Seventh AMS Symposium on Education


ABSTRACT

The American Meteorological Society (AMS) held its Seventh Symposium on Education in conjunction with the 78th AMS Annual Meeting. The theme of the symposium was “Atmospheric and Oceanographic Education: Advancing Our Awareness.” Thirty-six oral presentations and 47 poster presentations summarized a variety of educational programs or examined educational issues relevant for both the precollege and university levels.

There were also joint sessions held with the Second Conference on Coastal Atmospheric and Oceanic Prediction and Processes and the Ninth Conference on Interaction of the Sea and Atmosphere, as well as the 10th Symposium on Meteorological Observations and Instruments. Over 200 people representing a wide spectrum of the Society attended one or more of the sessions during this two-day event.

1. Introduction

As part of its 1998 annual meeting, the American Meteorological Society (AMS) held its Seventh Symposium on Education in Phoenix, Arizona. The Symposium on Education is a forum for the AMS membership at large to learn about ongoing educational initiatives and to discuss educational issues of interest to the entire atmospheric and related sciences community. Oral and poster presentations summarized a variety of educational programs or examined issues of importance for both the precollege and university levels. The K–12 session focused on precollege educational initiatives across the country. There was a special session on diversity and gender equity issues related to the atmospheric and oceanic science communities. The university educational initiatives session examined topics relevant to enhancing teaching and learning at the university level. There was a joint session in conjunction with both the Second Conference on Coastal Atmospheric and Oceanic Prediction and Processes and the Ninth Conference on Interaction of the Sea and Atmosphere, on educational programs related to oceanography or air–ocean sciences. In addition, a joint session with the 10th Symposium on Meteorological Observations and Instrumentation focused on educational aspects of measurements and measuring systems. The program for the conference appeared in the Bulletin of the American Meteorological Society (78, 2454–2459). A 194-page preprint volume was produced. The following is a summary of the two-day event.
2. Session summaries

a. Session 1: K–12 educational initiatives
   (Cochairs: R. McPherson and M. Hayes)

   R. Weinbeck (New York College at Brockport, State University of New York) began the K–12 session by discussing the DataStreme Project, a teacher enhancement program based on a partnership of the AMS, the National Weather Service (NWS), and several universities. DataStreme offers a distance-learning course that uses real-time weather data and is delivered primarily via the World Wide Web. The fall 1997 DataStreme course was offered through approximately 85 local implementation teams (LITs) in 41 states to over 550 teachers. By December 1997, about 1400 precollege teachers had been instructed in the fundamentals of meteorology and the use of environmental data in the classroom.

   The daily summary and supplemental files of the DataStreme Project were described by E. Hopkins (University of Wisconsin–Madison) and F. McCollum (Muscogee County School District, Columbus, Georgia). These files complement the weekly DataStreme activities, allowing current weather to be used as an effective instructional vehicle. The files are prepared and distributed daily via the Internet and include narratives summarizing current national weather conditions and offering insight into special weather topics. The interdisciplinary nature of weather is capitalized on by directing attention to geographic features and including historical perspectives on weather events.

   J. Adolphson [National Weather Service Forecast Office (NWSFO), North Webster, Indiana] highlighted several applications of the DataStreme Project, including using DataStreme as a systemic initiative within an elementary school (incorporating data from their on-site automated weather station) and providing the course to nonmeteorological staff at the University Corporation for Atmospheric Research (UCAR). The Boulder, Colorado, LIT recruited seven educators from Longmont Estates Elementary School. Participants in the project found that the activities were fun, were targeted at the appropriate level for their students, and enhanced their own content knowledge.

   Another example of using local meteorological data in a classroom setting was provided by L. Painter, who described the use of real-time and archived Oklahoma Mesonet data in Monroe Elementary School in Enid, Oklahoma. This network of 114 automated environmental monitoring stations provides data to government agencies, universities, K–12 schools, and others. A sample of the activities conducted by Monroe’s sixth-grade students included communicating weather observations and forecasts to the rest of the school and working with the local emergency manager to monitor severe weather conditions. Students now listen to broadcast meteorologists with a more critical ear and discuss their opinions with their parents during the weathercasts. The reasoning skills and confidence of the students have shown improvement as they use data that are meaningful to them in their local area.

