Preview of the June Users Workshop

Carlyle Wash

Chairman, Unidata Users Committee
Naval Postgraduate School

The Unidata Users Committee is well on its way to finalizing the agenda for this summer's users workshop. (As described in the winter issue of this newsletter, the workshop will be held in Boulder, 18-22 June. It is being coordinated by NCAR's Advanced Study Program and sponsored by the National Science Foundation in cooperation with the COMET Program and the STORM Project Office, both of which receive NOAA funding.) There will be over 70 participants from the university community, representing a majority of the Unidata sites.

The agenda contains a mix of presentations, roundtable discussions, and lab sessions. Topics range from using McIDAS, the SDM, and GEMPAK in the classroom, to university experiences with educational labs. There will be presentations on COMET (which stands for the Cooperative Program for Operational Meteorology, Education and Training), on the STORM (the Stormscale Operational and Research Meteorology) Program, on the future of Unidata, and on campus weather distribution systems.

The workshop will be held on the University of Colorado's Boulder campus. Unidata is arranging to have two computer labs in the vicinity (one for Unidata McIDAS, the other for SDM workstations); the labs will be used for tutorials in the afternoons and will be open in the evenings as well.

Be sure to contact the participant from your university and give him or her your unanswered questions, or any new ideas, suggestions for improvements you have for the Unidata program. Following the workshop, the Unidata Users Committee will describe the workshop in an article targeted for the Bulletin of the American Meteorological Society.

Introducing Linda Miller, Unidata's External Programs Coordinator

Sally Bates

There is an alphabet soup of organizations who share a common interest in the modernization of the nation's weather services and in associated research and development activities. Four of these—Unidata, COMET, FSL, and STORM—in recognition of their overlapping responsibilities, have agreed to cooperate and coordinate their activities. To foster this, Linda Miller has been hired as Unidata's External Programs Coordinator.

The four organizations are already closely related. Unidata is man-
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Unidata User Support
Internet: support@unidata.ucar.edu
Omnet/Telemail: UNIDATA.SUPPORT

Linda comes to Unidata with a long history of involvement with the atmospheric sciences community. She was the visitor program manager of the Program for Regional Observing and Forecasting Services (PROFS, now a part of FSL). At PROFS, she coordinated the activities of the scientists from around the world who visited the program and/or participated in PROFS-linked experiments. From PROFS she moved into private industry, to Tycho Technology, Inc., a manufacturer of atmospheric wind profilers.

In establishing this cooperation, the four organizations have set distinct goals:

1) to maximize the benefits that universities can gain from the new data-delivery system (NOAAport) that will be employed by the modernized weather service;

2) to provide university access to three kinds of research-quality data—those that are collected by FSL in its efforts to improve forecasting and to understand atmospheric phenomena, those that will be assembled into case studies under the COMET program, and those that are organized and archived for research under the STORM program; and

3) to facilitate the exchange of workstation, data management, communications, and software technologies with the cooperating organizations and the university atmospheric science community.

Linda’s responsibilities as coordinator include:

• involving university scientists, along with Unidata, COMET, STORM, and FSL staff, in developing strategies to achieve the above goals;

• defining specific objectives and detailed plans that can form the basis for programmatic and budgetary decisions;

• facilitating and coordinating interactions among the four organizations and including personnel from NWS and NEXRAD (the next generation...
As most of you realize by now, Unidata is not a static program. While the central goals of the program have remained stable, the program’s software and services are continually adapting to changes in the computer, communications, and software industries, and to changes in community expectations. The dynamic scientific environment in which the Unidata program operates has thus required Unidata to identify and implement flexible (perhaps the term “evolving” would be more accurate) approaches to data access, to hardware and software support, and to software development. The evolution of Unidata’s Scientific Data Management (SDM) system exemplifies this.

When Unidata’s three-year proposal to NSF was submitted (November 1989), the SDM contained just two main components, Purdue’s Weather Processor (WXP) and the UPC’s own Local Data Manager (LDM). The software was fully supported on specified workstations running either the VMS or the UNIX operating system. (VMS was developed by Digital Equipment Corporation for their hardware platforms; UNIX is a trademark of AT&T.) However, the cost of supporting two widely dissimilar operating systems was becoming prohibitive. Thus the proposal to NSF contained a major change in SDM support: by the end of the period covered by the grant, support for VMS would be discontinued. The implications of this change in Unidata support for hardware operating systems, however, are only now being clarified. Support for the UNIX operating systems has evolved into support for several “flavors” of UNIX, namely ULTRIX, AIX, and SUNOS. Each of these systems was originally derived from AT&T UNIX and each of the vendors (DEC, IBM, and Sun Microsystems, respectively) is committed to achieving eventual compliance with the IEEE standard known as POSIX. In the long run, then, it will be more accurate to say that the Unidata program is supporting POSIX-compliant operating systems.

