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The Maury Project: A Partnership to Promote Educational Outreach on the Physical Foundations of Oceanography

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1. INTRODUCTION

In 1994, with funding from the National Science Foundation, the American Meteorological Society, in conjunction with the United States Naval Academy and in cooperation with the State University of New York at Brockport, initiated the Maury Project. This unique partnership provides a teacher enhancement program that focuses on the preparation of peer trainers on topics related to the physical foundations of oceanography. The unique feature of the Maury Project is its focus on physical processes. Most teacher enhancement programs in oceanography have a strong biological component. Teachers who attend the Maury Project summer workshops are provided with a learning experience that enables them to understand the structure and dynamics of the oceans and methods for determining its physical properties.

This presentation will trace the history of the Maury Project. In particular, it will examine this eight-year partnership, which is comprised of a professional society, a university, and scientific and operational agencies working as colleagues.

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2. PARTNERSHIPS

The Maury Project began eight years ago as an educational endeavor of the American Meteorological Society (AMS) in partnership with the United States Naval Academy. The content focus of this teacher enhancement program is the physical foundations of oceanography. Since physical oceanography is one of the related disciplines under the AMS umbrella, and it is the primary emphasis of the Oceanography Department at the Naval Academy, this program was a perfect fit to promote the study of the ocean and its physical processes.

Initial funding for the program came from an NSF grant, but subsequent funding has been provided by a number of agencies, including the Navy (Naval Meteorology and Oceanography Command [CNMOC] and the Office of Naval Research [ONR]) the

National Oceanographic and Atmospheric Administration (National Environmental Satellite, Data and Information Service [NESDIS] and the National Ocean Service), and the AMS, as well as the Maryland Space Grant Consortium. In addition to the funding, these agencies also provide materials and speakers to explain the role of the agencies in oceanic research and operational activity.

Perhaps the greatest benefit derived from the sponsoring agencies is their linkage to pre-college education through the participant teachers. A partnership develops that enables teachers to draw upon the resources of the participating agencies. These agencies are able to demonstrate their relationship to the field of physical oceanography. For example, both the Navy and NOAA have an interest in marine and coastal environments. The Navy's interest in the sea includes the impact of the ocean environment on aviation, surface and submarine warfare. NOAA has considerable interest in the oceans, but especially in the coastal environment, which serves as a primary region for our nation's homes, recreation, food, etc. In order to manage the resources of this vital economic zone, NOAA has a responsibility to educate the public about the marine and coastal environments. The Maury Project affords an excellent opportunity for these agencies to inform teachers of the of the agencies' involvement in physical oceanography. Teachers can then educate their students about the oceans and coastal zone.

3. CURRENT PROGRAM

The primary teacher enhancement focus of the Maury project is two-fold: teacher workshops and materials development. In the eight-year tenure of the program, 200 teachers have attended one of the Summer Workshops held at the United States Naval Academy in Annapolis, Maryland. These teachers have come from every state in the United States as well as a number of foreign countries (Great Britain, Canada, South Africa, Australia, Switzerland, Japan and Mexico) and Department of Defense educators from Great Britain, Germany, Okinawa, Puerto Rico and Guam. The two-week workshops give participants an excellent background on the physical foundations of oceanography. Maury Project workshop staff and Naval Academy oceanographers conduct lectures and laboratory instruction. In addition, guest lectures are given by individuals from NSF, NESDIS, the National Ocean Service, CNMOC, ONR, and the Office of the Oceanographer of the Navy. Further, the teachers tour National Ocean Service, National Weather Service, and National Ice Center facilities, providing a view of research and operational activities of government agencies involved in physical oceanography (Smith *et al.*, 1996a, 1996b, and 1997).

Materials development has been an equally important component of the Maury Project. Resource materials in the form of teacher's guides are provided to workshop participants. These guides contain basic understandings and hands-on activities topics in oceanography and that introduce teachers to the topic. These teacher's guides include such topics as wind-driven and density-driven circulation systems, deep and shallow ocean water waves, ocean sound, remote sensing, coastal upwelling and El Niño.

