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1. INTRODUCTION

The Atmospheric Visualization Collection (AVC) is a National Science Foundation (NSF) National Science Digital Library (NSDL) project with two essential components (Klaus 2001). The first is an archive of weather images based on data from the Atmospheric Radiation Measurement (ARM) program's Southern Great Plains (SGP) site. The second is educational material based on these images developed by a growing educational community.

This paper informs users in the scientific and educational communities as to how they can access and contribute to this collection.

2. VISUALIZATION

2.1 Weather Images

A visitor to www.nsd.arm.gov can view near real time and archived weather images for most of the SGP instruments. Some examples of these images include meteograms (time series of surface data), sitewide isopleths (surface contour plots), wind barb plots, skewt plots with stability indices for soundings, and radar images like the reflectivity plot shown in Figure 1.

These images have been used in undergraduate research projects (Larabee 2001), case studies for undergraduate and K-12 classes, and for data quality purposes by ARM Instrument Mentors (IM) and the ARM Data Quality Office (Bahrmann 2001).

The cooperation of AVC developers with ARM's IM and scientists has led to various high quality images displayed in near real-time. The quality and scientific validity of visualization routines is verified by using the ARM engineering change review process.

The current effort is to develop animation and to include satellite and model images.

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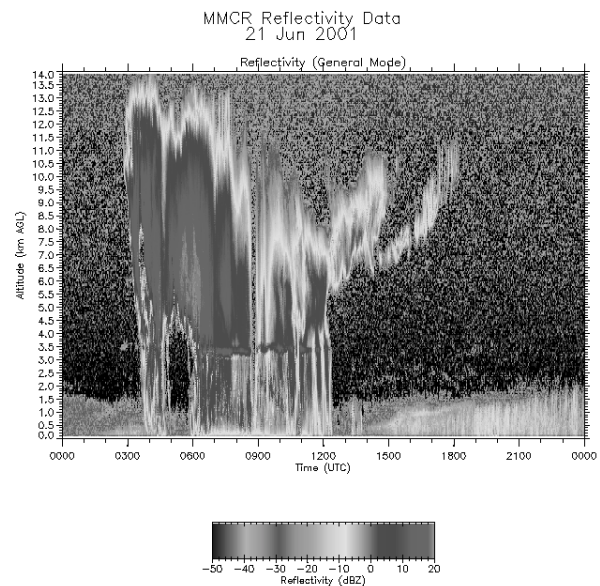


Figure 1. The Millimeter Cloud Radar reflectivity plot displaying a melting layer visible at 3.5 km.

2.2 Interface methods

Input from educators and ARM scientists has led to a few different interfaces for navigating this collection of images. These include a focus area interface, a quicklook interface, and a calendar interface.

The focus area interface is educationally oriented. It starts with a graphic depicting the geophysical focus areas of interest to ARM, which leads to descriptive pages on each geophysical focus area. Each geophysical focus area page contains a list of instruments that pertain to that specific focus area and provides links to instrument specific pages with descriptions and example of that instrument's images. The instrument pages also contain relevant links to our archived images, lesson plans, software repository, and web forum.

The quicklook and calendar interfaces are directed towards the scientific community. The quicklook interface provides a list of instruments and a site map to access the same instrument specific pages mentioned in the focus area interface. The calendar interface allows browsing of all archived images for a specific day.

The current effort is to make this material searchable from the NSDL via an Open Archives Initiative (OAI) protocol metadata server.

2.3 Source Code Repository

The IDL and MatLab visualization routines used to produce these images are available for download from our software repository. Documentation of these routines is being improved for easier use in undergraduate and graduate research projects.

The user community is encouraged to join us in improving these visualization routines. Code contributions and modifications used in this collection will be recognized as authorship in the collection's metadata.

3. EDUCATION

3.1 User community

The educational user community has started with an outreach program at Eastern Illinois University to middle school and high school physical science teachers. These teachers are initiating classroom and student based atmospheric projects that will use the wide range of weather images available through this collection. These instructors are establishing connections to students and other teachers expanding towards a national base of users. Community development already involves workshops at the Illinois Science Teacher Association (ISTA) and the National Science Teachers Association (NSTA), web based classes, activities at the American Association of Physics Teachers meetings, regional technology conferences and summer classes based on this collection.

3.2 Online lesson plans

Teachers can author, contribute and evaluate material being developed for this growing community of users. The material may be knowledge based, demonstration oriented, laboratory oriented or lesson plans with an emphasis on teaching standards. Each type of educational material is subject to an evaluation and user assessment rubric.

3.3 Educational java applets

Various java applets have been implemented and developed for use with online lesson plans. The University of Wisconsin's java contouring applet has been implemented to allow students to draw various isopleths and compare them to those produced by our

visualization tools. Material developed is appropriate for all levels of education in the K-12 range.

3.4 Web forum

A web forum is available for student and teacher questions and for discussions on developing or improving the visualization routines and lesson plans. The web forum has self-registration capabilities. Unregistered users can participate in discussions. Registered users can upload files of lesson plans, new visualization routines, or modified visualization routines. Those that are assessed and approved will become part of this collection.

4. SUMMARY

The significant amount of atmospheric data at the SGP site offers excellent educational and scientific opportunities. Through visualization of the ARM SGP data, our intent is to extend these opportunities to a larger community.

We hope in the future to expand this work to ARM's Tropical Western Pacific (TWP) and North Slope of Alaska (NSA) data gathering locations.

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Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect those of the NSF, DOE, or ARM.

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