Our vision for the SDM has changed in other ways. Under the current NSF grant we are committed to broadening SDM functionality with additional applications software from public and private organizations, including NASA/Goddard’s GEMPAK, and a suite of netCDF “operators” modeled after New Mexico Tech’s Candis program. Also as part of the planned enhancement, we have contracted with MacDonald Dettwiler & Associates (following a competitive procurement) to provide Unidata with an image-analysis system called Ynot that will be integrated with the SDM. As it does now for WXP, the LDM software will provide data capture and management capabilities to underlie the new applications.

We have come to realize that one of Unidata’s most important tasks in broadening SDM functionality is to design and implement the interfaces among its various components. In discussing “interfaces,” we mean the methods by which applications interact with their environments—for acquiring and storing data, for creating graphical output, for obtaining user-defined and default parameters, etc. These interfaces are crucial, because they determine the extent to which the
**SDM Plans, continued**

various applications are interoperable, share common features, and generally form part of a unified whole. In essence, the interfaces are the "standards" for Unidata software. Therefore we have refined our SDM development plan, placing greater emphasis on the natures and scheduling of these interfaces. (In our proposal to NSF, some of these interfaces appeared under the label GUISE, the name adopted by the Unidata subcommittee that developed most of the interface specifications. However, this label created confusion and, as we explain elsewhere in this issue, it has recently been dropped.)

Unidata’s Network Common Data Form (netCDF) has already achieved some recognition as a standard (or at least as a potential standard) for data access. Its name notwithstanding, the netCDF is not so much a data format as a data-access interface: it is a library of input/output subroutines that may be called from (FORTRAN or C) applications. We will continue to emphasize the netCDF as Unidata’s standard method for storing and retrieving all data, and it is prototypical of the “standard” interfaces we intend to use for integrating SDM applications.

Beyond the increasing SDM integration, the emphasis on interfaces will enhance the extensibility of the system: users may add new applications at will, so long as the interface standards are observed. Figure 1 depicts the interfaces between a generic application and its SDM environment.

As illustrated, we have defined four categories of interfaces and one of utilities by which SDM applications interact with their environments. The natures of these can be summarized as follows:

- **Parameter Handling and Resource Interface (udres).** Handles (keyword and positional) parameters as passed from the command line or, if they are absent, obtaining default values via a specified hierarchy of “X Resource” files and/or environment variables. The udres library (which stands for Unidata Resource Library) also handles parameter type checking and error conditions. The library, which may be employed by C programs, was implemented to permit natural and equivalent usage under both POSIX and VMS—applications coded to the udres interface typically can run under either system. The udres library is presently in beta test.

- **Data Access Interface (netCDF).** Accesses self-describing files. Unidata’s netCDF interface is an I/O library, accessible via FORTRAN or C, which stores and retrieves scientific data structures in self-describing, computer-

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**Unidata Programming Environment**

![Diagram of Unidata Programming Environment](image)

*Figure 1: Interfaces between an application and its SDM environment.*
SDM Plans, continued

Independent files. These files can contain a number of multi-dimensional, named variables (of types integer, real, character, byte, etc.) accompanied by ancillary data.

The netCDF has been employed on computing platforms that range from CRAYs to Personal Computers and include many (UNIX- and VMS-based) workstations. It can be used to create a complex data set on one computer (say in FORTRAN) and retrieve that same (self-describing) data set on another computer (say in C) without intermediate translations; netCDF files can be transferred across a network, or they can be accessed remotely using a suitable protocol, such as the Network File System (NFS).

Version 1.11 of the netCDF library was released in March 1991.

• Window and Graphics Interfaces (X Window System and XGKS). Allows computer-independent and network-transparent use of windows for user interaction and graphical output. The X Window System is not a Unidata product, but it is considered a Unidata standard, to which applications are to conform. (Most workstation manufacturers provide X software, or some inter-operable equivalent, at no charge.) Through the use of this standard, any computer can act as an X Window server and be used to display output from, and to interact with, a Unidata application running elsewhere on the local network or even on the Internet.

