Unidata Strategic Advisory Committee Meeting

20-21 May 2014

San Francisco State University
Blakeslee Room, Thornton Hall
San Francisco, California

Staff Status Reports

- ACADIS - Arms, Ramamurthy, Weber
- Admin
  - Equipment Awards - Mitchell, Ramamurthy
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- Python - Arms, Chastang, Domenico, Fisher, May, Rew
- Rosetta - Arms, Oxelson, Weber
- Support - Yoksas, Oxelson
- THREDDS - Caron, Arms, Davis, May, Ward-Garrison
- Unidata Outreach Progress - Domenico
- Comprehensive Metrics Data

ACADIS

Status Report: September 2013 - March 2014

Sean Arms
Mohan Ramamurthy
Jeff Weber

Strategic Focus Areas

The *ACADIS* group's work supports the following Unidata funding proposal focus areas:

- **Enable widespread, efficient access to geoscience data**
  The ACADIS Data Portal is creating an effective way to access Arctic data
- **Develop and provide open-source tools for effective use of geoscience data**
  Unidata is creating an ASCII to netCDF translation tool that will allow a large amount of Arctic data to be translated to netCDF CF
- **Provide cyberinfrastructure leadership in data discovery, access, and use**
  ACADIS is an exemplar for data portals
- **Build, support, and advocate for the diverse geoscience community**
  ACADIS continues to champion useful access to data holdings

Background Information

The new Advanced Cooperative Arctic Data and Information Service (ACADIS) is a joint effort by the National Snow and Ice Data Center (NSIDC), the University Corporation for Atmospheric Research (UCAR), UNIDATA, and the National Center for Atmospheric Research (NCAR) to provide data archival, preservation and access for all projects funded by NSF's Arctic Science Program (ARC). ACADIS builds on the CADIS project that supported the Arctic Observing Network (AON). This portal will continue to be a gateway for AON data and is being expanded to include all NSF ARC data.

Activities Since the Last Status Report

- Unidata is moving forward with our contribution to homogenize the data for ease of re-use by the larger scientific comunity. This is being addressed with the Rosetta project, Rosetta's status report can be found here
- Another NSF Program Manager "site visit" will take place the week of May 5th and this will also include a "blue ribbon" panel for suggestions and insight.

Relevant Metrics

- ACADIS now holds metadata and data, or metadata alone (with link to external data), for about 30 AON projects
- ~30,000 files
- ~125 Gigabytes

- ACADIS Home Page

Prepared *March 2014*

The 2014 Unidata Equipment Awards Program

Sponsored by the National Science Foundation

The NSF provides the Unidata Program Center up to $100k in equipment grant funds each year. In alignment with the Unidata 2014 proposal, the Equipment Awards Program is designed to broaden participation and promote the use of Unidata tools and systems (e.g., THREDDS, NetCDF, IDV, GIS connections) to support education and research on various aspects of climate studies (e.g., diagnostics, change and impacts), by providing grants to be used in the procurement of new computers and equipment including upgrades to existing classroom and laboratory equipment.

This year, special consideration will be given to proposals that include one or more of the following:

- Installation of a prototype AWIPS II standalone EDEX server and CAVE client, coupled with the Unidata LDM, to test data ingest and display both locally, and using the CAVE thin client to connect to remote servers
- Implementation of or pilot projects with remotely-accessible storage systems for geoscience data (“cloud-based storage”)
- Implementation of or pilot projects with remote server-based data analysis or visualization systems (“cloud-based analysis”)

A Request for Proposals was sent out on January 15, 2014 with a March 14 submission deadline. A review panel met on April 1 at the Unidata Program Center to review the 13 proposals that were received. The Panel recommended that seven proposals be funded. The following proposals were awarded grants:

Creighton University - “A Proposal to Upgrade the Creighton University Meteorology Lab to Enhance Operational Meteorology Education” - Dr. Timothy J. Wagner

Embry-Riddle Aeronautical University - “Linux Server in the Cloud” - Dr. Curtis N. James

Metropolitan State University of Denver - "Enriching Meteorological Education in Undergraduate Courses Using Real-Time, High Resolution Datasets at Metropolitan State University of Denver" - Dr. Sam Ng

Pennsylvania State University - “AWIPS II Prototype Testing Equipment for a Standalone Experimental EDEX/LDM/CAVE System for Penn State and Unidata” - Dr. Charles F. Pavloski

San Jose State University - “Acquisition of AWIPS II EDEX Server and CAVE Client in a Synoptic Weather and Analysis Classroom” - Dr. Sen Chiao

University of Iowa - "Improving Visualization and Access to Radar Data Using Unidata Tools for Flood Prediction and Mangement" - Dr. Ibrahim Demir

University of Missouri - "Increasing Access to AWIPS II in the Unidata Community and at the University of Missouri" - Dr. Patrick S. Market, Dr. Bohumil Svoma, Dr. Anthony R. Lupo, and Dr. Neil I. Fox

Congratulations to all of the recipients and a special thank you to the Review Panel and the NSF for making the Equipment Awards program possible.

UCAR COMMUNITY PROGRAMS

The Unidata Program Center is a member of the UCAR Community Programs, is managed by the University Corporation for Atmospheric Research, and is funded by the National Science Foundation.

AWIPS II

Status Report: October 2013 to May 2014

Michael James

AWIPS II Beta Release Progress

The development baseline AWIPS II source code is maintained in a git repository on National Weather Service servers. Unidata has been allowed access to this repository thanks to our partnership with NCEP. The NCEP 14.2.1 source code branch is the baseline for the upcoming Unidata AWIPS II beta release.

Release Schedule

Going forward, the supported operating system for AWIPS II is 64-bit Linux (Red Hat, CentOS, Fedora Core). Full system requirements for server, client and development deployments are available on the Unidata AWIPS II software page.

Given current project progress, the next expected release date for Unidata AWIPS II is **July 2014**.

