

The Maury Project 2013 Annual Report

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Award Number: N00014-11-1-0122
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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 teacher enhancement instructional resource materials, 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 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 2013, 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 an oceanographic research vessel and 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 2013 workshop is summarized below from the 24 participants who completed the survey.

When the 24 participants were asked for:

- their overall rating of the Maury Project in terms of its educational value, all 24 gave the highest response of “excellent.”
- the long-term effect on their teaching, 23 reported “great deal” and 1 “some.”
- the long-term effect on their curriculum development, 20 reported “great deal” and 4 “some”
- the long-term effect on training of colleagues, 22 reported “great deal” and 2 “some”

When asked “Has your perception of the value of the Navy changed as a result of your workshop participation?” 22 reported “increased” and 2 reported “remained the same.”

When asked “Has your perception of the value of NOAA changed as a result of your workshop participation?” 22 reported “increased” and 2 reported “remained the same.”

When asked how they would rank the Maury Project workshop with other summer workshop experiences they have had since becoming a teacher, 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?

- The integration of lecture, modules, activities, and trips was fantastic.
- I enjoyed the contact with USNA faculty most. Their insight and experience was helpful and interesting.
- The ability to collaborate with other teachers from around the country, while learning more about Oceanography from folks who live it. It has really enhanced my knowledge base!

What did you like least about the Maury Project workshop?

- A few of the lectures used some Math or Science I had not seen in a while, or not at all, so I struggled. However, others in the class would help me when needed. There were also some lectures that were too long.
- The only small complaint was how so much was packed in but at the same time I understand how that was necessary.
- I think the incorporation of technology could be improved.

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.)?

- More time on the boat, if possible. Perhaps it would be possible to have some of the lectures on board?
- Small focus groups with the lectures towards the end of the 2 weeks would be awesome. That way we could ask questions specific to lesson plans we have back home.

With the training of 24 new participants in the Summer 2013 Maury Project workshop, a total of 478 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. These educators, in turn, have conducted approximately 1000 peer training sessions for approximately 12,000 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 2011 and 2012 workshop groups. Note that Summer 2013 participants will begin to conduct their required workshops during school year 2013-2014 and many Summer 2012 participants are still completing required workshops.

Table 1: Maury Project Peer Training Workshops (2011 - 2013)

Workshops given by 2011-2013 Maury alumni:

<u>Year</u>	<u>USNA Participants</u>	<u># of Peer-Training Workshops</u>	<u># Trained</u>
2011	24	37	429
2012	24	25	327
2013	24	<i>(just completed training, no workshop opportunities)</i>	

The 2012 Maury alumni have so far conducted 25 workshops for 327 persons (mostly precollege teachers). During the FY13 reporting period, additional workshops were conducted by Maury alumni from the 2011 group and from groups attending the workshop prior to 2011.

To see the multiplying effect of this program, consider that since its inception in 1994, about 1000 workshops have been conducted by Maury peer trainers across the country, reaching about 12,000 (using a typical average of 12 participants per workshop). 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 several hundred teachers each year. In school year 2012-2013 *DataStreme Ocean* course offerings, Maury Project alumni lead approximately 17 LITs. Through spring semester 2013, a total of 3620 precollege teachers were trained by this program. Due to sequester-related cuts impacting the AMS-NOAA cooperative agreement supporting the course offering, there are only 60 teachers registered for Ocean this fall – about half the spring 2013 participants – although the number should increase significantly for spring 2014 if NOAA funding is 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 provided major support for the USNA workshops through Summer 2013. AMS recently submitted a three-year proposal to ONR that would assure the continuation of the USNA workshops and related project activities 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 fosters 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 FY13, 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 – President-Elect of the National Earth Science Teachers Association

Additional Project alumni gave presentations at regional and national conferences related to ocean science education.

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. Additionally, the Academy plans to: (1) offer a series of Maury Project peer-training workshops with a southern New England focus (4-5 workshops per year using 2 Maury modules per session); (2) establish AMS *DataStreme Ocean* and *Atmosphere* Local Implementation Teams at the Academy and offer courses to regional middle school and high school teachers; (3) conduct week-long summer workshop sessions (similar to the USNA workshop) for Oceanography; and (4) expand 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, 160 undergraduate institutions and 20 high schools have offered the course to approximately 20,000 students. About 2600 students took the course during Academic Year 2012-2013/Summer 2013.

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 halfway 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 and 2013 *AMS Climate Studies* course implementation workshops, RADM (Ret.) Dr. David Titley, former Oceanography and Navigator of the Navy, gave an informative presentation on national security and climate change.

COSEE Partnership

AMS and Centers for Ocean Sciences Education Excellence (COSEE) continued their Memorandum of Understanding “to promote atmospheric and oceanic science research, education, and outreach and cooperation and action.” This MOU is creating new avenues of outreach and educational opportunities for potential and current teacher participants. Historically many Maury Project peer trainers have also been involved with COSEE at a variety of levels, including several in leadership positions.

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 FY13 the group continued to discuss the design of a more extensive project and search for appropriate grant solicitations.

PUBLICATIONS AND PRESENTATIONS

1 October 2012 – 30 September 2013:

Brey, James. “AMS Education Program: Leading the Way in Online Instruction Since 1996.” 18th Annual Sloan Consortium International Conference on Online Learning. Orlando, Florida. October 2012. Conference Presentation.

Brey, James. “AMS Professional Development Courses: Arming K-12 Teachers with the Tools Needed to Increase Students’ Scientific Literacy.” AGU Fall Meeting. San Francisco, California. December 2012. Conference Presentation.

Brey, James. “AMS Partnerships to Raise Scientific Literacy.” American Association of Community Colleges 93rd Annual Convention. San Francisco, California. April 2013. Poster Presentation.

Brey, James. “The AMS Education Program: How We are Raising the Scientific Literacy of Thousands of Teachers and Students.” National Conference for Geographic Education 2013. Denver, Colorado. July 2013. Conference Presentation.