

Special Notice 13-SN-0003
Special Program Announcement for 2013 Office of Naval Research
“Hypoxia Monitoring, Alert, and Mitigation System”

I. INTRODUCTION:

This announcement describes a research thrust entitled “Hypoxia Monitoring, Alert and Mitigation System” (HAMS) to be launched under the ONRBAA13-001, Long Range Broad Agency Announcement (BAA) for Navy and Marine Corps Science and Technology which can be found at: <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>. The research opportunity described in this announcement specifically falls under numbered paragraph 2 (item c) of the sub-section entitled Warfighter Performance (Code 34). The submission of proposals, their evaluation and potential execution of funds will be carried out as described in that Broad Agency Announcement.

The purpose of this announcement is to focus attention of the scientific community on the area to be studied and the planned timetable for the submission of proposals.

II. TOPIC DESCRIPTION:

The Office of Naval Research (ONR) is interested in receiving proposals for the initial development of Hypoxia Monitoring, Alert and Mitigation System sub-components. The Hypoxia Monitoring, Alert, and Mitigation System will predict/detect/warn warfighters of impending hypoxic events based on individual physiological, environmental, and cognitive monitoring. The goal is to provide optimal protection of military personnel and equipment through intelligent monitoring and adaptive modeling that accounts for individual differences in tolerance and provides timely notification/warning aids such that personnel can take corrective action before assets are compromised or lost.

1. The primary technology areas of interest for full system development over the *lifetime* of the program are (1) detection/prediction algorithm, (2) sensing suite, (3) warning modalities, and (4) modes of mitigation.

NOTE: This Special Notice seeks proposals for Item 1 only; the scope of the entire program includes the following, which are not part of this Notice and are provided for reference only:

- (1) Detection/Prediction Algorithm: (Described in Section 2, below.)
- (2) Sensing Suite Development: Physiologic sensors must be miniaturized, self-contained, low power, and unobtrusive, requiring minimal interaction with warfighters. These should be easy to maintain and calibrate without special tooling. Any person-borne system must not present an increased injury risk in an adverse event such as vehicle crash or aircraft ejection. Physiologic monitoring should include air quality and expiration of O₂, CO₂, flow, and pressure under an oxygen mask. Other parameters should be monitored to detect the presence of toxins in breathing gas, such as CO, NO, and hydrocarbons. Tissue responses, such as blood oxygen saturation (SpO₂), cerebral tissue oxygen content (rSO₂), and blood dyshemoglobins (carboxyhemoglobin (COHb) and methemoglobin (MetHb)) should be considered. Respiratory rate and function, as well as physical workload are also key

parameters. Consideration should be given for developing sensor suites that do not include a tightly sealed aviator mask as well. The system should include environmental measures, such as barometric pressure, acceleration, temperature and humidity. All recommended sensing transducers should specify the necessary calibration methods for error sources.

- (3) Warning Modalities: The warning modalities should be physiologically based and provide enough time to take corrective actions or provide automated mitigation.
- (4) Modes of Mitigation: The basic system shall include a mitigation component, e.g. supplemental oxygen and should afford the opportunity to account for both altitude and acceleration-induced hypoxia.

The overall HAMS system must be compatible with multiple operational environments.

2. Under this Special Notice, vendors may propose any combination or all of the following items:

(A) Detection/Prediction Algorithm (Beta version development sought under this Special Notice): An advanced adaptive monitoring algorithm should account for both the textbook predictions of hypoxia based on barometric pressure as well as individual variations in tolerance. It should predict physiologic state, how it changes over time and compute level of risk accordingly. The working environment will have multiple noise sources, including speaking, respiratory maneuvers, mask leaks, and data drop outs which must be considered. Predicted decrements in physiologic and cognitive / motor responses should factor into the decision algorithm to classify the type of warning issued. Performers will provide a validated algorithm that can be upgraded as the entire system matures.

(B) Determination of Physiologic Metrics: Animal and/or human testing is expected to determine appropriate physiologic metrics that can be used to determine negative sequelae associated with hypoxia and/or hypoxia-like events. Detection must be non-invasive, and the metric should provide information with enough lead-time to implement mitigation strategies, automatic or manual. Metrics should be largely consistent across subjects with significant reliability. Detection of such physiologic events should be easily measured with minimal equipment.

(C) Sensing Suite Integration: a plan to incorporate the sensing suite, warning modalities and modes of mitigation. (See above for description of Sensing Suite Requirements.)

III. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Full proposals should be submitted under ONRBAA13-001 by January 18, 2013. Full instructions are outlined at the following link <http://www.onr.navy.mil/~media/Files/Funding-Announcements/BAA/2013/13-001.ashx> . Full Proposals received after that date will be considered as time and availability of funding permit.

ONR anticipates that both grants and contracts will be issued for this effort. Full proposals for contracts should be submitted in accordance with the instructions at Section IV, Application and Submission Information, item 2.b, Full Proposals and item 6, Submission of Full Proposals for Contracts, Cooperative Agreements, and Other Transactions. Full proposals for grants should be submitted in accordance with

the instructions at Section IV, Application and Submission Information, item 5, Submission of Grant Proposals through Grants.gov. All full proposals for grants must be submitted through www.grants.gov. The following information must be completed as follows in the SF 424 to ensure that the application is directed to the correct individual for review: Block 4a, Federal Identifier: Enter N00014; Block 4b, Agency Routing Number, Enter the three (3) digit Program Office Code (342) and the Program Officer's name, last name first, in brackets (Steele, Chris). All attachments to the application should also include this identifier to ensure the proposal and its attachments are received by the appropriate Program Office.

The period of performance for projects is for up to 12 months.

ONR anticipates funding multiple awards for this 12-month effort totaling no more than \$1,560K for all awards.

Although ONR expects the above described program plan to be executed, ONR reserve the right to make changes.

Funding decisions should be made by January 30, 2013. Selected projects will have an estimated award date of May 30, 2013.

IV. SIGNIFICANT DATES

<u>Event</u>	<u>Date</u>
Recommended Full Proposal Submission	January 18, 2013
Notification of Selection: Full Proposals *	January 30, 2013
Awards *	May 30, 2013

Note: * These are approximate dates.

V. POINTS OF CONTACT

In addition to the points of contact listed in ONRBAA13-001, the specific points of contact for this announcement are listed below:

Technical Point of Contact:

LCDR Chris Steele
E-mail: Christopher.steele4@navy.mil
Phone; (703) 696-0618

Business Point of Contact:

Mr. Richard H. Pollack
875 North Randolph St., Suite 1425
Arlington, Virginia 22203-1995
E-mail: richard.pollack@navy.mil

VI. Submission of Questions

Any questions regarding this announcement must be provided to the Technical Points of Contact and/or the Business Point of Contact listed above. All questions shall be submitted in writing by electronic mail.

Questions regarding this special notice must be submitted via email to LCDR Chris Steele (Christopher.steele4@navy.mil) no later than 1700 ET, 07 JAN 2013. Title the subject line "13-SN-0003 Questions." Questions after this date may not be answered

Answers to questions submitted in response to this Special Notice will be addressed in the form of an Amendment and will be posted to the following web pages:

Federal Business Opportunities (FEDBIZOPPS) Webpage – <https://www.fbo.gov/>

Grants.gov Webpage – <http://www.grants.gov/>

ONR Special Notice Webpage - <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Special-Notices.aspx>