Release Checklist

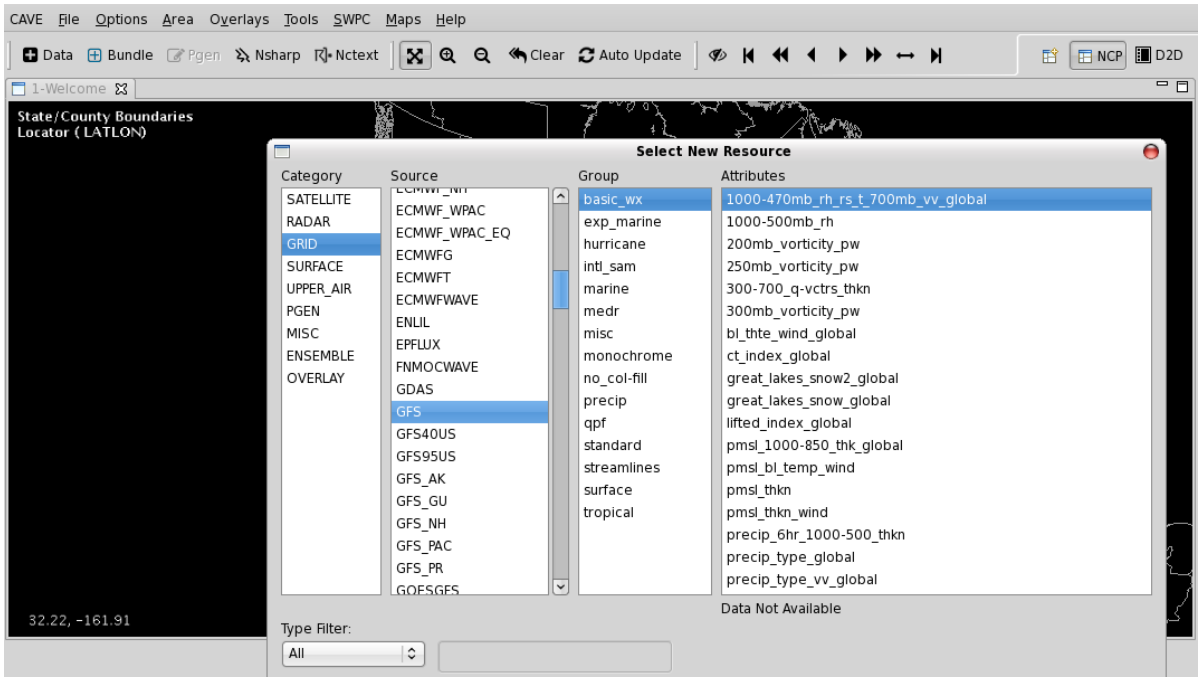
1. connect to AWIPS II development baseline git repository and gerrit (**done**)
2. branch remotes/origin/ncep_14.2.1 to upc for next beta release (**done**)
3. CAVE UI updates, map and menu reconfiguration. (**in progress**)
4. database updates for new grid, radar, scatterometer products (**in progress**)
5. mute alertviz and prevent from adding to startup scripts on install
6. GEMPAK 7 should be able to read from remote HDF5/PyPIES, Postgres
7. **build RPMs** for all components.
8. test test test RPMs for install and runtime errors on various Linux systems.
9. release Unidata AWIPS II 14.2.1 beta to the EDU community and gather their thoughts once again.

Recent Work

The National Centers Perspective (NCP) will be the primary GUI offered and supported by Unidata, with the user having the ability to switch into different perspectives (D2D, Hydro, GFE, etc.), but the extent of UPC support for function of these other perspectives is still uncertain.

Difference between Unidata CAVE NCP and NCEP CAVE NCP

NCEP CAVE NCP is designed to run continuously on a forecaster's workstation, and as delivered in the NCEP 14.2.1 branch, takes a significantly long time to load, freezing the splash dialog as it loads, finally alerting the user with a large red error message immediately on startup. This is operational software with heavy startup cost and we need to deliver it to a student / research environment where click-to-load does not take 30 seconds (10 seconds loading is an extremely long time for a piece of desktop software).



The Unidata AWIPS II release has some modification to work around these slow startup times, as well as updates to the user interface:

1. A number of NCEP-requires geographic areas, which require slow pre-rendering, have been removed from startup, shortening the load time of CAVE by half. The geographic projections offered in the default suite of **Area** in the CAVE GUI offer enough.
2. The D2D progressive-disclosure default base maps, which shows county outlines when zoomed in far enough, but not zoomed out.
3. The Data Resource Legend was moved from bottom-right to top-left to better work as a kind of "loaded inventory" for map-maker end users.
4. The names given to data and groups of data in the AWIPS II framework (RBD, SPF, SPF Group, Display, View, Editor, Map) have been simplified to more understandable terms such as Data, Bundle, Map.
5. Use of the **Font Awesome** bootstrap icon set, an update over the dated two-tone NMAP2 icons.

EDEX Data Server Engineering

The standalone EDEX server at Unidata data throughput is approximately 120 GB/day, including the global 0.5 degree resolution GFS and GEFS (via CONDUIT) and the full nationwide suite of level 3 NEXRAD products. The default NWS configuration for EDEX can not support such data throughput. I found a way involving solid state hard drives and tweaks made to the EDEX data decoder threads.

Data Products Added

1 km national NEXRAD composite for DHR, DVL, HHC and EET are supported in Unidata AWIPS II as McIDAS Area files. Fixed-domain WRF-NMM output in grib2 has also been added, and support for floating-domain WRF grids is being investigated.

Cloud Activities

Status Report: Oct 2013 - May 2014

Tom Yoksas, Mike Schmidt, Mohan Ramamurthy, Michael James, Ward Fisher

Strategic Focus Areas

Unidata has a number of projects aimed at evaluating the capabilities and costs of providing data services from Cloud-based systems. These Cloud activities support the following Unidata funding proposal focus areas:

1. **Enable widespread, efficient access to geoscience data**

   Unidata's cloud activities are exploring ways in which the community can take advantage of Cloud capabilities for improved access to geoscience data.

2. **Develop and provide open-source tools for effective use of geoscience data**

   Efforts are focused on how Unidata's existing open source tools will perform on cloud systems and how to evolve these systems to better take advantage of the features of cloud systems.

3. **Provide cyberinfrastructure leadership in data discovery, access, and use**

   Working with international groups

4. **Build, support, and advocate for the diverse geoscience community**

   Partnering with agencies and other groups to explore how cloud capabilities can be used to improve the capabilities of the entire geoscience community.

Status of Current Projects

Demonstration System Generating Internet Data Distribution (IDD) Content

Unidata migrated the generation of NEXRAD Level 3 composite products from our ***motherlode*** data server to our Amazon EC-2 virtual machine (VM). We also migrated generation of Unidata-Wisconsin datastream image products from a very old Solaris machine housed in the University of Wisconsin (UW) Space Science and Engineering Center (SSEC) Data Center to the same Amazon EC-2 VM. The transition to use of the products created in EC-2 was made on the evening of March 22, 2014.

- NEXRAD Level 3 Composites

  New 1km resolution national composite GINI images include Digital Hybrid Reflectivity (DHR), Digital Vertically Integrated Liquid (DVL), Enhanced Echo Tops (EET), and Hybrid Hydrometeor Classification (HHC). The generation of legacy products are also maintained: 1km Base Reflectivity (N0R), 2km One Hour Precipitation (N1P), and 4km Storm Total Precipitation (NTP). These products are created every five minutes and are available on the Unidata IDD FNEXRAD feed. More detailed product descriptions, example images, and LDM pattern actions can be found on the Unidata IDD Radar Products page.

- Unidata-Wisconsin Satellite Image Sectors

  As part of the migration to use of Amazon EC-2 resources, we took the opportunity to enhance the product offerings in the Unidata-Wisconsin (IDD feedtype UNIWISC (aka MCIDAS)) datastream. The following represents the set of UNIWISC products as of March 22, 2014:

Product	Res	Form	Status
GOES-East Visible	4 km	PNGA	existing product
GOES-East Shortwave Infrared	4 km	PNGA	existing product
GOES-East Water Vapor	4 km	PNGA	existing product
GOES-East Thermal Infrared	4 km	PNGA	existing product
GOES-East Longwave Infrared (CO2)	4 km	PNGA	existing product
GOES-West Visible	4 km	PNGA	existing product
GOES-West Shortware Infrared	4 km	PNGA	existing product
GOES-West Water Vapor	4 km	PNGA	existing product
GOES-West Thermal Infrared	4 km	PNGA	existing product
GOES-West Longwave Infrared (CO2)	4 km	PNGA	existing product
Antarctic Thermal Infrared composite	5 km	PNGA	existing product
Manually digitized radar	10 km	PNGA	existing product
Global Mollweide Water Vapor composite	30 km	PNGA	higher resolution
Global Mollweide Thermal Infrared composite	30 km	PNGA	higher resolution
GOES-East HiRes Visible	1 km	PNGA	**new** product
GOES-East/West NH Visible composite	10 km	PNGA	**new** product
GOES-East/West NH Shortwave Infrared composite	10 km	PNGA	**new** product
GOES-East/West NH Water Vapor composite	10 km	PNGA	**new** product
GOES-East/West NH Thermal Infrared composite	10 km	PNGA	**new** product
GOES-East/West NH Longwave Infrared composite	10 km	PNGA	**new** product
Arctic Visible composite	4 km	PNGA	**new** product
Arctic Shortwave Infrared composite	4 km	PNGA	**new** product
Arctic Water Vapor composite	4 km	PNGA	**new** product
Arctic Thermal Infrared composite	4 km	PNGA	**new** product
Arctic Longwave Infrared composite	4 km	PNGA	**new** product
Antarctic Visible composite	5 km	PNGA	**new** product
Antarctic Water Vapor composite	5 km	PNGA	**new** product
Global Rectilinear Water Vapor composite	20 km	PNGA	**new** product
Global Rectilinear Thermal Infrared composite	20 km	PNGA	**new** product

