

Interactive Uses of the NSDL: Atmospheric Visualization Collection

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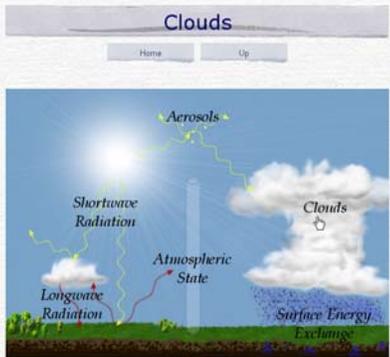
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Norman, Oklahoma*

User Interfaces

The National Science Digital Library (NSDL) has three user interfaces for accessing data images.

1. The [Geophysical Focus Area](#) (GFA) user interface that allows access to data images by selection of focus area and instrument.



Clouds

Home Up

Aerosols
Shortwave Radiation
Longwave Radiation
Atmospheric State
Clouds
Surface Energy Exchange

Clouds

Clouds have a profound effect on the weather and climate of our planet due, in large part, to their interactions with radiation. Given that our understanding of these interactions is, at best, incomplete, the ARM Program has installed remote sensing instruments at its sites to measure the horizontal and vertical distributions (macroscopic properties) of cloud and the sizes and shapes of the particles that comprise the clouds (microphysical properties). Knowledge of these properties will provide researchers with the information they need to assess the impact of clouds on the Earth's climate system.

Instruments that Measure Cloud Properties

Cloud properties over the ARM CART sites are sampled using a combination of active and passive remote sensors. The millimeter-wavelength cloud radar, which can penetrate multiple cloud layers and reveal their structure in unprecedented detail (except during periods of heavy rain), is the centerpiece of an array of ARM cloud instruments, each possessing unique, but complementary, features.

- **MMCR** - Millimeter-wavelength Cloud Radar at central facility; radar reflectivity, Doppler velocity, spectral width
- **BLC** - Belfort Laser Ceilometer at central facility; base height of first, second and third lowest cloud detected (up to 7.8 km)
- **MPL** - Micropulse Lidar at central facility; cloud base height (up to 15 km), backscatter ratio
- **MWR** - Microwave Radiometer at central and boundary facilities; column integrated liquid water and integrated water vapor
- **WSI** - Whole Sky Imager at central facility; cloud fraction, sky imagery
- **RL** - Raman Lidar at central facility; backscatter ratio, linear depolarization ratio
- **VCEIL** - Vaisala Ceilometer at central and boundary facilities; base height of first, second and third lowest cloud detected

Cloud Measurements

Radar reflectivity, Doppler velocity, spectral width
Cloud base height, backscatter ratio
Integrated liquid water
Integrated water vapor
Hemispheric sky images
Cloud cover fraction

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NSDL

2. The original [Quick Look](#) user interface that allows data image access by instrument and geographic location.

Home

Quicklook Interface

- [aos](#)
- [brs](#)
- [cm](#)
- [ebbr](#)
- [mfr](#)
- [mfrsr](#)
- [mmcr](#)
- [mpl](#)
- [mwr](#)
- [ncep](#)
- [nfov](#)
- [nimfr](#)
- [rl](#)
- [rwp](#)
- [sirs](#)
- [smos](#)
- [sonde](#)
- [swats](#)
- [thwaps](#)
- [twr](#)
- [vceil](#)

Click on the instrument name on the side to see the appropriate SGP quicklook.

You may also find these links below useful. They are quicklooks of SGP data produced by other organizations.

