SBIR

Small Business Innovation Research

FY 2011

NOAA Program Solicitation: **NOAA 2011-1**

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U.S. DEPARTMENT OF COMMERCE
http://www.oar.noaa.gov/ORTA

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DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PROGRAM SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH (SBIR)

1.0 PROGRAM DESCRIPTION

1.1 Introduction

The Department of Commerce (DOC) National Oceanic and Atmospheric Administration (NOAA) invites small businesses to submit research proposals under this solicitation. Firms with strong research capabilities in any of the areas listed in Section 8 of this solicitation are encouraged to participate. The SBIR Program is not a substitute for existing unsolicited proposal mechanisms. **Unsolicited proposals are not accepted under the Small Business Innovation Research (SBIR) program.**

Objectives of this program include stimulating technological innovation in the private sector and strengthening the role of small business in meeting Federal research and development (R&D) needs. This program also seeks to increase the commercial application of innovations derived from Federal research and to foster and encourage participation by socially and economically disadvantaged and woman-owned small businesses.

1.2 Three-Phase Program

The "Small Business Innovation Research Program Reauthorization Act of 2000" requires the Department of Commerce to establish a three-phase SBIR program by reserving a percentage of its extramural R&D budget to be awarded to small business concerns for innovation research.

The funding vehicles for NOAA's SBIR program in both Phase I and Phase II are contracts. This document solicits Phase I proposals only.

NOAA has the unilateral right to select SBIR research topics and awardees in both Phase I and Phase II, and to award several or no contracts under a given subtopic.

1.2.1 Phase I – Feasibility Research

The purpose of Phase I is to determine the technical feasibility of the proposed research and the quality of performance of the small business concern receiving an award. Therefore, the proposal should concentrate on research that will significantly contribute to proving the feasibility of the proposed research, a prerequisite to further support in Phase II.

1.2.2 Phase II – Research and Development

Only firms that are awarded Phase I contracts under this solicitation will be given the opportunity to submit a Phase II proposal immediately following completion of Phase I. Phase II is the R&D or prototype development phase. It will require a comprehensive proposal outlining the research in detail, plan to commercialize the final product, and a company presentation to the panel (more information concerning company presentations will be sent to all Phase I awardees under consideration for a Phase II contract). NOAA may require delivery of the prototype. Each Phase II applicant will be required to provide information for the SBA Tech-Net Database System (http://tech-net.sba.gov) when advised this system can accept their input.

Further information regarding Phase II proposals and Tech-Net requirements will be provided to all firms receiving Phase I contracts.

1.2.3 Phase III – Commercialization

In Phase III, it is intended that non-SBIR capital be used by the small business to pursue commercial applications of Phase II.

1.3 Manufacturing-related Priority

Executive Order (EO) 13329 "Encouraging Innovation in Manufacturing" requires SBIR agencies, to the extent permitted by law and in a manner consistent with the mission of that department or agency, to give high priority within the SBIR programs to manufacturing-related research and development (R&D). "Manufacturing-related" is defined as "relating to manufacturing processes, equipment and systems; or manufacturing workforce skills and protection."

The NOAA SBIR Program solicits manufacturing-related projects through many of the subtopics described in this Solicitation. Further, NOAA encourages innovation in manufacturing by giving high priority, where feasible, to projects that can help the manufacturing sector through technological innovation in a manner consistent with NOAA's mission. This prioritization will not interfere with the core project selection criteria: scientific and technical merit, and the potential for commercial success.

1.4 Energy Efficiency and Renewable Energy Priority

The Energy Independence and Security Act of 2007 (P.L. 110-140) directs SBIR Programs to give high priority to small business concerns that participate in or conduct energy efficiency or renewable energy system R&D projects.

The NOAA SBIR Program solicits energy efficiency or renewable energy system R&D projects through many of the subtopics described in this Solicitation. Further, NOAA encourages innovation in energy efficiency or renewable energy system R&D by giving

high priority, where feasible, to projects that conduct energy efficiency or renewable energy system R&D through technological innovation in a manner consistent with NOAA's mission. This prioritization will not interfere with the core project selection criteria: scientific and technical merit and the potential for commercial success.

1.5 Eligibility

Each organization submitting a proposal for both Phase I and Phase II **must** qualify as a small business (Section 2.1) for research or R&D purposes (Section 2.2) at the time of the award. In addition, the primary employment of the principal investigator must be with the small business at the time of the award and during the conduct of the research. More than one-half of the principal investigator's time must be spent with the small business for the period covered by the award. **Primary employment with a small business precludes full-time employment with another organization. The NOAA program manager in consultation with the contracting officer must approve deviation from these requirements.**

Also, for both Phase I and Phase II, the work must be performed in the United States. "United States" means the fifty states, the territories and possessions of the United States, the Commonwealth of Puerto Rico, the District of Columbia, the Republic of the Marshall Islands, the Federated States of Micronesia, and the Republic of Palau. **The NOAA program Manager in consultation with the contracting officer may approve exceptions to this requirement.**

Joint ventures and limited partnerships are eligible, provided the entity created qualifies as a small business as defined in this Solicitation. **Consultative arrangements between firms and universities or other non-profit organizations are encouraged, with the small business serving as the prime contractor.**

For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the awardee. For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the awardee.

Unsolicited proposals or proposals not responding to subtopics listed herein are not eligible for SBIR awards. Only proposals that are directly responsive to the subtopics as described in Section 8 will be considered.

1.6 Contact with NOAA

In the interest of competitive fairness, oral or written communication with NOAA or any of its components concerning additional information on the technical topics described in Section 8 of this solicitation **is strictly prohibited**.

Requests for additional general SBIR information shall be submitted in writing via email or fax to:

Joan Clarkston, Contract Specialist
601 E. 12th Street, Rm 1756
Kansas City, MO 64106
E-mail: joan.e.clarkston@noaa.gov
Fax: (816) 426-7469

Additional scientific and technical information sources are listed in Section 7.

In order to assure a timely response from the government and prevent potential delays in this procurement***, all questions shall be submitted no later than December 15, 2010.***

2.0 DEFINITIONS

Definitions are from "Small Business Innovation Research Policy Directive; Notice of final Policy Directive," Federal Register, September 24, 2002 (Vol. 67, Number 185) unless specifically noted.

2.1 Small Business Concern

A Small Business Concern is one that, at the time of award for both Phase I and Phase II funding agreements:

(a) is organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;

(b) is in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture, there can be no more than 49 percent participation by foreign business entities in the joint venture;

(c) is at least 51 percent owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States, except in the case of a joint venture, where each entity to the venture must be 51 percent owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States; and

(d) has, including its affiliates, not more than 500 employees.

2.1.1 Socially and Economically Disadvantaged Small Business Concern (See 13 CFR 124 Parts 103 and 104 for additional information)

Is one that is:

(a) at least 51 percent owned by (1) an American Indian tribe or a native Hawaiian organization, or (2) one or more socially and economically disadvantaged individuals, and

(b) controlled by one or more such individuals in its management and daily business operations.

A socially and economically disadvantaged individual is defined as a member of any of the following groups: Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Subcontinent Asian Americans, or any other individual found to be socially and economically disadvantaged by the Small Business Administration (SBA) pursuant to Section 8(a) of the Small Business Act, 15 U.S. Code (U.S.C.) 637(a).

2.1.2 Women-Owned Small Business

An SBC that is at least 51 percent owned by one or more women, or in the case of any publicly owned business, at least 51 percent of the stock is owned by women, and women control the management and daily business operations

2.1.3 Historically Underutilized Business Zone (HUBZone) Small Business Concern (See 13 CFR Part 126 for additional details)

Status as a qualified HUBZone Small Business Concern is determined by the Small Business Administration.

2.2 Joint Venture

An association of concerns with interests in any degree or proportion by way of contract, express or implied, consorting to engage in and carry out a single specific business venture for joint profit, for which purpose they combine their efforts, property, money,

skill, or knowledge, but not on a continuing or permanent basis for conducting business generally. A joint venture is viewed as a business entity in determining power to control its management.

2.3 Research or Research and Development

Any activity that is (a) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied; (b) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or (c) a systematic application of knowledge toward the production of useful materials, devices, systems, or methods, and includes design, development, and improvement of prototypes and new processes to meet specific requirements.

In general, the NOAA SBIR program will fund Phase I and Phase II proposals with objectives that can be defined by (b) and (c) in the above paragraph.

2.4 Funding Agreement

Any contract, grant, or cooperative agreement entered into between any Federal agency and any small business concern (SBC) for the performance of experimental, developmental, or research work, including products or services, funded in whole or in part by the Federal Government.

For purposes of this Solicitation, NOAA intends to award contracts in accordance with the Federal Acquisition Regulation.

2.5 Subcontract

Any agreement, other than one involving an employer-employee relationship, entered into by an awardee of a funding agreement calling for supplies or services for the performance of the original funding agreement..

2.6 Commercialization

The process of developing marketable products or services and producing and delivering products or services for sale (whether by the originating party or by others) to Government or commercial markets.

As used here, commercialization includes both Government and private sector markets.

2.7 Feasibility

The practical extent to which a project can be performed successfully.

2.8 Essentially Equivalent Work

This occurs when (1) substantially the same research is proposed for funding in more than one contract proposal or grant application submitted to the same Federal agency; (2) substantially the same research is submitted to two or more different Federal agencies for review and funding consideration; or (3) a specific research objective and the research design for accomplishing an objective are the same or closely related in two or more proposals or awards, regardless of the funding source.

2.9 SBIR Technical Data

All data generated during the performance of a SBIR award.

2.10 SBIR Technical Data Rights

The rights an SBC obtains in data generated during the performance of any SBIR Phase I, Phase II, or Phase III award that an awardee delivers to the Government during or upon completion of a Federally-funded project, and to which the Government receives a license.

3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

3.1 Proposal Requirements

The objective is to provide sufficient information to demonstrate that the proposed work represents a sound approach to the investigation of an important scientific or engineering innovation. **The proposal must meet all the requirements of the subtopic in Section 8 to which it applies.** A proposal must be self-contained and written with all the care and thoroughness of a scientific paper submitted for publication. It should indicate a thorough knowledge of the current status of research in the subtopic area addressed by the proposal. Each proposal should be checked carefully by the offeror to ensure inclusion of all essential material needed for a complete evaluation. The proposal will be peer reviewed as a scientific paper. All units of measurement should be in the metric system.

NOAA reserves the right not to submit to technical review any proposal which it determines has insufficient scientific and technical information, or one which fails to comply with the administrative procedures as outlined in the NOAA/SBIR Checklist in

Section 10. Proposals that do not pass the screening criteria (outlined in Section 4.2) will be returned to the offeror without further consideration.

The proposal must not only be responsive to the specific NOAA program interests described in Section 8 of the solicitation, but also serve as the basis for technological innovation leading to **new commercial products, processes, or services.** An organization may submit different proposals on different subtopics or different proposals on the same subtopic under this Solicitation. When the proposed innovation applies to more than one subtopic, the offeror must choose that subtopic which is most relevant to the offeror's technical concept.

Proposals principally for the commercialization of proven concepts or for market research must not be submitted for Phase I funding, since such efforts are considered the responsibility of the private sector.

The proposal should be direct, concise, and informative. Promotional and other material not related to the project shall be omitted. **The Phase I proposal must provide a description of potential commercial applications.**

3.2 Phase I Proposal Limitations

- Page Length - **no more than 25 pages**, consecutively numbered, including the cover page, project summary, main text, references, resumes, any other enclosures or attachments, and the proposal summary budget. **Any pages included after the 25th will not be reviewed.** The only exception to the page count limitation are those pages necessary to comply with the itemization of prior SBIR Phase II awards, per Section 3.5.

- Paper Size - must be 21.6 cm X 27.9 cm (8 ½" X 11").

- Print Size - **must be easy to read with a fixed pitch font of 12 or fewer characters per inch or proportionally spaced font of point size 10 or larger with no more than six lines per inch. Margins should be at least 2.5cm.**

Supplementary material, revisions, substitutions, audio or videotapes, or other electronic media will **not** be accepted.

Proposals not meeting these requirements will be returned without review.

3.3 Phase I Proposal Format
3.3.1 Cover Sheet

Complete Section 9.1 "Cover Page" as page 1 of each copy of each proposal. **NO OTHER COVER WILL BE ACCEPTED.** Xerox copies are permitted.

3.3.2 Project Summary

Complete Section 9.2 “Project Summary” as page 2 of your proposal. The technical abstract should include a brief description of the problem or opportunity, the innovation, project objective, and technical approach.