   P. Rumpp (Bala Cynwyd Middle School, Bala Cynwyd, Pennsylvania) spoke about her eighth-grade class activities with the Kids as Global Scientists (KGS) program. The 3800 middle-school students from around the world were divided into eight groups; each participating class took measurements at their own weather station and shared their data within their group. Activities included viewing live satellite maps, forecasting weather conditions for other KGS sites, and sharing e-mail with other schools. Dialogue between educators and students greatly enhanced the program. Through the use of hands-on activities, students became proficient in several weather-related topics, then presented their research to the other members of the class. At the end of the year, the KGS activities were voted as the best learning experience for the year.

   The next few presentations focused on various outreach programs. E. Vallier-Talbot (NWSFO, Taunton, Massachusetts) discussed the results of two recent surveys regarding NWS K–12 educational outreach programs, which included activities such as school visits, office tours, and career days. The first survey was given to NWS Eastern Region meteorologists in charge, who were asked to evaluate their office’s past and projected future support of K–12 education. A second survey was mailed to 130 K–12 teachers and administrators throughout the NWS Boston Warning Area who participated in NWS outreach activities. The educators were asked to rate the benefits from their experiences and to discuss how these experiences enhanced their science curriculum. The results of the surveys indicated that NWS support of past and present outreach activities was moderate to high, and the teacher/administrator respondents overwhelmingly felt that there was a high level of enrichment for the students. However, the expectation was that NWS budget cuts would cause the level of activity to decrease or, at best, stay the same.

   T. Spero (Offutt Air Force Base, Omaha, Nebraska) discussed the Air Force Weather Agency’s sponsor-
ship of the Boy Scouts’ Explorer Post 999, the Weather Explorer Post, as one way to contribute to the local community. In 1996–97, the Weather Explorer Post provided a unique opportunity for high school students in the Omaha metropolitan area to learn more about weather and other related sciences. The Weather Explorer Post met every two weeks and participated in several in-house and field trip activities throughout the school year. The final activity was a trip to Norman, Oklahoma, to visit both federal and university weather facilities.

A. Melvin (Oklahoma Climatological Survey, Norman, Oklahoma) provided an overview of the Southern Great Plains Atmospheric Radiation Measurement (ARM) Educational Outreach Program. This outreach program provides science teachers the means to incorporate environmental data from U.S. Department of Energy atmospheric monitoring stations into their classrooms. The program focuses on professional development of participant teachers, scientifically and pedagogically sound lessons provided online, and the display of data via the Internet. Schools access recent ARM data via the World Wide Web (http://outreach.ocs.ou.edu/arm/) using a Web browser developed by the Oklahoma Climatological Survey to view various maps. School activities include participation in a virtual science fair, where projects will be placed on the World Wide Web and scientists from around the country will judge the projects online.

Public education was addressed in a presentation by R. Holle (National Severe Storms Laboratory, Norman, Oklahoma), who increased the awareness of lightning education by discussing both the hazards of lightning and the educational materials that highlight lightning safety and recent research results. NWS annual summaries for recent years indicate that 325–500 people are injured each year by lightning, with an additional 85–100 people killed. Educators should provide opportunities for the public to become more aware of the hazards from lightning; posters and publications are available for teachers to help in this effort. In addition, policies need to be established or updated for athletes, since there have been a growing number of lightning casualties during recreation and leisure activities.