<http://cimss.ssec.wisc.edu/aeriwww/aeri/>

<http://gonzalo.er.anl.gov/ABLE/currentdata.html>

<http://arm.mrcsb.com/>

<http://www6.etl.noaa.gov/instruments/cloudradar/>

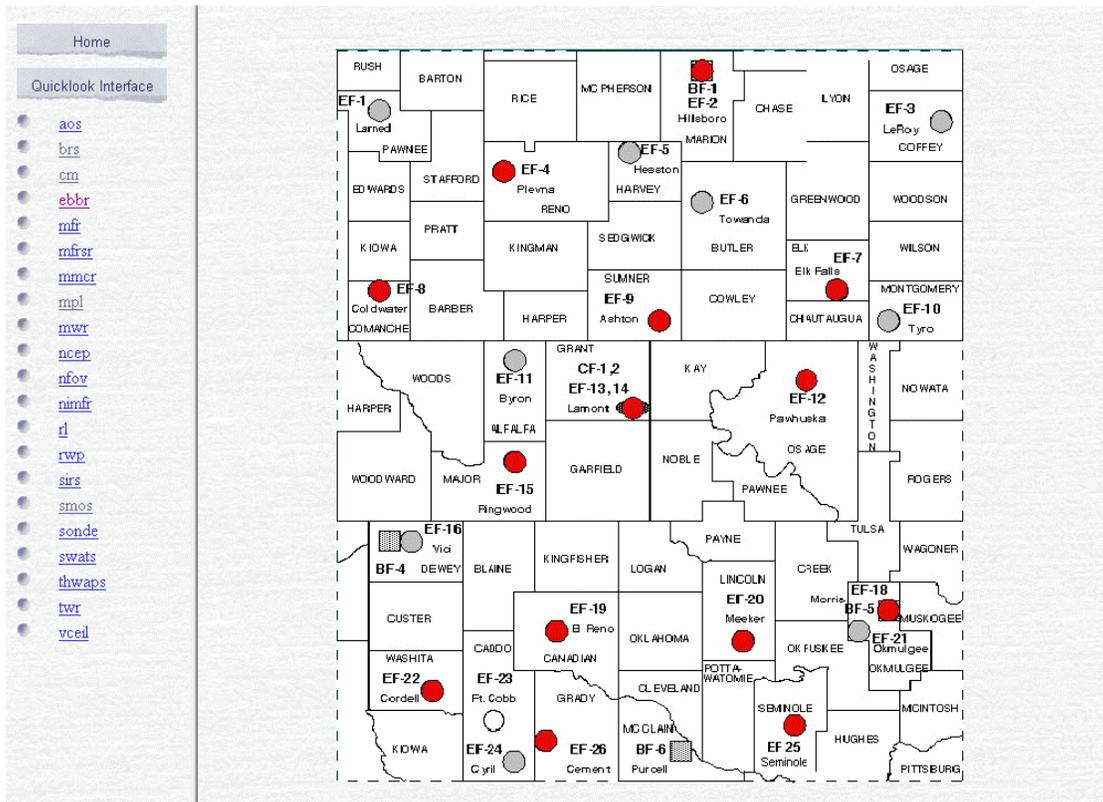
<http://zonda.ssec.wisc.edu/~waynef/>

<http://www.cmdl.noaa.gov/aero/net/sgp/qcplots.html>

If you have one to add, then let me know at klaus@anl.gov.

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3. The [Calendar](#) user interface that allows data image access by selection of date and instrument name.

C1	
aos	sgplaosC1.b1.png
cm	sgpcmC1.a1.png
mfr	sgpmfr25mC1.b1.20020409.png
mfr	sgpmfr10mC1.b1.20020409.png
mfrsr	sgpmfrsrC1.b1.png
mmcr	sgpmmcrC1.a1.png
mpl	sgpmplC1.a1.000014.png
mwr	sgpmwrosC1.a1.20020409.png
rwp	sgp915rwpwindconC1.a1.png
rwp	sgp915rwptempconC1.a1.png
rwp	sgp50rwpwindconC1.a1.png
rwp	sgp50rwptempconC1.a1.png
sirs	sgpsirsC1.a2.png

Each of these interfaces takes the user to pages describing data images include links to forums, lesson plans, reference material, and visualization tools. For an example see the descriptive figures above of [Millimeter Cloud Radar Quick Looks](#).

Home

Focus Areas

mmcr
C1 2002
1 go

mmcr C1

2002/04/05
[reflectivity](#)

2002/04/04
[reflectivity](#)

2002/04/03
[reflectivity](#)

2002/04/02
[reflectivity](#)

2002/04/01
[reflectivity](#)

Millimeter Cloud Radar - Quicklook Data

SGP Research System

Instrument Description

Millimeter Wave Cloud Radar (MMCR)

The MMCR transmits a radar pulse directly overhead to determine the tops and bottoms of clouds. It can also serve as a type of Doppler radar in measuring up and down particle movements within a cloud. Values that the radar measures are [\[doppler velocity\]](#), [\[radar reflectivity\]](#), and [\[spectral width\]](#). For more information see the [\[ARM instrument description\]](#).



