting HAB species and their toxins are laborious, time-consuming and require expensive equipment. To overcome these problems, Lynntech proposes to build an automated field instrument for detecting toxigenic HAB organisms and their toxins from mixed phytoplankton assemblages. The detection method will be innovative, cost-effective, rapid, accurate, and quantitative. Direct oxidation of guanine residues of ribosomal RNAs lysed from algae cells captured by species-specific probes immobilized onto an electrode will provide the necessary sensitivity without target or signal amplification. Also, an innovative, inexpensive device will be used for biotoxin detection. The final systm can potentially be installed on moored buoy or ship-deployed vehicles for automated monitoring with real-time data access capability.

POTENTIAL COMMERCIAL APPLICATIONS:

The proposed integrated nucleic acid and biotoxin detection device would b e a significant benefit to state and federal resource managers who are often required to make quick decisions to safeguard public health, local economies, and fisheries with limited HAB data. Related markets would include seafood safety testing and a broad range of marine, estuary, and freshwater environmental applications such as disease detection and rapid recognition of unwanted “invader” species. Lynntech’s core electrochemical detection technology are also envisioned to lead to marketable devices for both government and civilian uses such as biosensors for countering biological warfare and biological terrorism, hand-held devices for point-of-card medical diagnostics, and biochips for genomic research.

FY 2005 PHASE I AWARD WINNER

FIRM:	Aethon Intelligence, LLC P.O. Box 13956 Tampa, FL 33681-3956
AWARD:	$74,835
PHONE:	813-837-3374 x102
FAX:	813-837-7302
EMAIL:	pbissett@aethonintel.com
PRINCIPAL INVESTIGATOR:	W. Paul Bissett, Ph.D., President

PROJECT TITLE:	The Design of a Low Cost, Rapidly Deployable, Airborne Harmful Algal Bloom Identification Technology (HABIT) Sensor
SUBTOPIC NUMBER:	8.3.4N

TECHNICAL ABSTRACT:

The optimal design for a rapidly-deployable, airborne HAB identification sensor requires the determination of the minimum spectral, spatial, dynamic range, and deployment capabilities necessary to achieve the goal of operational detection. This sensor must be capable of rendering a positive identification, with a low false alarm rate, in optical shallow waters, where the bottom is visible in the spectroscopic signature. This requirement places extreme demands on the operational capabilities of the airborne sensor. NOAA currently issues a HAB Bulletin for the West Florida Shelf based on an ecological matrix approach, which includes ocean color products. While this approach uses ocean color, it is not solely dependent on spectroscopy to yield an identification result. Using this approach will reduce the design demands and costs of an airborne sensor. This proposal will design a HAB Identification Technology (HABIT) sensor that will allow expand the NOAA HAB Bulletins into the nearshore environment.

POTENTIAL COMMERCIAL APPLICATIONS:

The project will provide the design necessary to develop a low-cost, rapidly-deployable spectral imaging sensor for the coastal environment. These sensors will provide a wealth of information products for the assessment of the current coastal environment, including beaches and upland areas, as well as in-water habitats. The commercial applications include the manufacturing and sales of the HABIT sensor suite, and the contract-for-services work for the operations of the HABIT sensor in the nearshore environment.

FY 2005 PHASE I AWARD WINNER

FIRM:	ProSensing, Inc. 107 Sunderland Road Amherst, MA 01002
AWARD:	$74,859.44
PHONE: FAX: E-MAIL:	413-549-4402 413-549-5203 goodberlet@prosensing.com
PRINCIPAL INVESTIGATOR:	Mark Goodberlet, Senior Microwave Engineer

TITLE OF PROJECT:	Affordable Microwave Salinity Sensor for Near-Surface Platforms
SUBTOPIC NUMBER:	8.3.5W

TECHNICAL ABSTRACT:

This Phase I SBIR proposal describes the development of a low-cost microwave salinity sensor specifically designed for single point sea surface salinity (SSS) measurements from a buoy, ship or ocean tower. Existing airborne L-band radiometers developed by our company and others have demonstrated the practicality of mapping SSS from airborne platforms. These complex radiometers employ multi-beam antennas with multiple receiver channels to create push-broom images of SSS with better than one second time resolution. Single point, coarse time resolution measurements from near-surface platforms can be accomplished with a much simpler instrument. Phase I research will focus on the design of a compact, single-beam antenna and integrated L-band radiometer module, and issues related to integration of the radiometer with the buoy's data system and with auxiliary sensors required for accurate SSS retrievals.

FY 2005 PHASE I AWARD WINNER

FIRM:	Planning Systems, Inc. (Neptune Sciences Division) 40201 Highway 190 East Slidell, LA 70461-2443
AWARD:	$74,997.81
PHONE:	985-649-7252 x202
FAX:	985-649-9679
E-MAIL:	Mearle@plansys.com
PRINCIPAL INVESTIGATOR:	Marshall D. Earle, Ph.D., Assistant Vice President
TITLE OF PROJECT:	Low-Cost Wave Data Buoys for Offshore Monitoring
SUBTOPIC NUMBER:	8.3.7W

TECHNICAL ABSTRACT:

Ocean waves are well-known to be the most hazardous of ocean environmental conditions affecting vessel operations. The vast majority of incidents responded to by the U.S. Coast Guard, injuries and fatalities, and damage to or sinking of vessels (particularly small craft) are wave-related. Recognizing the considerable spatial and temporal variability of waves in coastal areas, research will design and evaluate an easily-deployed, low-cost (e.g., less than $2,000 in large quantities), reasonable life-time (e.g., one year or more) buoy that measures and automatically processes wave data, and relays wave information to nearby vessels. The buoy is called the Vessel Assistance Buoy – Wave (VAB-W). It will be developed so that other data can be optionally measured. VAB-W systems will include buoys and low-cost (e.g., less than $200 in large quantities) vessel data receiving and display units. Appropriately making the wave measurements and real-time communications are the two most important research areas.