In summarizing anticipated results, include technical implications of the approach (for both Phase I and II) and the potential commercial applications of the research. **The Project Summary of the proposals that receive an award will be published by NOAA and, therefore, must not contain proprietary information.**

3.3.3 Technical Content

Beginning on page 3 of the proposal, include the following items with headings as shown:

(a) **Identification and Significance of the Problem or Opportunity.** Make a clear statement of the specific research problem or opportunity addressed, its innovativeness, commercial potential, and why it is important. Show how it applies to a specific subtopic in Section 8.

(b) **Phase I Technical Objectives.** State the specific objectives of the Phase I effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.

(c) **Phase I Work Plan.** Include a detailed description of the Phase I Research or Research Development plan. The plan should indicate not only what will be done, but also where it will be done, and how the Research will be carried out. The method(s) planned to achieve each objective or task, mentioned in item (b) above, should be discussed in detail. **This section should be at least one-third of the proposal.**

(d) **Related Research or R&D.** Describe research or R&D that is directly related to the proposal, including any conducted by the principal investigator or by the proposer’s firm. Describe how it relates to the proposed effort, and describe any planned coordination with outside sources. **The purpose of this section is to persuade reviewers of the proposer’s awareness of recent development in the specific topic area and assure them that the proposed research represents technology presently not available in the marketplace.**

(e) **Key Personnel and Bibliography of Related Work.** Identify key personnel involved in Phase I, including their directly related education, experience, and publications. Where resumes are extensive, summaries that focus on the most relevant experience and publications are

suggested. List all other commitments that key personnel have during the proposed period of contract performance.

(f) **Relationship with Future R&D.** Discuss the significance of the Phase I effort in providing a foundation for the Phase II R&D effort. Also state the anticipated results of the proposed approach, if Phases I and II of the project are successful.

(g) **Facilities and Equipment.** The conduct of advanced research may require the use of sophisticated instrumentation or computer facilities. The proposer should provide a detailed description of the availability and location of the facilities and equipment necessary to carry out Phase I.

(h) **Consultants and Subcontracts.** The purpose of this section is to convince NOAA that: (1) research assistance from outside the firm materially benefits the proposed effort, and (2) arrangements for such assistance are in place at the time the proposal is submitted.

Outside involvement in the project is encouraged where it strengthens the conduct of the research; such involvement is not a requirement of this solicitation.

1. Consultant – A person outside the firm, named in the proposal as contributing to the research, must provide a signed statement confirming his/her availability, role in the project, and agreed consulting rate for participation in the project. **This statement is part of the page count.**

2. Subcontract – Similarly, where a subcontract is involved in the research, the subcontracting institution must furnish a letter signed by an appropriate official describing the programmatic arrangements and confirming its agreed participation in the research, with its proposed budget for this participation. **This letter is part of the page count.**

(i) **Potential Commercial Applications and Follow-on Funding Commitment.** Describe in detail the commercial potential of the proposed research, how commercialization would be pursued, benefits over present products on the market, and potential use by the Federal Government.

(j) **Cooperative Research and Development Agreements (CRADA).** State if the applicant is a current CRADA partner with NOAA, or with any other Federal agency, naming the agency title of the CRADA, and any relationship with the proposed work.

(k) **Guest Researcher.** State if the applicant is a guest researcher at NOAA, naming the sponsoring laboratory.

(l) **Cost Sharing.** Offerors may propose cost sharing. Cost participation could serve the mutual interest of NOAA and certain SBIR contractors by helping to assure the efficient use of available resources. Except where required by other statutes, NOAA does not encourage or require cost sharing on Phase I projects, nor will cost sharing be a consideration in evaluation of Phase I proposals.

3.4 Equivalent Proposals or Awards

A firm may have received other SBIR awards or elected to submit essentially equivalent proposals under other SBIR program solicitations. In these cases, a statement **must** follow the Technical Content section in the proposal indicating:

(a) the name and address of all agencies to which a proposal was submitted or from which an SBIR award was received;

(b) the date of proposal submission or date of award;

(c) the title, number, and date of the SBIR program solicitation under which a proposal was submitted or award received;

(d) the specific applicable research topic for each proposal submitted or award received;

(e) the title of the research project; and

(f) the name and title of the principal investigator for each proposal submitted or award received.

If no equivalent proposal is under consideration or equivalent award received, a statement to that effect **must** be included in this section.

3.5 Prior SBIR Phase II Awards

If a small business concern has received more than 15 Phase II awards from any of the Federal agencies in the prior five fiscal years, it must submit on a separate page, the names of awarding agencies, dates of awards, funding agreement numbers, amounts, topic or subtopic titles, follow-on agreement amounts, sources and dates of commitments, and current commercialization status for each Phase II. **This required information shall not be part of the page count limitation.**

3.6 Proposed Budget

Complete the "NOAA/SBIR Proposal Summary Budget" (Section 9.3) for the Phase I effort, and include it as the last page of the proposal. Some items on this form may not apply. Enough information should be provided to allow NOAA to understand how the offeror plans to perform if the contract is awarded. A complete cost breakdown should be provided giving labor rates, proposed number of hours, overhead, G&A, and profit. A reasonable profit will be allowed. When proposing travel, identify the number of trips, people involved, labor categories, destination of travel, duration of trip, commercial airfare or mileage rate, per diem expenses, and purpose of travel. Proposed travel costs cannot exceed the rates and amount specified in the Joint Travel Regulations. Budgets for travel funds must be justified and related to the needs of the project. Where equipment is to be purchased, list each individual item with the corresponding cost. The inclusion of equipment will be carefully reviewed relative to need and appropriateness for the research proposed. Equipment is defined as an article of nonexpendable, tangible property having a useful life of more than one year and an acquisition cost of $5,000 or more per unit.

SBA Policy requires that NOAA not issue SBIR awards that include provisions for subcontracting any portion of the contract back to the originating agency or any other Federal Government agency or to other units of the Federal Government. Requests for waivers from this requirement must be sent to the contracting officer. Upon receipt, the government shall review the request and make a determination whether to forward the request to SBA for review. SBA may issue a waiver on a case-by-case basis.

For Phase I, the proposing firm must perform a minimum of two-thirds of the research and/or analytical effort. The total cost for all consultant fees, facility leases, usage fees, and other subcontract or purchase agreements may not exceed one-third of the total contract price. For Phase II, the proposing firm must perform one-half of the research and/or analytical effort.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

4.1 Introduction

All Phase I and II proposals will be evaluated and judged on a competitive basis. **A proposal will not be deemed acceptable if it represents presently available technology.** Each Phase I proposal will be screened by NOAA to ensure that it meets the administrative requirements outlined in Section 4.2. Proposals that meet these requirements will be peer reviewed (reviewers may be NOAA employees or outside of NOAA), undergo competitive review within each laboratory, and may also undergo a third round of competitive review across the agency. Each proposal should be checked by the offeror to ensure inclusion of all essential material needed for a complete evaluation.

4.2 Phase I Screening Criteria

To avoid a misunderstanding, small businesses are cautioned that Phase I proposals not satisfying all the screening criteria shall be returned without peer review and eliminated from consideration for a contract. Proposals may not be resubmitted (with or without revisions) under this Solicitation. The screening criteria are:

(a) The proposing firm must qualify as a small business in accordance with Section 2.1.

(b) The Phase I proposal must meet **all** of the requirements stated in Section 3.

(c) The Phase I proposal must be limited to one subtopic and clearly address research for that subtopic.

(d) **Phase I proposal budgets must not exceed $95,000.**

(e) **The project duration for the Phase I research must not exceed six months.**

(f) The proposing firm must carry out a minimum of two-thirds of expenditures under each Phase I project.

(g) The proposal must include all essential material needed in accordance with Section 3 for a complete evaluation in accordance with the criteria in paragraph 4.3.

Screening Criteria for Phase II Proposals shall be provided at a later date for all Phase I awardees.

4.3 Phase I Evaluation and Selection Criteria

Phase I proposals will be rated by NOAA and/or external scientists or engineers with equal consideration given to the following criteria, except for item (a), which will receive twice the value of any of the other items:

(a) The scientific and technical merit of the Phase I research plan and its relevance to the objectives, with special emphasis on its innovativeness and originality.

(b) Importance of the problem or opportunity and anticipated benefits of the proposed research to NOAA, and the commercial potential, if successful.

(c) How well the research objectives, if achieved, establish the feasibility of the proposed concept and justify a Phase II effort.

(d) Qualifications of the principal investigator(s), other key staff, and consultants, and the probable adequacy of available or obtainable instrumentation or facilities.

Reviewers will base their ratings on information contained in the proposal. It cannot be assumed that reviewers are acquainted with any experiments referred to, key individuals and facilities.

Final award decisions will be made by NOAA based upon ratings assigned by reviewers and consideration of additional factors, **including possible duplication of other research**, the importance of the proposed research as it relates to NOAA needs, and the availability of funding. NOAA may elect to fund several or none of the proposals received on a given subtopic. Approximately one-third of subtopic areas are generally funded. Upon selection of a proposal for a Phase I award, NOAA reserves the right to negotiate the amount of the award.

4.4 Phase II Evaluation and Selection Criteria

The Phase II proposal will undergo NOAA and external peer review for the purpose of determining overall technical and scientific merit. Review panels, composed of senior technical specialists, will make the final Phase II selection decision based on the written reviews and the company presentation to the panel (more information concerning company presentations will be sent to all Phase I awardees under consideration for a Phase II contract). Each of the following evaluation criteria will receive approximately equal weight, except for item (a), which will receive twice the value of any of the other items:

(a) The scientific and technical merit with emphasis on innovation and originality.

(b) Degree to which the Phase I objectives were met.

(c) The commercial potential of the proposal as evidenced by: 1) a record of prior commercialization of products and/or services by the small business, 2) the existence of Phase II funding commitments from non-SBIR sources, 3) existence of Phase III follow-on commitments, and 4) the presence of other indications of commercial potential of the research.

(d) The adequacy of the Phase II objectives to meet the problem or opportunity.

(e) The qualifications of the principal investigator and other key personnel to carry out the proposed work.

Upon selection of a proposal for Phase II award, NOAA reserves the right to negotiate the amount of the award. NOAA is not obligated to fund any specific Phase II proposal.

4.5 Release of Proposal Review Information

After final award decisions have been announced, the technical evaluations of a proposal will be provided to the proposer only upon written request and for a period not to exceed 90 days. The identity of the reviewers will not be disclosed.

5.0 CONSIDERATIONS

5.1 Awards

Contingent upon availability of funds, NOAA anticipates making approximately **15** Phase I firm-fixed price contracts of no more than **$95,000** each. Performance period, with no exception, shall be no more than six months. Historically, NOAA has funded about ten percent of the Phase I proposals submitted which is approximately one-third of the subtopic areas.

Phase II awards shall be for no more than $400,000 (except for subtopics with the suffix "SG", which are limited to $300,000). The period of performance in Phase II will depend upon the scope of the research, but should not normally exceed 24 months.

It is anticipated that **approximately half of the Phase I awardees will receive Phase II awards**, depending upon the availability of funds. To provide for an in-depth review of the Phase I final report and the Phase II proposal and commercialization plan, Phase II awards will be made approximately five months after the completion of Phase I.

For planning purposes, proposers should understand that Phase I awards are tentatively issued in July 2011, Phase II proposals are due approximately February 2012, and Phase II awards are issued tentatively June 2012.

This Solicitation does not obligate NOAA to make any awards under either Phase I or Phase II. Furthermore, NOAA is not responsible for any monies expended by the proposer before award of any contract resulting from this Solicitation.

5.2 Reports

Progress reports scheduled periodically during the Phase I and Phase II periods of performance will include all technical details regarding the research conducted up to that point in the project and will provide detailed plans for the next stages of the project. The acceptance of each progress report will be contingent upon appropriate alignment with the solicited and proposed milestones. Consideration will be given to changes from the solicited and proposed milestones if results from experimentation warrant a

deviation from plan. Inclusion of proprietary information within the progress reports and final report may be necessary in order to effectively communicate progress and gain appropriate consultation from NOAA experts regarding next steps. All such proprietary information will be marked according to instructions provided in section 5.5.

Final reports submitted under Phase I and Phase II shall include a single-page project summary as the first page, identifying the purpose of the research, and giving a brief description of the research carried out, the research findings or results, and the commercial applications of the research in a final paragraph. The remainder of the report should indicate in detail the research objectives, research work carried out, results obtained, and estimates of technical feasibility.

All final reports must carry an acknowledgement on the cover page such as: "This material is based upon work supported by the National Oceanic and Atmospheric Administration (NOAA) under contract number _____. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the NOAA."

