

## The Maury Project 2014 Annual Report

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### LONG-TERM GOALS

The Maury Project is a graduate-level, teacher professional development program designed to promote the scientific literacy of young people by improving the background of in-service precollege teachers on the physical foundations of oceanography. This is accomplished through a process of training the trainers at a two-week workshop held at the U.S. Naval Academy (USNA) and subsequently via single-topic modules that Maury peer trainers present in sessions throughout the United States. By increasing the scientific knowledge of teachers, the Maury Project is ultimately directed toward attracting precollege students, including underrepresented minorities, to science, technology, engineering, and mathematics (STEM) studies. This is in close alignment with the ONR STEM2Stern commitment to “nurture a world-class [STEM] workforce able to contribute to, and support, a culture of innovation.”

### OBJECTIVES

This project was designed to meet the following objectives:

- (a) Train master teachers to be peer trainers and resource persons on the physical foundations of selected oceanographic topics and/or issues.
- (b) Develop self-contained, single-topic, teacher-enhancement instructional modules on selected oceanographic topics.
- (c) Develop and maintain a national network of Maury peer trainers and resource persons.
- (d) Supply Maury peer trainers with instructional resource materials to use in the 1- to 2-hour training sessions they conduct.
- (e) Promote the adaptation of instructional resource materials on the physical foundations of oceanography for classroom use by the Maury teachers and those teachers they peer-train.
- (f) Provide leadership training for Maury alumni who serve as *DataStreme Ocean and Earth's Climate System* course Local Implementation Team (LIT) leaders.

## **APPROACH**

There are three major components to this program: an annual summer workshop for master precollege teachers, the production of instructional resource materials for teacher enhancement, and the peer-training of additional teachers. The main goal of the Maury Project is to provide a core group of teachers with the knowledge and instructional resources to enable them, in turn, to train a large number of their peers on selected oceanography topics. These classroom teachers who were peer-trained by Maury participants will then adapt their new found knowledge for in-class use of oceanography topics to enhance learning experiences for K-12 students, inspiring them to consider careers in STEM disciplines. Maury peer trainers are eligible to receive three graduate-level credits through State University of New York's The College at Brockport upon completion of program requirements, which include conducting workshops for colleagues in their school districts and states.

## **WORK COMPLETED**

In summer 2014, a two-week workshop for 24 precollege teachers on the physical foundations of selected oceanographic topics was held at the U.S. Naval Academy in Annapolis, MD. The USNA Oceanography Department makes available to the Maury Project essentially all of its outstanding facilities for the workshop, including the Hendrix Oceanography Laboratory. Participants have an intensive, hands-on experience in oceanography, which they are excited to share with others via peer-training workshops they conduct in their local school districts and communities.

## **RESULTS**

End-of-workshop survey questionnaires are administered on the last day of each Maury Project summer workshop. Data collected at the end of the summer 2014 workshop is summarized below from the 22 (out of 24) participants who completed the survey.

When the 22 participants were asked for:

- their overall rating of the Maury Project in terms of its educational value, 20 gave the highest response of “excellent,” 1 chose “fair”, and 1 wrote in the response box of “good” – between excellent and fair.
- the long-term effect on their teaching, 21 reported “great deal” and 1 “some.”
- the long-term effect on their curriculum development, 20 reported “great deal” and 2 “some”
- the long-term effect on training of colleagues, 21 reported “great deal” and 1 “some”

When asked “Has your perception of the value of the Navy changed as a result of your workshop participation?” 21 reported “increased” and 1 reported “remained the same.” There were three written-in notes expressing appreciation for the Navy.

When asked “Has your perception of the value of NOAA changed as a result of your workshop participation?” 20 reported “increased” and 2 reported “remained the same.” One person noted, “I’ve always been a fan of NOAA.”

When asked how they would rank the Maury Project workshop with other summer workshop experiences they have had since becoming a teacher, nearly all participants indicated it was the best or among the very best.