POTENTIAL COMMERCIAL APPLICATIONS:

Spatial and temporal variability of waves in coastal areas combined with increasing coastal populations and growing numbers of small craft operators show that the numbers of locations where systems could be used may be in the hundreds or thousands indicating significant commercialization potential. As shown by high public interest in the National Data Buoy Center's real-time wave data, there would be strong public support for VAB-W networks.

FY 2005 PHASE I AWARD WINNER

FIRM:	Blue Water Design, LLC P.O. Box 879 Niwot, CO 80544-0879
AWARD:	$74,450.11
PHONE:	303-652-1591 x103
FAX:	303-652-1794
E-MAIL:	c.roark@bluewaterdesign.us
PRINCIPAL INVESTIGATOR:	R. Chris Roark, Managing Director

TITLE OF PROJECT:	Forward Error Correction Enabled Open-Source Packet Modern Development
SUBTOPIC NUMBER:	8.3.8W

TECHNICAL ABSTRACT:

Development of a non-proprietary Frequency Shift Key (FSK) modern and packet assembler and disassembler incorporating forward error correction capable of “plug and play” interfacing to standard off the shelf VHF/UHF FM transceivers could provide an order of magnitude improvement in communication bandwidth and channel utilization for Automated Flood Warning Systems (AFWS). The use of 4 level orthogonal direct FSK encoding and raised cosine response data filtering interfaced to the normal audio input and output of a standard FM transceiver for 4800 bps raw data rate while maintaining an occupied RF bandwidth of 12.5 kHz and BER performance equivalent to 300 bps AFSK-FM is proposed. The use of a NASA standard concatenated channel code is proposed to provide coding gain and multipath mitigation. Development of prototype hardware to demonstrate feasibility is proposed.

POTENTIAL COMMERCIAL APPLICATIONS:

Automated Flow Warning Systems; Environmental Monitoring; Water Quality Monitoring; Remote Control Systems; Homeland Security Communications.

FY 2005 PHASE I AWARD WINNER

FIRM:	Woodley Weather Consultants 11 White Fir Court Littleton, CO 80127-2600
AWARD:	$74,600
PHONE:	303-979-7946
FAX:	303-973-3446
E-MAIL:	williamlwoodley@cs.com
PRINCIPAL INVESTIGATOR:	William L. Woodley, Ph.D., President

TITLE OF PROJECT:	Short-Term Forecasting of Severe Convective Storms Using Quantitative, Multi-Spectral, Satellite Imagery
SUBTOPIC NUMBER:	8.3.9E

TECHNICAL ABSTRACT:

The development, testing and marketing of a new tool for the short-term (~1 hr) forecasting and warning of severe weather (i.e., tornadoes and large hail), involving the use of multi-spectral satellite imagery, is proposed by Woodley Weather Consultants. The proposal is based on its finding that height profiles of cloud effective radius, showing a deep zone of diffusion droplet growth, little coalescence, no precipitation, and delayed glaciation to near the temperature of homogeneous nucleation (~ -38^{o}C) appear to be associated with tornadoes and hail. The initial analyses suggest that the severe storm signature is an extensive property of the clouds before storm outbreaks, suggesting that the probabilities of tornadoes and large hail and can be obtained at lead times > 1 hour as contrasted with the current NWS warning lead times < 15 minutes. These apparent relationships must be tested in Phase I on an independent set of GOES satellite imagery to refine and test them. This will entail the use of archived and future multi-spectral GOES imagery instead of polar-orbiter satellite data, which were used to derive the relationships. Upon successful completion of Phase I, an operational severe-weather forecasting system, making primary use of current and projected multi-spectral GOES satellite imagery, will be developed under SBIR Phase II and then marketed to potential users.

POTENTIAL COMMERCIAL APPLICATIONS:

The methodology will be marketed to governmental and private entities that are mandated to develop forecasting methods that will mitigate the losses of lives and property due to severe weather, especially tornadoes and large hail.

FY 2005 PHASE I AWARD WINNER

FIRM:	Synkera Technologies, Inc. 2021 Miller Drive, Suite B Longmont, CO 80501-6787
AWARD:	$75,000
PHONE: FAX: E-MAIL:	720-494-8401 x105 720-494-8402 ddeininger@synkera.com
PRINCIPAL INVESTIGATOR:	Debra J. Deininger, Senior Scientist

TITLE OF PROJECT:	Acoustic Sensors for Detection of Persistent Organic Contaminants in Water
SUBTOPIC NUMBER:	8.3.10R

TECHNICAL ABSTRACT:

This SBIR Phase I project is for an innovative, advanced microsensor for the detection of persistent organic pollutants in natural waters. The proposed sensor is a type of acoustic wave sensor fabricated via micromachining of anodic aluminum oxide, followed by coating with piezoelectric zinc oxide and analyte specific polymers. The sensor design (a flexural plate wave device) offers significant advantages for detection of very low levels of chemical species in liquids compared to surface and bulk acoustic wave devices.

Phase I will demonstrate the feasibility of detecting low levels of persistent organic contaminants in water using the proposed acoustic sensor. A subsequent Phase II will extend the flexural plate wave design from a single sensor to multiple sensors in an array. Supporting instrumentation will be developed in order to fabricate a low-cost field portable instrument for the detection and quantification of chemical compounds in a marine environment.

POTENTIAL COMMERCIAL APPLICATIONS:

Significant applications exist for the proposed technology in homeland security, environmental research and water quality monitoring, and drinking water assessments.

FY 2005 PHASE I AWARD WINNER

FIRM:	Covega, Inc. 10335 Guilford Road Jessup, MD 20794
AWARD:	$74,952
PHONE: FAX: E-MAIL:	240-456-7142 240-456-7200 jwei@covega.com
PRINCIPAL INVESTIGATOR:	Dr. Jian Wei, Chip Design Engineer

TITLE OF PROJECT:	Low Noise, High Efficiency InGaAs/InAIAs Avalanche Photodiodes for Photon Counting at 1.55 Micrometer Wavelength
SUBTOPIC NUMBER:	8.3.12R

TECHNICAL ABSTRACT:

A large area (diameter > 200 micrometer) mesa type InGaAs/InAlAs avalanche photodiode with a novel surface passivation technique is proposed for photon counting at eye-safe wavelength of > 1.4 micrometer. The device is expected to exhibit high detection efficiency, low dark count rate with minimal afterpusling, due to the small k factor of InAlAs gain material and the unique mesa sidewall treatment. It should also have the improved reliability, suitable for a broad range of commercial applications. A fully packaged APD chip will be fabricated and tested in Geiger mode to demonstrate proof-of-concept.