5.3 Payment Schedule

The specific payment schedule (including payment amounts) for each award will be incorporated into the contract. Typically Phase I has approximately three progress reports with invoices submitted which includes the final report. The final report shall be due six months from contract award. Phase II progress reports and invoices are typically due every two to four months with the final report due 24 months from the date of award.

5.4 Deliverables

Offers submitted in response to subtopics that require delivery of a prototype should state in the proposal, the plan to develop and deliver the specified prototype. Notwithstanding the absence of such an explicit statement in the offeror's proposal, delivery of the developed prototype as called for by the Solicitation subtopic is required.

5.5 Proprietary Information, Inventions, and Patents

5.5.1 Limited Rights in Information and Data

Information contained in unsuccessful proposals will remain the property of the proposer. Any proposal, which is funded, will not be made available to the public, except for the "Project Summary" page.

The inclusion of proprietary information is discouraged unless it is absolutely necessary for the proper evaluation of the proposal. Information contained in unsuccessful

proposals will remain the property of the offeror. The Government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements. If proprietary information is provided by an offeror in a proposal, which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security, it will be treated in confidence, to the extent permitted by law. This information must be clearly marked by the offeror with the term "confidential proprietary information" and the following legend must appear on the first page of the technical section of the proposal:

> "These data shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose other than evaluation of this proposal. If a funding agreement is awarded to this offeror as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement and pursuant to applicable law. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction are contained on pages _____ of this proposal."

Any other legend may be unacceptable to the Government and may constitute grounds for removing the proposal from further consideration, without assuming any liability for inadvertent disclosure. The Government will limit dissemination of such information to its employees and, where necessary for evaluation, to outside reviewers on a confidential basis.

Examples of laws that restrict the government to protect confidential/proprietary information about business operations and trade secrets possessed by any company or participant include: Freedom of Information Act (FOIA) – 5. U.S.C. § 552(b); Economic Espionage Act – 18 U.S.C. § 1832; and Trade Secrets Act – 18 U.S. C. § 1905.

In view of the above, proposers are cautioned that proposals are likely to be less competitive if significant details are omitted due to the proposer's reluctance to reveal confidential/proprietary information.

5.5.2 Copyrights

The contractor may normally establish claim to copyright any written material first produced in the performance of an SBIR contract. If a claim to copyright is made, the contractor shall affix the applicable copyright notice of 17 U.S.C. 401 or 402 an acknowledgment of Government sponsorship (including contract number) to the material when delivered to the Government, as well as when the written material or data are published or deposited for registration as a published work in the U.S. Copyright Office. For other than computer software, the contractor gives to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.

For computer software, the contractor gives to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license for all such computer software to reproduce, prepare derivative works, and perform publicly and display publicly, by or on behalf of the Government.

5.5.3 Rights in Data Developed under SBIR Contracts

Except for copyrighted data, the Government shall normally have unlimited rights to data in Phase I, II, or III awards, such as:

(a) data specifically identified in the SBIR contract to be delivered without restriction;

(b) form, fit, and function data delivered under the contract;

(c) data delivered under the contract that constitute manuals or instructions and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under the contract; and

(d) all other data delivered under the contract.

The contractor is authorized to affix the following "SBIR Rights Notice" to SBIR data delivered under the contract:

SBIR RIGHTS NOTICE

These SBIR data are furnished with SBIR rights under Contract No. _____ (and subcontract _____, if appropriate). For a period of four years after acceptance of all items to be delivered under this contract, the Government agrees to use these data for Government purposes only, and they shall not be disclosed outside the Government (including disclosure for procurement purposes) during such period without permission of the contractor, except that, subject to the forgoing use and use by support contractors. After the aforesaid four-year period, the Government has a royalty-free license to use, and to authorize others to use on its behalf, these data for Government purposes, but is relieved of all disclosure prohibitions and assumes no liability for unauthorized use.

(END OF NOTICE)

The Government's sole obligation with respect to any properly identified SBIR data shall be as set forth in the paragraph above. The four-year period of protection applies for Phases I, II, and III.

5.5.4 Patents

Small business firms normally may retain the worldwide patent rights to any invention made with NOAA support. The government receives a royalty-free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must substantially manufacture it domestically. To the extent authorized by 35 U.S.C. 205, the government will not make public any information disclosing a government-supported invention for a minimum 4-year period (that may be extended by subsequent SBIR funding agreements) to allow the awardee a reasonable time to pursue a patent. SBIR awardees must report inventions that are planned to be patented to the SBIR Program Office, 1335 East West Highway, Room 106, Silver Spring, MD 20910 via email to Kelly.wright@noaa.gov.

5.6 Awardee Commitments

Upon the award of a contract, the contractor will be required to make certain legal commitments. The outline that follows illustrates the types of clauses to which the contractor would be committed. This list is not a complete list of clauses to be included in Phase I funding agreements, and is not the specific wording of such clauses. Copies of complete terms and conditions are available upon request.

(a) Standards of Work. Work performed under the contract must conform to high professional standards.

(b) Inspection of Work. Work performed under the contract is subject to Government inspection and evaluation at all reasonable times.

(c) Examination of Records. The Comptroller General (or a duly authorized representative) shall have the right to examine pertinent records of the contractor involving transactions related to this contract.

(d) Default. The Government may terminate the agreement if the contractor fails to perform the work contracted.

(e) Termination for Convenience. The Government may terminate the contract at any time if it deems termination to be in the best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.

(f) Disputes. Any dispute about the contract, which cannot be resolved by agreement, shall be decided by the Contracting Officer with right to appeal.

(g) Contract Work Hours. The contractor cannot require an employee to work more than eight hours a day or 40 hours a week, unless the employee is compensated accordingly (i.e., received overtime pay).

(h) Equal Opportunity. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

(i) Affirmative Action for Veterans. The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.

(j) Affirmative Action for the Handicapped. The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.

(k) Officials Not to Benefit. No Government official shall benefit personally from any SBIR contract.

(l) Covenant Against Contingent Fees. No person or agency has been employed to solicit or secure the contract upon an understanding for compensation, except bona fide employees or commercial agencies maintained by the contractor for the purpose of securing business.

(m) Gratuities. The Government may terminate the contract if any gratuity has been offered to any representative of the Government to secure the contract.

(n) Patent Infringement. The contractor shall report each notice or claim of patent infringement based on the performance of the contract.

(o) American-Made Equipment and Products. When purchasing either equipment or a product with funds provided through the contract, purchase only American-made equipment and products to the extent possible, in keeping with the overall research needs of the project.

5.7 Additional Information

(a) Projects. The responsibility for the performance of the principal investigator, and other employees or consultants, who carry out the proposed work, lies with the management of the organization receiving an award.

(b) Organizational Information. Before award of an SBIR contract, the Government may request the proposer to submit certain organizational,

management, personnel, and financial information to assure responsibility of the proposer.

(c) **Duplicate Awards. If an award is made under this solicitation, the contractor will be required to certify that he or she has not previously been, nor is currently being, paid for essentially equivalent work by any agency of the Federal Government. Severe penalties may result from such actions.**

(d) **Your firm is required to obtain a Dunn and Bradstreet Number (DUNS) and register in the Central Contractor Registration (CCR) database and the Online Representations and Certifications (ORCA) database in order to be eligible to receive a contract award. You can obtain a DUNS number free of charge by contacting Dunn and Bradstreet by phone at 1-800-333-0505 or on-line at http://www.dnb.com/US/duns_update/index.html. It is required that the CCR and ORCA databases be filled out upon submission of the proposal. Within these databases, please pay special attention to filling out the data required in the North American Industry Classification System (NAICS) and the Federal Supply Classification (FSC) portions of the forms. This will greatly expedite the contract award process.**

This program Solicitation is intended for information purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract are controlling.

5.8 Research Projects with Human Subjects, Human Tissue, Data or Recordings Involving Human Subjects

Any proposal that includes research involving human subjects, human tissue, data or recordings involving human subjects must meet the requirements of the Common Rule for the Protection of Human Subjects, codified for the Department of Commerce at 15 CFR Part 27. Any questions regarding these requirements should be addressed to Ms. Kelly Wright. Telephone: 301-713-3565 or e-mail: kelly.wright@noaa.gov

5.9 Research Projects Involving Vertebrate Animals

Any proposal that includes research involving vertebrate animals (including fish) must be in compliance with the National Research Council's "Guide for the Care and Use of Laboratory Animals" which can be obtained from National Academy Press, 2101 Constitution Avenue, NW, Washington, D.C. 20055. In addition, such proposals must meet the requirements of the Animal Welfare Act (7 U.S.C. 2131 et seq.), 9 CFR Parts 1, 2, and 3, and if appropriate, 21 CFR Part 58. These regulations do not apply to proposed research using pre-existing images of animals or to research plants that **do**

not include live animals that are being cared for, euthanized, or used by the project participants to accomplish research goals, teaching, or testing. These regulations also do not apply to obtaining animal materials from commercial processors of animal products or to animal cell lines or tissues from tissue banks.

6.0 SUBMISSION OF PROPOSALS

6.1 Deadline for Proposals and Modifications

Deadline for Phase I proposal receipt (six copies) at the NOAA Eastern Region Acquisition Division is **4:00 p.m. (CST) on January 12, 2011.** Offerors are responsible for submitting proposals that adhere to the requirements of the solicitation (see 10.0 NOAA SBIR Checklist) so as to reach the government office by the time specified in the solicitation. Any proposal that is received after the exact time specified for receipt of proposals is "late" and will not be considered unless there is acceptable evidence to establish that it was received at the Government installation designated for receipt of proposals and was under the Government's control prior to the time set for receipt of proposals or it was the only proposal received.

Modifications to proposals may be submitted at any time before the solicitation closing date and time, and the offeror may submit modifications in response to an amendment, or to correct a mistake at any time prior to award. A late modification of an otherwise successful proposal that makes its terms more favorable to the Government will be considered at any time it is received and may be accepted. Revised proposals may only be submitted when requested or allowed by the Contracting Officer. Proposals may be withdrawn at any time before award. Withdrawals are effective upon receipt of notice by the Contracting Officer.

Letters of instruction will be sent to those eligible to submit Phase II proposals. The Phase II proposals are due after receipt of the Phase I Final Report, approximately seven months after commencement of the Phase I contract.

Proposers are cautioned of unforeseen delays that can cause late arrival of proposals at NOAA, resulting in them not being included in the evaluation procedures. No information on the status of proposals under scientific/technical evaluation will be available until formal notification is made.

6.2 Proposal Submission

Six hardcopies of each proposal must be received no later than 4:00 pm (CST) on January 12, 2011. Proposals are to be mailed to:

U.S. Department of Commerce, NOAA
ATTN: SBIR Proposals/Joan Clarkston

Eastern Region Acquisition Division - KC
601 E. 12th Street, Room 1756
Kansas City, Missouri 64106

Telephone: 816-426-7469

Acknowledgment of receipt of a proposal by NOAA will be made. All correspondence relating to proposals must cite the specific **proposal number** identified in the acknowledgment.

(a) **Packaging: Secure packaging is mandatory. NOAA cannot process proposals damaged in transit. All six copies of the proposal must be sent in the same package. Do not send separate "information copies," or several packages containing parts of a single proposal, or two packages of six copies of the same proposal. The top copy must be signed as an original by the principal investigator and the corporate official. Other copies may be photocopies.**

(b) **Bindings: Do not use special bindings or covers**. Staple the pages in the upper left hand corner of each proposal. Separation or loss of proposal pages cannot be the responsibility of NOAA.

Proposals in response to this solicitation shall be valid for a period of 240 calendar days after the closing date of the solicitation.

6.3 Warning

While it is permissible, with proper notification to NOAA, to submit identical or essentially equivalent proposals for consideration under numerous Federal program solicitations, it is unlawful to enter into contracts requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

7.1 General Information

The following web pages may be sources for additional technical information:

http://www.noaa.gov http://www.lib.noaa.gov

7.2 Oceanography and Marine Science

Scientific information in the areas of oceanography and marine science may be obtained from organizations shown in the website
http://www.nsgo.seagrant.org/SGDirectors.html

8.0 RESEARCH TOPICS

8.1 TOPIC ECOSYSTEMS

8.1.1SG SUBTOPIC: Development of Hazard Resilient Structures and Infrastructure Systems Using New Technologies

NOAA's National Sea Grant College Program is focused on promoting hazard resilient coastal structures. To accomplish this, communities need access to new technologies that will enable them to forecast, resist and recover from the impacts of coastal disasters (e.g. hurricanes, tsunamis, coastal erosion, etc.) on these structures. NOAA is looking for proposals that will develop new technologies and construction products that can be used to increase resiliency to coastal hazards, including water level changes (sea level rise and Great Lakes fluctuations) during both retrofitting and new construction.