Unidata applications also require an interface for displaying vector graphics, with built-in capabilities for transformations (linear at a minimum). Presently, these services are provided by a package denoted XGKS (for X-Window Graphics Kernel System) which was developed by IBM and the University of Illinois and is distributed and maintained by Unidata. It provides both FORTRAN and C interfaces, and the FORTRAN interface conforms to the international GKS standard. Depending on the directions taken by computer manufacturers, a different standard for vector graphics (perhaps PHIGS) may be employed in future Unidata interfaces. Unidata software is compatible with version X11.R4 of the X Window System; version 2 of XGKS is currently available through Unidata.

• System Services and Portability Interface (udposix). Contains commonly used system services, such as memory allocation and error exits, in ways that promote portable (i.e., POSIX-compliant) programming. With the udposix library and header files, programs may be written as if for a standard C and standard POSIX environment (even though such an environment does not yet actually exist on most commercial computers). Discrepancies of individual platforms from this standard environment are handled by Unidata-supplied header files, macros, and library routines. This library is in beta test.

• Units and Coordinates Utilities (udunits and udmap). Allows representation and manipulation of common units of measure, map projections, and coordinate systems. Unidata’s udunits library handles all the International Standard (SI) units, plus Universal Time and various measures that are specific to meteorology. It can perform unit conversions and algebraic operations (i.e., unit analysis).

Though it has not yet been designed or implemented, the planned Unidata mapping library (udmap) will permit representation and interpretation of map projections and coordinate systems adequate to properly locate all types of data (i.e., the contents of netCDF files) in time and space. It will also provide capabilities to generate line segments representing geopolitical boundaries for specified regions of the earth. The library will use concepts from MacDonald Dettwiler’s Ynot system, especially in regard to geo-referencing of satellite images. The udunits library has been released; udmap is being designed.

All Unidata interface libraries are intended to be as platform-independent as practical and to be consistent with networks of heterogeneous computers. Although Unidata’s official policy

Continued on next page
SDM Plans, continued

is to support a selected few operating systems, it is recognized that some users find it necessary and/or advantageous to use Unidata software in other environments. For this reason, existing and draft standards, such as for languages, protocols, system services, etc., are employed to the greatest practical extent in the Unidata libraries.

The overall planned SDM configuration is illustrated in Figure 2.

Not illustrated is the “LDM Connection,” a package permitting data to be exchanged between the SDM and Unidata’s other major software system, McIDAS. In essence, this is a set of translators between netCDF files and various McIDAS file formats.

This configuration is consistent with our proposal to NSF, but we have refined the sequencing and intermediate release levels to reflect our improved understanding of what is involved. The current version of the system, designated SDM-2.9, contains WXP and LDM. All data access occurs (at least optionally) via the netCDF interface, and the X Window System is used for user interaction and display. Vector graphics are drawn via the XGKS library.

We have planned three major new releases for the SDM system:

SDM-3 (with udres, udunits, and udposix). WXP will use udres to handle parameters as originally planned. In addition, WXP and the LDM will both be outfitted with a new set of netCDF templates and units conventions, compatible with the udunits library. These changes were not identified in the original plan—their need has become evident through development of the udunits library and through experience with the use of netCDF. The netCDF library (version 1.11 or higher) now performs better, especially for certain write operations. The LDM will employ the udposix system services and portability interface. Various enhancements to WXP initiated by Purdue will also be incorporated. SDM-3 will be the last version supported for use on VMS-based computers.

Between the SDM-3 and SDM-4 releases, several universities will be invited to “beta” test the Ynot software from MacDonald Dettwiler. It will have been integrated with SDM only to the extent that it can work with McIDAS image files captured by the LDM and converted to netCDF files.

SDM-4 (with Ynot, netCDF Operators, and GEMPAK). This release will include several new applications—Ynot, netCDF operators, and GEMPAK—but the extent of their integration will vary. GEMPAK will include an option for taking input from netCDF files, but will not be adapted to udres or other Unidata interfaces; it will be packaged for ease of installation under UNIX. Ynot will use the netCDF, both for input and output. Ynot also will be capable of invoking, via its point-and-click user interface, other applications (including the netCDF operators) that employ udres and that generate netCDF files.