  Notes:
  - update cycles vary by product
  - all images are distributed in a PNG-compressed McIDAS AREA (PNGA) format
  - Arctic and Antarctic composites are provided by the UW/SSEC Antarctic Meteorological Research Center (AMRC)
  - Global WV and IR composites are provided by the UW/SSEC Data Center
  - Detailed information including sample displays of these satellite image sectors can be found on the Unidata-Wisconsin Datastream Satellite Imagery page.

Comment:

The most recent Amazon billing for the EC-2 VM suggest that operating these product generation services will cost on the order of $350/month. This estimate includes the cost for the VM itself, and the movement of the products out of EC-2 by LDM transfers to accumulators for the top level IDD relay cluster, idd.unidata.ucar.edu, operated by Unidata.

Application Streaming of IDV: Microsoft Research Award of Azure Resources

Overview

This project is evaluating *application streaming* as a strategy for making the IDV available to a new generation of users and computing platforms. It is using the Microsoft Azure cloud platform to look at delivering cloud-based IDV-as-a-service instances to our user community on an as-needed basis. The result will be a better understanding of how the IDV works in cloud environments and any changes that might improve that performance.

This project also serves as a pilot program; with it we will further develop expertise related to cloud computing and application streaming. This will allow us to extend cloud-based software offerings beyond the IDV to other Unidata projects.

Issues

- How best to adapt mouse-driven interfaces to a touch-based interface, while minimizing the need

to re-engineer any part of the software package.
- Evaluation of bandwidth requirements for acceptable IDV use.
- How to make this transition *seamless* and *painless* to our user community.
- Evaluate the extent to which we can use "off-the-shelf" technology and under what circumstances do we need to create our own protocols and packages.

Current Status

Currently, we are able to instantiate cloud-based IDV instances, which are then streamed via existing remote-desktop protocols to iOS devices. Nothing in the existing technology limits this to iOS devices, however; those are simply the devices on hand for testing.

The next step will be to automate the creation and provisioning of these IDV instances, so that they might be generated dynamically and provided to the end user.

Open Weather and Climate Service: “Servers & NCEP” Experiment

The goal of the “Servers @ NCEP” project is to develop a time-limited (approximately 2 year), open, community-operated experimental prototype capability to receive unique, high-volume Numerical Weather Prediction (NWP) data from the National Centers for Environmental Prediction (NCEP) supercomputers in Reston, VA sufficient to enable new value-added processing by the community that was otherwise not possible.

Unidata is participating in the experiment, and will be installing computing equipment in the community data center co-located with NCEP. Our goal is to use the experimental setup to investigate the feasibility of data subsetting and server-side processing techniques that could enable us to deliver a wider range of data to university researchers and educators.

Partners in the experiment are in the process of establishing the necessary business, legal, and technical procedures and instruments. (Unidata is currently the only non-commercial organization that has expressed its intent to participate in the experiment.) When access to the NCEP data becomes available, the experiment will establish a high-volume data feed; the project partners will work with NCEP to determine which high-volume datasets are of interest in order to enable experiments and use by the project partners.

A slightly more detailed description of the project's history and progress is available on Unidata's OWCS Project Page.

Cloning the IDD Data Server (Motherlode) Capabilities

This project has two main goals. First, it will focus on the core datastreams available on the IDD and gather the minimal set of configuration needed by the LDM, TDS, and ADDE to distribute and provide data services for that data. Second, it will package the configuration files needed in a way that can easily be implemented at University sites and on systems running on cloud platforms.

Community Services

Status Report: October 2013 - March 2014

Doug Dirks, Jeff Weber, Joshua Young

Strategic Focus Areas

Community Services supports the following goals described in Unidata Strategic Plan:

1. **Enable widespread, efficient access to geoscience data**
   We monitor and collaborate with data sources to stay apprised of impending changes and to advocate for the needs of our user community. We provide user workshops, tutorials, and community workshops to help build supportive relationships between community members.
2. **Develop and provide open-source tools for effective use of geoscience data**
   We promote Unidata tools and software for multi-disciplinary use, with an eye toward finding additional research and educational communities that can benefit from our work.
3. **Provide cyberinfrastructure leadership in data discovery, access, and use**
   We work with government and industry data providers to secure access to data for Unidata community members.
4. **Build, support, and advocate for the diverse geoscience community**
   We coordinate with our governing committees to find ways to expand Unidata's community participation. We use our web site, electronic newsletters, and social media to keep community members informed about enhanced data services, software tools, and cyberinfrastructure.

   We participate in UCAR/NCAR and NSF projects for underrepresnted populations and minority communities (SOARS, AIHEC, outreach to HBCUs). We provide services and tools to facilitate education and research in diverse communities. We work to broaden the Unidata community by participating in student and professional conferences.

Activities Since the Last Status Report

News@Unidata blog

Posts to the News@Unidata blog appear regularly, but not on a specific schedule. Some highlights:

- Using METOC Geospatial Intelligence in anti-Piracy Operations
- New IDV Tutorial Videos: the Mapes IDV Collection
- A Nice Global Weather Visualization in your Browser
- Unidata Funding Proposal Approved by National Science Foundation
- Unidata Program Center Welcomes Christian Ward-Garrison
- Unidata Program Center Welcomes Ryan May
- AMS 2014 Conference Highlights from the Unidata Staff
- Software release information
- Community job postings
- Community meetings and other announcements

Community Outreach and Services

- Distributon of Lightning data from Earth Networks Total Lightning Data is under discussion
- Coordinating with Peter Neilley, The Weather Companies, and Ben Kyger, NCEP, about the Open Weather and Climate Service and how we might work cooperatively to provide a server at Reston,

VA that could make high-resoluton datasets that are in demand, but not currently available, to our community. This is an exploratory project where Peter Neilley is the lead. This service will not supersede CONDUIT. (For more information, see the relevant slides from the August 2013 NWS Partners meeting.)
- Coordinating with ESRL/GSD on distribution of HRRR, FIM, and HIWPP data
- Participate in weekly AWIPS II meetings with NCEP Headquarters and NCEP Centers technical staff discussing progress and technical issues
- Participating in the AMS's Committee to Improve Climate Change Communcations (CICCC)
- Continue to mentor SOARS proteges, and serve on the SOARS selection committee.
- Actively engaged in the Education Working Group at UCAR to explore novel techniques and applications for the educational community
- Attendance and active participation at the AMS annual meeting and student conference in Atlanta, GA. and the AGU in San Fransico.
- Planning for the second NCAR & UCAR Research and Partnerships Summit to explore potential collaborations with the private weather enterprise

Social Media Outreach Activities

- We have continued to update the Facebook and Twitter feeds.
- We have begun publishing short videos/screencasts on the Unidata YouTube channel.

