

The Atmospheric Radiation Measurement (ARM) Education and Outreach Program: An Integrated Approach

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Abstract

The Atmospheric Radiation Measurement (ARM) Education and Outreach Program supports ARM Operations at all three Cloud and Radiation Testbed (CART) sites in ways that are relevant to the needs of the communities and regions that host the ARM Program sites. The goal of the Education and Outreach Program is to develop basic science awareness, critical thinking skills, and to improve environmental science capacity building for communities, teachers, and students in ARM host communities and regions. This year, the primary goal is to extend the existing program to cover all three sites and to coordinate activities among them.

To achieve this goal, we:

- Bring awareness of the ARM Program to host communities through public education relevant to the culture of the region.
- Aid capacity building and community involvement in developing and implementing ARM education at each site.
- Promote a broader knowledge of regional and international climate concerns for teachers and students through integration of ARM education across sites.
- Assist access to ARM data for educational programs, as technical resources permit, and to provide real-time research experiences for students.

- Increase the knowledge base for teachers and students in basic science and critical thinking skills using curriculum-based enrichment activities in climate, climate change, and climate change effects relevant to each region.

We will integrate all three ARM sites by:

- Developing one newsletter that includes news from all sites
- Increasing communication, data sharing, and projects between teachers and students at all sites
- Producing TV and radio announcements of all workshops and events
- Publishing relevant curriculum that includes information and comparisons to the other sites
- Publishing papers and articles about the ARM education program in appropriate media
- Promoting science teacher conference participation, such as the National Science Teachers Association's regional and annual conferences
- Supporting teacher, student, and data exchanges between all sites.

The ARM education program has accomplished the following at the three ARM sites:

North Slope of Alaska (NSA): Barrow and Atkasuk Sites

Achievements at the NSA site include the following:

- Support for the enhancement of local science education efforts:
 - provided 7-in. telescope as requested for use in community college astronomy course
 - provided more than \$20K of science demonstration equipment requested by teachers
 - supported more than a half dozen teacher/student-proposed science projects.
- Increased NSA community understanding of the scientific issues associated with large-scale, local, and regional climate change.
- Implemented networks between students, researchers, educators, and community members.
- Established interest in community members pursuing careers with ARM.

Tropical Western Pacific (TWP): Manus and Nauru Sites

Achievements at the TWP site include the following:

- Published two curriculum volumes: Climate Change and Sea Level, Part I: Physical Science, and Climate Change; and Sea Level, Part II: Social Science.
- Conducted workshops and evaluations for teachers based on the curriculum.
- Sponsored teachers to attend regional education conferences.
- Established important collaborations with South Pacific Regional Environmental Programme (SPREP), Schools of the Pacific Rainfall Climate Experiment (SPaRCE), AusAid, Flinder's University (Australia), and National Tidal Facility (Australia).

Southern Great Plains: Oklahoma City, Lamont, Oklahoma; and Wichita, Kansas, Sites

Achievements at the SGP site include the following:

- Supported Oklahoma Climatological Survey (OCS) for education outreach since 1992.
- Promoted use of near real-time and archived ARM data in schools through EARTHSTORM Project.
- Conducted many workshops for students and teachers, grades 7-12 and college.
- Developed curriculum materials and lessons and visualization software for numerous units based on ARM data.
- Presented at conferences and published several papers a year on ARM/OCS educational outreach efforts.
- Sponsored teacher enrichment through their participation in regional educational conferences and professional development workshops.

Future Work

During the remainder of FY01 and throughout FY02-03, the ARM Education and Outreach Program is planning the following development activities at the three ARM sites:

NSA: Barrow and Atkasuk Sites

- FY01: Conduct a workshop for the community and elders to discuss their views on global warming on the North Slope in collaboration with the International Institute of Sustainable Development, Manitoba, Canada.

- FY01: Increase use of the ARM display at the Heritage Center.
- FY01-03: Develop a regional curriculum for use in kindergarten through grade 12 that builds on existing materials in collaboration with BASC, National Oceanic and Atmospheric Administration (NOAA), ARCUS, and the North Slope School District.
- FY01-03: Initiate activities, internships, training, and workshops for teachers and students as determined by needs analysis.
- FY01-03: Institute science fairs for students in the lower grades with projects based on ARM data and information.

TWP: Manus and Nauru Sites

- FY01: Develop curriculum for Volume 3: Climate Change and Sea Level, Part III: Biological Science.
- FY01: Conduct teacher workshops and evaluations in Manus and Nauru, with particular focus on Volume III.
- FY01-03: Support teacher enrichment through participation in regional conferences.
- FY01-03: Support specific activities involving data and meteorological stations.

SGP: Oklahoma City, Lamont, Oklahoma, and Wichita, Kansas, Sites

- Expand awareness and use of ARM data and learning materials across the nation.
- Enhance Web pages to include more data and display types.
- Continue to develop curriculum and lessons for distribution on the Web and in print.
- Conduct workshops for teachers and students throughout Oklahoma and Kansas, and at appropriate teachers' conventions.
- Publish papers on ARM educational programs in appropriate science teacher journals.

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