Quick look Description

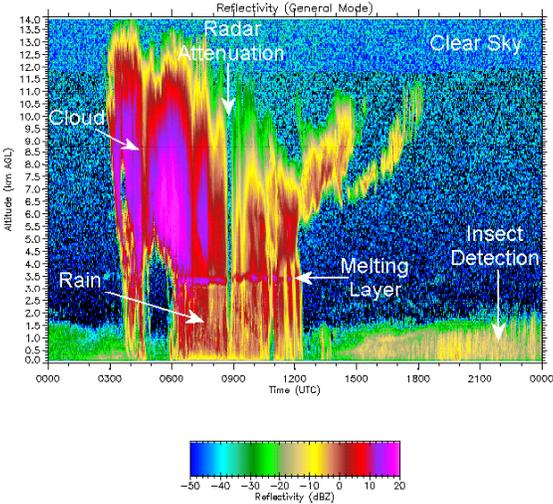
These links connect to time/height reflectivity, Doppler velocity, and spectral width quick look plots of data as reported by ARM's Millimeter Cloud Radar (MMCR) operating at the SGP CART site. Height is in kilometers above ground level, time is in [\[UTC\]](#) and local time, radar reflectivity is in [\[dBZ\]](#), velocity is in meters per second, and spectral width is in terms of meters per second. The color code at the bottom of each plot can be used to assign number values to the data. These plots should be regarded as PRELIMINARY DATA.

Source code for SGP MMCR quick look

- [\[sgpmmcrmoments.a1.pro\]](#)
- [\[sgpmmcrca1.a1.pro\]](#)

Example Image

MMCR Reflectivity Data
21 Jun 2001



Suggested Lesson Plans

- [\[Understanding Cloud Radar\]](#)
- [\[Melting Layer\]](#)
- [\[Doppler Effect\]](#)
- [\[Electromagnetic waves\]](#)
- [\[Insect detection\]](#)

Links

- [\[NOAA's Cloud Profiling Radar Page\]](#)
- [\[Discussion forum: \[MMCR topic\]\]](#)

References

- Clothiaux, E. E., M. A. Miller, B. A. Albrecht, T. P. Ackerman, J. Verlinde, D. M. Babb, R. M. Peters, and W. J. Syrett, [An evaluation of a 94-GHz radar for remote sensing of cloud properties.] *J. Atmos. Oceanic Technol.*, 12, 201-229, 1995.
- Clothiaux, E. E., K. P. Moran, B. E. Martner, T. P. Ackerman, G. G. Mace, T. Uttal, J. H. Mather, K. B. Widener, M. A. Miller, and D. J. Rodriguez, 1999: [The Atmospheric Radiation Measurement Program Cloud Radars: Operational Modes.] *J. Atmos. Oceanic Technol.*, 16, 819-827.
- Moran, K. P., B. E. Martner, M. J. Post, R. A. Kropfli, D. C. Walsh, and K. B. Widener, 1998: [An Unattended Cloud-Profiling Radar for Use in Climate Research.] *Bull. Amer. Meteor. Soc.*, 79, 443-455.

Please feel free to [\[submit\]](#) any bug reports, suggested improvements, or questions about the visualization tools producing these images.

Questions concerning these data should be sent to the MMCR Instrument Mentors, [\[Mark Miller\]](#) or [\[Kevin Widener\]](#).

Getting Started with the Quick Look Description Wiki

One of the exciting tools offered by the NSDL Communication Portal is a Wiki server, which can be used for collaborative development of web pages. In this case we're using this capability to allow Atmospheric Radiation Measurement (ARM) Scientist to interactively modify Quick Look description pages.

sciencewiki: AVC Science Wiki - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail

Address http://avc.comm.nslib.org/cgi-bin/sciencewiki.pl Go Links Y! >>

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All Workspaces
By Categories
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Workspace Menu
Workspace: sciencewiki
Summary
Forums
Lists
Tasks
Tracker
Docs
News
CVS
Files
Statistics

Search
Software/Group
 Require All
Words
Search

AVC Science Wiki

WEBSITE: [AVC Science Wiki](#) | [Edit this page](#) | [Help](#) | [RecentChanges](#) | [Preferences](#) | [Printer Friendly Version](#)

The intended use of this page is for collaborative development of pages describing the images produced by this collection. These will be displayed in the [quicklook interface](#) as soon as I have all the pages available for editing here.