8.1.2SG SUBTOPIC: Development of Renewable Alternative Energy Sources

NOAA is interested in receiving proposals for the research and development of Renewable Ocean and Coastal Energy Technology, which will include the following technology areas of focus:

- Biofuels developed from microalgae or macroalgae, b) Wave, c) Tidal/current, d) Geothermal, or e) Offshore/coastal wind. Projects may involve research in technology development, and/or testing and improvement of existing technologies as well as proposals that will measure the environmental impacts created by the implementation of alternative energy systems.

References:

Peer M. Schenk, Skye R. Thomas-Hall, Evan Stephens, Ute C. Marx, Jan H. Mussgnug, Clemens Posten[4], Olaf Kruse and Ben Hankamer, Second Generation Biofuels: High Efficiency Microalgae for Biodiesel Production, Bio Energy Research, Volume 1, Number 1, March 2008

Michele Aresta, Angela Dibenedetto[a] and Grazia Barberio, Utilization of macro- algae for enhanced CO_2 fixation and biofuels production: Development of a computing software for an LCA study, Fuel Processing Technology Volume 86, Issues 14-15, October 2005, Pages 1679-1693

8.1.3N,R SUBTOPIC: Compact, Portable and Light-Weight Two-Person Hyperbaric Chamber

Currently, at many dive sites, NOAA cannot perform "working" dives deeper than 100 feet or using nitrox breathing mixtures due to the OSHA requirement for a multi-lock, multi-person hyperbaric chamber at the dive site. Such chambers are primarily constructed of metal, are heavy, occupy a substantial footprint, and are not easily transported. Although NOAA has two of these chambers containerized in eight by twenty foot ISO shipping containers, because of their size and weight they cannot be used on many of NOAA's smaller vessels, nor can they be quickly and easily shipped to various locations around the world where NOAA divers operate. The development of a compact, portable, and light-weight hyperbaric chamber designed to accommodate two occupants would provide NOAA, and the wider diving community, a system that would address OSHA requirements and allow NOAA to conduct important research deeper than 100 feet or when using nitrox breathing mixtures. Although there are a couple of non-metallic chambers available today that are compact, portable, and light-weight, they can only accommodate one occupant due to their sizes. Single occupancy units have the disadvantage of not being able to include a second person (attendant) inside the chamber to monitor the condition of the patient and provide hands-on medical assistance (e.g., administer medications and take corrective action in emergencies) during a treatment - which can last several hours. Without this attendant, certain treatments cannot be performed, thereby reducing the victim's chances of achieving full medical recovery. The chamber must be capable of compressing a diver and attendant to a minimum depth of sixty (60) feet and be capable of providing therapeutic gases to the patient via a BIBS (Built-In Breathing System) mask. The chamber can be a double-lock chamber or can be two single lock chambers that can be connected to provide the capability to move a person between the main chamber and the surface when the main chamber is under pressure. Since size, weight, and portability are important features for transportation considerations; the proposed chamber must be capable of being shipped via ground or air transportation overnight and occupy a minimum footprint when deployed. **And finally, all hyperbaric chambers used by NOAA must be constructed in accordance with the U.S. National Standard for Pressure Vessels for Human Occupancy ASME PVHO-1 2007 & Cases.**

8.1.4F SUBTOPIC: Aquaculture: Sustainable Marine Aquaculture

The purpose of this topic is to develop innovative products and services to support the development of an environmentally, socially, and economically sustainable marine aquaculture industry. There is a need for products and services that will allow the aquaculture industry to operate in a way that is compatible with healthy marine ecosystems and other users of coastal and ocean resources.

As marine aquaculture technology moves from research to operations, aquaculture producers need affordable and reliable products and services to support growth and

economic viability of sustainable aquaculture operations. There is also a need for reliable and affordable equipment, instruments, tools and techniques for managers to assess the potential risks and benefits of marine aquaculture facilities and to monitor any impacts of marine aquaculture operations on marine ecosystems. Required products and services include the techniques and/or tools for:

- Producing fish, shellfish, and marine algae in hatcheries
- Raising fish, shellfish, and marine algae to market size in land-based, coastal, and open-ocean grow-out facilities
- Monitoring, minimizing, and mitigating environmental impacts
- Evaluating and selecting appropriate sites for marine aquaculture operations
- Preventing, diagnosing, and controlling disease
- Preventing or reducing effluents and escapes from marine aquaculture facilities
- Excluding predators from aquaculture facilities in ocean and coastal waters
- Analyzing genetic differences between farmed and wild, and providing methods to distinguish the two
- Meeting the nutritional requirements of marine species in all life stages (from hatchery to market size), including use of diets that rely less on fish oil and fish meal without sacrificing the human health benefits of seafood consumption

References:

Nash, C.E., 2004. Achieving Policy Objectives to Increase the Value of the Seafood Industry in the United States: The Technical Feasibility and Associated Constraints. Food Policy 29, 621-641.

National Marine Fisheries Service, 2007. Summary of the National Marine Aquaculture Summit. Available at http://aquaculture2007.noaa.gov/pdf/summitsum_web_1_08.pdf

National Oceanic and Atmospheric Administration, 2007. NOAA 10 Year PlanforMarineAquacultureAvailable at http://aquaculture.noaa.gov/pdf/finalnoaa10yrrweb.pdf

8.1.5F SUBTOPIC: Portable Device for Field-Based Forensic Genetic Identification of Wildlife Samples

The cornerstone for monitoring the take of animals and the trade of wildlife products is the ability to identify samples to species. This task becomes exceedingly difficult when presented only with a portion of an organism (e.g. shark fins, fish fillets). Modern genetic techniques can now readily identify species by comparing genetic sequences of an unknown sample to reference libraries (i.e. Barcode of Life Database). Though the technology to genetically identify samples is now readily available the required equipment is too cumbersome to readily transport and use in the field.

We envision a device that is small enough to easily transport, has minimal power requirements, is relatively inexpensive to operate, provides identifications in a relatively short period of time, and has the flexibility to be applied to different groups of organisms. This device would be able to extract DNA from a single sample, amplify DNA by PCR, and query this DNA to assign a species or taxonomic group identification. We anticipate that a DNA array type method will be used to assign identification to unknowns. The composition of these arrays should be fairly flexible in order to efficiently focus on unique taxonomic groups (e.g. sharks, whales) while keeping costs to a minimum. Perhaps this device could have interchangeable DNA arrays that could be easily swapped depending on the general taxonomic category.

Anticipated Application of Technology:

This technology is anticipated to be used by enforcement agencies to monitor the trade in restricted species (e.g. CITES). Assuming the availability of unique markers to differentiate stocks, this technology could be adapted to go beyond species identification and assign samples to stock, further aiding enforcement and fishery management

Key Deliverable:

1. A handheld or easily portable device for DNA extraction, PCR amplification, and DNA array hybridization and visualization that has the ability to identify an unknown sample to species or taxonomic group.
2. The ability to easily adapt the device to focus on different taxonomic groups (e.g. species, stocks)

8.1.6F SUBTOPIC: Program for Estimating Whale Migration Statistics

The purpose of this topic is to develop an innovative product to support the population monitoring of specific whale populations and detect movements of large groups/pods of whales.

Estimates of abundance and reproduction for the Eastern North Pacific population of Gray Whales are based on counts of migrating whales made by shore based observers. These shore based counts are made during day light hours and estimates are made assuming that migration rates are the same during night hours. Scientists have used thermal imagers to collect data to test this assumption (Perryman et al. 1999; Perryman et al. 2002). The potential bias in the accuracy of observer estimates of the number of whales in groups/pods is another statistic of shore based counts that has proven difficult to test. NOAA scientists from the Southwest Fisheries Science Center are preparing for a major field assessment of this gray whale population and the collection of video from thermal imagers will be part of this effort. Currently counts of whales from the thermal sensor images are made by technicians who spend hundreds of hours counting blows of whales and estimating group sizes, swimming speeds, and offshore distances. This

technique is laborious, time consuming and results in errors by technicians who are required to spend hours looking at black and white monitor screens. NOAA Fisheries is requesting the development of a software system that would scan the video record from the thermal sensors and record the time and distance among detected whale blows (based on height of eye and focal length of the lens the sensor lens). In addition, the software system should calculate swimming speeds from multiple surfacing of the same group and also estimate the number of whales in a group/pod (given data on average swimming speeds and surfacing intervals).

Commercial development using an application of the same technology to provide real time collision avoidance data for large vessels operating in high density regions of large whales is a desired as an integral part of any Phase II project, should a Phase I project be successful.
References:

Perryman, W., Donahue, M., Laake, J., and Martin, T. 1999. Diel variation in migration rates of eastern Pacific gray whales measured with thermal imaging sensors. Marine Mammal Science 15:426-445.

Perryman, W., Donahue, M., Perkins, P., and Reilly, S. 2002. Gray whale calf production 1994-2000: are observed fluctuations related to changes in seasonal ice cover. Marine Mammal Science 18:121-144.

8.1.7F SUBTOPIC: Creation of an Incremental Recording Membrane for Tracking Ocean Chemistry

The purpose of this topic is to develop a chemically-sensitive membrane to enable characterization of large-scale distributions of small marine tetrapods during long-distance migrations.

Identifying patterns of habitat use during long-distance migrations of seabirds, pinnipeds, and other small marine tetrapods is in an important frontier in marine ecology. Current tracking technologies, like satellite and GPS tags, are often too large to reliably attach to smaller animals for extended periods of time. Furthermore, such geo-locating tags remain expensive and sample sizes, consequently, are constrained by limited budgets. A potential alternative to geo-referenced tagging technologies arises from the spatial patterns in ocean chemistry that can reliably indicate oceanic province. In fisheries research, the microstructure of otoliths, the small ear bones in fishes, are analyzed to provide long-term records of habitat use. Briefly, ambient chemical conditions encountered as an animal moves through the marine environment are incorporated into the daily growth rings of the otolith. The long-term record of habitat use is revealed by measuring the changes in chemical make-up of the otolith microstructure. Seabirds and pinnipeds, however, do not have similar tissues that incorporate information about their movements through the marine environment.

We envision a discriminately absorptive membrane and/or coating that could be incorporated onto small plastic and metal flipper tags (Fig. 1), deployable on many animals (ca. 100s), and recovered for analysis of chemical composition after long-term (6-12 month) deployments. We request a Phase I study to develop such a membrane and/or coating that is capable of sampling ambient chemical constituents of seawater over an extended period of time. The chemical sampling should occur in stages, like in an otolith, to enable the detection of movement among oceanic provinces.

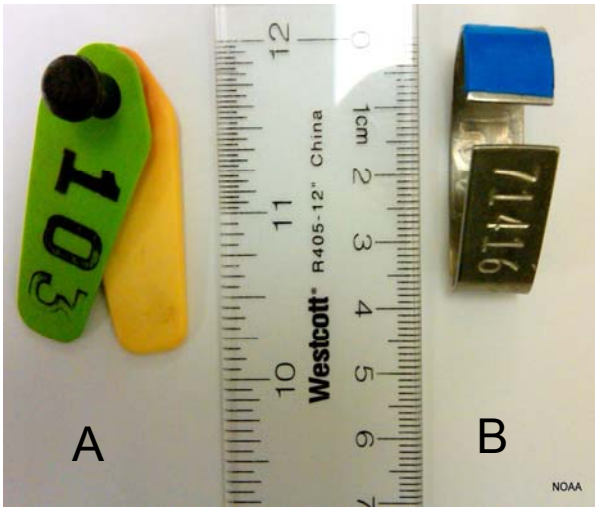

Fig. 1. Flipper tags used currently on pinnipeds (A) and penguins (B). Surface dimensions for membrane/coating application are 12x25mm(A) and 12x20mm(B).