POTENTIAL COMMERCIAL APPLICATIONS:

The high-performance, reliable, and cost-effective InGaAs/InAIAs APDs have applications in a large number of commercial markets, including telecommunications, remote sensing, quantum cryptography, time-resolved spectroscopy, three-dimensional imaging, and optical time-domain reflectometry.

FY 2005 PHASE I AWARD WINNER

FIRM:	Aerodyne Research, Inc. 45 Manning Road Billerica, MA 01821-3976
AWARD:	$74,741
PHONE:	978-663-0266
FAX:	978-663-4918
E-MAIL:	Herndon@aerodyne.com
PRINCIPAL INVESTIGATOR:	Scott C. Herndon, Senior Scientist

TITLE OF PROJECT:	Formaldehyde and Hydrogen Peroxide Instrument for Flight Based Measurement
SUBTOPIC NUMBER:	8.3.14R

TECHNICAL ABSTRACT:

Hydrogen peroxide formation represents a loss of gas phase HOx and results in the transfer of atmospheric oxidative capacity to the liquid phase. Measurements of formaldehyde and H2O2 are vital to fully elucidate the atmospheric mechanisms associated with ozone formation and the formation of inorganic and secondary organic aerosol throughout the atmosphere.

Tunable infrared differential absorption spectroscopy allows selective and sensitive measurements of many low molecular weight trace gas species. The ability to detect HCHO from an aircraft platform using pulsed quantum cascade lasers has been demonstrated (300 pptv Hz-½. This proposal will apply these methods to the detection of H2O2. A novel approach to increase sensitivity is proposed by developing a continuous wave light source with an improved linewidth. Realization of the improvements proposed in this research program will lead to a single instrumentation package with detection sensitivity of 125 pptv Hz – ½ for H2O2 and 50 pptv Hz-½ for formaldehyde.

POTENTIAL COMMERCIAL APPLICATIONS:

The development of a sensitive, cryogen-free, mid-infrared absorption method for HCHO and H2O2 detection has wide benefits for atmospheric and environmental research and broader potential commercial applications in areas such as medical diagnostics and industrial process monitoring of gaseous compounds.

FY 2005 PHASE I AWARD WINNER

FIRM:	Boulder Internet Technologies, Inc. 4878 Curie Court Boulder, CO 80301
AWARD:	$75,000
PHONE:	720-771-1124
FAX:	303-415-2500
E-MAIL:	doxas@colorado.edu
PRINCIPAL INVESTIGATOR:	Isidoros Doxas, Ph.D., President

TITLE OF PROJECT: Branch Prediction and Speculative Execution (BPSE): A Data Assimilation Scheme for Space Weather

SUBTOPIC NUMBER: 8.3.15R

TECHNICAL ABSTRACT:

Although Space Weather is modeled after Tropospheric weather, both in its conception as a weather system and in our efforts to forecast it, no capability exists today for assimilating magnetospheric data into Space Weather simulations. The proposed project will develop the first such capability in Space Weather. Branch prediction and speculative execution consist of making probabilistic predictions about the likely evolution of the near-Earth space, and distributing among available computers a large number of simulations that assume each of the probabilistically estimated states as initial conditions. As the near-Earth space evolves and near-Earth satellite data are compared with the models, some of the speculatively executed simulations will be seen to diverge from the observations more than others. At that point the machines that were executing them will be reassigned to new lines of speculative simulation, resulting in a continuous ensemble of runs that are in the neighborhood of measured values.

POTENTIAL COMMERCIAL APPLICATIONS:

The ultimate goal of the proposed project is the development of a software package that will use Branch Prediction and Speculative Execution together with appropriate cost functions to produce a running ensemble of data-validated global forecasts with corresponding error estimates. The data-validated global forecasts will be marketed to Space Weather forecast providers who are currently using global forecast without any magnetospheric data assimilated.

FY 2005 PHASE I AWARD WINNER

FIRM:	Remote Sensing Solutions, Inc. P.O. Box 1092 Barnstable, MA 02630-1105
AWARD:	$74,642
PHONE: FAX: E-MAIL:	508-362-9400 508-519-9175 carswell@rmss.us
PRINCIPAL INVESTIGATOR:	James R. Carswell, President
TITLE OF PROJECT:	A High Resolution Airborne Atmospheric Boundary Layer and Surface Wind Field Imager for the NOAA WP-3D Aircraft
SUBTOPIC NUMBER:	8.3.16R

TECHNICAL ABSTRACT:

High resolution, continuous monitoring of the lower boundary layer wind field and ocean surface wind field within tropical cyclones is required to improve intensity forecasting. This proposed Phase I effort will focus on realizing an operational airborne imaging Doppler radar capable of providing these winds with 15-meter vertical resolution from a minimum of 5000 feet to, and including, the ocean surface. The technical innovations required to realize this system are a digital receiver and spectral processor capable of handling 4.4 Gb/s input data rate and suppressing surface backscatter contamination in the lower volume backscatter profiles; a novel solid-state design that will achieve high sensitivity; a low loss, multi-beam antenna compatible with the NOAA WP-3D aircraft and a real-time retrieval processor. In addition to serving the tropical cyclone forecasting and research communities, this system and innovations developed could service the homeland defense and weather industries.

POTENTIAL COMMERCIAL APPLICATIONS:

Coastal surveillance, low cost weather radars, advanced radar receiver and processor, atmospheric boundary layer profiling.