Planned Activities

Ongoing Activities

We plan to continue the following activities:

- NAWIPS migration to AWIPS II, including the overall AWIPS II project
- Ongoing development of news articles for publication through News@Unidata
- Continue to support and contribute to governing committees
- Seminars
- Outreach
- Engagement with professional societies
- Triennial workshop planning and coordination

New Activities

We plan to organize or take part in the following:

- AGU annual meeting December 2014 - presentation(s)
- Booth at AMS 2014 January annual meeting
- Table at AMS 2014 January student conference

Relevant Metrics

Statistics from the Community pages on the Unidata web site. Comparisons are made with statistics from the previous six-month period.

All Community pages

Most recent six months

- 44,246 unique pageviews (up from 40,223 in previous period)
- 5.3% of total unique pageviews to site (up from 4.9% in previous period)

Top community pages

1. All blog pages

News@Unidata blog and developers' blog
- 29,370 unique pageviews (31,109 in previous period)
- 71% of total community unique pageviews (70% in previous period)

2. Community pages (www.unidata.ucar.edu/community/)
   Information about Unidata community events and governance
   - 3424 unique pageviews (2750 in previous period)
   - 10.4% of total community unique pageviews (6.2% in previous period)
3. About Unidata (www.unidata.ucar.edu/about/)
   Information about Unidata
   - 4167 unique pageviews (4082 in previous period)
   - 10.0% of total community unique pageviews (9.2% in previous period)
4. Events pages (www.unidata.ucar.edu/events/)
   Information about training courses and other events
   - 2522 unique pageviews (4893 in previous period)
   - 6.1% of total community unique pageviews (11% in previous period)

Social media statistics, March 5, 2014

1. # of Twitter followers: 330 (288 in October 2013)
2. # of Facebook followers: 290 (257 in October 2013)

Prepared March 2014

IDV with RAMADDA

Status Report: September 2013 - April 2014

Yuan Ho, Julien Chastang, Sean Arms

This report updates the status of Unidata's Integrated Data Viewer (IDV) development efforts since the last report (September, 2013). In the last six months, the IDV project reached a number of important milestones including the Java 7 / Java3D 1.6 transition, an early prototype of GEMPAK upper air format viewing capability, and a well attended Atlanta 2013 AMS IDV workshop. Moreover, there were several important display changes aimed at improving the user experience and system efficiency.

Strategic Focus Areas

The *IDV* group's work supports the following Unidata funding proposal focus areas:

1. **Enable widespread, efficient access to geoscience data**
   The IDV is a state of the art geoscience visualization application. It gives users the ability to view and analyze a rich set of geoscience data, including real time data, in a seamless and integrated fashion. This analysis is captured in IDV bundles. RAMADDA is a content management system and service specifically tailored towards the sharing and distribution of IDV bundles facilitating distribution of scientific data and analysis.
2. **Develop and provide open-source tools for effective use of geoscience data**
   The IDV has been an open-source project for several years. The IDV is available on the github version control platform for greater open-source collaboration. The IDV provides users the unparalleled ability to analyze, integrate, and visualize heterogeneous geoscience data in two, three, and four dimensions. The IDV coupled with RAMADDA enables geoscience specialists the capability to share and collaborate their IDV analysis via social scientific networks.
3. **Provide cyberinfrastructure leadership in data discovery, access, and use**
   RAMADDA allows geoscience specialists the ability to search and publish their IDV bundles on-line. Unidata's RAMADDA installation enables the IDV team to communicate more effectively to our users concerning their IDV issues. Specifically, during support ticket conversations, the IDV team requests that users upload pertinent data to RAMADDA for analysis. The IDV team also takes advantage of RAMADDA to share instructional IDV screencasts with users.
4. **Build, support, and advocate for the diverse geoscience community**
   Unidata offers yearly multi-day training and occasionally regional workshops for IDV and RAMADDA. The IDV coupled with RAMADDA enables our earth science community partners to distribute geoscience data and metadata through web-based technologies thereby fostering scientific collaborations. Moreover, the IDV's ability to share bundles through RAMADDA creates a scientific social and collaborative network for the geoscience community.

Activities Since the Last Status Report

System Changes

Java 7 / Java3D 1.6 migration: Java 7 / Java3D 1.6 migration: Java 6 reached end-of-life in 2013, and Java 3D < 1.6, JOGL < 2.0 are no longer supported. Because of these changes and to take advantage of new Java 7 features, we migrated the IDV to Java 7 and Java3D 1.6. This process was somewhat difficult and time consuming on Apple OS X where we transitioned from an Apple or Oracle Java Runtime Environment. There were three steps involved in this effort:

- Collaborated with the Java OpenGL (JOGL) open-source community to resolve issues in Java3D 1.6 on the Apple OS X operating system. In particular, we reported multi-tab rendering and deadlock problems and worked with the community to resolve them.

- Identified and resolved Java Swing (non-Java3D) user interface issues such as font antialiasing and look and feel problems.
- Modified and enhanced our install4j workflow to deploy the IDV with Java 7.

This transition ensures a smooth collaboration with the netCDF-Java project which must make use of Java 7 for improved I/O. Moreover, this migration also benefits the VisAD project (the scientific 3D rendering library used by the IDV) and any project that leverages VisAD. In sum, these improvement will benefit the IDV, McIDAS-V, and VisAD user communities. Lastly, this work will ensure the IDV will continue to work on Mac OS X, Linux, Windows and Solaris platforms for the foreseeable future.

Latest netCDF-Java Version: 4.3.21: Please see the netCDF-Java and TDS update item for more details on these changes.

Install4J deployment workflow improvements: Improved the deployment workflow of the IDV via Install4J. Users are now presented with a current installation warning after they have selected a directory where the IDV may be already installed. When a current installation directory is detected and the user does not want to overwrite, they are presented with a new directory.

IDV Memory Usage: We have added a command line argument to disable explicit garbage collection within the IDV code. As the Java Virtual Machine evolves its already sophisticated memory management algorithms, it is simply best to let Java manage its own memory.

Display Changes

New ADDE Image Chooser: Added an image preview panel in the data subset window, and moved the image property widgets from the original chooser to the Advanced panel in the subset window. The result is a more intuitive and efficient user experience when selecting the area of interest before creating the final display.

Progressive Resolution (PR): This capability is a new advanced feature in the IDV. When loading large datasets with PR enabled, the IDV calculates the resolution of the map view window, dynamically sets the magnification, and loads sufficient data to generate the image. The quality of the image is not compromised. The result of this improvement is more efficient use of both client and server system resources thereby reducing network traffic significantly.

Match Display Area (MD): When the user selects this option in the data source property or subset panel, the IDV will automatically spatially subset to match the display area in the view window. This feature will allow IDV users to switch to new areas of interest by simply selecting the new projection.

Data Changes

GEMPAK Upper Air format Support: Satisfying a request from the September 2013 User Committee Executive Session, the IDV and netCDF-Java groups collaborated to arrive at an early prototype GEMPAK upper air data format IDV display capability.

IDV and RAMADDA Training and Conference Attendance

- Produced three new IDV training videos:
    - How to Navigate in the IDV Display
    - Save and Restore your Work with Bundles
    - Three-Dimensional Parcel Trajectories
- Brian Mapes, University of Miami Professor of Meteorology & Physical Oceanography prepared three videos available on Unidata's YouTube channel. The videos concern the Mapes IDV Collection, which is a curated compilation of IDV bundles and templates.

