



SBIR



Small Business Innovation Research Program

ABSTRACTS OF PHASE II AWARDS FOR FISCAL YEAR 2012

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

INTRODUCTION

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

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

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

FY 2012 PHASE II AWARD WINNER

FIRM: Prescient Weather Ltd.
200 Innovation Blvd. Suite 229
State College, PA 16803-6602

AWARD: \$398,185

PHONE: 814-466-2231
FAX: 814-234-5869
E-MAIL: john.dutton@prescientweather.com

PRINCIPAL INVESTIGATOR: John A. Dutton, President

TITLE OF PROJECT: Client-Centered Calibration of the NOAA Climate Forecast System

SUBTOPIC NUMBER: 8.2.1C

TECHNICAL ABSTRACT:

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

SUMMARY OF ANTICIPATED RESULTS:

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

FY 2012 PHASE II AWARD WINNER

FIRM: PCCI, Inc.
300 N. Lee Street, Suite 201
Alexandria, VA 22314

AWARD: \$ 399,976.40

PHONE: 703-684-2060
FAX: 703-684-5343
E-MAIL: thudon@pccii.com

PRINCIPAL INVESTIGATOR: Robert M. Loesch, PE, Senior Engineer III

TITLE OF PROJECT: Multi-Occupant Flexible Hyperbaric Chamber

SUBTOPIC NUMBER: 8.1.3N,R

TECHNICAL ABSTRACT:

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

SUMMARY OF ANTICIPATED RESULTS:

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

FY 2012 PHASE II AWARD WINNER

FIRM: Peregrine Power LLC
27350 SW 95th Avenue
Suite 3022
Wilsonville, OR 97070

AWARD: \$ 294,863

PHONE: 503-682-7001
FAX: 503-682-6014
E-MAIL: bratliff@peregrinepower.com

PRINCIPAL INVESTIGATOR: Brian Ratliff, Chief Technology Officer

TITLE OF PROJECT: Wave Energy Harvesting System

SUBTOPIC NUMBER: 8.1.2SG

TECHNICAL ABSTRACT:

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

SUMMARY OF ANTICIPATED RESULTS:

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

FY 2012 PHASE II AWARD WINNER

FIRM: Toyon Research Corporation
6800 Cortona Drive
Goleta, CA 93117-3021

AWARD: \$400,000

PHONE: 805-968-6787
FAX: 805-685-8089
E-MAIL: ksullivan@toyon.com

PRINCIPAL INVESTIGATOR: Kevin J. Sullivan, Vice President, Senior Scientist

TITLE OF PROJECT: Program Estimating Whale Migration Statistics

SUBTOPIC NUMBER: 8.1.6F

TECHNICAL ABSTRACT:

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

SUMMARY OF ANTICIPATED RESULTS:

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

FY 2012 PHASE II AWARD WINNER

FIRM: Remote Sensing Solutions, Inc.
3179 Main Street, Unit 3
PO Box 1092
Barnstable, MA 02630

AWARD: \$ 399,691

PHONE: 508.362.9400
FAX: 508.519.9175
E-MAIL: carswell@remotesensingsolutions.com

PRINCIPAL INVESTIGATOR: Dr. James R. Carswell, President

TITLE OF PROJECT: A Single Aperture Dual-Wavelength Dual-Polarized Antenna for AWRAP

SUBTOPIC NUMBER: 8.3.4D

TECHNICAL ABSTRACT:

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

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

SUMMARY OF ANTICIPATED RESULTS:

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