The final papers of this session described some of the successful strategies that are being employed to reach underrepresented groups in science education. P. Croft [Jackson State University (JSU), Jackson, Mississippi] described a course for high school students that took place over two summers on the campus of JSU. Through one month of instructional sessions, laboratories, field trips, peer contact, and computer usage, students were exposed to the concepts of atmospheric motion, the development of storms, and the practical application of meteorology. Course goals were to develop basic science skills, make students aware of the interdisciplinary nature of meteorology, provide information and incentive for students to choose a career in meteorology or other sciences, impart awareness of employment opportunities in the field, and discuss the moral and ethical responsibilities of scientists. The 30 participants included 23 females and 7 males, nearly all of whom were African-American. Pre- and posttest evaluation results showed that basic meteorological knowledge had been acquired and/or improved and that the program had increased the students’ desires to pursue college and to study science.

P. Killam Smith (St. Mary’s High School, Annapolis, Maryland) discussed a partnership between college and precollege educators for addressing problems of gender inequity in geography education. Program goals were to raise teacher awareness of gender in the classroom environment and to provide lessons in which the content and teaching strategies focused on gender issues. Current research indicates that a significant number of girls in the upper elementary through high school grade levels withdraw from active participation in science- and math-related subjects. “Finding a Way” was composed of two 17-day summer institutes, during which a total of 50 teachers attended 34 instructional sessions and two field trips. Participants became more aware of the gender dynamics within their classrooms and studied how changes in their own awareness and instructional techniques could improve the classroom climate.

To close the K–12 session, T. Kelly (Grandville Public Schools, Grandville, Michigan) provided strategies by which educators could use weather education to promote equity for underrepresented groups in the K–12 classroom. Because weather is a common element experienced by children of both genders and from all ethnic, racial, and socioeconomic backgrounds, it serves as a focal point for the author’s strategies. One strategy that is effective for encouraging and motivating members of underrepresented groups to excel in math and science is through the use of successful role models. Other strategies that an educator can employ include increasing their own knowledge of meteorology and providing opportunities for students to write in science journals.
b. Poster session P1 (chair: M. Hayes)

The Seventh Symposium on Education poster session presented AMS members and affiliated organizations with a look at the wide variety of programs, projects, and courses being implemented nationwide in the atmospheric and oceanographic sciences by educational institutions at the precollege and university levels.

In the oceanographic sciences, several posters dealt with the AMS’s Maury Project. For example, D. Brice from Woodland Park Middle School in San Marcos, California, explained how the Maury Project empowers teachers to implement physical oceanography in their classrooms. In conjunction with the TOPEX Project, Brice demonstrated how she teaches the relationship between sea surface height and sea floor topography. There were also several posters presented on marine education in southeastern Florida, including a discussion on the Inner City Marine Project, which has resulted in innovative magnet programs that reach inner-city youth and provide them with hands-on experiences in marine science.

A. Kelly and K. Murphy (both Missouri teachers) made the “Sea and Sky Connection” when they joined forces to offer teacher workshops that combined their experiences from the Maury Project and Project ATMOSPHERE into a single study of the hydrosphere. As a follow-on project, they provided electronic links for their students to share meteorological and oceanographic data and other information. Students worked on interdisciplinary projects that were later presented to their fellow students via the World Wide Web.

In the atmospheric sciences, the DataStreme Project was the focus of a number of posters. Some posters dealt with the working relationships within LITs and the use of real-time meteorological data in the classroom. Other posters addressed the wide scope of outreach achieved through the DataStreme Project: teacher enrichment and enhancement; boosting awareness of careers in atmospheric science and other geosciences; links to other outreach programs such as Global Learning and Observations to Benefit the Environment (GLOBE); and impact on national science education standards.

There were several interesting electronic posters demonstrating teaching/enrichment tools utilized by a broad range of people, from early childhood educators through working meteorologists. For example, I. Palao from Stennis Space Center, Mississippi, featured Web pages that provide resources for middle school teachers and students to research scientific principles by utilizing available buoy measurements provided by the National Data Buoy Center. The virtual classroom was addressed in posters that demonstrated Cooperative Program for Operational Meteorology Education and Training (COMET) modules.