FY 2005 PHASE I AWARD WINNER

FIRM:	ProSensing, Inc. 107 Sunderland Road Amherst, MA 01002-1098
AWARD:	$75,000
PHONE: FAX: E-MAIL:	413-549-4402 x15 413-549-5203 popstefanija@prosensing.com
PRINCIPAL INVESTIGATOR:	Dr. Ivan PopStefanija, Vice-President

TITLE OF PROJECT:	Operational Scanning Radar Altimeter for Real-Time Reporting of Directional Ocean Wave Spectra
SUBTOPIC NUMBER:	8.3.17R

TECHNICAL ABSTRACT:

This Phase I SBIR Proposal describes design concepts for a solid-state scanning radar altimeter suitable for operational measurement of ocean wave spectra from hurricane reconnaissance aircraft. A compact, solid-state radar design is proposed, suitable for operation from a wing pod, mounted on a P-3 or C-130 aircraft. Using a high compression ratio linear FM chirp waveform, the proposed design can achieve very high effective peak power (over 100 kW) with a commercially available solid-state Ka-band amplifier. The system will be designed for unattended operation, relaying measurements of the directional ocean wave spectra computed on-board the aircraft to the National Hurricane Center via a satellite link. The Phase I design study will cover all aspects of the RF, digital and software design, resulting in a concise plan for construction and demonstration of a solid-state scanning radar altimeter system in Phase II.

POTENTIAL COMMERCIAL APPLICATIONS:

Successful development of the proposed solid state radar altimeter will result in a system ready for deployment on the Air Force Reserve 53rd Weather Reconnaissance Squadron's fleet of ten C-130 hurricane hunter aircraft. These instruments will provide the National Hurricane Center with routine estimates of the radius of 12 foot seas required for forecasting dangerous landfalling hurricanes and tropical storms.

FY 2005 PHASE I AWARD WINNER

FIRM:	Toyon Research Corporation 75 Aero Camino, Suite A Goleta, CA 93117
AWARD:	$75,000
PHONE:	805-968-6787 x192
FAX:	805-685-8089
E-MAIL:	rcagley@toyon.com
PRINCIPAL INVESTIGATOR:	Dr. Richard Cagley, Senior Analyst

TITLE OF PROJECT: Multipath Reducing GPS Receiver and Antenna

SUBTOPIC NUMBER: 8.4.1N

TECHNICAL ABSTRACT:

Toyon Research Corporation proposes to design an improved GPS receiver and GPS antenna to reduce installation-dependent errors due to multipath. To develop the receiver, we will prototype and implement various interference cancellation algorithms on a software-defined radio simulation toolkit and hardware testbed. We will design an antenna complementary to this receiver that will suppress signals incident at angles at or near the horizon. Our unique antenna pattern shaping methodology will allow very precise control over the elevation angle coverage of the antenna. Together, this receiver and antenna will yield improved positioning in the presence of multipath signals compared to currently available technology.

POTENTIAL COMMERCIAL APPLICATIONS:

GPS receivers for surveying, geodetic, atmospheric, seismic monitoring, and other high-accuracy differential GPS applications.

FY 2005 PHASE I AWARD WINNER

FIRM:	RD Instruments, Inc. 9855 Businesspark Avenue San Diego, CA 92131
AWARD:	$74,682.54
PHONE:	858-693-1178 x3176
FAX:	858-695-1459
E-MAIL:	wxu@rdinstruments.com
PRINCIPAL INVESTIGATOR:	Dr. Wen Xu, Technical Director

TITLE OF PROJECT: Low Power Multibeam Echo Sounder for Small AUVs

SUBTOPIC NUMBER: 8.4.3N

TECHNICAL ABSTRACT:

This Phase I proposal is to establish the technical feasibility of developing a low-power multibeam echo sounder for small AUVs for hydrographic survey applications. The proposed approach will leverage innovative electronics, signal processing, and transducer design techniques with modern industrial and RDI-developed technologies to provide a system, which meets the technical requirements for the defined mission. The proposed system is expected to have performance capabilities similar to those typically used on surface craft and larger underwater vehicles, while being small enough to fit into an AUV with a diameter of less than 8-inches while requiring only 15W of power.

POTENTIAL COMMERCIAL APPLICATIONS:

Multibeam Echo Sounders for small underwater vehicles (including AUVs and UUVs); Low-cost Multibeam Echo Sounders for small surface craft; Obstacle avoidance sonars for a wide variety of AUVs and UUVs; Automatic underwater pipe and cable tracking using AUVs or ROVs.

FY 2005 PHASE I AWARD WINNER

FIRM:	Nanohmics, Inc. 6201 E. Oltorf Street, Suite 400 Austin, TX 78741-7511
AWARD:	$74,684
PHONE:	512-389-9990
FAX:	512-389-9850
E-MAIL:	dpatterson@nanohmics.com
PRINCIPAL INVESTIGATOR:	Donald E. Patterson, Ph.D., Senior Scientist

TITLE OF PROJECT: Natural Product Antifoulant Protection for Bio-Sensors and Solar Panels

SUBTOPIC NUMBER: 8.4.5R

TECHNICAL ABSTRACT:

Solar panels and bio-optical sensors play a significant role in a number of applications that are of importance to NOAA. Many of these instruments require a high transmission of radiation into the device for it to work properly. Typically, these devices have a coverglass affixed over the active part of the device to protect the sensor or panel from harsh conditions. A problem that presently exists with this technology is biological fouling of the coverglasses on these instruments. In an effort to mitigate this problem, Nanohmics, Inc. is developing a new class of instrument coverglass that incorporates natural product antifoulants (NPAs) into optical quality, hard polymers. NPAs are incorporated into thin polymer coverglass materials using standard processes and are being tested in a laboratory marine environment in order to determine their effectiveness. Subsequent phases of the project will include optimizing and scaling-up the production of the antifoulant-impregnated polymeric sheets.

POTENTIAL COMMERCIAL APPLICATIONS:

The availability of inexpensive, long-life protective windows for marine environment optical sensors and solar panels will greatly enhance their value and usefulness to NOAA, other government agencies (in particular, the US Navy), and the private sector. Other potential application areas include: greenhouse glass, marine windows, and instrument viewports subject to harsh biological environments.