Presented a well attended an Atlanta AMS 2014 Short Course on Integrating WRF and Other Model Output with Remote and In-situ Observational Datasets using Unidata's Integrated Data Viewer (IDV)

RAMADDA

No activity from Unidata although the ramadda.org team continues to make progress on RAMADDA.

Planned Activities

New Activities

Preparing for the IDV Regional Workshop at Miami University on April 18-19.

Relevant Metrics

The number of both casual and regular IDV users is increasing. For example, in October 2012, there were 596 IDV users starting the IDV more than 5 times per month compared with 651 users for the same period in 2013. In November 2012, there were 88 IDV users starting the IDV more than 30 times per month compared with 91 users for the same period in 2013. Notably, there are large numbers of new IDV users are from China. Readers can find the raw metrics at http://www.unidata.ucar.edu/software/idv/logging/left.html.

In the area of greater collaborative development, since the migration of the IDV project to github, we have accepted 65 "pull requests" or code contributions from internal and external collaborators.

In the area of online IDV training, the Youtube IDV instructional videos have been viewed a total of ~2000 times or roughly a 3 fold increase from six months ago.

Prepared March 2014

International Activities and Collaborations

Status Report: October 2013 - March 2014

Tom Yoksas

Strategic Focus Areas

The International Activities and Collaboration group's work supports the following Unidata funding proposal focus areas:

1. Develop and provide open-source tools for effective use of geoscience data
   The majority of tools downloadable from Unidata are available free-of-charge to everyone (the exception being McIDAS-X).
2. Provide cyberinfrastructure leadership in data discovery, access, and use
   Activities of the Unidata Program Center are routinely provided to the worldwide atmospheric science community. Strategic partnerships with leading organizations in other countries minimize the impact on UPC staff.
3. Build, support, and advocate for the diverse geoscience community
   By informing the international atmospheric science community of the products, data and services available in the Unidata Program, an extended community has been enabled.
   Non-U.S. users of products available from Unidata reflect, in a number of cases, minority constituencies in the U.S. atmospheric science community.

Activities Since the Last Status Report

There are no significant new activities since the last status report.

The UCAR African Initiative transfer of technologies developed during the Google-funded Meningitis project to the African Centre of Meteorological Application for Development (ACMAD) continues at a low level.

Prior International Activities

Unidata's Africa-related international outreach activities have largely focused on its role in the UCAR Africa Initiative (AI) which officially ended on April 15. The UPC is currently involved in transfer of technologies developed during the UCAR Africa Initiative project to the African Centre of Meteorological Application for Development (ACMAD) which is located in Niamey, Niger. The following are some highlights of the UPC's involvement in the UCAR Africa Initiative:

- The IDV was used to generate displays of forecast relative humidity that is created using TIGGE ensemble data from ECMWF (via the NCAR/CISL TIGGE repository). The 2013 products and data being made available in the RAMADDA instance on motherlode.ucar.edu can be found in:

  Motherlode Data Server

  RAMADDA Data Repository

  Projects -> Africa Initiative -> Data -> 2013 Prediction Exercise
  -> Areal Coverage
  -> Timeseries
  -> TIGGE Model Ensembles

  - areal distribution of the 50% quantile for RH (which means that each point in the RH field has a 50% probability of being that value or less).

These products have been stored as animated GIFs, individual frames of the animated GIFs, and week 1 and 2 averages.

- probe timeseries plots of QC25, QC50, and QC75 fields for districts (a district is a subdivision of a region which is like a U.S. state) in a select set of countries (Benin, Burkina Faso, Cote D'Ivoire, Nigeria, Senegal, Tchad, and Togo) that are located in the meningitis belt (which is roughly the Sahel) in Africa.

  The locations for the probe time series plots are determined by meningitis ***attack rates*** (number of new cases per week normalized by population) that are reported by the national health service of each country.

- Also made available were the RH and quantile regression fields (in netCDF format) that are created from ECMWF ensembles that are part of TIGGE.

Every other Thursday UCAR/NCAR AI team members (Tom Hopson NCAR/RAL, Raj Pandya formerly of UCAR/Spark, and/or Arnaud Dumont NCAR/RAL) participated in conference calls with WHO, U Lancaster, and African nation stake holders to discuss the forecast of meningitis cases for the upcoming 1-4 weeks (focusing on the next and second weeks).

- The final stage of AI work in Unidata included automating the generation of display products upon receipt of a new forecast file produced in RAL (by Tom Hopson).

  There were a number of challenges that had to be overcome to automate the product generation process:

  - The programmatic use of the IDV

    Yuan was very helpful in making changes/additions to the IDV to enable this. Don Murray has also been contributing expertise to help Yuan in his efforts.

  - Use of RAMADDA to serve display products to the African Decision Information System (ADIS) interface that Arnaud Dumont (NCAR/RAL) created for the project.

    Jeff McWhirter (NASA, UNAVCO) readily implemented enhancements to RAMADDA for this task.

  - Scraping human-generated documents to get the list of districts for which probe time series plots should be generated.

    The issue is that the sort of information being made available to folks reading MS excel spreadsheets or MS word documents needs to be turned into machine-readable documents that can be used in the product generation workflow.

Other activities of note:

- Data from UCAR GOES East/West ingest systems continue to be routinely accessed by international users in North, Central and South America using McIDAS-X, IDV, and McIDAS-V.

- Use of Unidata tools, especially netCDF, the IDV and GEMPAK, continues to grow internationally.

- IDD-Brazil continues to deliver data via the LDM in Africa.

Updated: March 17, 2014

IDD and NOAAPort

Status Report: October 2013 - March 2014

Mike Schmidt, Jeff Weber, Tom Yoksas

Strategic Focus Areas

The *IDD/NOAAPort* group's work supports the following Unidata funding proposal focus areas:

1. Enable widespread, efficient access to geoscience data
   A project like the IDD demonstrates how sites can employ the LDM to move data in their own environments.
2. Develop and provide open-source tools for effective use of geoscience data
   The IDD is powered by the Unidata LDM-6 which is made freely available to all. The Unidata NOAAPort ingest package is being used by a variety of university and non-university community members. Both the LDM and NOAAPort ingest packages are being bundled by Raytheon in AWIPS-II.
3. Provide cyberinfrastructure leadership in data discovery, access, and use
   The community-driven IDDs provide push data services to users an ever increasing community of global educators and researchers
4. Build, support, and advocate for the diverse geoscience community
   Providing access to data in real-time is a fundamental Unidata activity.
   The IDD-Brasil, the South American peer of the North American IDD operated by the UPC, is helping to extend real-time data delivery outside of the U.S. to countries in South America and Africa. The Universidad de Costa Rica is experimenting with relaying data received in the IDD to Colombia.

Activities Since the Last Status Report

Internet Data Distribution (IDD)

- Unidata continues to act as a toplevel relay in NEXRAD Level II data distribution for university sites and others that were receiving data from the MAX GigaPoP that was decommissioned by the NWS. The other toplevel relay sites for Level II data are the ERC (Education and Research Consortium), IRaDS (Integrated Robust Assured Data Services), and Purdue University.