The continued success of educational outreach within AMS was well demonstrated in this poster session. The examples provided in this summary represent only a sample of the wonderful programs that were presented within this poster session.

c. Session 2: Diversity and gender equity in the atmospheric, oceanic, and related sciences (chair: J. Moran)

W. Washington (a past president of the AMS; National Center for Atmospheric Research, Boulder, Colorado) provided the session’s keynote address, entitled “Diversity in the Science Workforce: Trends and Programs.” Based on data from the National Science Board, he showed numbers for groups extremely underrepresented in science and engineering (e.g., women, who represent 22%; African-Americans, 3.5%; Hispanics, 2.8% and Native Americans, 0.2%). The reasons for the poor representation have historically included lower skill scores in science and math and fewer math and science courses taken in high school by members of these underrepresented populations. Within the college setting, women (nearly 30%) and minorities (nearly 40%) account for the greatest proportion of freshman needing remedial work. However, there has been some improvement over the last 10–25 years. Of new Ph.D.s in science and engineering in 1995, women accounted for 38%, minorities 7%, and Asians 15%, compared to 12%, 2%, and 7%, respectively, in 1973. Now, with less general support for affirmative action in several states, the small number of minority students is once again becoming smaller. Washington reported that the National Science Foundation (NSF) has committed itself to increasing the number of women and minorities in the workforce by expanding their funding criteria to include grants for projects that contribute to a broader goal, such as science education.

T. Windham (UCAR, Boulder, Colorado) discussed the role of the Significant Opportunities in Atmospheric Research and Science (SOARS) program in increasing the number of minorities supported, and encouraged to work in, atmospheric science. Thirty-nine participating universities currently provide significant financial support for 17 participants, or SOARS protégés, which include both women and mi-
An important component of the program is the SOARS “learning community,” which includes a science research mentor, a community mentor, a scientific writing mentor, and a SOARS peer mentor. This support network conditions SOARS protégés and helps them develop a variety of skills to perform effectively in the atmospheric science community. SOARS protégés have contributed to a number of scholarly papers and are being tracked to record their career successes.

Next, P. Croft described the role of the JSU Meteorology Program in preparing atmospheric scientists from underrepresented groups. Only 35% of African-American students ever complete an undergraduate degree; in science and math the number is only 8%. One-half of all students indicate their high school preparation was inadequate for college. The JSU program is designed to address several key components that are student focused, including recruitment, retention, the whole student, faculty mentoring, integrated coursework, and professional development. Student response to the program and its support network has been positive and constructive.

J. Matkins (Currey School of Education, University of Virginia, Charlottesville, Virginia) focused on the success of women in science and the obstacles they encountered in her paper entitled “Woman, Wife, Mommy, and Scientist: Helping Females See Themselves in Science.” Her unique presentation featured a readers’ theater in which members of the audience assumed the identities of actual female Ph.D. recipients from various scientific fields. The dialogues presented were based on interviews that had been conducted with these successful women, who represented several generations of scientists. These women talked about their career goals, the many obstacles they had to overcome in achieving their goals, and the importance of a strong personal and professional support network. Although many of the women expressed frustrations about the various circumstances and sexism they encountered along the way, they remained persistent and succeeded in achieving notable careers as scientists.

J. Knox completed this session by describing an outreach program of the Goddard Institute for Space Studies that links three National Aeronautics and Space Agency priorities: research, science education, and minority outreach. The Institute on Climate and Planets Program was coordinated with the City University of New York and the New York City Public Schools system to provide research opportunities for students. The program integrated global climate change modeling research with the science curricula at the public schools and colleges. Students were involved in research concerning El Niño, a high pressure system climatology, and Rossby waves.

d. Session 3: University educational initiatives

P. Croft (chair: P. Croft)

G. Byrd (UCAR/COMET, Boulder, Colorado) started the afternoon session with a presentation on a multimedia learning technology funded by NSF to build on the success of the COMET modules. The goal is to help introduce innovative, multimedia instructional technology into the undergraduate science laboratory with a target audience of nonscience majors and future K–12 teachers. Appropriate courses include introductory meteorology, earth science, and physical geography. Modules will be Web-based and interactive and will complement the popular introductory textbooks. The pilot module in the series focuses on weather satellites and includes conceptual material on the principles of remote sensing by satellite, types of satellite imagery, and applications to hurricane surveillance. The first module is available free for general access on the World Wide Web (http://www.meted.ucar.edu).