FY 2005 PHASE II AWARD WINNER

FIRM:	MetroLaser, Inc. 2572 White Road Irvine, CA 92614-6237
AWARD:	$299,950.96
PHONE:	949-553-0688 x294
FAX:	949-553-0495
E-MAIL:	vdoushina@metrolaserinc.com
PRINCIPAL INVESTIGATOR:	Valentina Doushkina, Senior Scientist

TITLE OF PROJECT: An Innovative Raster-Mirror Optical Detection System for CCD Camera Bistatic Lidar

SUBTOPIC NUMBER: 8.1.2R

TECHNICAL ABSTRACT:

An innovative ground-based CLidar receiver for measuring aerosol scattering in the atmospheric boundary layer was developed and tested for proof-of-concept. It offers several orders of magnitude higher etendu and spatial resolution than existing systems, thus allowing the use of lower power/eye safe lasers. The design is based on dividing the wide 100^0 vertical field of view into several sectors, using 1-D rastering of mirrors and parallel imaging of the laser scattered light from each sector onto one CCD, while employing a single narrow angle of view objective. The system is applicable to the simultaneous measurements of several laser beams to obtain spectral, spatial, and temporal information about the atmosphere. Using an off-axis parabolic mirror objective eliminates chromatic aberrations making the system employable in a broad spectral range from IR to UV. The advantages of the proposed technology are: the ability to control the dynamic range of the registered signal, the superior height resolution of 18 mm/pixel at the ground level, and 175 m/pixel at 20km altitude, low cost and simplicity. Phase II will consist of the design, development and delivery of a prototype system with automatic system feedback and self-calibration. The system will be developed to accommodate daytime operating conditions.

POTENTIAL COMMERCIAL APPLICATIONS:

For decades, optical instruments have provided the means by which aeronomers have studied the complex processes that take place in the atmosphere. The increased sophistication of optical remote sensing techniques has rapidly advanced our knowledge about the atmosphere and brings new demands for advanced but simple optical devices. A ground-based bistatic lidar that incorporates the proposed innovative optics can find broad application in (1) monitoring boundary layer aerosols to asses the impact of anthropogenic and natural aerosols on climate; (2) monitoring spatial and temporal atmospheric aerosol profiles, which is essential for air quality and health effect studies; (3) monitoring the tropospheric ozone density and transport, as well as the chemicals that form it; (4) monitoring the water vapor density and transport since the water vapor provides an important clue about the atmospheric dynamics; (5) understanding the physics, chemistry, radiation, and dynamics of the atmosphere by measuring and monitoring the aerosols in the boundary layer; and (6) studying and monitoring the green house global warming effect. A network of ground-based, bistatic lidars can be very beneficial for understanding the dynamics of the atmosphere.

FY 2005 PHASE II AWARD WINNER

FIRM:	ADA Technologies, Inc. 8100 Shaffer Parkway, Suite 130 Littleton, CO 80127-4107
AWARD:	$299,999.89
PHONE: FAX: E-MAIL:	303-792-5615 303-792-5633 patf@adatech.com
PRINCIPAL INVESTIGATOR:	Patrick D. French, Instruments Program Manager
TITLE OF PROJECT:	Modular Micro-Weather Station for Use in Open Ocean and Coastal Marine Environments
SUBTOPIC NUMBER:	8.1.3OGP

TECHNICAL ABSTRACT:

NOAA collects meteorological measurements in open-ocean and coastal marine environments from research vessels, data buoys and commercial ships for use in numerical weather prediction, global climate change research, and severe storm identification. The current system costs for robust marine automated meteorological stations along with the necessary long-haul satellite communications systems is too high to allow ubiquitous use on the available platforms. Through this SBIR program ADA Technologies is developing a cost effective, modular micro-weather station network (sensors, local wireless communications, and satellite communications) for use in marine environments. ADA is leveraging an existing miniature self-networking sensor pod developed for military applications. The final modular system will 1) weigh a few pounds, 2) measure meteorological parameters, 3) measure GPS location and spatial orientation to correct for platform motions, 4) contain integral communications to wirelessly transfer data on a routine basis to the aggregation point on the ship then through the Iridium satellite system back to NOAA, 5) use a plug-and-play port for additional sensors, and 6) be extremely simple to install. In Phase II, the system is being rigorously tested on a VOS ship and a sea-surface temperature sensor is being added to the system.

POTENTIAL COMMERCIAL APPLICATIONS:

The commercial potential for the modular marine weather station includes the existing applications of use in 1) the VOS fleet (currently around 4,000 participate), and 2) the NDBC buoys (roughly 100). Additional markets include the creation of marine meso-nets for harbors and estuaries for improved resources management, incident meteorology and homeland security. ADA's weather stations will also be suitable for use on channel markers, buoys, navigation aides, and day markers. Outside of marine applications, this modular sensor platform has applications in the DOD and various scientific sectors.

FY 2005 PHASE II AWARD WINNER

FIRM:	Sonoma Technology, Inc. 1360 Redwood Way, Suite C Petaluma, CA 94954-1169
AWARD:	$291,074
PHONE:	303-279-4499
FAX:	707-665-9800
E-MAIL:	Marty@sonomatech.com
PRINCIPAL INVESTIGATOR:	Martin P. Buhr, Senior Scientist

TITLE OF PROJECT:	An Autonomous Gas Chromatograph for Measurement of Greenhouse Gases in Airborne Applications
SUBTOPIC NUMBER:	8.1.5R

TECHNICAL ABSTRACT:

An automated, high precision, lightweight gas chromatograph, capable of measuring hydrogen (H_2), methane (CH_4), carbon monoxide (CO) and carbon dioxide (CO_2) with a fast duty cycle (1 sample per two minutes) was designed and built during the Phase I research effort. The detector used for the chromatograph is an electron capture detector with sensitivity enhanced by addition of nitrous oxide (N_2O) reagent gas. The Phase I instrument was designed for minimum power consumption, weight and size to best facilitate deployment on small research aircraft. The instrument components were selected to maximize commercial viability in both system performance and reliability. The focus of the Phase II research will be to further characterize and optimize the Phase I instrument and to build an operational prototype that will be validated under both surface-based and airborne conditions. The final stages of the Phase II effort will focus on development of a manufacturing process that will allow efficient commercial production of the system.