References:

Elsdon T.S and B. M. Gillanders. 2003. Reconstructing migratory patterns of fish based on environmental influences on otolith chemistry. Reviews in Fish Biology and Fisheries 13:219-235

Epstein S. and Mayeda T. 1953. Variation of O^{18} content of waters from natural sources. Geochemica et Cosmochimica Acta 4:213-214

Longhurst A. 2007. Ecological geography of the sea. 2nd edition. Elsevier, USA

Trivelpiece W. Z., S. Buckelew, C. Reiss, and S.G. Trivelpiece. 2007. The winter distribution of chinstrap penguins from two breeding sites in the South Shetland Islands of Antarctica. Polar Biology 30:1231-1237

8.1.8NSUBTOPIC: Improved Saxitoxin Detection Technology

Paralytic shellfish poisoning (PSP) is an important public health threat and causes significant economic losses in New England and along the entire west coast of the US including Alaska. Paralytic shellfish poisoning is caused by consuming shellfish that have bioaccumulated saxitoxins which are produced by certain microalgae. The field detection kits used to monitor PSP detect only some of many forms of saxitoxins known as congeners. These kits currently fail to detect important saxitoxin congeners that are toxic to humans and marine mammals. The goal of this request for proposals is to develop monoclonal antibodies capable of detecting saxitoxin congeners bearing the N1 hydroxy, 11-hydroxysulfate, and 21-sulfo groups. Antibodies specific for these congeners are requisite for the development of detection technologies that comprehensively assess the threat of paralytic shellfish poisoning. The successful

applicant will be responsible for conducting immunizations, producing and screening the monoclonal antibodies, producing a stable saxitoxin-HRP (horseradish peroxidase) or other conjugate system that can be used to construct competitive assays, and demonstrate that the antibodies can specifically measure concentrations of the N1 hydroxy, 11-hydroxysulfate, and 21-sulfo saxitoxin congeners in the range of 0.1 to 80 ug/100 g saxitoxin equivalent toxicity in a shellfish matrix.

8.2 TOPIC: CLIMATE

8.2.1C SUBTOPIC: Calibration of the New Climate Forecast System (CFSv2) for Commercial Applications

NOAA seeks development of calibration methods that will lead to quantifiable improvement of the new version of the U.S. Climate Forecast System (CFSv2) model and thereby enhance its value in the private sector. All such methods developed in response to this Solicitation must be suitable for the ongoing calibration of the CFS forecasts by private sector firms in real-time operations.

Computer probability seasonal forecasts are calibrated and used in the private sector both by firms that market value-added versions to users and by users themselves. The NWS CFS forecasts (and those of the European Centre for Medium-Range Forecasting) are particularly valuable because the associated archive of reforecasts for 30 or more years supports calibration strategies and operations. Forecast improvements made possible by effective calibration methods developed with the new CFS Reforecast and Reanalysis will be of great interest to private sector users and implemented as soon as they become available.

With this subtopic, NOAA seeks assistance in developing and demonstrating methods for calibrating the dynamical seasonal probability forecasts of the new Climate Forecast System and thereby improving their verification and thus their value in private sector applications. Contemporary ensemble forecast systems are intended to produce predicted probability distributions that simultaneously encompass the subsequent verification and indicate the uncertainty of the forecast. By comparing the statistical characteristics of the forecasts and the observations, it is possible to develop calibration methods for post-processing the numerical forecasts in ways that will improve subsequent verification.

Weather and climate forecasts spanning weeks to months are vital to management of weather and climate risk. Significant weather and climate anomalies affect national and global economic activity related to energy demand, agriculture production, water resource management, and other weather and climate sensitive activities. The improvement and quantification of climate forecast accuracy is critical to improving risk management strategies and results.

Recent assessments of the seasonal anomaly forecasts of the NOAA National Weather Service Climate Prediction Center (CPC) (O'Lenic et al. 2008, Livezey and Timofeyeva, 2008) have demonstrated both the improving capabilities of seasonal forecasts and the magnitude of the remaining challenge. The advent in 2010 of a new version of the U.S. Climate Forecast System (CFSv2) and an accompanying new reanalysis and set of reforecasts (CFSRR) (Saha and Coauthors, 2010) mandates a comprehensive assessment and calibration of the model.

Clearly it is desirable that the probability structure of the ensemble forecasts of climate anomalies closely resembles the statistical characteristics of the observed climate anomalies. The most obvious systematic or bias errors occur in the average of the ensemble values and in the variance of the ensemble averages. Thus forecast verification and calibration must address the statistical characteristics of the ensemble averages and the spread of the ensemble members.

Some additional attributes of effective dynamical probabilistic forecasts are summarized in the accompany table. A few are fixed by the numerical model; some might be improved by post-processing. Consideration of these characteristics demonstrates the poignancy of the late Prof. Alan H. Murphy's 1993 observation, "*…it is difficult … to enhance forecasting … without an unambiguous definition of a good forecast."* Accuracy generally decreases as resolution and range increase. Reliability usually decreases as sharpness increases.

The intent of this solicitation is to give respondents maximum flexibility to propose, develop, and demonstrate methods that will lead to quantifiable improvement of the CFSv2 forecasts to serve the private sector.

Attributes of Probability Forecasts

Resolution Resolution in time and space matches the scales of user activities and decision space

Range Lead times match the decision horizon

Span Predicted variables cover the scope of user interests

Accuracy Ensemble means correspond to observed averages

Reliability Predicted probabilities of discrete events correspond to verified frequencies of occurrence; spreads of probability distributions reflect forecast uncertainty

Sharpness Forecast uncertainty is minimized; discrete events are characterized by large or small probabilities; probability densities for continuous variables are narrow

Suitability Probability estimates are expressed relative to user operational criteria or decision variables

References:

Livezey, Robert E. and Marina M. Timofeyeva, 2008. The first decade of long-lead U. S. seasonal forecasts: Insights from a skill analysis, Bull Amer. Met. Soc., 89, 843-853.

Murphy, Alan H., 1993. What is a good forecast? An essay on the nature of goodness in weather forecasting. Wea. Forecasting, 8, 281-293.

O'Lenic, Edward A., and D. A. Unger, M.S. Halpert, and K.S. Pelman, 2008. Developments in long-range climate prediction at CPC. Wea. Forecasting, 23, 496-515.

Saha, S. and Coauthors, 2010. The NCEP Climate Forecast System Reanalysis, Bull. Amer. Met. Soc., in press.

8.2.2C SUBTOPIC: Climate Impact Visualization Tools for Planning and Outreach

Among the findings of the America's Climate Choices Report on Adaptation is that "Climate change is occurring… and poses significant risks for — and in many cases is already affecting — a broad range of human and natural systems." The authors of this report call for a new era of climate change science with "fundamental, use-inspired" research, which not only improves our understanding of the causes and consequences of climate change but also is useful to decision makers at the local, regional, national, and international levels acting to limit and adapt to climate change. The leaders of this study understand the limitations that decision makers face and as a result will produce an additional report that will be released later this year on an "*Effective Response to Climate Change" that* will report on how to best provide decision makers information on climate change.

As a result of this and other recent studies on climate, cities and towns across the United States are beginning to realize how important it will be to begin to include potential impacts of a changing climate into their planning efforts. Some cities, like New York City and Chicago have begun to develop reports that will guide them in this endeavor, while other smaller cities and towns simply do not have the funding or staff to do these types of activities and/or do not have the backing of their governing boards to start. Both planners, who have the benefits of reports, and those that do not, lack the ability to visualize and communicate the potential impacts of climate.

While some tools have been developed for planners in the coastal regions (see Digital Coast website cited below) and while scientists are working to bring these complex ideas to decision makers (see NASA website cited below), there is still a need for tools for planners in a variety of sectors (including water, transportation, and health), with limited resources and/or technical ability, to visualize, understand and communicate the risks they need to consider in planning for their jurisdictions. This call for proposals is aimed at providing these decision makers the ability to better understand and visualize the impacts of climate change on their jurisdictions and will give them the ability to show both their constituents as well as their governing bodies the potential impact of a changing climate on their environment. We encourage development of tools that will easily fit with software and hardware that typical planners use, particularly with GIS

software. Therefore, we also encourage a needs assessment of the specific planning sector's needs for these types of tools; this assessment could be focused on the requirements and capabilities of the planners themselves or on the professional organizations to which they belong to whom they would turn for advice or knowledge about this type of product.

References:

National Aeronautics and Space Administration, "NASA Earth Exchange (NEX)"", http://nex.arc.nasa.gov/w/index.php/Main_Page

National Oceanic and Atmospheric Administration, Coastal Services Center, "Digital Coasts", http://csc.noaa.gov/digitalcoast/

National Research Council, (2010) America's Climate Choices, Adapting to the Impacts of Climate Change, http://americasclimatechoices.org/?utm_medium=etmail&utm_source=The%20National%20Academies&utm_campaign=ACC+Update+13

8.2.3C SUBTOPIC: Climate Decision-support Tools for the Energy and Insurance Sectors

Societal concerns about the impacts of climate change and variability are growing. Also, uses of climate data and services in the business sector and by the public are expanding. Citizens in public and private sectors require easy access to credible climate science information and climate services to help them make informed decisions affecting their lives and livelihoods. Climate influences almost every sector of society and affects up to 40 percent of the United States' $10 trillion annual economy. In Engaging NOAA's Constituents: A Report from the NOAA Science Advisory Board (SAB EOE Report, 2007), the SAB reported that NOAA's current engagement activities (Education, Communication, Outreach and Extension) are so diffuse that they are almost invisible to the public, and this adversely affects NOAA's ability to serve society.

Additionally, the ability of those in the private sector, such as energy and insurance, to readily use and visualize the incredible array of environmental data now available (from NOAA and many others in the public and private sector) is very limited. The requirements for these data range from long-range planning in regards to longer-term climate change; to medium-range issues related to climate variability (such as El-Nino/La-Nina, the North Atlantic Oscillation, etc); to shorter-term situations often related to natural disasters. The current oil-spill disaster in the Gulf of Mexico would be an excellent example. However, simply having the data available does not translate into the decision-support tools in a form useful to decision-makers in these sectors. What is required is the ability to quickly: 1) integrate data from disparate sources, 2) visualize the data in a manner that's understandable by the non-scientist community in these

sectors, and 3) translate the data into “information products” that are immediately useful for decision-making.

This call for proposals is aimed toward the development of environmental data visualization tools useful for decision-support in the energy and insurance sectors. The tools would dynamically integrate data from various existing datasets (which are not yet integrated) and provide visualization capabilities. These capabilities would then be useful in the energy/insurance sectors as tools/products for those users, and would provide a foundation for additional products and capabilities which could be developed and marketed in the commercial sector. Specific examples might include tools that would be useful along the Gulf Coast in the current oil spill situation, to aid in preparing for the affects of an expected active hurricane season, or to better estimate peak energy loads in a warming climate (under various scenarios).

We encourage development of tools that will easily integrate with software currently used in these sectors, especially in a GIS environment. Therefore, we also encourage a needs assessment of the energy and insurance sector’s requirements for these types of tools -- this would include key individuals in those sectors along with professional organizations to which they belong. It would be very important that the tools are capable of automatically “consuming” various datasets rather than having to “re-host” the data on a separate/centralized server, due to the dynamic nature of data which are frequently updated. Also, all products produced should comply with Open Geospatial Consortium (OGC) standards (reference below), to allow for “machine to machine” interoperability – e.g., a server at a company site in the energy sector would be able to display the products/tools of choice on their website for routine use.

In the proposals, we would expect to see a general but concise concept of operations regarding data flow, integration, visualization, and resulting products for decision-support. This should include at least one or two examples citing specific climate/environmental datasets and examples of their potential usage and visualization (with images). The proposed IT architecture should be briefly described, along with an initial estimate of the software and hardware requirements for users (although we realize this may change somewhat as the sector needs assessment occurs). References should be provided regarding prior work in this area, along with any specific examples (eg, via URL) of final results.

References:

Open Geospatial Consortium, http://www.opengeospatial.org/

8.2.4CSUBTOPIC: Online Tools for Incorporating Climate Information into TV Weather Reports

Recent surveys show there’s a general lack of understanding among the American public about climate science concepts and principles, and that this general lack of “public climate literacy” is being exacerbated by public media campaigns that both

inadvertently and deliberately increase uncertainty and confusion among the public about modern climate science understanding.[1,2] Both of these issues must be addressed if policy leaders, resource managers and public citizens are going to improve their capacity for climate-related discourse and decision-making in their lives and livelihoods.

A logical place to begin to address the public climate literacy problem is through the national network of local TV meteorologists' daily weather reports and forecasts. Research shows that the majority of Americans' largest single daily source of exposure to scientific information of any kind is through local TV weather reports.[3] Thus, a goal for this year's SBIR call should be to innovative new tools and techniques for incorporating timely climate data and climate information services into TV meteorologists' nightly weather reports.