Figure 2: Target Configuration for the Unidata SDM System
SDM Plans, continued

The netCDF operators will employ all of the Unidata standard interfaces and will encompass a set of basic functions, along the lines of a white paper titled "Proposal for NetCDF Algebra" written in September 1989 by David Raymond of New Mexico Tech. There are several categories into which such operators fall:

- **Selectors** perform various subsetting operations, from selecting particular variables, leaving their sizes and dimensionalities unchanged, to reducing dimensionality by averaging, integrating, or taking cross sections. Other operators leave dimensionalities fixed but reduce the sizes of variables by eliminating points, based on a variety of selection criteria.

- **Fusers** are roughly the reverse analogs of selectors. They are more complicated, however, because fusing data from distinct files depends, in most cases, on the extent to which the files conform to one another. For example: stacking vectors or grids to create a new dimension requires that the input dimensionalities match exactly; splicing grids at their edges (to extend a single dimension) requires only that their other edges match; proper joining (i.e., overlaying) or distinct variables from different files requires determining the extent to which the variables share common dimensions (and coordinates); merging records from two files (of profiler and upper-air observations, for example) may require introducing null values for variables (for example temperature) that are not common to both files.

- **Math Operators** perform algebraic and related functions. Some perform point-by-point mathematics with the usual arithmetic operators and are coordinate-system independent. Others perform calculus operations that require the use of the independent variables, i.e., the underlying coordinate values.

- **Arrangers** perform organizational tasks such as sorting records and transposing grids, i.e., changing the orders of their dimensions.

Because each netCDF operator takes one or more netCDF files for input, and creates a netCDF file on output, they can easily be "composed" with one another to perform complex functions.

SDM-5 (with udmap). This release will achieve the final configuration represented by Figures 1 and 2. The udmap library will be implemented to support Unidata standard mapping (geo-referencing). Ynot and the netCDF operators will be adapted to achieve the greatest practical consistency and to use all the interface libraries and utilities. By employing these interfaces when adding new operators and other applications, users can be certain of inter-operability between their software and the Unidata-supported systems.

If additional resources can be obtained (the current NSF grant is insufficient), the LDM will be augmented with ingesters and decoders to capture data from NOAAport, the data delivery system planned for deployment with the National Weather Service Advanced Weather Information Processing System (AWIPS). Also depending on the identification of new resources, SDM-5 may include enhanced capabilities for managing, browsing, and utilizing larger data collections, possibly encompassing off-line storage media (CD-ROMs and high-density tapes) and access to major data centers, such as at NCAR and NCDC.
Community Interactions

Last year, Unidata McIDAS was put to a distant use during the University of Wyoming’s field project in Saudi Arabia. The University’s King Air research aircraft was involved in a cloud study in the Asir region, along the southwestern coast of the Arabian Peninsula. To support the flights, operationally as well as with archived data, METEOSAT images were downloaded from the University of Wisconsin via “smart” modems. Once the initial problems caused by a mismatch of phone systems were solved, data transfer rates at nearly the full 9600 bps were possible. The project acquired an average of six images (visible and infrared; 2.5-km and 5-km resolution) per day on an IBM PS/2-70. The images were used to plan flights, and they were saved on diskettes for further analyses. In the process, some Saudi meteorologists received training in the use of the McIDAS system. The real-time availability of the images at the operation center, without any elaborate installations, was a big benefit to the project.

Saudi Arabian meteorologists also received training in the use of Unidata McIDAS at the Laramie campus. As part of a larger program, 13 forecaster trainees sent by the Saudi government became proficient users of the Unidata McIDAS system. In support of their studies over a 17-month period, these meteorologists first used Unidata McIDAS for basic training, then practiced weather analysis and forecasting using U.S. data, and finally worked on data from Saudi Arabia (extracted from the WMO international data and from the ECMWF model output). These forecasters have now all returned to Saudi Arabia and are part of the Saudi national weather service.—Gabor Vali, University of Wyoming

How One School Uses Unidata*

Bob Henson
NCAR Information Services

Nearly 100 universities nationwide take advantage of the tools and information available from Unidata. The flexibility of the Unidata system permits great variation in its use. One university has applied Unidata in locales ranging from a snowy Wyoming mountaintop to the Middle East.

The University of Wyoming’s atmospheric science department is a small, research-intensive unit well known for field studies. Over the past two years, Wyoming faculty have taken Unidata with them to provide real-time data that can be

Continued on next page

* Excerpted from the 1990 UCAR Corporate Report.
School, continued

invaluable in remote research projects. The first such use was in the summer of 1989, when a Unidata McIDAS system went to central Kansas for a NASA study of land surface climatology. Weather data fed through a commercial satellite link to the McIDAS system helped forecasters at the rural site use their array of observing equipment most efficiently.