- Unidata is receiving High Resolution Rapid Refresh (**HRRR**) grids (both 2D and 3D fields) in an LDM/IDD feed from NOAA/GSD. These products are available **currently** from the Unidata-operated toplevel IDD relay, **idd.unidata.ucar.edu**. The challenge in making the data routinely available is its large data volume which is on the order of ~8GB for the pressure level output and ~10 GB/hour for the sigma level output. The HRRR is being experimentally served at: http://lead.unidata.ucar.edu/thredds/catalog.html (.xml for machines)

  - Other data sets we are actively exploring with NOAA/GSD/ESRL are:
    - FIM
    - HIWPP

- The UPC continues to relay FNMOC and the CMC data model output directly to the community. FNMOC provides the COAMPS and NAVGEM model output and the CMC provides the GEM model output. Unidata has provided access to these data for the past 8 years, but on a "point-to-point"

basis. GEM model output was converted from GRIB1 to GRIB2 in January. The CMC is now relaying output of there new hi-resolution (15km) GEM model to Unidata.

NOAAPort Data Ingest

- NOAAPort ingest has been functioning well since the NWS transitioned the SBN from DVB-S to DVB-S2 in April/May 2011.

- The NOAAPort ingest package was bundled with the LDM starting in version 6.10. The current LDM releases is 6.11.6.

- Raytheon bundles a modified version LDM-6 with AWIPS-II and is actively managing NOAAPort ingest at a variety of NOAA offices using the Unidata NOAAPort ingest package. Raytheon's LDM modifications are evaluated by the UPC LDM developer and incorporated into Unidata releases when possible

Relevant IDD Metrics

- Approximately **540** machines at **230** sites are running LDM-6 **and** reporting real time statistics to Unidata. Unidata staff routinely assist in the installation of LDM-6 at user sites as a community service.

  A number organizations/projects use the LDM to move substantial amounts of data that do not report statistics to Unidata: NOAA, NASA, USGS, USACE, Governments of Spain, South Korea, private compaines, etc.).

- IDD toplevel relay node, **idd.unidata.ucar.edu**

  The cluster approach to toplevel IDD relay, has been operational at the UPC since early summer 2005.

  The cluster, described in the June 2005 CommunitE-letter article Unidata's IDD Cluster, routinely relays data to more than 700 downstream connections. Data input to the cluster nodes now routinely averages about 15 GB/hr (~0.36 TB/day); average data output from the entire cluster exceeds 1.1 Gbps (~13 TB/day); peak rates routinely exceed 2.2 Gbps (which would be ~24 TB/day if the rate was sustained).

  The following shows a snapshot by feedtype of the data being received on one node of the Unidata toplevel IDD relay, idd.unidata.ucar.edu.

```
Data Volume Summary for uni16.unidata.ucar.edu

Maximum hourly volume  17903.967 M bytes/hour
Average hourly volume   9582.558 M bytes/hour

Average products per hour     247931 prods/hour

Feed                            Average             Maximum     Products
                       (M byte/hour)            (M byte/hour)   number/hour
CONDUIT                  3109.129     [ 32.446%]     5508.893    70263.791
NEXRAD2                  1624.647     [ 16.954%]     2591.167    36151.930
NGRID                    1330.851     [ 13.888%]     2275.660    20318.209
FNMOC                    1129.902     [ 11.791%]     6434.368     2839.651
FSL2                      989.430     [ 10.325%]     1555.097     1240.767
NEXRAD3                   703.909     [  7.346%]     1069.840    61259.419
HDS                       318.323     [  3.322%]      597.553    16219.093
NIMAGE                    130.804     [  1.365%]      248.942      178.535
GEM                        64.435     [  0.672%]      415.164      694.070
FNEXRAD                    56.945     [  0.594%]       77.799       66.698
EXP                        50.449     [  0.526%]       93.573      403.535
IDS|DDPLUS                 47.557     [  0.496%]       61.330    37956.140
UNIWISC                    22.538     [  0.235%]       30.999       27.302
DIFAX                       2.858     [  0.030%]       12.712        4.349
LIGHTNING                   0.441     [  0.005%]        0.938      306.070
GPS                         0.340     [  0.004%]        7.674        1.116
```

  Currently six real server nodes operating in one location on the UCAR campus (in the UCAR co-location facility in FL-2) and two directors comprise idd.unidata.ucar.edu. The cluster approach to IDD relay has been adopted by NOAA/GSD, Penn State and Texas A&M.

Updated: March 18, 2014

The Unidata Program Center is a member of the UCAR Community Programs, is managed by the University Corporation for Atmospheric Research, and is funded by the National Science Foundation.

LDM

Status Report: October 2013 - March 2014

Steve Emmerson, Mike Schmidt, Tom Yoksas

Strategic Focus Areas

The *LDM* group's work supports the following Unidata funding proposal focus areas:

1. **Enable widespread, efficient access to geoscience data**
   The LDM powers the Unidata Internet Data Distribution (IDD) system.
2. **Provide cyberinfrastructure leadership in data discovery, access, and use**
   The LDM allows sites to move data in their own environments.
3. **Build, support, and advocate for the diverse geoscience community**
   The LDM is used by US universities and by entities throughout the world.

Activities Since the Last Status Report

LDM-7 proposal approved by NSF

As previously reported, NSF approved a 2 year project to integrate into the LDM the Virtual Circuit Multicast Protocol (VCMTP) previously developed in an EAGER grant with the University of Virginia and to deploy the modified LDM (LDM-7) to various test universities that are equiped with DYNES routers. If successful, this has the potential to greatly reduce the bandwidth used by the UPC to distribute data via the Internet Data Distribution (IDD) system.

Work has started on the multicast component of LDM-7. The VCMTP receiver component is about half done.

Work on hardening NOAAPORT GRIB ingestion

On Feb 25 at 15:41:54 UTC LDM processes at several sites that were ingesting binary data-products from NOAAPORT crashed due to a segmentation violation (basically, the programs attempted to access an invalid memory location). Subsequent examination of the GRIB library used by the ingester programs revealed places where insufficient verification of the input data was occurring. The working hypothesis is that a poorly-constructed GRIB message was broadcast that activated a latent bug in the GRIB library.

The GRIB ingestion software has been enhanced to reduce this risk and a new version of the LDM will be released shortly.

Incorporation of retransmission-request code from Raytheon

For the AWIPS-II system, Raytheon added the capability for the LDM to request retransmission of NOAAPORT data-products that are missed. This code has been merged into the LDM codebase. Unfortunately, this capability is useless for non-NWS sites.

Planned Activities

Ongoing Activities

We plan to continue the following activies:

- Support LDM users
  - Email, phone, etc.
  - Training workshops
- Work on multicast-capable LDM-7
- Incrementally improve the LDM as necessary
- Incorporate additional AWIPS-II-related changes into the LDM
- Update table-driven decoding of GRIB products as necessary

Prepared March 2014

McIDAS, ldm-mcidas, Satellite Data Ingest

Status Report: October 2013 - March 2014

Tom Yoksas

Strategic Focus Areas

McIDAS activities support the following Unidata funding proposal focus areas:

1. Enable widespread, efficient access to geoscience data
   *McIDAS remains **the** application of choice for the satellite meteorology community.*
   The Advanced Data Distribution Environment (ADDE) componet of McIDAS was the first application offered by Unidata to provide remote, programmatic access to a wide variety of data that is important to the atmospheric science community.
2. Develop and provide open-source tools for effective use of geoscience data *The fifth generation of McIDAS, McIDAS-V, unlike its predecessors, is a fully open source application that is is in wide scale and growing use in the satellite meteorology community.*
   McIDAS ADDE continues to evolve and provide access to increasing volumes of image and non-image data.
3. Provide cyberinfrastructure leadership in data discovery, access, and use
   Concepts articulated in ADDE inspired the development of THREDDS (to address the lack of rich metadata available in ADDE) and RAMADDA. ADDE remains one of the most used data services in the Unidata suite serving over 3 TB per month.
4. Build, support, and advocate for the diverse geoscience community
   McIDAS is sought for use by those interested in satellite meteorology worldwide.