There are three major challenges in meeting this goal: (1) **Cognitive** — many TV weathercasters don't fully understand the differences between weather and climate, nor do they grasp the key differences between weather forecasting and climate modeling; (2) **Technological** — many TV weathercasters don't have proficiency in working with climate data, nor is there a climate analog to the "production pipeline" that exists for weather reporting (e.g., commercial weather providers) to help bridge this proficiency gap; and (3) **Social** — TV weathercasters report both a lack of time and lack of professional development support from their bosses that they would need in order to incorporate climate data into their weather reports. But, they say, if they had ready access to resources that were easily adapted for on-air use, and training in how to use them, then they would gladly incorporate them into their daily weather reports.[4]

Today's high-speed networks, video-conferencing capabilities, and modern mapping and geospatial data visualization tools make it possible to build and sustain the cognitive and technological bridges needed to overcome the aforementioned barriers and to put into place a production pipeline from NOAA to the national network of TV meteorologists. Moreover, development of such a pipeline lends itself perfectly to the SBIR model—it is inherently a value-added enterprise that will be sustainable by commercial and consumer demand beyond an initial pilot phase begun with seed funding from the SBIR program. Today's proliferation of commercial weather providers points also to the commercial viability of this idea.

Proposals should address the following three key components needed to build an end-to-end system for delivery of climate service products to TV meteorologists nationwide:

(1) Inventory the relevant open-source and commercial software and hardware tools used by TV meteorologists and recommend an optimally integrated system for

[1] Boykoff, M.T. and Boykoff, J.M. (2004): "Balance as bias: Warming and the U.S. prestige press." *Global Environmental Change*, Vol. 14, 125-136.
[2] Corbett, J.B. and Durfee, J.L. (2004): "Testing public (un)certainty of science: Media representations of global warming." Science Communication, Vol. 26, No. 2, 129-151.
[3] Miller, J.D. (2008): "Civic Scientific Literacy: The role of the media in the electronic era." White paper presented at AAAS Conference.
[4] Maibach, E., K. Wilson, and J. Witte (2010): *America's TV Weathercasters as Informal Climate Change Educators.* An NSF-funded report, online at http://www.climatechangecommunication.org/resources_reports.cfm

production and delivery of climate services, and/or to propose design and development of a new tool or suite of tools if none exists today that is / are sufficient for the task;
(2) Pay special attention to the differing scopes, timeframes, and uncertainties of climate information versus weather information, and adapt the production and delivery system to accommodate those differences in on-air presentations for the public; and
(3) Include resources for professional development needed to assist TV meteorologists in incorporating these tools and climate services into their daily workflow.

The deliverable will include the following:

(1) A demonstration for NOAA of a working beta version of an end-to-end system for delivery of climate services — such as maps of climate-relevant geospatial data, data visualizations, and climate model outputs downscaled for local relevance — to TV meteorologist nationwide that serves as a good proof-of-concept for the idea and approach taken;
(2) An schedule of the technologies used and an estimate of the cost to NOAA should the agency decide to procure a working copy of the system for its own use; and
(3) A concluding report at the end of Phase I that (a) quantitatively and qualitatively evaluates the outcomes of the pilot project, (b) investigates and assesses the commercial demand for this type of climate service, and (c) recommends to NOAA what future options the agency should consider for funding the pilot project in a Phase II development.

8.2.5W SUBTOPIC: Development and Integration of Compact Soil Moisture Sensors for Fire Weather and National Integrated Drought Information System (NIDIS)

Soil moisture observations are critical to assessing the potential for drought conditions, agricultural output, and forest fires. There are only a few soil moisture sensors available within Oregon and Washington; outside of that there are very few available throughout the United States. Furthermore, only a small number of the main observing sensor suites that fire weather personnel use, called the Remote Automated Weather Station, contain soil moisture sensors. In the absence of soil moisture observations, fire weather personnel and climate monitors depend on calculated indices that only provide a rough guess for soil moisture based on short- and long-term precipitation, expected precipitation (based on climate data), satellite-derived measurements of vegetative health and moisture, and temperature. These indices provide a good estimate of the balance of evapotranspiration and precipitation and their effects on the deep duff and upper soil layers; however, they have been criticized for arbitrary algorithms and being affected by seasonal variations. Most importantly, they do not generate the data with the resolution, localized representativeness and timeliness that fire weather personnel need for customers.

The objective is to design and build a low-cost, compact, and preferably wireless, soil moisture sensor that can be easily integrated into the observational system that fire weather personnel use. There is already research underway at many universities (Boise State University, Univ. of Michigan, Massachusetts Inst. of Technology to name a few) to design in situ soil moisture sensors and develop an adaptive strategy for the in situ network to meet measurement objectives of spaceborne soil moisture sensors. The data from the sensor should be available to all fire weather personnel on a real-time basis and there should be an ability to archive the data for climate use. The overall objective is to eventually cover the entire United States with soil moisture sensors, and use them to provide real-time assessments of soil moisture for fire weather personnel, to confirm output from climate models, verify and adjust drought indices, and verify and adjust satellite-derived measurements of soil moisture.

References:

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Fire Weather Research: A Burning Agenda for NOAA. A Report from the NOAA Science Advisory Board. Oct. 2008, 92 pp.

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Remote Automated Weather Station, Fire Weather, RAWS-F. Available at website: http://www.campbellsci.com/documents/product-brochures/b_raws.pdf

8.2.6W SUBTOPIC: Detection and Evidence Collection of Climate Buoy Vandalism

NOAA climate buoy arrays in the equatorial Pacific have seen increasing incidences of vandalism which reduce buoy data availability leaving gaps in critical climate observation data. This situation directly impacts the NOAA 5-year Research Plan

Performance Objective of “Improve predictability of the onset, duration, and impact of hazardous and severe weather and water events”. In particular, fishing boats frequently damage climate buoys and/or damage buoy moorings by using “slingshot” fishing techniques which put undue stress on buoy moorings that may cause mooring failures. In addition, vandals often remove solar panels, batteries, and electronics, or buoy superstructure metal for salvage.

NOAA is seeking the capability to detect attempts at vandalism or intrusions on its climate buoys and a means to deter, dissuade, or preclude vandalism, “sling shotting”, or other interference with climate observation buoys. A variety of methods might be employed to mitigate vandalism on NOAA buoys that include: detection of buoy bumping, pulling or other disturbances to trigger defensive responses or evidence capture; detection of the presence of vessels near buoys and/or detection of the presence of people on buoys; deterrence of buoy boarding; deterrence of buoy “slingshotting”; In addition, it is desired to capture photographic or other evidence to identify either vessels or individuals engaged in buoy vandalism, storing the evidence for later retrieval or real-time transmission of this evidence.

Because of limited space and power availability on climate buoys, a system for detection/recording of evidence of vandalism would be a self-powered, stand-alone system that would not require changes to climate buoy design, have sufficient power and recording or reporting capacity to last for a minimum of 1 year and up to 2 years, limit size and weight to the capability of the buoy to host the device, be easy to maintain and replace in the field while operating from small service vessels, survive a marine environment, and be relatively low cost.

References:

Dr. C.C. Teng, et. al, Buoy Vandalism Experienced by NOAA’s National Data Buoy Center, Presentation to the 25th session of the Data Buoy Cooperation Panel, IOC of UNESCO, http://ioc-unesco.org/hab/index.php?option=com_oe&task=viewDocumentRecord&docID=4358

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8.3 TOPIC: Weather and Water

8.3.1R SUBTOPIC: Sensor for Measurement of Black Carbon from Balloons

The objective of this subtopic is to develop an inexpensive, potentially disposable sensor for measuring Black Carbon (BC) aerosols in the atmosphere. The sensor will have sufficient analytical performance to yield useful data when carried on a balloon or dropped as a sonde from an aircraft. The sensor will report position coordinates and BC concentration in a format compatible with radiosonde telemetry.

Black Carbon aerosol is a leading, but poorly understood climate forcing agent. Its distribution in the atmosphere is extremely variable and heterogeneous, in all dimensions: X, Y, t, and Z. Knowledge of its vertical distribution (Z) and consequent interaction with clouds and surfaces is crucial in all models of climate radiative forcing. The development of a BC sonde capable of being attached to a balloon or dropped from an aircraft will provide vertical atmospheric BC profiles.

Such a BC sonde would be especially useful in BC sensitive regions such as the Arctic ice cap that is logistically difficult to access by other than aircraft and balloons. This new instrument will allow for BC deposition studies, especially in the Arctic, and has a great potential to be commercialized quickly, if successful.

SCIENTIFIC PERFORMANCE REQUIREMENTS: The sensor should provide measurement of BC aerosol with a noise and detection limit of ± 20 ng m^{-3} over a 1 minute integration period or ± 200 ng m^{-3} averaged over a 5 second integration period; measure BC in a range of 20-20,000 ng m^{-3}; weigh 8 lbs, or less; operate for 2 hours on its own power source (included in the 8 lbs); and not contain any hazardous components.

OPERATIONAL REQUIREMENTS: The desired sensor will be deployed on normal large full atmosphere radiosonde balloons. It must be small enough to be built into a standard aircraft dropsonde package, and rugged enough to be deployed from aircraft. It must be capable of activation and operation by technical staff without specialized training; operate in ambient temperatures of -20C to +40C and function over an altitude range of 0-10 km.

References:

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8.3.2R SUBTOPIC: Airborne Wave Height Sensor Based on Multistatic GPS RADAR

The assimilation of sea wave heights and related winds into ocean models and verification of the NWS wave forecast model improves their accuracy. To map ocean surface topography and wave heights, satellite and airborne radars are currently used. However, those instruments are expensive and are not suitable for installation on board small platforms such as the Unmanned Aircraft Systems (UAS). Recent research has been performed using reflected signals of the U.S. Global Positioning System (GPS). The ability of GPS signals that are reflected from the ocean surface and received by an aircraft at medium-high altitude to determine ocean surface roughness and height, along with wind speed and direction has been demonstrated. The primary advantage of using GPS multistatic signals rather than an active (monostatic) microwave source for ocean surface remote sensing is the elimination of the need for a transmitter and large directional antennae required for high resolution observations. This alternative translates into a payload with low power consumption, small size and weight making GPS scatterometry an attractive complement to any NOAA aircraft including high altitude-long endurance UAS platforms. To this end, a compelling need exists for an inexpensive, small, automated airborne sensor of GPS multistatic reflections with built-in processing power to perform the necessary calculations in real time. We request a Phase I study that might demonstrate the development of such an airborne system, both for aircraft and UAS. Reflected range/Doppler waveforms that carry information about ocean heights and surface roughness must be observable by this approach. The design of the device must include an ability to receive, preprocess, and store reflected GPS signals from all available satellites to provide a large swath mapping capability. Ideally, the receiver may have a reprogrammable architecture for use with future civil positioning signals.

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8.3.3D SUBTOPIC: Hyperspectral Microwave Sensor

Passive Microwave Sensors have existed for several decades, as ground-based, airborne or space-borne. They provide a wealth of information about the atmosphere, the surface, the hydrometeors (rain, ice, etc) and are invaluable for weather prediction. Modern passive microwave space-borne sensors and even planned sensors have only a limited number of channels available, totaling anywhere between 5 and 30 channels. This limited number of channels has been shown to be insufficient to solve for the ill-posed nature of the inversion of the geophysical state from space-borne measurements. This is especially true for cases where cloud, rain and/or ice are present in the atmosphere. In this case indeed, a large uncertainty exists due the lack of knowledge about the particle density, shape, size, distribution, vertical structure, temperature dependence, etc. A larger number of channels will help solve for the inherent ambiguities in these cases. It will also allow providing a higher vertical resolution for the temperature and humidity sounding, a better distinction between the surface and the atmospheric signals, a better surface typing due to the different spectral signatures of the different surface parameters mixtures, etc. While sensors operating in the infrared and near-infrared have experienced an ever increasing number of channels and bands with the new hyperspectral sensors (such as IASI, CrIS, AIRS), microwave sensors despite their large benefits to weather prediction and their ability to penetrate cloud and sense within and below the cloudy and rainy layers, have not seen their number of channels increase. This solicitation aims at exploring the possibility of building a prototype hyperspectral microwave sensor. Although the ultimate goal is to be able to fly the sensor in space, the approach suggested is to design a sensor with incremental complexity to accelerate the feasibility study. In other words, the prototype could first be designed to be deployed on-ground, then be mounted on airplanes as a risk reduction phase for a future space-borne platform (either in geostationary or polar orbit modes). This type of sensor would be expected to have significant positive impacts on the forecast skills of numerical weather prediction models, especially if deployed in space with large spatial and temporal coverage.

Besides the large of number of channels (between hundreds and thousands) sought, in the range between 3 GHz and 300 GHz (and to 600 GHz and higher), it is emphasized that the noise level should be as low as possible and at least as low as the current state of the art sensors. The proposals would be expected to take advantage of recent technological advances made in the microwave sensors technology, related among others, to the prototyping of microwave geostationary sensors (reduced noise levels, local oscillators, wave guides, antenna designs, etc). The lifetime of the sensor should be at least ten years with service intervals of 2-3 years. The sensor should be self

contained, automated and frequency-modular to a certain extent, i.e. the range of frequencies, spacing and bandwidths should potentially be flexible.