M. Marlino (UCAR/PAGE, Boulder, Colorado) followed with a summary of recent activities of UCAR’s new Program for the Advancement of Geoscience Education (PAGE). PAGE is currently engaged in a “community conversation” aimed at developing and implementing new pedagogies and technologies in undergraduate geoscience education. The goal is to build consensus among geosciences faculty and to formulate a plan that identifies needs and potential action. Among issues being addressed are emerging pedagogues, alternative means of assessment, technology training, software development and dissemination, evaluation strategies, and clearinghouse activities.

M. Michaels (WHDH-TV, Boston, Massachusetts) discussed an educational initiative formed through a cooperative arrangement between the University of Massachusetts, Lowell, and WHDH television. Michaels developed and offered a unique course, Meteorological Communications, as a response to increasing pressure from both public and private sectors for better written and verbal communications skills among graduates. Students learn how to translate technical principles and terminology into consumer-friendly information. The semester-length course is
targeted at junior/senior-level meteorology majors and includes written assignments, laboratory exercises (e.g., resume building), “reality-based” lectures, and field trips to private meteorological agencies.

L. McMurdie (University of Washington, Seattle, Washington) described her “electronic laboratory.” Funded by NSF, this laboratory utilizes modern technology to guide undergraduate students through detailed analysis of actual case studies. Students learn about management of large datasets while exploring the structure and evolution of synoptic and mesoscale weather systems through interactive analysis, display, and animation at computer workstations. McMurdie took the audience through two case studies: the cool season Midwest storm of 17–18 October 1996 and the intense Midwest storm of 26–28 January 1996.

L. Spayd (NOAA/NWS, Silver Spring, Maryland) concluded the afternoon session with a discussion of the NWS training program. Spayd opened with a historical perspective on NWS training organizations. He also addressed the impact of the budget cuts. Staffing levels and expenditures for the NWS Training and Professional Development Program have been reduced but are still significantly higher than premodernization levels. He then explored alternative, cost-effective education and training strategies including teletraining and use of the World Wide Web as the NWS shifts away from centralized residential courses.

e. Joint Session J1: Oceanic educational initiatives (cochairs: P. Phoebus and R. Fauquet)

The session on oceanic educational initiatives was held jointly with the Second Conference on Coastal Atmospheric and Oceanic Prediction and Processes and the Ninth Conference on Interaction of the Sea and Atmosphere. Papers presented at the beginning of the session were focused on educational initiatives and outreach programs at the university level. Later papers provided an update of the AMS’s Maury Project and presentations by some of the Maury Project’s K–12 educators, as well as an exciting outreach program for elementary and middle school students.

The first presentation, by M. Crowley, discussed an outreach project developed at Rutgers University that combines World Wide Web–based classroom teaching modules with research being conducted at the Long-Term Ecosystem Observatory (LEO-15). LEO-15 not only makes a variety of ocean profile measurements, it is also networked to data from shore-based radars, satellites, and an instrumented meteorological tower. A number of instructional modules have been developed, targeted at grades six to nine, that allow educators to access this data and involve their students in active scientific inquiry. Each module has separate and parallel teacher–student pages and links, but activities are journal based, so that only limited Web access is required. Teachers can also interact with scientists via e-mail to obtain additional information or have their questions answered. (To learn more about this interesting program, visit the Project Tomorrow Web site at http://www.marine.rutgers.edu/pt/home.htm.)