POTENTIAL COMMERCIAL APPLICATIONS:

Commercial applications for this instrument include a variety of U.S. and foreign research organizations that require a small, automatic instrument for precise determination of the principal greenhouse gases. Extension of the instrument to measure other important atmospheric trace species will further enhance the commercial viability of the system. Beyond the environmental applications for the instrument development in this research, there may be opportunities to customize the system for both industrial and homeland security applications.

FY 2005 PHASE II AWARD WINNER

FIRM:	International Radiation Detectors, Inc. 2527 W. 237th Street, Unit A Torrance, CA 90505-5243
AWARD:	$300,000
PHONE:	310-534-3661
FAX:	310-534-3665
E-MAIL:	rajkorde@ird-inc.com
PRINCIPAL INVESTIGATOR:	Dr. Raj Korde, President

TITLE OF PROJECT:	Detectors with Integrated Filters for Solar VUV Observations
SUBTOPIC NUMBER:	8.1.6R

TECHNICAL ABSTRACT:

IRD manufactures nearly 100% internal carrier collection efficiency silicon photodiodes which are being used presently aboard SOHO, SNOE, TIMED and SOURCE EUV instruments and will be used in GOES N, O and P spacecrafts to make the solar EVV measurements. Performance of these silicon photodiodes is not adequate for making the solar measurements in 50 nm to 100 nm (VUV) region because of the poor light blocking of the current Sn and In filters. Objective of this research is to realize silicon photodiodes with Sn and In directly deposited filters so that the diodes have less than 7 orders of magnitude response to visible light. Fabrication of VUV silicon carbide (SiC) photodiodes with directly deposited filters will also be investigated. Because of the wide band gap of SiC (3.2 eV), these devices are insensitive to visible light. Once successfully developed, these devices can be used in future GOES missions to make solar measurements in the problematic 50 nm to 100 nm passband.

POTENTIAL COMMERCIAL APPLICATIONS:

Owing to their light weight and long term stability, the proposed AXUV filtered diodes will be extremely useful in future EUV solar space instrumentation. Other applications of the proposed devices are plasma diagnostics, process control during reactive film sputtering and EUV spectroscopy in general. The developed SiC detectors will be useful in almost all the applications where UV/EUV radiation is involved. Some of these applications are: EUV/ deep UV lithography, synchrotron radiation, air quality control, flame safeguard and fire detection, water purification, personal dosimetry, solar spectrum measurements and missile threat warning.

FY 2005 PHASE II AWARD WINNER

FIRM:	FIRST RF Corporation 4865 Sterling Drive, Suite 100 Boulder, CO 80301
AWARD:	$299,942
PHONE:	303-449-5211 x101
FAX:	303-449-5188
E-MAIL:	flalezari@firstrf.com
PRINCIPAL INVESTIGATOR:	Farzin Lalezari, Chief Executive Officer

TITLE OF PROJECT: Advanced Microwave Antenna for Airborne Soil Moisture and Salinity Mapping Phase II

SUBTOPIC NUMBER: 8.1.10R

TECHNICAL ABSTRACT:

The NOAA Environmental Technology Laboratory seeks to perform advanced wide-area mapping of soil moisture and salinity. This requires a large scanning antenna with aerodynamic form, narrow beamwidth, high efficiency, and dual polarization. This antenna system must provide operation at L-band (1400-1427 MHz) and C-band (6.0-6.5 GHz). This large aperture must maintain stable performance independent of changes in environment. This is important, as the test conditions require high accuracy and a high degree of calibration for the sensitivity levels that are sought.

During Phase I, FIRST RF demonstrated, via modeling and prototypes, a dual polarized microstrip antenna capable of meeting performance requirements. The design parameters and materials were chosen carefully to achieve bandwidth, efficiency, and packaging constraints. The FIRST RF design users separate apertures at L-band and C-band. During Phase II FIRST RF will fabricate and test a full scale L-band antenna and a C-band subarray.

POTENTIAL COMMERCIAL APPLICATIONS:

The most direct use of this technology will be for precision airborne mapping of soil moisture and salinity. This antenna can be used on airborne platforms to perform this mission. Many of the technology components, however, will have use in various other applications. The dual polarized array with co-located orthogonal polarization beams can be scaled and applied to polarization diverse communications antenna applications of the U.S Government.

FY 2005 PHASE II AWARD WINNER

FIRM:	Planning Systems, Inc. 12030 Sunrise Valley Drive Reston Plaza I, Suite 400 Reston, VA 20191-3453
AWARD:	$300,000
PHONE:	228-689-8458
FAX:	228-689-8499
E-MAIL:	wmcbride@psistennis.com
PRINCIPAL INVESTIGATOR:	Dr. Walton E. McBride, II, Principal Scientist

TITLE OF PROJECT: Remote Sensing of Coastal Environment

SUBTOPIC NUMBER: 8.2.17E

TECHNICAL ABSTRACT:

Planning Systems, Inc. (PSI) proposes to expand upon results of the Phase I SBIR investigating the use of polarization to assist in the enhanced detection of coastal phenomena. In Phase I, a promising de-hazing algorithm was tested to determine whether it showed promise in enhancing image quality. The original algorithm was developed for horizontal sensing. The theoretical investigation in Phase I shows every indication that the algorithm will provide similar results in the vertical, supporting satellite and airborne sensors. IN Phase II, PSI proposes to test the algorithm for vertical applications both mathematically and through comparison with collected data. PSI will work with subcontractor Air-O-Space to outfit their airborne cameras with polarized filters. A series of polarization configurations will be used to image a specific scene. Differences in these images will be determined and compared to simulated images (with and without polarization applied). Additionally, PSI will work with subcontractor Radiance Technologies to identify satellite images of coastal phenomena to compare to simulations. If successful, the results will yield a new atmospheric algorithm that will reduce haze in newly collected and historical satellite and airborne imagery and may be combined with existing PSI tools to sunlint/glare as well.