References:

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8.3.4D SUBTOPIC: A Novel, High Efficiency, Narrow Beam Dual-Polarized Antenna to Support the Advanced Wind and Rain Airborne Profiler on the NOAA P-3 Aircraft

The NOAA WP-3D aircraft are tasked with providing critical research and real-time observations of severe weather (e.g. tropical cyclones, winter storms). The vital measurements collected advance our knowledge and ability to model and forecast these storms along with presenting the ability to validate and improve satellite based remote sensing observations. The Advanced Wind and Rain Airborne Profiler (AWRAP) system, deployed on this aircraft, is a conically scanning, multi-beam C and Ku-band Doppler radar which possesses the ability to profile the atmospheric winds and precipitation (within precipitation bands) and also to provide continuous ocean vector wind observations. The AWRAP system profiles the ocean surface, volume backscatter and Doppler at vertical polarization. This Solicitation seeks a novel, high efficiency, narrow beam dual polarized antenna capable of supporting AWRAP's measurement geometry. With incidence angles reaching beyond 60 degrees, the dual polarized measurements would enable AWRAP to use polarimetric techniques for estimating precipitation drop size distribution and phase. Such information is critical to improving the understanding of tropical cyclone intensification and characterizing the precipitation within winter storms. High efficiency and narrow beam widths would improve the ability of the system to profile the atmospheric boundary layer winds, especially near the surface. The dual polarized ocean surface backscatter measurements would improve AWRAP's sensitivity to ocean surface vector winds at high wind speeds and would provide critical observations to improve the ocean surface normalized radar cross section – ocean vector wind geophysical model functions. NOAA is working with Japan Aerospace Exploration Agency (JAXA) to launch a C/Ku-band dual polarized scatterometer in 2016. This system will address user needs as detailed in the impact study that reported on the effect operational satellite surface vector winds have on operational weather forecasting and warning [ref impact study and oceanography paper]. This dual polarized antenna would enable the AWRAP system to provide critical

calibration / validation measurements from the satellite platform while at the same time fulfilling NOAA's immediate need for improved observations.

8.3.5D Subtopic: Using Graphic Processing Unit (GPU) Architecture to Advance High-Performance Radiative Transfer Computations in Operational Data Assimilation for Improved Weather Forecasting

In the era of hyperspectral sounders with thousands of spectral channels of observations, the computation of the radiative transfer model becomes ever more time-consuming. The assimilation of hyperspectral radiance data for Numerical Weather Prediction (NWP) requires the use of a computationally fast radiative transfer model to simulate radiances from an input atmospheric profile. In the past few years the Graphics Processing Unit (GPU) has evolved into a highly parallel, multithreaded, many-core processor with tremendous computational speed and very high memory bandwidth. The combined features of general-purpose supercomputing, high parallelism, high memory bandwidth, low cost, and compact size are what make a GPU-based desktop computer an appealing alternative to a massively parallel system made up of commodity CPUs (e.g. Beowulf clusters). Currently, a low-cost (~$7000) personal computer with the 4 NVIDIA Tesla GPU cards (960 GPU cores) delivers 4 TFlops of compute power. For comparison, the Earth Simulator, the world fastest supercomputer in 2004, was a stadium sized computer cluster with 5120 CPU cores to deliver 40 TFlops of compute power. The exploding GPU capability in the past few years has attracted more and more scientists and engineers to use it as a cost-effective high-performance computing platform. GPU nowadays has been able to offer two to three orders of magnitude speedup over CPU for various science and engineering applications. Some successful examples can be seen in the reference and from the NVIDIA CUDA website: http://www.nvidia.com/object/cuda_home.html#.

This Solicitation seeks a novel approach to use GPU to improve the computational power of radiative transfer calculations for use in data assimilation and the generation of atmospheric soundings. Future hyperspectral infrared instruments will likely evolve to thousands of spectral measurements with contiguous sampling at 5 km spatial resolution or greater. The challenge is to develop and demonstrate the capability to allow affordable operational processing of very high volume hyperspectral data using GPU architecture.

References:

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8.3.6N SUBTOPIC: Easily Deployable Offshore Real Time Tropical Storm Surge Sensors

With respect to tropical storms, NOAA's mission ranges from coastal hazard planning, real-time operational forecasts and observations, to emergency response and long-term recovery. Storm surge is the number one cause of loss of life during tropical storm events, yet critical, high resolution storm surge dynamics are typically limited to post storm assessment due to the lack of a sufficiently dense real-time observation network, Furthermore, given the extreme nature and variability of storm surge & flooding during tropical storm events, it is unreasonable to implement a long term network with the associated costs of operations and maintenance.

However, the innovative development of a mobile network of storm surge sensors would yield a much great density of observations for short term utilization, improving storm surge warnings and increasing the efficiency of evacuations, in addition to recovery and land use planning. Such mobile equipment would supplement existing NOAA water level networks, where long term infrastructure placement may be unavailable or have limited long term utilization. In addition, there is a need for affordable equipment, instruments, tools and techniques to evaluate the continuously changing tropical storm conditions.

The concept of mobile, remote networks has been tested by United States Geological Survey (USGS) and results have been utilized by National Weather Service for post-storm model validation. Given NOAA's national water level standards and existing infrastructure, a proof of concept application is required to evaluate new measurement technologies and the risks and benefits of national operational approach.

Lastly, high levels of accuracy and spatial density could lead to multiple applications of the data. Data would also be incorporated into other NOAA and interagency systems, such as the Integrated Ocean Observing System (IOOS). A Phase-I study could develop a field prototype system, evaluate IT requirements, and review broader applications.

References:

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8.4 TOPIC: COMMERCE AND TRANSPORTATION

8.4.1W SUBTOPIC: Two-Way Communications Protocol For Environmental Data Sensing Systems

The National Weather Service (NWS) relies on environmental data from a variety of sources to fulfill its mission of saving lives and protecting property through the issuance of timely and accurate watches and warnings. One source of such data comes from local automated flood warning systems (AFWS). The protocol used in these systems is a simple ALOHA called ALERT (Automated Local Evaluation in Real-Time). The flood warning community is moving towards a newly adopted, open source ALERT2 protocol. While ALERT2 has advantages over ALERT, further efficiencies are desired.

Automated local flood warning systems throughout the country have relied on a simple ALOHA based VHF (Very High Frequency) RF (Radio Frequency) communications infrastructure. In some densely populated geographical areas, e.g. Southern California, multiple agencies use the same simple communications system to share data regionally. Currently, the VHF infrastructure is frequently overloaded and channel capacity for sharing data is not reliable. This limits the expansion of the in-situ flood warning and water quality networks and limits the regional sharing of data.

The newly adopted, open source ALERT2 protocol has demonstrated in field trials and production AFWS systems a 10x channel capacity improvement at the physical layer, with an additional 5x capacity improvement at the Media Access layer using Time Division Multiple Access (TDMA). This could provide a means of improving regional data quality and quantity, in an industry standard format, improving integration of regional data into Flood Warning models and improving Flood Warning forecasts.

This subtopic seeks a Phase I study to determine the feasibility of implementing a two-way communications capability into ALERT2. The desire would be to have this two-way capability without sacrificing the current ALERT2 gains in VHF radio channel capacity, while maintaining an open source standard and backward compatibility with the current ALERT2 protocol.

References:

ALERT Real Time Weather Monitoring and Flood Warning, 20 Sep 2000. Report available via website: http://www.onerain.com/includes/pdf/whitepaper/ALERTintro.pdf

ALERT-2 Protocol Development, 22 Aug 2007. Report available at website: http://www.alert-2.com/ALERT-2-Overview.pdf

Customer Spotlight: ALERT2. Available via One Rain: The Rainfall Company (Contrails Newsletter): http://www.onerain.com/includes/pdf/newsletter/OneRainNewsletter1Q2009.pdf

8.4.2W SUBTOPIC: Enabling NextGen Aviation Weather Data Access

The intent is to provide Federal Aviation Administration (FAA) tower operators who utilize National Weather Service (NWS) forecast products with an interface to see localized weather at their airport and another airport of their choosing. It also has the goal of proving the aviation database with weather elements prototyped, something that the NOAA Office of Oceanic and Atmospheric Research (OAR) and NWS have been focusing on for many years. The NWS Next Generation Air Transportation System (NextGen) Weather Cube technology represents the ability to provide weather products faster, in greater quantity, with higher reliability and to the targeted needs of the FAA as well as internally. This area is critical so tower personnel can view their current location as well as another airport of interest to better manage traffic flow in real time.

Currently, the towers in most airports use the Weather Channel (TruWeather) to compare data to information from the National Weather Service. Tower operators appear unable to obtain localized weather information to the airport(s) being operated, or other airports of their interest. They seek this to manage real time traffic between airports for select flights, especially connections, to reduce delays and maintain traffic schedules. No one source appears to provide them with the Single Authoritative Source (SAS) they seek for real-time air traffic management. Therefore, they take data from these two sources and make localized assumptions. With the accuracy of National Weather Service information and its ability to provide localized weather, the NextGen Weather Cube and the proposed interface offer a perfect solution for aviation operations.

With the deployment of NWS NextGen, more information in a greater bandwidth will become available faster, in greater quantity, and in a more localized fashion. In most cases, these data are already available but not in the preferred format for traffic management. The inefficiencies currently experienced would be mostly resolved with such an interface and would be the best use of NWS NextGen data by flight operations.

The project would be for a user interface suitable at any airport for use by airport personnel having the following parameters:

1. User setting for range around the airport (up to 100 mi maximum or to the nearest airport)
2. Display of ambient temperature, humidity, barometric pressure, wind speed and direction, convection information and probability of precipitation/icing as displays update to the refresh rate that NWS currently provides its products;
3. A weather radar map updated to the frequency that radar is currently recorded;
4. Display on one screen of a computer monitor;
5. Selection on an airport-by-airport basis using airport codes as a delineator;
6. Operator can select any airport in the US system and obtain the same data sets for that individual location;
7. Operator can compare up to two locations to determine weather conditions affecting flights at any two locations for their use.

With the growth of products such as TruWeather by 'The Weather Channel', conflicts can arise in weather forecasting by the operators especially when there is a conflict in the data observed. This also leads to a potential liability issue not only for the FAA but the NWS as well if there is significant difference between TruWeather and NWS products. In either case, tower personnel find localized airport weather scarce for their particular purpose. This project would be a key program in resolving this situation and provide added benefit to the FAA, NWS and NOAA overall.

References:

FAA NextGen Site: http://www.faa.gov/about/initiatives/nextgen/

Joint Planning and Development Office for NextGen: http://www.jpdo.gov/

NOAA NextGen Weather Site: http://www.weather.gov/nextgen/index.shtml

Report of the Weather-ATM Working Group, Research, Engineering and Development Advisory Committee, Federal Aviation Administration, 3 October 2007

Schumer, C., Maloney, P., et.al., "*Your Flight Has Been Delayed Again*", Report by Joint Economic Committee Majority Staff, May, 2008, U.S. Congress;

Wang, Schaefer, Wojcik, "*Flight Connections and their Impacts on Delay Propogation*", Center for Advanced Aviation Systems Development, Mitre Corp., http://www.mitre.org/work/tech_papers/tech_papers_03/wang_delay/wang_delay.pdf

8.4.3D SUBTOPIC: Autonomous Visible to Near-Infrared Hyperspectral Imaging System for GOES-R Calibration/Validation

Under the NOAA Commerce and Transportation 5-year Research Plan there is a recognized need for "accurate, timely, and integrated weather information to meet air and surface transportation needs". Satellite based remote sensing measurements are an important component of this integrated weather information system. Radiometric and spectral calibration of remote sensing data is necessary for the retrieval of physical parameters from the measured radiances and is required for combining data from different instruments on different platforms such as the next generation geostationary and polar-orbiting satellites. The Advanced Baseline Imager (ABI) on GOES-R is a multi-spectral channel radiometer that will measure emitted and solar reflected radiance simultaneously in 16 spectral channels. Radiometric quality will assessed by NESDIS through calibration/validation studies using a number of approaches, including airborne radiometer under-flights. Data from airborne radiometers will be used for ABI radiometric and spectral calibration, Signal to Noise Ratio (SNR) and Noise Equivalent Delta Temperature (NEDT) determination, assessment of the ABI on-board calibration

capabilities, and characterization of uncertainties in ABI spectral response functions (SRF). The ABI calibration/validation studies require high altitude hyperspectral measurements spanning the shortwave and near-infrared (SWIR) (0.47-2.25 μm) and infrared (IR) (3.9-13.3 μm) channels. Hyperspectral measurements are necessary so that the airborne radiances can be convolved with the predicted spectral response functions to characterize SRF uncertainties. The measurements need to be performed from a high altitude aircraft so that the atmospheric column observed by the airborne instrument is maximized. This facilitates comparison with radiances measured from space.