Next, T. Johnson (Purdue University, West Lafayette, Indiana) described a collaboration between himself and C. Clayson to implement student-directed simulation projects in the teaching of geophysical fluid dynamics at Purdue. To improve the students’ abilities to translate theoretical mathematics into an understanding of the physical system, the simulation paradigm emphasizes self-discovery and analysis of processes using computers as a tool. As the students become increasingly knowledgeable, complexity can be added to the simulation, thereby building gradually upon their knowledge base and increasing their analytical and interpretive skills. This educational experience demonstrates that even complex subjects can be approached through an active learning process that increases students’ motivation, confidence, and understanding of the subject material.

In his invited presentation, D. Smith (U.S. Naval Academy, Annapolis, Maryland) traced the history of the Maury Project, sponsored by AMS, NSF, the U.S. Navy, and NOAA. Designed as a teacher development program, it has a twofold emphasis. First, the project provides hands-on training in the fundamentals of physical oceanography through activities that include interpreting satellite data, collecting and analyzing data during a research cruise on Chesapeake Bay, and participating in wave-tank experiments. This training is offered in residence at the U.S. Naval Academy each summer. The second emphasis of the Maury Project is the development of instructional materials in physical oceanography. Maury Project teachers are provided with two new topical teachers’ guides each year. The Maury workshop participants use these materials and their oceanographic knowledge to act as mentors and resource experts for other teachers in their state. A total of 375 peer-training workshops have been conducted for over 6700 teachers across the nation through the efforts of the Maury Project participants.

Next, G. Duane (Framingham High School, Framingham, Massachusetts) demonstrated how the
Ocean Tides module from the Maury Project was used along with other materials, including tide charts from the local bait shop, to engage his high school science class in a series of discovery activities. Maintaining a hands-on approach to the project, the students worked in groups on exercises designed to illustrate the influence of the moon on ocean tides at various latitudes. Then, using their tide charts, the students worked in teams to develop a large mural depicting the entire annual variation in low and high tides in their area, also plotting the changing phases of the moon throughout the year. This impressive mural was used by the students to look for patterns in the tides. Finally, the audience was treated to a demonstration of mass conservation, with glasses of water used to simulate the various ocean basins, and a demonstration of wind-induced storm surge, which was particularly appreciated by those attendees in the first few rows!

Two Maury Project middle school teachers, G. and P. Rumpp (Colonial Middle School, Norristown, Pennsylvania, and Bala Cynwyd Middle School, Bala Cynwyd, Pennsylvania, respectively), shared many of their experiences and discussed a World Wide Web site that they developed as a place for teachers to share ideas and for students to share data. In particular, the Web site (http://mciunix.mciu.kl2.pa.us/~seastar) serves as an archive for beach profile data that have been gathered by not only their own students, but by other students around the world. Beach profiles are measurements made of beach faces, generally perpendicular to the coast line, using techniques that are described on the Web site. Over time, it is expected that this database on beach profiles and associated information on tides, waves, atmospheric pressure, water and air temperature, and surf zone width can be used to study erosion and deposition processes at work in coastal areas. In addition to providing an opportunity for exciting field trips to the beach, this project has improved the students’ cognitive abilities and their skill in working with graphs and tables.

The final presentation of this session described the outreach activities of a public magnet school in Dade County, Florida, that is dedicated to the study of maritime and science technology, or MAST. D. Garcia, one of the MAST outreach specialists, talked about their two mobile laboratories—the Land SHARC (Science Hands-On and Related Careers) and WOW (Weather on Wheels). The Land SHARC is a refurbished bus (painted to look like a shark) that has been outfitted as a marine laboratory on wheels. On board, students are exposed to a variety of hands-on lessons using a wet lab, computer-based learning, and laser video discs. WOW is contained in a smaller renovated bus, equipped to allow students to collect and analyze meteorological data, including satellite observations, and to practice making their own weather forecasts. The MAST outreach program focuses on minority students in the inner city, and it is an example of how a public school can come together with government and academic institutions to provide exciting scientific learning experiences for young students.

f. Session J2 with 10th Symposium on Meteorological Observations and Instrumentation (cochairs: E. Takle and J. Snow)

Session J2, held jointly with the 10th Symposium on Meteorological Observations and Instrumentation, opened with a keynote presentation by S. Cohn (NCAR, Boulder, Colorado) on integrating research and education. Cohn made an analogy to learning to play basketball or the piano, asserting that most skills needed to augment knowledge cannot be learned by lecture alone. Intensive student engagement in a temperature-inversion study led to numerous student papers and analyses that linked abstract principles to personal experiences.