1. [\[Aerosol Observing System\] descriptive page](#)
2. [\[Atmospheric Emitted Radiance Interferometer\] descriptive page](#)
3. [\[Balloon Borne Sounding System\] descriptive page](#)
4. [\[Broadband Radiometer System\] descriptive page](#)
5. [\[Chilled Mirror Dew Point Hygrometer\] descriptive page](#)
6. [\[Energy Balance Bowen Ratio\] descriptive page](#)
7. [\[Micropulse Lidar\] descriptive page](#)
8. [\[Microwave Water Radiometer\] descriptive page](#)
9. [\[Millimeter Cloud Radar\] descriptive page](#)
10. [\[Multi-Filter Radiometer\] descriptive page](#)
11. [\[Multi-Filter Rotating Shadowband Radiometer\] descriptive page](#)
12. [\[Narrow Field of View Zenith Radiometer\] descriptive page](#)
13. [\[NCEP/NCAR Reanalysis\] descriptive page](#)
14. [\[Normal Incidence Multi-filter Radiometer\] descriptive page](#)
15. [\[Raman Lidar\] descriptive page](#)
16. [\[Rass/Radar Wind Profiler\] descriptive page](#)
17. [\[Soil Water and Temperature System\] descriptive page](#)
18. [\[Solar Infrared Radiation System\] descriptive page](#)
19. [\[Surface Meteorological Observation System\] descriptive page](#)
20. [\[Temperature, Humidity, Wind, and Pressure Sensors\] descriptive page](#)
21. [\[Total Sky Imager\] descriptive page](#)
22. [\[Tower\] descriptive page](#)
23. [\[Vaisala Ceilometer\] descriptive page](#)

See [\[Chris Klaus\]](#) for the editing password.

WEBSITE: [AVC Science Wiki](#) | [Edit this page](#) | [Help](#) | [RecentChanges](#) | [Preferences](#) | [Printer Friendly Version](#)
View other revisions
Last edited April 3, 2002 10:02 pm ([diff](#))

Search:

This Wiki server is located at <http://avc.comm.nsdlib.org/cgi-bin/sciencewiki.pl>. When you first visit this site you'll need to setup an account. To do this click on the "Preferences" option in the top or bottom menu, bringing you to the [NSDL Editing Preferences page](#).

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Workspace:
[sciencewiki](#)
[Summary](#)
[Forums](#)
[Lists](#)
[Tasks](#)
[Tracker](#)
[Docs](#)
[News](#)
[CVS](#)
[Files](#)
[Statistics](#)

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Software/Group
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[Support Info](#)
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Your User ID number: 1002
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(Passwords allow sharing preferences between multiple systems. Passwords are completely optional.)
Administrator Password: (blank to remove password)
(Administrator passwords are used for special maintenance.)
 Include this address in the site email list. (Uncheck the box to remove the address.)
Email Address:

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 Show all changes (not just most recent)
Minor edit display:
 Use "changes" as link to history