When asked if they would recommend that the Maury Project USNA workshop be offered in the future to other teachers, all participants responded affirmatively.

The following are selected qualitative evaluation responses that emphasize the impact of the USNA workshop and areas for future enhancement:

*What did you like most about the Maury Project workshop?*

- Face-to-face learning, camaraderie, hands on demonstrations, relevance, sense of connectedness to USNA, AMS, and NOAA.
- Student activities and labs will fit and enhance existing curriculum
- Hands on activities, lab demos, the field trips, especially the boat! Meeting colleagues from around the country.

*What did you like least about the Maury Project workshop?*

- More time would be great.
- Reduce powerpoint presentations by one-half. Add more break-out sessions for teachers to work together to show how they would present this material in the classroom.
- Field trip day should be trimmed. Keep it a full day, but cut out libraries, [condense] atomic time hour, and do it at night so we can use the telescope.

*What changes would you recommend in the workshop programming? (If you suggest a change, you must also suggest what could be eliminated or modified to make room for it.)?*

- Spread out the field experiences.
- I think the participants should be responsible for more “homework.” You can send out readings before the workshop so that we can discuss contents.
- Bring in more technology during the presentations.

With the training of 24 new participants in the Summer 2014 Maury Project workshop, a total of 502 teachers representing all 50 states, the District of Columbia, Puerto Rico, American Samoa, Argentina, Guam, Mexico, South Africa, Canada, Great Britain, Australia, Switzerland, Japan, and U.S. Department of Defense Overseas School System have become peer trainers since the first USNA summer workshop in 1994. Workshop reports received by AMS indicate that, since 2002, workshop participants have conducted 611 peer training sessions for 7470 teachers. Additionally, the Maury Project alumni have provided significant leadership in precollege ocean science education curriculum reform. About 30 Maury workshop alumni have played key rolls in the development and national

implementation of the graduate-level AMS *DataStreme Ocean* (2003-present), *DataStreme Water in the Earth System* (2001-2008), and *DataStreme Earth's Climate System* (2009-present) in-service teacher professional development courses, which have trained thousands of other teachers.

## IMPACT/APPLICATIONS

Maury Project summer workshop participants are committed to offering a minimum of two single-topic training sessions lasting from one to two hours each, primarily directed toward precollege teachers. The table below lists workshops conducted by the 2012 and 2013 workshop groups. Note that Summer 2014 participants will begin to conduct their required workshops during school year 2014-2015 and a few Summer 2013 participants may still submit required workshops.

**Table 1: Maury Project Peer Training Workshops (2012 - 2014)**

Workshops given by 2012-2014 Maury alumni:

Year	USNA Participants	# of Peer-Training Workshops	# Trained
2012	24	30	383
2013	24	44	504
2014	24	<i>(just completed training, few workshop opportunities)</i>	

The 2013 Maury alumni have so far conducted 44 workshops for 504 persons (mostly precollege teachers). Two 2014 alumni has already offered their two workshops. During the FY14 reporting period, additional workshops were conducted by Maury alumni from the 2012 group and from groups attending the workshop prior to 2012.

To see the multiplying effect of this program, consider that since 2002; at least 611 workshops have been conducted by Maury peer trainers across the country, reaching 7470. And while AMS does not have exact records on the period 1994-2001, it is estimated that at least several thousand additional persons were impacted by Maury peer training. Most of those trained were teachers, who from AMS evaluation data have been shown to impact, on average, about 150 students per year. Therefore the peer-training multiplier effort demonstrates the large-scale impact made by 24 highly trained teachers per summer USNA workshop.