J. Snow (University of Oklahoma, Norman, Oklahoma) reminded the audience that nontraditional observers such as schoolchildren, farmers, and hobbyists could be used to supplement professional observers for some research and operational activities. Training and data quality assurance are significant issues when such observers are employed, but feedback to participants can help create a useful extension to observing programs at minimal cost.

M. Wetzel (Desert Research Institute, Reno, Nevada) described computer-based software to facilitate decision making on solar and wind energy. The software engaged the student through a real-world scenario requiring decisions on siting instruments; sensor evaluation, selection, and deployment; and data evaluation.

D. Smith described a research project that used an automated network of sensors set up and overseen by volunteers. The data collected by the sensors during the passage of an East Coast storm over the Chesapeake Bay demonstrated the value of these relatively inexpensive mesoscale networks for research projects. However, he also pointed out the need for enhanced quality assurance of the data.

R. Giannola (The Johns Hopkins University Applied Physics Laboratory, Baltimore, Maryland) gave
an overview of the deployment of a network of over 2000 inexpensive automated stations managed by amateurs. These systems have been marketed nationwide to provide TV weathercasters with local mesonetworks. Application of the data by students to an analysis of heat-island effects produced high-resolution results.

E. Takle (Iowa State University of Science and Technology, Ames, Iowa) provided preliminary results of a survey of university faculty perceptions on the improvement of university instruction in observations and instrumentation. While progress has been made in some areas, notably in remote sensing data, data distribution, and data use for educational purposes, many challenges and problems highlighted in a 1989 study remain to be addressed.

In the final paper of the session, E. Bierly (American Geophysical Union, Washington, D.C.) described the Global Atmospheric Watch program for training international scientists in making atmospheric chemistry measurements. The program engaged highly respected atmospheric chemists to offer short courses in observing atmospheric trace gases of importance to air pollution and global climate change.

3. Summary

The Seventh Symposium on Education examined a number of educational issues for precollege, university, and popular education in meteorology and oceanography. The American Meteorological Society continues to be a leader in K–12 science education, through such programs as Project ATMOSPHERE, the Maury Project, and the DataStreme Project. In addition, individuals and groups throughout the atmospheric and oceanic communities are involved in outreach activities to enhance the study of their disciplines in the precollege classroom.

An area of concern to both the university and professional communities is how to enhance diversity and to incorporate underrepresented groups into the atmospheric and oceanic sciences. As in all professional careers, there is a continuing need to promote equity for all groups and to provide opportunities for minorities and women in the fields of meteorology and oceanography.

There were two special sessions held jointly with other scientific conferences at the annual meeting. The intent was to weave the theme of education throughout all aspects of the Society. The first joint session focused on these processes linking the atmosphere and the oceans, and educational programs related to both. The second session provided insights on educational aspects of meteorological observations and instruments. The practice of rotating through various scientific conferences helps to remind the membership that education is a cornerstone of the American Meteorological Society, upon which all other activities are based. Education is indeed the foundation for the advancement of our science; it is through the educational process that we can enhance the general public’s awareness of the earth’s atmosphere and oceans.

Acknowledgments. The authors wish to recognize the efforts of the organizing committee for the Seventh Symposium on Education. The committee provided the guidance necessary for ensuring a successful symposium. They also would like to express their gratitude to the many individuals who made presentations at this meeting and the organizations they represent, which are involved in diverse programs to enhance science education at all levels.