Satellites and modems also made it possible for Unidata McIDAS to aid thunderstorm research in Saudi Arabia the following spring. The Saudi government sponsored investigations of storms that form in mountainous areas near the Red Sea. Forecasters on site "dialed up" satellite and conventional data from Wisconsin and, using Unidata McIDAS software, created displays that identified thunderstorms near the Saudi research site.

For over a year, the Saudi government has sent novice meteorologists to Wyoming's Laramie campus for training. Here, Unidata takes on the task of furnishing observations and computer-model output for the weatherpeople in training. "Until now," says assistant professor Larry Oolman, "much of the weather forecasting in Saudi Arabia has been done by visiting foreigners. The Saudi government is trying to integrate their own people into the work force." About 100 observers and 13 higher-level forecasters have returned from stints in Laramie to begin their meteorology careers in Saudi Arabia.

Oolman, the Unidata coordinator for Wyoming, keeps in touch with the Unidata Program Center in Boulder and ensures that hardware in Laramie runs smoothly with the latest versions of Unidata software. In the winter months, Unidata helps scientists at Laramie advise colleagues at Wyoming's Elk Mountain observatory, 50 miles to the west. Oolman also assists colleagues outside his discipline; as is the case at many schools, interest in Unidata has spread beyond the atmospheric science community. For instance, data captured by Unidata's LDM software were archived in fall 1990 for a Wyoming physics department study of ozone depletion over the Antarctic.

External Programs, from page 2

- radar effort) to provide the technical bases for the above responsibilities;
- observing university use of both Unidata systems and COMET workstations to evaluate the usefulness of the software.

Linda's office is within the Unidata Program Office, although her responsibilities require her to travel frequently. Don't be surprised if she appears on your doorstep for a visit.

Visitors to Unidata
February through April

K.R. Abhayasingha Bandara from Sri Lanka, Hector Fuenmayor from Venezuela, and Saeed Shamson from Yemen (WMO SHARE Project): Discussed the concept of the Unidata Program and viewed a software demonstration.

Roger Barga and Mike Devaney (Computational Science Department, Battelle Pacific Northwest Laboratories): Discussed the use of netCDF in a new setting and the development of a C++ library for netCDF.

Steve Bobrowski and Ron Melton (Batelle Pacific Northwest Laboratories): Discussed their interest in using the LDM system.

Wayne Brazille and Steve Williams (U.S. Weather Research Program, formerly STORM): Steve is a new employee and met with the UPC for the first time.

Steve Businger (North Carolina State University, Raleigh): Met with Bob Green to discuss updates on various Unidata software packages.

Russ DeSouza (Millersville University): Met with Tom Yoksas to discuss usage of the University of Washington CD ROM for McIDAS.

Steve Finley (Colorado State University): Discussed the various packages.
Visitors, continued

Unidata systems that CSU has been and will be using in their synoptic lab.

Goetz Graefe (University of Colorado) and David Maier (Oregon Graduate Institute): Visited to discuss plans for including new operations on existing data types and the addition of new data types.

Danny Harvey (University of Colorado): Discussed potential areas of common interest.

Paul Herzegh, Cindy Mueller, and Steve Williams (NCAR): Discussed possible use of the floater image in support of CAPE (Convection and Precipitation/Electrification Experiment) this summer and of NCAR’s Atmospheric Technology Division experiments in the future.

Rear Admiral James Koehr (Central Naval Oceanography Command): Viewed presentation on the Unidata Program.

Patrick Obasi (Secretary General of the WMO): Viewed presentation on the Unidata Program.

Visits by UPC Staff
February through April

Bob Green and Dave Fulker met with COMET’s Workstation Work-
In Brief

**UDAPE: Just GUISE disGUISEd**

**Russ Rew**

In the last newsletter, we announced "GUISE Software Available." We were referring to some new application programming interfaces, supporting libraries, and documentation to provide application- and platform-independent ways for earth-science applications to access commonly-needed system functions. The name GUISE, however, was an unfortunate choice for several reasons:

- the original source of the acronym, Group for Unidata Interface Software Exploration, was obscure and difficult to remember;
- the common use of GUI for Graphical User Interface caused more confusion, since the GUISE software had little to do with graphical user interfaces;
- an earlier GUISE interface and library covered only the subset of functionality dealing with command-line parameters and resources, whereas later use of the acronym covered other additional interfaces to other system services;
- talking about "that GUISE software" may easily be misunderstood, since it sounds like "that guy's software;" this could potentially lead to Who's-on-first scenarios;
- the name was not gender neutral. Fairness and symmetry would have required that we change the name of the netCDF library to DAWLS (Data Access With Less Suffering?).