After completion of the summer workshop, these teachers conduct training sessions for their peers, reaching thousands of teachers on a variety of topics relevant to physical oceanography. To date, over 1200

Maury peer-training sessions have reached over 20,000 teachers both nationally and internationally. These peer-training workshops usually are held at statewide science teachers conferences, using materials that explain the physical aspects of oceanography as the subject matter of the workshops, which are utilized in their peer-training activity. These peer-training sessions have been a highly effective mechanism to distribute instructional materials to teachers both nationally and internationally.

4. IMPACT OF THE PROGRAM

The Maury Project has been actively engaged in teacher enhancement for eight years. Since 1994, 200 teachers have attended one of the two-week workshops in Annapolis, MD. These workshops represent the initial step of training - "teaching the teachers", in which teachers receive over 100 hours of instruction on the physical foundations of oceanography. Evaluations of workshop attendees indicate the quality of the workshops and many state that the Maury Project summer workshop is the best teacher enhancement program in which they have ever participated. Upon completion of the summer workshop, all Maury Project participants must complete a minimum of two peer-training sessions in their home areas. This enables a second tier of teachers to be reached by Maury workshop participants, and demonstrates the multiplicative power of the program, extending the outreach capability of the Maury Project staff. Teachers attending the peer-training sessions indicate near unanimous approval for the workshops and state that they will utilize the Maury Project materials in their classrooms. Although statistics are not gathered on numbers of students who benefit from teachers using these materials in the classroom, but if one estimates student loads (25-30 students per elementary school teacher, 100-150 students per middle school teacher and 100-150 students per high school teacher), the total number of students reached is astounding.

Although the primary goal of the program is to enhance the background of teachers in physical oceanography, another major objective of the Maury Project is to develop the leadership skills of the teachers who attend the summer workshops. This leadership is demonstrated in a variety of ways. For example, many of these teachers may never previously have made a presentation at a professional conference during their careers. In the eight academic years since the first workshop, Maury Project teachers have given numerous presentations at such meetings as the AMS Symposium on Education, meetings of the American Geophysical Union, regional or national meetings of the National Science Teachers Association (NSTA), the National Marine Educators Association, etc. Often these presentations were accompanied by papers appearing in the conference proceedings volumes. As a result of such presentations and their peer-training efforts, these teachers gain reputations as oceanographic education resource persons in their respective states. This recognition promotes self-esteem and empowers the teachers to become advocates for ocean science curriculum. Several Maury Project teachers have been cited as NSTA Presidential Awardees as the outstanding science teacher in their respective states. Two teachers were selected for the NSF-funded "Teacher in Antarctica" program and participated in scientific research activities. Such examples indicate how the Maury Project cultivates leadership and professional development. Attending this program enables master teachers to become

"agents of change" to promote the study of the oceans at the pre-college level.

5. FUTURE DIRECTIONS

What direction does the Maury Project take in the future? The two-week summer workshop is expected to continue to be held annually at the Naval Academy. This will maintain a flow of teachers through the Maury Project pipeline, with a solid background in the physical foundations in oceanography. In addition, the workshop participants will continue to spread their newly acquired knowledge at peer-training sessions in their respective states.

Some Maury Project peer trainers are utilizing their background in the newest AMS educational initiative, Water in the Earth System (Geer *et al.*, 2002). Maury peer trainers and Project ATMOSPHERE Atmospheric Education Resource Agents (AERAs) serve as leaders and members of Local Implementation Teams in a distance-learning course to promote the study of water processes from an Earth system science perspective. The participating Maury peer trainers play a key role for the teachers enrolled in the distance-learning course in their respective states. These agents assist in the instruction, providing guidance and motivation as mentors for their peers.

The prospects for the future appear bright for the Maury Project to enhance the backgrounds of teachers on the physical foundations of oceanography.

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