## TRANSITIONS

Maury Project alumni continued to provide leadership in other AMS oceanography-related teacher training and learning materials development initiatives, including participation in Local Implementation Teams (LITs) for the *DataStreme Ocean* and *DataStreme Earth's Climate System* semester-long graduate-level courses, which are offered nationally to a few hundred teachers each year. In school year 2013-2014 *DataStreme Ocean* course offerings, Maury Project alumni lead approximately 12 LITs. Through spring semester 2014, a total of 3758 precollege teachers were trained by this program. Due to budgetary cuts impacting the AMS-NOAA cooperative agreement supporting the course offering, there are currently 94 teachers registered for Ocean this fall – about

half the number of spring 2013 participants for instance – although semester numbers should increase as LITs are rebuilt with NOAA funding partially restored.

Originally funded by the NSF for 3 summers starting in 1994, the existing Maury Project workshops at the U.S. Naval Academy received additional NOAA, Navy, and AMS support. Current ONR funding provides major support for the USNA workshops through Summer 2016.

## **RELATED PROJECTS**

The Maury Project inspires participants to further their training and administrative activities. The project also directly impacts U.S. Coast Guard Academy course offerings, *AMS Ocean Studies* introductory college-level course and AMS Diversity Projects, and has helped foster formal partnerships with COSEE and the Consortium for Ocean Leadership.

### **Leadership Roles Assumed by Maury Participants**

In addition to Maury alumni peer-training activities and DataStreme LIT participation during FY14, there are notable examples of Maury Project participants continuing their broader leadership roles in STEM education. For example,

Barbara Walton-Faria – 2009 Rhode Island Teacher of the Year

John Moore – 2009-2010 Albert Einstein Distinguished Educator Fellow

Michael Passow – 2014-2016 President of the National Earth Science Teachers Association

Richard Jones – 2014 Regents Medal for Excellence in Teaching

### **U.S. Coast Guard Academy**

The U.S. Coast Guard Academy currently uses materials from the Maury Project in its Introduction to Atmospheric and Marine Science course and Physical Oceanography course. Additionally, Academy faculty routinely provide Maury Project presentations at local and regional teacher workshops and conferences. In the short-term, the Coast Guard Academy is investigating (1) the viability of a series of Maury Project Saturday workshops at CGA with a southern New England focus (4-5 workshops per year using 2 related Maury modules per session). There is also interest in developing (2) an AMS *DataStreme Ocean* and *Atmosphere* Local Implementation Team at the Academy, offering the AMS DataStreme courses to regional middle school and high school teachers. Longer-term initiatives that are being investigated include (3) a week-long summer workshop session (similar to the USNA workshop) for Oceanography; and (4) expanding workshop topics to include Meteorology, Marine Biology & Ecology, and Marine Environmental Protection. The proposed workshop series targets Grade 7-12 teachers, but would be open to others as well, and would expand CGA educational/community outreach efforts, establish key partnerships with local marine science educators, and lay the foundation for similar workshops in the future.

### **AMS Ocean Studies**

Building on the experiences gained in the Maury Project and the *DataStreme Ocean* in-service teacher professional development course, the AMS developed an introductory college-level oceanography course, entitled *AMS Ocean Studies*. Since national implementation in fall 2005, 165 undergraduate

institutions and 20 high schools have introduced the course to more than 22,100 students. About 1950 students took the course during Academic Year 2013-2014/Summer 2014.

*AMS Ocean Studies* would not exist without the experiences gained from the Maury Project, including materials development. A major benefit of the *AMS Ocean Studies* course is that it reaches hundreds of pre-service precollege teachers. In addition, the U.S. Navy has periodically used *AMS Ocean Studies* course materials for distance education training of sailors.

### **AMS Diversity Projects**

The *AMS Ocean Studies* Diversity Project, an offshoot of work with the *AMS Ocean Studies* undergraduate course, was a direct result of an NSF grant and NOAA support to provide special workshop opportunities for faculty at institutions serving significant numbers of minority students. Workshops were held each summer at University of Washington and NOAA facilities in Seattle, WA from 2006-2008. The 77 minority-serving institutions (MSIs) participating in the program have offered the course to more than 8000 students, providing an opportunity to sample an oceanography course where none existed prior to this program.