As a result, we have decided to abolish and deprecate future use of the acronym GUISE. We are thinking of replacing it with UDAPE for UniData Application Programming Environment. As a mnemonic aid to assist in remembering the new acronym, (which we pronounce "yoo dape") we offer the following:

If you'd ape this way of interfacing to system services, you'd find your applications would be easier to write portably.

But then again, we may come up with a better acronym in the future. Stay tuned.

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**Fall Training Workshop**

As we have noted elsewhere in this issue, there will be a workshop for Unidata users in Boulder, CO this June. Because of this workshop, we will not hold the usual sessions for training on Unidata software at anytime this summer. The date and content have not yet been set for the next training workshop; they will be announced in the Summer 1991 issue of this newsletter.

**Staff Changes**

Unidata has had some staffing changes since our last newsletter. In addition to Linda Miller (see the article on Unidata's new external programs coordinator elsewhere in this issue), Unidata is happy to welcome two new staff members: Mitch Baltuch (User Support software engineer) and Linda Henderson (Administrative Secretary).

Mitch joins Unidata from the State University of New York at Albany, where he was involved with the National Lightning Detection Network.

Linda comes to Unidata from Seed Testing of America, where she was an administrative assistant working with customers and managing the sales databases. She replaces Mary Mintz.
Version 1.11 of Unidata netCDF Software Now Available

Russ Rew

Unidata’s Network Common Data Form (netCDF) software allows programs to create, access, and share scientific data in a form that is self-describing and network-transparent. “Self-describing” means that a file includes information defining the data it contains. “Network-transparent” means that a file is represented in a form that can be accessed by computers with different ways of storing integers, characters, and floating-point numbers.

In this release, installation is significantly easier than with previous versions. We have implemented some performance, portability, and functionality enhancements, making netCDF writes twice as fast as before under some conditions. User-defined “fill values” for missing data are now supported in the library, as well as optimized writes when prefilling isn’t necessary. Improvements have been made to the way data are shared among multiple processes accessing the same netCDF file.

Support for MSDOS and OS/2 has been significantly improved in this release, including support for a FORTRAN interface on these platforms. Shared libraries are supported under both SunOS and AIX platforms, which means that applications that link against the shared libraries will get the benefits of future library fixes and enhancements without relinking.

Reference documentation, in the form of UNIX man pages, was added, to supplement the NetCDF User’s Guide.

The new release has been successfully tested on various platforms including:

- SPARC (SunOS)
- Sun3 (SunOS)
- DECstation (Ultrix)
- VAX (Ultrix)
- VAX (VMS)
- IBM RS6000 (AIX)
- IBM PS/2 (OS/2)
- IBM PC-AT (MSDOS)
- CRAY-YMP (Unicos)

You can obtain a copy of the latest version of netCDF software using anonymous FTP. For UNIX systems, a compressed tar file can be accessed (in binary mode) from the file pub/netcdf.tar.Z in the anonymous FTP directory:
unidata.ucar.edu [128.117.140.3].

VMS sites can get a back-up save file of the same software from the file: vms/netcdf.bck.

What’s New in Unidata McIDAS Revision 5.20

Tom Yoksas

Unidata McIDAS 5.20 was distributed to 64 sites in early April. This distribution marks a change in how we assemble the disks. From now on, the Unidata McIDAS distribution will always consist of:

- the unaltered SSEC distribution (they are in the standard GENERAL, STANDALONE, and SOURCE sections);
- two Unidata-specific sections (TESTCODE and UNIDATA).

We have also, on request from SSEC, changed the online documentation screens to reflect the fact that Unidata McIDAS differs from the SSEC-supported software. These changes allow Unidata sites
to choose between standard SSEC McIDAS-OS2 or Unidata McIDAS (a superset of SSEC McIDAS). They were implemented because software conflicts arose when sites using Unidata McIDAS tried to contact the SSEC mainframe directly.

Also for the first time, we have included site-contributed software in the distribution. This includes several general routines from Lyndon State College (developed by Steve Green and Don Murray); a routine to create PostScript hardcopy, from the University of Wyoming (contributed by Larry Oolman); and hardcopy support of color Okidata printers was added to SCRDMP by New Mexico State University (contributed by Steve McGee). All these routines are on the second UNIDATA diskette. User-contributed bug fixes and additions to routines are screened by User Support and included where possible. In the future, user-contributed code will be available via anonymous FTP to sites with Internet access.