Activities Since the Last Status Report

Unidata McIDAS v2009q released on March 8, 2014

Unidata McIDAS version 2009q includes all SSEC versions up to and including the current release, v2013.1 and Unidata updates and bugfixes. Changes to Unidata McIDAS continue to be made through an **addendum** process. The current release, v2009q, reflects 17 updates since McIDAS v2009 was first made available in late July, 2009. v2009q **is** the 2013 release of McIDAS-X.

SSEC McIDAS Advisor Committee (MAC)

The UPC (Yoksas) continues to participate as the Unidata representative to the McIDAS Advisory Committee (MAC) that is operated by SSEC. IDV developers (Yuan Ho) have been participating in the MAC recently mainly to help MAC members understand new features being added to the IDV.

The MAC was assembled by UW/SSEC to advise SSEC on McIDAS-X users needs/concerns/desires for development in the next generation McIDAS, McIDAS-V. The MAC was modeled after the Unidata IDV Steering Committee.

Interest in McIDAS by Non-core Users

The UPC continues to receive requests for McIDAS from international university users, U.S. government agencies and other non-traditional Unidata users (e.g., private businesses, etc.). Government agencies and non-traditional Unidata users are referred to UW/SSEC for access to McIDAS; international educational community user requests are granted on a case-by-case basis after they provide a clear statement of their acceptance of the terms of use provided by SSEC.

Planned Activities

Ongoing Activities

Continued support of existing and new community members.

New Activities

Implement an indexing scheme for ADDE image datasets to speed up access especially in large and archive datasets. A preliminary design for ADDE image dataset indexing has been made. Investigations for how to integrate the new capbilities in to the suite of existing ADDE servers is in progress.

Add support for new types of data when they become available, otherwise McIDAS-X support is in maintenance mode.

Relevant Metrics

- Internet2 (I2) bandwidth usage by the McIDAS ADDE protocol routinely exceeds several TB/week. This ranks second in Advanced Applications use behind the LDM.
- McIDAS Inquiry Metrics

ldm-mcidas Decoders Activities

Development

ldm-mcidas releases are made when needed to support changes in software development and operating system environments. **ldm-mcidas** v2012 was released at the end of September, 2012. This release addresses building on newer OS versions.

Geostationary Satellite Data Ingest

Unidata continues to ingest GOES-East and GOES-West imager data at the UCAR Foothills Lab campus in Boulder. GOES-South (GOES-South America) was decommissioned on August 16, 2013, and there appears to be no current plans for repurposing an existing GOES platform for South American surveillance.

- Direct, programmatic access to real-time GOES-South (GOES-12) data via McIDAS ADDE had been used by over 820 users in 33 countries who downloaded approx. 520 GB of data per month over the past year.
- Direct, programmatic access to real-time GOES-East (GOES-13) data via McIDAS ADDE is being used by approx. 35 users who downloaded an average of approx. 1 TB of data per month over the past year.
- Direct, programmatic access to real-time GOES-West (GOES-15) data via McIDAS ADDE is used by approx. 25 users have downloaded an average of 800 GB of data per month for the past year.

Planned Activities

Ongoing Activities

Continued ingest and serving of GOES-East and GOES-West imagery. This effort sporadic requires maintenance of the satellite ingest and computer data equipment.

New/future Activities

Repurpose former USAN dish at Mesa Lab to operation as a remotely controllable ingester for any of the GOES platforms. This is a moderately low priority activity.

Proposed Activities

Begin planning for the resources it will take to ingest and disseminate GOES-R data (which is currently scheduled to become availble in 2015). This activity will proceed with cooperation/coordination of NCAR/RAL, NCAR/EOL and NOAA. A draft DRAFT Executive Summary and Budget (i.e., a *non-proposal* "proposal") was developed in cooperation with RAL and EOL, and submitted to Steve Goodman who is in NOAA's GOES-R office. After submittal, NOAA decided to postpone making a decision on funding GOES-R ingest capabilities until the summer of 2013 at the earliest.

Updated: March 23, 2014

NetCDF

Status Report: September 2013 - April 2014

Russ Rew, Ward Fisher, Dennis Heimbigner

Strategic Focus Areas

The *netCDF* group's activities support Unidata's strategic goals in the following ways:

1. **Enable widespread, efficient access to geoscience data** *by developing netCDF and related cyberinfrastructure solutions to facilitate local and remote access to scientific data.*
2. **Develop and provide open-source tools for effective use of geoscience data** *by supporting the use of netCDF and related technologies for analyzing, integrating, and visualizing multidimensional geoscience data; enabling visualization and effective use of very large data sets; and accessing, managing, and sharing collections of heterogeneous data from diverse sources.*
3. **Provide cyberinfrastructure leadership in data discovery, access, and use** *by developing useful data models, frameworks, and protocols for geoscience data; advancing geoscience data and metadata standards and conventions; and providing information and guidance on emerging cyberinfrastructure trends and technologies.*
4. **Build, support, and advocate for the diverse geoscience community** *by providing expertise in implementing effective data management, conducting training workshops, responding to support questions, maintaining comprehensive documentation, maintaining example programs and files, and keeping online FAQs, best practices, and web site up to date; fostering interactions between community members; and presenting community perspectives at scientific meetings, conferences, and other venues.*

Activities Since the Last Status Report

Project and Issue Tracking

We use a project tracker tool to manage bug reports, track issues, plan releases, and make our development process more transparent to users. Between 25 September 2013 and 13 March 2014, we created **24** new issues, updated **11** issues, resolved **23** issues, and we currently have **77** open issues. (Note: issues vary greatly in size and effort required to resolve, so number of issues is not a useful measure of amount of work to do.)

The migration to a CDash-based test dashboard has proved successful. It has provided a large amount of flexibility with regards to the types of systems we perform our tests on. This has lead to the squashing of a number of bugs which only manifest on particular platforms or architectures.

Releases

The netCDF-C 4.3.1 release was made available on 2014-02-05, following 6 release candidates (three of which were made after presenting the last status report). Since then, a bug-fix release (4.3.1.1) was made to address several DAP-related issues in the 4.3.1 release. The 4.3.1 release included various bug fixes, as well as portability, performance, and documentation enhancements, as described in the latest Release Notes. Evidence for improved collaboration includes several git "pull requests" from community developers contributing fixes, as well as increased incidents of issue reporting via the `github` issue-tracking system.

We are currently preparing for the upcoming 4.3.2 release.

Collaborations

Jeff Whitaker (NOAA/ESRL) has developed netcdf4-python, a widely used Python interface to netCDF-4. In February, Unidata agreed to help migrate and host netcdf4-python on Unidata's GitHub site. This has already encouraged new contributions and collaborations that are leveraging the efforts of other Python developers to improve and extend the software.

Planned Activities

With Russ having gone to half-time on 1 October, the C-based netCDF project (which includes Fortran and C++ libraries, as well as netCDF utilities) is working with reduced resources, from 2.5 FTE to 2.0 FTE.

Ongoing Activities

- Respond to support questions and help requests from netCDF users.
- Improve support for netCDF on various platforms.
- Incorporate successful features of netCDF-Java into C-based libraries.
- Respond to needs of a growing user community for representing observational data, satellite products, and geoinformatics data.