AMS received an NSF OEDG Track 2 grant in August 2011 to continue Diversity Project workshops, this time focusing on implementation of the *AMS Climate Studies* course at 100 MSIs over a five-year period. As of this writing, AMS is over two-thirds of the way toward this goal. For many participating faculty members, the *AMS Climate Studies* course will accompany the offering of the *AMS Ocean Studies* and/or *AMS Weather Studies* course at their institution. At the May 2012, 2013, and 2014 *AMS Climate Studies* course implementation workshops, RADM (Ret.) Dr. David Titley, former Oceanographer and Navigator of the Navy, gave a highly-regarded and informative presentation on national security and climate change.

### **COSEE Partnership**

AMS and Centers for Ocean Sciences Education Excellence (COSEE) have had a Memorandum of Understanding “to promote atmospheric and oceanic science research, education, and outreach and cooperation and action,” which created new avenues of outreach and educational opportunities for potential and current teacher participants. As the COSEE network transitions from an NSF sponsored network to an independent consortium, Consortium for Ocean Science Exploration and Engagement, AMS will explore continued areas of collaboration. Membership in the new COSEE is “open to ocean science research and academic institutions and organizations with a mission to promote ocean science research and ocean literacy.”

### **Consortium for Ocean Leadership Partnership**

PI Brey attended School of Rock workshops in 2010 and 2011 for educators on the *JOIDES Resolution* ocean-drilling ship. At the 2011 workshop, Brey presented the idea for formal collaboration on a grant to bring minority-serving institution faculty members who offer *AMS Ocean Studies* and/or *AMS Climate Studies* to a special School of Rock. The goal was to train MSI faculty to infuse curricula involving paleoclimate data from ocean cores, thereby providing MSI students with opportunities to use real research data in the classroom. The idea came to fruition in 2012 when Consortium for Ocean Leadership was awarded an NSF OEDG planning grant to collaborate with AMS and other partners. The School of Rock workshop was held at the Texas A&M University Gulf Coast Repository in June 2012 for 12 MSI faculty.

During FY14, Consortium for Ocean Leadership, in collaboration with AMS and several other academic and research institutions, received NSF funding for a considerable expansion of these efforts entitled MSI-REaCH: Minority-Serving Institution-Reconstructing Earth's Climate History Program to Enhance Ocean and Climate Curricula and Provide Authentic Research Opportunities for Faculty and Students. MSI-REaCH will provide MSI faculty and students with immersive paleoclimate instruction, using authentic ocean core data, and mentored research experiences, for the purposes of enhancing scientific literacy and options for integrating research-based, data-rich ocean and climate curricula for MSI faculty and students, thus strengthening pathway towards advanced geoscience study and careers.

## **PUBLICATIONS AND PRESENTATIONS**

### **1 October 2013 – 30 September 2014:**

Asokan, A., Brey, J.A., Smith, D.R., Geer, I.W., Mills, E.W., and Weinbeck, R.S. (2014). The AMS Education Program: Raising Ocean Literacy One Teacher at a Time. *National Marine Educators Association's 2014 Annual Conference*. Annapolis, MD. Conference Presentation.

Brey, J.A, Geer, I.W., Weinbeck, R.S., Mills, E.W., and Nugnes, K.A. (2014) AMS DataStreme Project and the NGSS. *94<sup>th</sup> AMS Annual Meeting*. Atlanta, Georgia. 3 February 2014. Conference Presentation. Online at <https://ams.confex.com/ams/94Annual/webprogram/Paper233417.html>

Brey, J.A., Geer, I.W., Weinbeck, R.S., Mills, E.W., Nugnes, K.A . (2014). The AMS Education Program: Success through Effective Partnerships. *American Association of Community Colleges 94<sup>th</sup> Annual Convention*. Washington, DC. Conference Poster.

Smith, D.R. (2014) Welcoming comments (with a focus on the Maury Project) in the Opening Ceremony on the *National Marine Educators Association's 2014 Annual Conference*. Annapolis, MD.