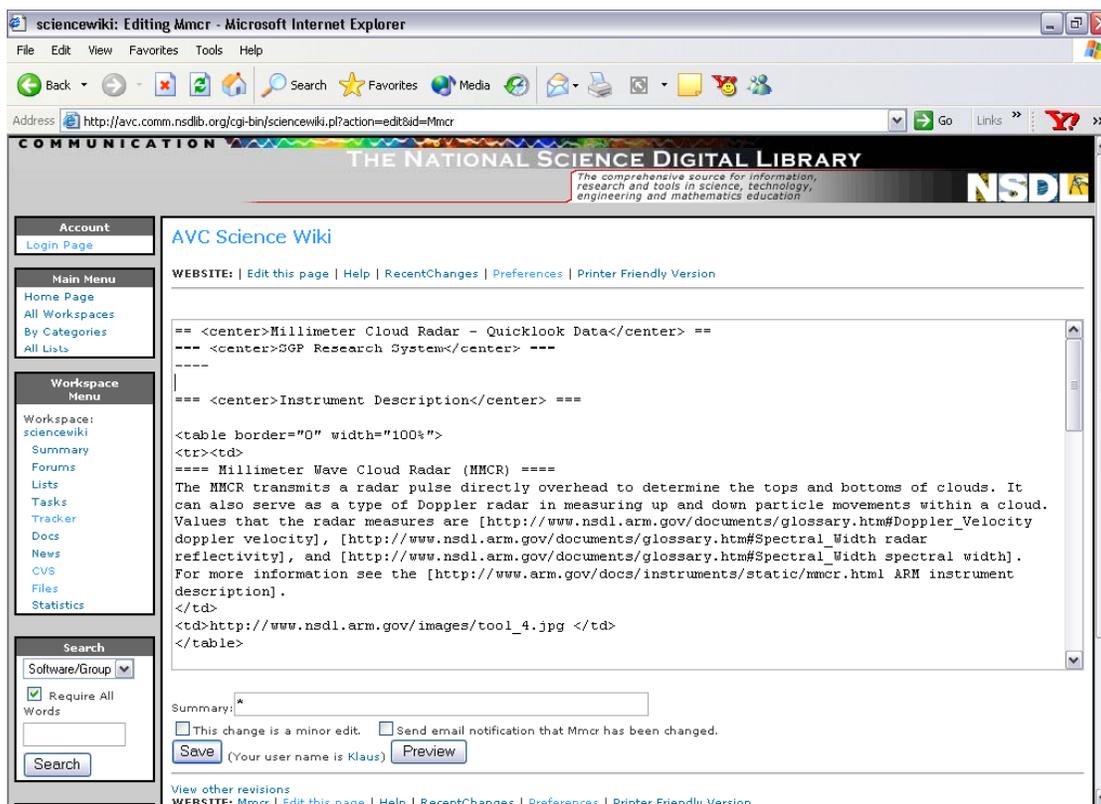
Differences:
 Show (diff) links on RecentChanges
 Show differences on all pages (No differences on RecentChanges)
Default difference type:

Misc:
Server time: April 10, 2002 10:07 am
Time Zone offset (hours):
 Use 100% wide edit area (if supported)
Edit area rows: columns:
 Show link bar on top
 Add "Random Page" link to link bar

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Select a User Name and Password of your own choice, which will keep someone from editing as you. Use the science team password as the Administrator password. Leave the site email list checked if you wish to receive emails of changes to the quick look description, otherwise uncheck that box. Click on the "Save" button and you now have an account with which to edit quick look descriptions.

Click the AVC Science Wiki link on top to return to the list of quick look description pages. Now when you see a page you want to edit, just click on the “Edit this page” link. This will access a web form from which you can preview or save changes. For an example see the [Millimeter Cloud Radar Quick Look Description Page](#).



Revisions are tracked so that mistakes can be easily corrected.

Getting Started with the Lesson Plan Sandbox

One of the exciting tools offered by the NSDL Communication Portal is a Wiki server, which can be used for collaborative development of web pages. In this case we're using this capability to allow teachers interactively modify lesson plans, which we call our Lesson Plan Sandbox.

The screenshot displays the NSDL Communication Portal interface. At the top, it reads "COMMUNICATION THE NATIONAL SCIENCE DIGITAL LIBRARY" with a tagline: "The comprehensive source for information, research and tools in science, technology, engineering and mathematics education" and the NSDL logo. On the left, there are three menu sections: "Account" with a "Login Page" link; "Main Menu" with links for "Home Page", "All Workspaces", "By Categories", and "All Lists"; and "Workspace Menu" with a "Workspace:" dropdown set to "avc" and links for "Summary", "Forums", "Lists", "Tasks", "Tracker", "Docs", "News", "CVS", "Files", and "Statistics". Below these is a "Search" section with a "Software/Group" dropdown, a checked "Require All Words" checkbox, a search input field, and a "Search" button. The main content area is titled "Atmospheric Visualization Collection" and includes a "WEBSITE:" header with links for "Atmospheric Visualization Collection", "Edit this page", "Help", "RecentChanges", "Preferences", and "Printer Friendly Version". The text states: "The intended use of this Wiki page is for collaborative development of lesson plans. Stable revisions will be displayed on our collection's [lesson plan page]. Our current lesson plans include:" followed by a numbered list of 13 links to lesson plans, such as "[An Introduction to Wind Chill]" and "[Planet Emission Temperature Climate Model]". Below the list, it says: "Our hope is to publish quality lesson plans to the Journal of Earth Science Education with credit given to the contributors. If you wish to join our development efforts, please email [Chris Klaus] for the editing password. When contributing try these [Wiki formatting tips].". At the bottom of the main area, it repeats the "WEBSITE:" header and includes links for "View other revisions" and "Last edited February 12, 2002 11:52 am (diff)", along with another "Search:" input field.