POTENTIAL COMMERCIAL APPLICATIONS:

If successful, the algorithm will provide a mechanism to reduce the degrading effects of haze (and possibly sunlint/glare) on image quality, with the goal of supporting both newly collected and historical imagery, Initial commercialization will focus on federal agencies, such as NOAA and NASA, which provide imagery for research and operational use. Commercial image providers will be interested in the de-hazing algorithm as well. PSI has already contacted DigitalGlobe's Brett Thomassie, who confirms they are interested in this type of research and will work with PSI to apply any resulting techniques to their imagery.

FY 2005 PHASE II AWARD WINNER

FIRM:	JPS Industries, Inc. P.O. Box 500 Bristol, NH 03222
AWARD:	$299,854
PHONE:	603-744-6400
FAX:	603-744-3700
E-MAIL:	cwsanta@aol.com
PRINCIPAL INVESTIGATOR:	Joseph Santamaria, General Manager

TITLE OF PROJECT:	Development of a Submersible Fish Cage for Open-Ocean Aquaculture
SUBTOPIC NUMBER:	8.3.1F

TECHNICAL ABSTRACT:

In the Phase I portion of the project, three submersible fish cage designs were investigated. With the use of hydrodynamic and structural computer models and the testing of a 1/10th scale model, the design characteristics started to focus on a particular configuration. The cage design consists of straight lengths of HDPE pipe (35-40 cm diameter) connected with steel fittings. Some of the pipe will be designated as fixed buoyancy and other variable buoyancy to enable it to be submerged.

The focus of the Phase II work is to refine the engineering techniques to estimate offshore survivability and fully test the fish cage concept. In the first year, a ¼ - ½ size submersible cage will be constructed and deployed during the winter at the University of New Hampshire's offshore site and fitted with load cells. In the spring, a full evaluation will be completed. Design changes will be make and a 5000 m^3 system built and deployed during the winter of the second year of the project. This cage will also be fitted with load cells and a uniquely designed feed hose buoy. IF tests are successful, stocking of fish will be considered for the spring of second year.

POTENTIAL COMMERCIAL APPLICATIONS:

The commercial applications for the cage design being pursued as part of this research are focused on two different aquaculture businesses. The first business area consists of the emerging Open-Ocean Aquaculture industry, which is presently in its infancy. A need exists to develop a relatively inexpensive, but robust and adaptable cage system for harsh open ocean environments and different types of species. The other commercial application is the existing near shore salmon industry of Downeast Maine and the Canadian Maritime Provinces. Many in this business are considering moving operations into more exposed locations to relieve "stress" associated with the multi-use and environmental issues typical of coastal regions. If the cage concept can penetrate into these regions, potential exists for selling cages on the west coast of North America and in Chile.

FY 2005 PHASE II AWARD WINNER

FIRM:	Advanced Design Consulting USA, Inc. P.O. Box 187, 126 Ridge Road Lansing, NY 14882
AWARD:	$288,000
PHONE: FAX: E-MAIL:	607-533-3531 607-533-3618 eric_Johnson@adc9001.com
PRINCIPAL INVESTIGATOR:	Eric Johnson, Ph.D., VP for Research & Development

TITLE OF PROJECT: Sensor Package for Bottom Water Environmental Measurements

SUBTOPIC NUMBER: 8.3.4F

TECHNICAL ABSTRACT:

In Phase I a sensor package was developed that takes hourly measurements of temperature and pressure for use in the eMOLT program. Since these data are collected by working lobstermen, ease-of-use is critically important for maintaining their participation. The sensor package monitors pressure to determine whether the lobster trap to which it is attached has been hauled on deck. When this occurs data is automatically transferred via Bluetooth communication protocol to a palm-top computer. Current or historical data can be displayed on the palm-top at any time.

In Phase II, a salinity sensor, based on a new class of MEMS devices developed by ADC, will be added to the package. These sensors use the swelling response of hydrogels to pH to change their capacitance. Since this is not a conductivity measurement it should be highly immune to fouling. Research will focus on sensor optimization and functionalizing new hydrogels to respond to salinity. In addition, the system will be further automated to use a satellite uplink to transfer data to NOAA. Position will be determined using GPS and automatically transmitted with environmental data.

POTENTIAL COMMERCIAL APPLICATIONS:

Given recent findings of source waters entering the New England fishery from the North there is an obvious need to assess the influx of the fresher (low salinity) water mass as it is transported into and around the Gulf of Maine. Is there a detectable increase in the Canadian ice melt waters? Will climate change have a significant effect on the conditions of our coastal waters? For purposes of monitoring the influences of advective water masses, salinity is an effective tracer.

The addition of a salinity sensor to the package developed in Phase I will make it a more useful tool for long term studies such as eMOLT. Incorporating a hydrogelMEMS sensor will make possible the monitoring of many other seawater parameters. Hydrogels can be tailored to respond to specific chemical compounds. Toxins from algae blooms or concentration of pollutants such as nitrates from the influx of fresh water could be sensed. The salinity sensor will be an ideal feasibility demonstration.

FY 2005 PHASE II AWARD WINNER

FIRM:	Analytical Instrument Systems, Inc. 118 Old York Road Ringoes, NJ 08551-1042
AWARD:	$300,000
PHONE: FAX: E-MAIL:	908-788-7022 908-788-5617 ais@aishome.com
PRINCIPAL INVESTIGATOR:	Dr. Donald B. Nuzzio, President

TITLE OF PROJECT: Rugged Electrodes for Mapping Sediment Habitat

SUBTOPIC NUMBER: 8.3.5F

TECHNICAL ABSTRACT:

Currently there are no commercially available voltammetric electrode systems, which can operate in the water column, water/sediment interface, or sediment. Rugged voltammetric electrodes, which can sense a variety of electroactive species in the marine environment, are needed to fully understand the Essential Fish Habitat. The goal of this Phase II is to continue the positive work stated in Phase I of using various polymeric materials for voltammetric electrode construction. The results obtained using this new approach on electrode construction will elevate the art of making electrodes to a commercially viable disposable system.