Airborne Fourier Transform Spectrometer (FTS) sensors such as the NPOESS Airborne Sounder Testbed-Interferometer (NAST-I) have been used to conduct high altitude aircraft measurements for on-orbit calibration of AIRS and IASI IR radiances [Larar et al., 2010]. NAST-I would be well suited for calibration/validation of the ABI IR channels due to its high spectral resolution (~1.5 nm) and wide spectral coverage (3.5-16.7 μm). Airborne spectrometers such as the Airborne Visible Infrared Imaging Spectrometer (AVIRIS) have been used for calibration of Hyperion SWIR radiances [Green et al, 2003]. AVIRIS has good SWIR coverage (0.375–2.50 μm) but the spectral resolution is ~10 nm and is not adequate for characterizing SRF uncertainties in the ABI visible bands, which are relatively narrow.

Several prototype hyperspectral imagers have been developed over the past several years in spectral ranges that cover the ABI visible bands 1-3, including high spectral resolution (~1.15nm) and good SNR (~150:1). Such instruments would be suitable for calibration/ validation of the ABI visible channels. However, these instruments are not currently capable of autonomous operation. Autonomous operation is required for instruments on high altitude aircraft such as the ER-2, WB-57, or PROTEUS aircraft.

We request that a Phase I SBIR study be conducted to determine the feasibility of adapting previously developed hyperspectral imagers for autonomous operation and, if feasible, develop a work plan and cost estimate for adaption for an autonomous system. The autonomous system will need to be designed to interface with the ER-2 electrical interface panel (EIP), which is also used by the PROTEOUS aircraft and links the instrument to the aircraft electrical system, the pilot control panel, and the aircraft data system.

References:

Advanced Baseline Imager (ABI) Performance and Operational Requirements Document (PORD) 417-R-ABIPORD-0017 (http://www.star.nesdis.noaa.gov/star/goesr/MRD/417-R-ABIPORD-0017_V_2_17.pdf)

Green, R. O., B. E. Pavri, and T. G. Chrien, 2003, “On-Orbit Radiometric and Spectral Calibration Characteristics of EO-1 Hyperion Derived with an Underflight of AVIRIS and *In Situ* Measurements at Salar de Arizaro, Argentina,” *IEEE Trans. On Geosci. Rem. Sens.*, 41(6), 1194–1203.

Larar, A. M., W. L. Smith, D. K. Zhou, X. Liu, H. Revercomb, J. P. Taylor, S. M. Newman, and P. Schlussel, “IASI spectral radiance validation inter-comparisons: case study
assessment from the JAIVEx field campaign”, Atmos. Chem. Phys., 10, 411–430, 2010

8.4.4N SUBTOPIC: New Concepts and Technology for Acquisition, Processing, Analysis, and Management of Hydrographic and Ocean Mapping Data

The efficiency of any ocean mapping effort is directly attributable to swath coverage of the sonar used to acquire the data. Since the bathymetric swath width of the sonar is directly proportional to the water depth (or altitude of the sensor), the coverage which may be expected in shallow water (less than 30 meters) is greatly reduced. The typical swath bathymetry sonar has a usable swath width, as defined in the IHO S44 hydrographic surveys standards [1], that ranges between 3.5 to 4.0 times the water depths. New technology is sought to expand this coverage up to 11 times the water depth with the same survey standards, and with concurrent high-speed, high-resolution acoustic backscatter imaging. The envisioned technology requires innovations in sonar design and signal processing algorithms to provide bathymetry with quantifiable uncertainties (e.g. [2, 3]) that meets or exceeds IHO (Order 1) accuracy requirements across the full width of the swath.

This technology would have wide-ranging benefits across the ocean mapping community. For commerce and transportation, it would reduce by half the time required for swath bathymetry surveys in waters depths less than 30 meters (all east coast and many west coast ports). The increased bathymetric coverage with co-registered acoustic backscatter imagery would provide enhanced capabilities for detecting small mine-like objects in our ports and harbors in support of homeland security. This co-registration would also increase the accuracy with which micro-scale marine habitats could be mapped using acoustic backscatter imagery. Of most interest with regard to current events would be the ability to map and identify large-scale contamination of the marine environment such as the oil residue expanding in the water column and on the bottom of the Gulf of Mexico from the Deepwater Horizon well.

References:

[1] International Hydrographic Organization, Standards For Hydrographic Surveys, 5th Edition, Special Publication No. 44, February 2008

[2] Hare, R.B., Error budget analysis for US Naval Oceanographic Office (NAVOCEANO) hydrographic survey systems, Technical Report, September 2001, 155 pp.

[3] Willcox, J.S.; J.G. Bellingham; Y. Zhang; and A.B. Baggeroer, “Performance metrics for oceanographic surveys with autonomous underwater vehicles”, IEEE Journal of Oceanic Engineering, 26(4), 711-725, 2001.

9.0 SUBMISSION FORMS
9.1 NOAA/SBIR Coverpage

NOAA/SBIR SMALL BUSINESS INNOVATION RESEARCH	This firm and/or Principal Investigator ___ has ___ has not submitted proposals for essentially equivalent work under other federal program solicitations, or ___ has ___ has not received other federal awards for essentially equivalent work

SOLICITATION NO.: NOAA 2011-1	CLOSING DATE: January 12, 2011
NAME OF SUBMITTING FIRM	
TAXPAYER IDENTIFICATION NUMBER	
DUNS NUMBER	
ADDRESS OF FIRM (INCLUDING ZIP CODE + 4)	
TITLE OF PROPOSED PROJECT	
REQUESTED AMOUNT: $	PROPOSED DURATION: Six (6) Months
SOLICITATION SUBTOPIC NO.	SOLICITATION SUBTOPIC TITLE

THE ABOVE ORGANIZATION CERTIFIES THAT:	YES	NO
1. It is a small business firm as defined on page 6.		
2. The primary employment of the principal investigator will be with the firm at the time of award and during the conduct of the research.		
3. A minimum of two-thirds of the research will be performed by this firm in Phase I.		
4. It qualifies as a socially and economically disadvantaged small business as defined on page 7.		
5. It qualifies as a woman-owned small business as defined on page 7.		
6. It will permit the government to disclose the title and technical abstract page, plus the name, address and telephone number of the corporate official if the proposal does not result in an award to parties that may be interested in contacting you for further information or possible investment.		
7. Is your business in a HUB Zone? (See: http://map.sba.gov/hubzone)		

PRINCIPAL INVESTIGATOR/ PROJECT DIRECTOR	CORPORATE OFFICIAL (BUSINESS)	OTHER INFORMATION
NAME (Printed)	NAME (Printed)	YEAR FIRM FOUNDED
SIGNATURE	SIGNATURE	NUMBER OF EMPLOYEES
DATE	DATE	Average Previous 12 months _____ Currently _____
TITLE	TITLE	HAS THIS PROPOSAL BEEN SUBMITTED TO ANOTHER AGENCY?
		Yes ☐ No ☐
TELEPHONE NO. + AREA CODE	TELEPHONE NO. + AREA CODE	IF YES, WHAT AGENCY? _____
E-MAIL (Printed)	E-MAIL (Printed)	FAX #

PROPRIETARY NOTICE

For any purpose other than to evaluate the proposal, this data shall not be disclosed outside of the Government and shall not be duplicated, used or disclosed in whole or in part, provided that if a funding agreement is awarded to this proposer as a result of or in connection with this submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement. This restriction does not limit the Government's right to use information contained in the data source without restriction. The data in this proposal subject to this restriction is contained on separate proprietary page(s).

9.2 NOAA/SBIR Project Summary Form

NAME OF FIRM	
AMOUNT REQUESTED	
ADDRESS	PHONE # FAX # E-MAIL:
PRINCIPAL INVESTIGATOR (NAME AND TITLE)	
TITLE OF PROJECT	
SOLICITATION SUBTOPIC NUMBER	SOLICITATION SUBTOPIC TITLE
TECHNICAL ABSTRACT (LIMIT 200 WORDS)	
SUMMARY OF ANTICIPATED RESULTS	

9.3 NOAA/SBIR Proposal Summary Budget

FIRM:	PROPOSAL NUMBER: (Leave Blank)
PRINCIPAL INVESTIGATOR:	
	PRICE
DIRECT LABOR:	$
OVERHEAD RATE:	$
OTHER DIRECT COSTS:	$
MATERIALS:	$
GENERAL AND ADMINISTRATIVE (G&A):	$
PROFIT:	$
TOTAL PRICE PROPOSED:	$
THIS PROPOSAL IS SUBMITTED IN RESPONSE TO NOAA SBIR PROGRAM SOLICITATION 2010-1 AND REFLECTS OUR BEST ESTIMATES AS OF THIS DATE.	
_____ TYPED NAME AND TITLE DATE	_____ SIGNATURE DATE

9.4 NOAA/SBIR BUDGET INSTRUCTIONS

The offeror is to submit a cost estimate with detailed information for each element, consistent with the offeror's cost accounting system. This does not eliminate the need to fully document and justify the amounts requested in each category. Such documentation should be contained, as appropriate, on a budget explanation page immediately preceding the budget in the proposal.

1. Principal Investigator (PI)

The PI must be with the small business concern at the time of contract award and during the period of performance of the research effort. Additionally, more than half of the PI's time must be spent with the small business firm during the contract performance.

2. Direct Labor

All personnel (including PI) must be listed individually, with the projected number of hours and hourly wage.

3. Overhead Rate

Specify current rate and base. Use current rate already negotiated with a Federal agency, if available. If no rate has been negotiated, a reasonable overhead rate (10-15% is average) may be requested, which will be subject to approval by NOAA. Overhead includes fixed costs not directly related to the research effort, e.g., rent, heat, light, facilities, telephones, maintenance, insurance, etc.

4. Other Direct Costs

List all other direct costs which are not described above (i.e. consultants, subcontractor, travel, and equipment purchases). Each of the above needs a detailed explanation and elaboration of its relation to the project. (Up to $4,000 may be allocated for technical and commercial assistance.)

5. Materials

The materials and supplies required for the project must be identified. There is also a need to specify type, quantity, unit cost, and total estimated cost of these materials and supplies.

6. General & Administration (G&A)

Specify current rate and base. Use current rate already negotiated with a Federal agency, if available. If no rate has been negotiated, a reasonable G&A rate may be requested, subject to approval by NOAA. G&A includes costs associated with managing and running the small business, e.g. computers, copier, marketing, charitable contributions, loans, gifts, entertainment, dues, etc.

7. Profit

The small business may request a reasonable profit. About seven percent of the cost is the average proposed.

10.0 NOAA/SBIR CHECKLIST

Please review this checklist carefully to assure that your proposal meets the NOAA requirements. Failure to meet these requirements may result in your proposal being returned without consideration.

Six copies of the proposal must be received by 4:00 p.m. (CST) January 12, 2011.

_____ 1. The proposal is **25 PAGES OR LESS** in length.

_____ 2. The proposal is limited to only **ONE** of the subtopics in Section 8.

_____ 3. The proposal budget is for **$95,000 or LESS**.

_____ 4. The abstract contains **no proprietary information** and does **not exceed** space provided on the Project Summary, or word limitation.

_____ 5. The proposal contains only pages of 21.6cm X 27.9cm size (8 ½" X 11").

_____ 6. The proposal, Cover Page and Project Summary contains **an easy-to-read font (fixed pitch of 12 or fewer characters per inch or proportional font of point size 10 or larger) with no more than six lines per inch**, except as a legend on reduced drawings, but not tables.

_____ 7. The **COVER PAGE** has been completed and is **PAGE 1** of the proposal.

_____ 8. The **PROJECT SUMMARY** has been completed and is **PAGE 2** of the proposal.

_____ 9. The **TECHICAL CONTENT** of the proposal begins on **PAGE 3** and includes the items identified in **SECTION 3.3.3** of the solicitation.

_____ 10. The **SBIR PROPOSAL SUMMARY BUDGET** has been completed and is the **LAST PAGE** of the proposal.

_____ 11. The P.I. is employed by the company.

NOTE: Proposers are cautioned of unforeseen delays that can cause late arrival of proposals, with the result that they may be returned without evaluation.

11.0 SBIR NATIONAL CONFERENCES

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FOR
TECHNOLOGY INTENSIVE FIRMS

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Working with Academia and the States.

Agency and company exhibits and/or One-on-One tables will be open for networking opportunities for all attendees!

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