The Lesson Plan Sandbox is located at <http://avc.comm.nsdlib.org/cgi-bin/wiki.pl>. When you first visit this site you'll need to setup an account. To do this click on the "Preferences" option in the top or bottom menu, bringing you to the [NSDL Editing Preferences page](#).

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[Home Page](#)
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Workspace Menu
Workspace:
[avc](#)
[Summary](#)
[Forums](#)
[Lists](#)
[Tasks](#)
[Tracker](#)
[Docs](#)
[News](#)
[CVS](#)
[Files](#)
[Statistics](#)

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User Information:
Your User ID number: 1002
UserName: (blank to remove, or valid page name)
Set Password: (blank to remove password)
(Passwords allow sharing preferences between multiple systems. Passwords are completely optional.)
Administrator Password: (blank to remove password)
(Administrator passwords are used for special maintenance.)
 Include this address in the site email list. (Uncheck the box to remove the address.)
Email Address:

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Default days to display:
 Most recent changes on top
 Show all changes (not just most recent)
Minor edit display:
 Use "changes" as link to history

Differences:
 Show (diff) links on RecentChanges
 Show differences on all pages (No differences on RecentChanges)
Default difference type:

Misc:
Server time: April 4, 2002 11:31 am
Time Zone offset (hours):
 Use 100% wide edit area (if supported)
Edit area rows: columns:
 Show link bar on top
 Add "Random Page" link to link bar

Select a User Name and Password of your own choice, which will keep someone from editing as you. Use "avcedit" for the Administrator password. Enter your email address if you wish to be contacted about possible publications of your contributions. Leave the site email list checked if you wish to receive emails of changes to lesson plans, otherwise uncheck that box. Click on the "Save" button and you now have an account on the Lesson Plan Sandbox.

Click the Atmospheric Visualization Collection link on top to return to the list of lesson plans. Now when you see a lesson plan you want to edit, just click on the “Edit this page” link. This will access a web form from which you can preview or save changes. For an example see the [Exercise in Air Pressure lesson plan](#).

The screenshot shows the NSDL website interface. At the top, it says "COMMUNICATION THE NATIONAL SCIENCE DIGITAL LIBRARY" with a tagline: "The comprehensive source for information, research and tools in science, technology, engineering and mathematics education" and the NSDL logo. On the left, there are navigation menus: "Account" (Login Page), "Main Menu" (Home Page, All Workspaces, By Categories, All Lists), "Workspace Menu" (Workspace: avc, Summary, Forums, Lists, Tasks, Tracker, Docs, News, CVS, Files, Statistics), "Search" (Software/Group dropdown, Require All Words checkbox, Search button), and "User Help" (Support Info, Help Docs, Request New Account, Request New Workspace). The main content area is titled "Atmospheric Visualization Collection" and includes links for "WEBSITE: | Edit this page | Help | RecentChanges | Preferences | Printer Friendly Version". The content is displayed in a text editor with HTML tags visible: `<p align="center">'An Exercise in Air Pressure'</p>` and `<hr>`. Below this, the text reads: "Air Pressure: This demonstration is for teachers to do for their students." followed by an "Introduction" paragraph and a "Materials:" list: "1 L Beaker", "Empty soda can", "Bunsen burner", "Striker or match", "Tongs". There is a "Summary:" field with an asterisk, and two checkboxes: "This change is a minor edit." and "Send email notification that An_Exercise_In_Air_Pressure has been changed." At the bottom of the editor are "Save" and "Preview" buttons. The "Save" button shows the user name "Klaus". Below the editor, there are links for "View other revisions" and "WEBSITE: An Exercise In Air Pressure | Edit this page | Help | RecentChanges | Preferences | Printer Friendly Version".

Contributions and revisions are tracked so that when the lesson plan reaches a high level of quality the contributors can be emailed about publication opportunities.

Using the AVC IDL Scripts

NSDL Communication Portal's Source Forge Environment provides public access to AVC interactive data language (IDL) visualization codes with various collaboration tools to aid development efforts. These IDL scripts that produce the SGP Quick Looks are available for download at <http://avc.comm.nsdlib.org>.