In Phase II we will continue electrode development and also build a prototype Lander, which can be used on local coastal deployments to try out the new electrode systems developed. It is also the goal of this project to be able to incorporate our current AIS deployable electrochemical analyzer with new electrodes produced on a “Seaboss System”. This type of deployment will allow the researcher the ability to fully describe the habitat of ground fish in select marine environments, i.e., Georges Banks, Gulf of Maine, or Nantucket Shoals.

POTENTIAL COMMERCIAL APPLICATIONS:

The major commercial application of these electrodes and our system will be the ability to more fully describe the marine habitat of any commercial fishing area. This system in combination will acoustical instrumentation would be able to fully describe an area of the bottom of a marine habitat to fully understand the biogeochemical materials which can effect a ground fish environment.

Use of this instrument coupled with Sediment profile imagery would truly give the researcher a picture and chemical information on the sediment under study.

Many oceanographic and environmental researchers have contacted AIS for our water column electrodes and I am sure that when we have rugged sediment electrodes our market will continue to expand.

FY 2005 PHASE II AWARD WINNER

FIRM:	Advanced BioNutrition Corporation 6430 Dobbin Road, Suite C Columbia, MD 21045
AWARD:	$199,893
PHONE: FAX: E-MAIL:	410-730-8600 410-730-9311 rbullis@advancedbionutrition.com
PRINCIPAL INVESTIGATOR:	Robert A. Bullis, D.V.M., M.S., Director of Animal Health and Regulatory

TITLE OF PROJECT:	Non-Marine-Based Fishmeal and Fish Oil Replacement Strategies for the Production of Aquaculture Feeds
SUBTOPIC NUMBER:	8.4.1SG

TECHNICAL ABSTRACT:

The overall goal of this project is to demonstrate that purified shrimp diets that performed well in a fifteen-week preliminary tank-based feeding trial during Phase I, can be prepared as a commercial diet that will grow shrimp without the use of fishmeal and fish oil. This work involves replacing certain components of already proven diets with components that are of non-marine origin. The study was designed to evaluate the effect of fishmeal and fish oil replacement by soybean meal, poultry by-product meal, and algal meal on growth and survival of the Pacific white shrimp *Litopenaeus vannamei* in a small scale tank system at a density of 30/M^2 and in 0.1 hectare lined ponds at a commercial density of 100-120/M^2.

POTENTIAL COMMERCIAL APPLICATIONS:

Commercial applications of this technology can range for the direct sales of HUFA algal meals for direct incorporation into diets, the development of a premix that would contain enabling ingredients, or a complete feed. Each of these product development lines would result in products that would enable the production of shrimp grow-out feeds with no marine-sourced ingredients. Such diets would be environmentally sustainable, have stabile commodity pricing of ingredients, and maintain critical levels of Omega 3 HUFAs in animals intended for human consumption.

FY 2005 PHASE II AWARD WINNER

FIRM:	Onomea Scientific, LLC 27-470 Old Mamalahoa Highway Papaikou, HI 96781
AWARD:	$199,848
PHONE:	808-936-6287
FAX:	808-964-8646
E-MAIL:	dan@onomeascientific.com
PRINCIPAL INVESTIGATOR:	Daniel J. O'Connor, Chief Scientist

TITLE OF PROJECT: A Prototype Fish Metrology System for Open-Ocean Aquaculture

SUBTOPIC NUMBER: 8.4.5SG

TECHNICAL ABSTRACT:

Open-Ocean Aquaculture businesses are proving commercially successful. There are several refinements this technology must undergo in order to maximize productivity. One of the specific areas of refinement is in gathering detailed statistical knowledge of the captive fish stock population as a function of time. This knowledge will allow optimization of feed rates. Optimized feed rates will minimize feed costs, maximize fish yields, and minimize environmental impact. In addition, time series analysis of measured length-frequency distributions can be used to enhance fish harvesting strategies. We propose to build a novel, non-invasive, environmentally friendly, in-situ imaging system to provide fish length-frequency data on a routine basis. The prototype system is a low-cost, diver-activated, biometric imaging system with laser based absolute metrology.

POTENTIAL COMMERCIAL APPLICATIONS:

Optimization of feed rates for all mostly clear-water aquaculture cage systems worldwide. Aid in optimization of harvesting strategies.

FY 2005 PHASE II AWARD WINNER

FIRM:	GMA Industries, Inc. 60 West Street, Suite 203 Annapolis, MD 21401
AWARD:	$300,000
PHONE:	410-267-6600
FAX:	410-267-6602
E-MAIL:	glenn@gmai.com
PRINCIPAL INVESTIGATOR:	R. Glenn Wright, President

TITLE OF PROJECT: Head-up Vessel Navigation Using Raster/Vector Data

SUBTOPIC NUMBER: 8.5.1N

TECHNICAL ABSTRACT:

This project entails a comprehensive approach to developing an innovative solution to heads-up display navigation for marine vessels that addresses the required hardware, the sources of raster and vector navigation and marine charting data, and the means to convey these data to watch standers on the bridge in a manner that enhances their performance. During Phase I we identified specific heads-up display system components suitable for use in the marine environment and capable of meeting the stringent operational requirements of vessel navigation. Raster and vector data sources for navigation, including radar contact information, and nautical charts are then considered by defining their scope, range, accuracy, and usefulness while minimizing clutter. We then create the software needed to integrate and display these data. A prototype demonstration system was developed during Phase I to illustrate our approach and validate our methods. Upon the conclusion of Phase II we anticipate having fully capable production hardware and software.

POTENTIAL COMMERCIAL APPLICATIONS:

Significant commercial potential exists for integrating head up displays within government, commercial, and private vessels as greater integration of electronics onto ships' bridges becomes more commonplace. Indeed, the additional safety margin afforded vessel operators through routine HUD use should reduce accident rates and enhance crew performance.