### Highlights of Unidata McIDAS 5.20

- The cross-sectional analysis routine, XSECT, has been significantly enhanced and documented since the TESTCODE version released with Unidata McIDAS 5.00.

- File storage on multiple disk drives previously handled with the DRIVE.LTR mechanism (described in the McIDAS Tips), is now being managed by the file redirection utility, REDIRECT.

- The 5.00 script processor, RUN, has been replaced by the TESTCODE BASIC-like interpreter of the same name.

- AREA statistics provided by ASTAT have had a number of enhancements even though the routine remains as TESTCODE.

- Two new rain-rate estimation routines, ARK (based on Arkin, 1979) and IRT (based on Goodman, et al, 1990), are now being distributed by Unidata as TESTCODE.

- ALOOP, the satellite loop-loader routine, has been enhanced to support specifications of enhancements, the display of NORTELed images, earth-centered loads by latitude and longitude, selectable sectors that can be quickly reloaded from raster files, and user-defined color look-up tables.

- CLUT, which generates custom color look-up tables, will remain in TESTCODE until it is replaced by new routines being developed by SSEC under WetNet funding.

- DOS, a Unidata-added routine, no longer interferes with graphic frame color maps. (DOS is a special version of SESSN, the SSEC OS/2 session initiator; it can be used to automate the generation of raster displays useful in Unidata Campus Weather Display systems.)

- We again included surface and upper-air plotting and contouring macros (SPC, SCC, UPC, and UCC) that allow sites to plot analyses in default conformal projections. These routines will eventually disappear when SYSKEY (the SSEC facility that, among other things, allows users to setup default plotting projections) is fully implemented.
Unidata McIDAS Tips

Tom Yoksas

Unidata occasionally publishes, via electronic mail, a file containing tips on how to use Unidata McIDAS. The file is disseminated on NSFnet and OMNET to all members of the Unidata McIDAS users list. If you do not receive the email tips column and wish to have past tips, please contact Unidata User Support (support@unidata.ucar.edu). Also contact them if you wish to have your name added to the email list.

Since our last newsletter, I have sent out 26 more tips:

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### Acronyms and Terms

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<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AIX</td>
<td>Advanced Interactive Executive; IBM's version of UNIX.</td>
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<td>ASOS</td>
<td>Automated Surface Observing System.</td>
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<td>AWIPS</td>
<td>Advanced Weather Interactive Processing System; an NWS program.</td>
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<tr>
<td>BASIC</td>
<td>A programming language.</td>
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<tr>
<td>C</td>
<td>A programming language used extensively in systems software and scientific program applications. UNIX is written in C.</td>
</tr>
<tr>
<td>C++</td>
<td>A programming language.</td>
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<tr>
<td>CAPE</td>
<td>Convection and Precipitation/Electrification Experiment.</td>
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<td>CD</td>
<td>Compact disc.</td>
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<tr>
<td>CD-ROM</td>
<td>Compact disc with read-only memory.</td>
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<td>CDF</td>
<td>Common Data Format; a software package for storing data sets developed by NASA's Space Science Data Center.</td>
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<tr>
<td>COMET</td>
<td>Cooperative Program for Operational Meteorology, Education, and Training; a joint effort of UCAR and National Oceanic and Atmospheric Administration.</td>
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<tr>
<td>DEC</td>
<td>Digital Equipment Corporation.</td>
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<td>DOS</td>
<td>Disk Operating System; a type of operating system used by personal computers; there are several types from different vendors, e.g., Microsoft's Corp. MSDOS.</td>
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ECMWF  European Centre for Medium-range Weather Forecasting.

email  Any electronic mail system.

file server  A node on a local area network that provides file-storage and file-access facilities to other network nodes. At the UPC, the Sun computer nicknamed groucho acts as a file server to IBM's, DEC VAXstations, and Sun workstations.

FORTRAN  (For formula translation.) A scientific programming language developed by IBM in the 1950s; used to create some of the graphics and analysis programs common to the Unidata program.

FSL  Forecast Systems Laboratory, part of NOAA's Environmental Research Laboratory.

FTP  File transfer protocol; a method of transferring files electronically that can be implemented on a variety of computers. It is an applications-level protocol based on TCP/IP.