The screenshot shows the NSDL workspace interface for 'Atmospheric Visualization'. The page includes a navigation sidebar on the left with sections for 'Your Account', 'Main Menu', 'Workspace Menu', 'Search', 'User Help', and 'Software'. The main content area features a 'Summary' section with project details, a 'Latest File Releases' table, and a 'Public Areas' section with various trackers and forums. A 'Developer Info' box on the right lists workspace administrators.

Workspace: Atmospheric Visualization

Summary

This project is for development and improvement of atmospheric visualization codes. The goal is to make these codes easy to modify for use on other datasets as well as more useful for education and research with the ARM dataset at www.nsdlib.arm.gov.

- Development Status: 1 - Planning, 3 - Alpha, 4 - Beta
- Programming Language: Interactive Data Language, Perl

Registered: 2001-10-29 17:04

Latest File Releases

Package	Version	Date	Notes / Change Log	Download
visualization_tools	vis_tools 0_1	2001-12-06 17:27	/	Download

[View ALL Files]

Public Areas

- Tracker**
 - Bugs** (5 open / 7 total)
Bug Tracking System
 - Support Requests** (0 open / 0 total)
Tech Support Tracking System
 - Patches** (0 open / 0 total)
Patch Tracking System
 - Feature Requests** (6 open / 6 total)
Feature Request Tracking System
- Public Forums** (5 messages in 3 forums)
- DocManager: Workspace Documentation**
- Mailing Lists** (1 public mailing lists)
- Task Manager**
Visualization Tools
- CVS Repository** (0 commits, 0 adds)
[Browse CVS](#)

Latest News

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klaus - 2002-04-04 16:56
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[Account Maintenance](#)
[My Personal Page](#)
[Bookmark Page](#)
[Diary And Notes](#)
[Logout](#)

Main Menu
[Home Page](#)
[All Workspaces](#)
[By Categories](#)
[All Lists](#)

Workspace Menu
[Website: avc](#)
[Summary](#)
[Forums](#)
[Lists](#)
[Tasks](#)
[Tracker](#)
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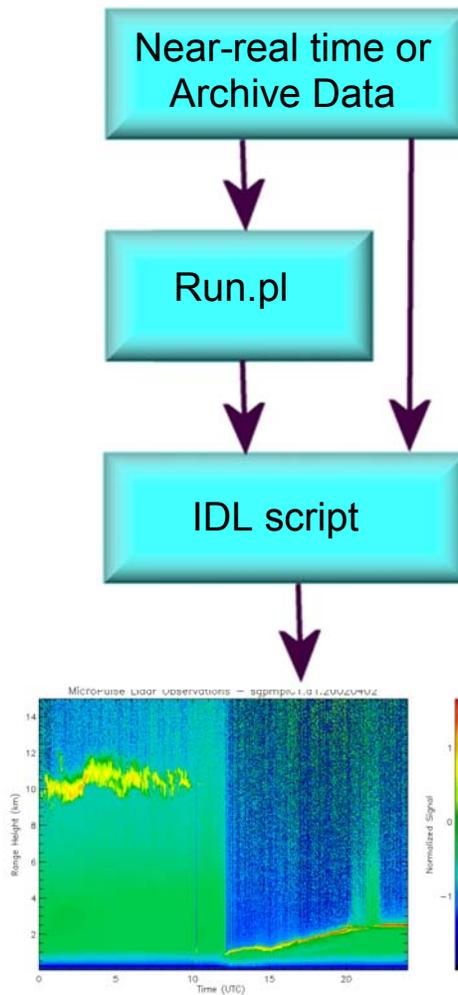
Developer Info
Workspace Admins
klaus
kandrew
mace
Developers 7 [[View Members](#)]

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By downloading these IDL tools and data from the ARM Archive the user can produce their own data images. This process has been tested by undergraduate students at Eastern Illinois University. For researchers this provides an initial code base for viewing ARM data, which can be modified for their own specific purposes.

The AVC visualization tools are IDL scripts that can be run interactively or automated with a Perl script, Run.pl. IDL scripts exist for most of the ARM instruments. Run.pl uses NCAR's NetCDF operator, nccat, to merger multiple data files before passing the data to a specific IDL script, which produces the data images like the [Micropulse Lidar \(MPL\) quick look](#).



Educational Workshops

AVC lesson plans are being tested in K-16 classes and national workshops. The most recent workshop, "Using Visualization Tools for Studying the Atmosphere", was held at the National Science Teacher Association.



A collection of educational java applets are available from unit conversions to basic models, such as a [radiation budget model](#).