GEMPAK  General Meteorological Package; an analysis and display package developed for meteorological data by the Severe Storms Branch of the NASA Goddard Space Flight Center.

GKS  Graphic Kernel System; a computer graphics standard.

GOES  Geostationary Operational Environmental Satellite; a NOAA weather satellite.

GUISE  Group for Unidata Interface Software Exploration; a working committee of people interested in helping design a uniform applications interface for the SDM.

IEEE  Institute of Electrical and Electronics Engineers.

ISSPAN  Information Stream Project for AWIPS/NOAAport.

LDM  Unidata's Local Data Management software; part of the Unidata Program Center's Scientific Data Management (SDM) software system. The LDM builds a local archive of data collected from various sources. The LDM ingests and formats incoming data and allows access to that data by multiple workstations. The computers used by employ either UNIX or VMS operating systems.

LDM Connection  Unidata software that creates Unidata McIDAS files from non-McIDAS data streams captured by the Unidata LDM.

McIDAS  Man-Computer Interactive Data Access System. A computer graphics software package for analyzing and displaying meteorological data; created by the University of Wisconsin-Madison's SSEC. The original McIDAS program runs on mainframes. The Unidata McIDAS version was designed to Unidata specifications by the SSEC; it runs on IBM PS/2-class computers and is distributed by Unidata.

METEOSAT  Meteorological satellite, European.

MSDOS  Microsoft Disk Operating System; an operating system for personal computers developed by Microsoft Corporation and adopted by IBM for its PCs.

NASA  National Aeronautics and Space Administration.

NCAR  National Center for Atmospheric Research, which is governed by UCAR.

NCDC  National Climatic Data Center.

NESDIS  National Environmental Satellite, Data and Information Service; a program of NOAA.

netCDF  A data-access method developed by Unidata and adopted as a Unidata standard; the method is self-describing (the file includes information defining the data it contains) and network transparent (it is in a form that can be access by computers regardless of how they store integers, characters, and floating-point numbers).

NEXRAD  Next Generation Weather Radars.

NIDS  NEXRAD Information Dissemination Service.

NMC  National Meteorological Center.

NOAA  National Oceanic and Atmospheric Administration.
A broadcast communication system planned by NOAA to link AWIPS sites; its function is to provide real-time environmental data to NOAA (and other) users.

National Science Foundation.

A national computer network established by NSF and managed by the University of Michigan and MERIT, Inc. NSFnet is part of the Internet.

National Weather Service.

A multitasking operating system developed by IBM for its PC-class computers; required by Unidata McIDAS.

Personal computer. An abbreviation sometimes used to refer generically to any personal computer, and at other times used to refer to the range of IBM personal computer and to IBM-compatible machines from other vendors.

Programmer's Hierarchical Interactive Graphics System.

Portable Operating System Interface based on UNIX, a computer operating system adopted as a standard by the IEEE.

Program for Regional Observing and Forecasting Services, a NOAA program.

An IBM personal computer.

Read-only memory, a type of computer memory.

Unidata's Scientific Data Management software system; a software package for capturing and displaying scientific data that has been broadcast by satellite; runs on UNIX systems and includes the Unidata LDM and netCDF software as well as Purdue University WXP applications.

University of Wisconsin-Madison's Space Science and Engineering Center; designer of the McIDAS and Unidata McIDAS software.

Stormscale Operational and Research Meteorology Program, now the U.S. Weather Research Program.

University Corporation for Atmospheric Research. A nonprofit corporation comprising a consortium of universities involved with atmospheric research; among their responsibilities are overseeing NCAR. The Unidata Program Center is managed by UCAR's Projects Office.

DEC's trade name for its version of Berkeley UNIX 4.2

A computer operating system developed by AT&T and modified extensively by the University of California, Berkeley. Berkeley UNIX is one of the operating systems supported by the UPC.

Unidata Program Center; part of UCAR.

A minicomputer series manufactured by DEC.

A computer operating system developed by the Digital Equipment Corporation.

The ability to display simultaneously a collection of materials (graphics or different parts of text from the same document) on a computer screen.

World Meteorological Organization.

Purdue University's Weather Processor software for analyzing and displaying meteorological data; this package has been ported to run with the SDM.

X Window System, a windowing software package developed and distributed by the Massachusetts Institute of Technology.

A version of GKS that runs in the X Window environment.

A software package for displaying image data being developed by MacDonald Dettwiler & Associates under a Unidata contract.