New Activities

During the next six months, we plan to continue efforts to

- finish CMake support on Linux for netCDF-Fortran
- expand Windows support and implement Doxygen-generated documentation for netCDF-Fortran
- improve Python example programs for netCDF-4
- decide whether and how to continue maintenance of netCDF-4 C++
- work on backlog of other unresolved issues entered into Jira for netCDF-C and netCDF-Fortran

Metrics

During the last 8 months, there were 65,300 downloads from 134 countries of the C-based netCDF software from Unidata, in addition to downloads from mirror sites, package management systems, and incorporation into other software packages. Detailed metrics, including for netCDF-Java/CDM, are available.

Other metrics, with comparisons from 6 months ago, include number of

- Google hits for "netcdf-3": **828,000 (638,000 in October 2013)**
- Google hits for "netcdf-4": **759,000 (605,000 in October 2013)**
- Blog mentions of netCDF: **22,100 (22,800 in October 2013)**
- Google scholar entries for "netcdf": **11,000 (9,960 in October 2013)**
- Books containing the term "netcdf": **7,610 (8,330 in October 2013)**
- Mentions of netCDF in patent applications: **1,110**
- Free software packages that can access netCDF data: **82**
- Commercial software packages that can access netCDF data: **23**
- Coverity estimate, defects per thousand lines of code: **0.87 (1.18 in October 2013)**

Prepared March 2014

GEMPAK/NAWIPS

Status Report: October 2013 to April 2014

Michael James

Strategic Focus Areas

GEMPAK supports the following goals described in Unidata Strategic Plan:

1. **Enable widespread, efficient access to geoscience data**
   GEMPAK remains widely used among academics, researchers and students as a way to visualize meteorological data in a package used by a number of operational forecasters. New data formats continue to be added and support for existing formats continues to improve.
2. **Develop and provide open-source tools for effective use of geoscience data**
   GEMPAK is and always will be open-source.
3. **Build, support, and advocate for the diverse geoscience community**
   GEMPAK continues to support new data formats, and Unidata continues to focus on training and documentation to bring in more of the university and research community. Scatterometer data visualization, for example, is being improved to prepared for use by marine forecasters from tje India Meteorological Department. A training workshop in Hyderabad, India is in the preliminary planning stage.

Activities Since the Last Status Report

GEMPAK7 Release

- GEMPAK7 was released in March 2014 and incorporates a number of the changes mentioned here.

RADAR DATA

- NEX2GINI was re-tooled to better support generation of high-resolution NEXRAD composites such as DHR Digital Hybrid Reflectivity, DVL Digital Vertically Integrated Liquid, EET Enhanced Echo Tops, HHC Hybrid Hydrometeor Classification. Unidata is now generating a number of high-res composites in addition to the 4-bit legacy products such as N0R, N1P and NTP. The national composite GINI images will be made operational (available via the LDM/IDD) in March 2014, with product genesis taking place on our ec-2 Amazon Cloud Computing instance.

- GPNIDS support added for FNEXRAD product aliases, using %SITE% as resolution (1km|2km|4km)

```
NEXRIII       $RAD/NIDS/%SITE%/%PROD%    %PROD%_YYYYMMDD_HHNN
NEXRCOMP      $NEXCOMP/%SITE%/%PROD%     %PROD%_YYYYMMDD_HHNN
```

- Added Python decoder to convert AWIPS II colormaps to GEMPAK lutfils.

- Level 2 and Level 3 graphical product color schemes updated to conform to AWIPS/AWIPS II standards.

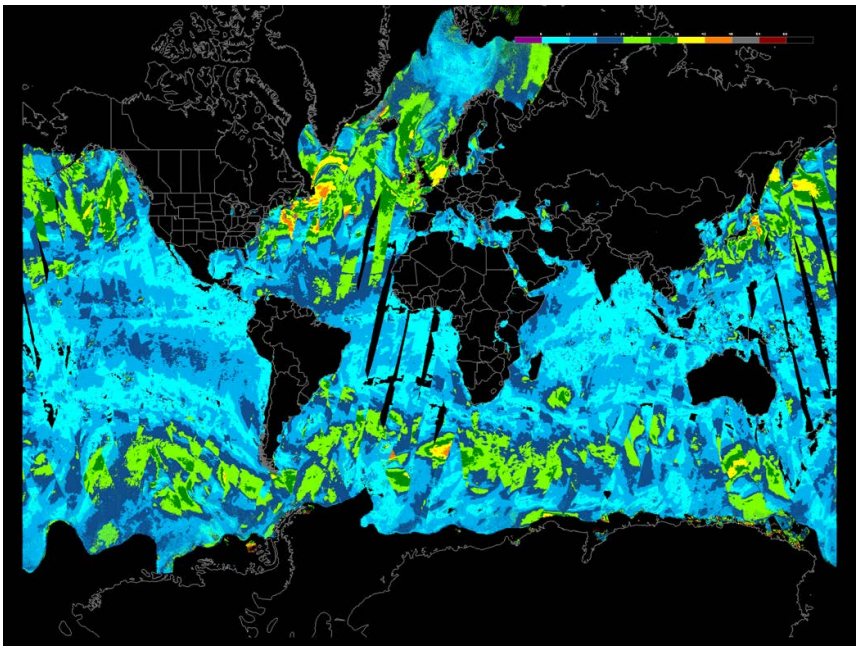
SCATTEROMETER DATA

- New program **GPSCAT** to plot scatterometer Significant Wave Height and Ocean Wind Vector data.

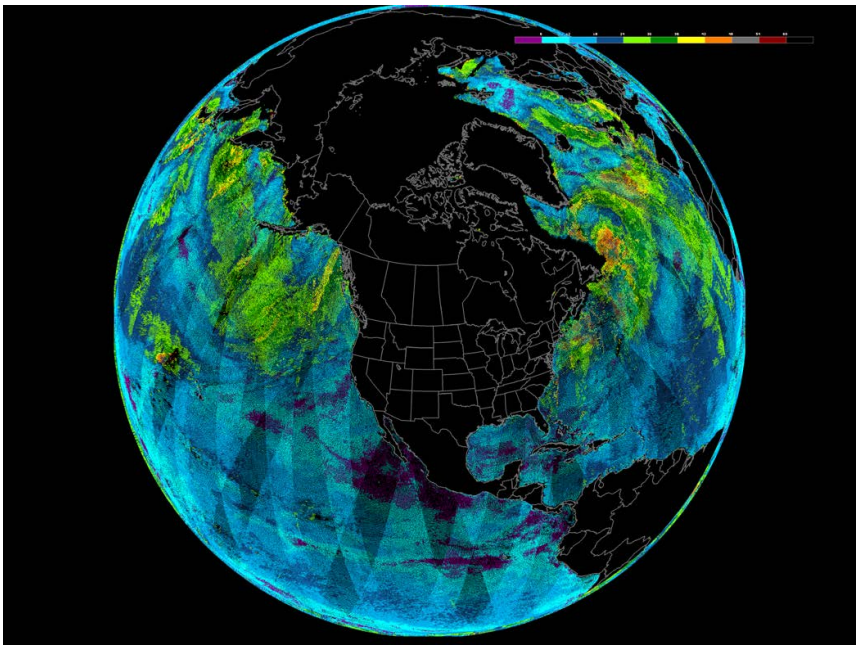
- Preliminary data feeds for **ASCT_HI** and **SGWH2** relayed through CPTEC/INPE, while new **OSCT_HI** data feed secured through agreement with NESDIS for use by international agencies and future

Marine Forecasting Workshops.

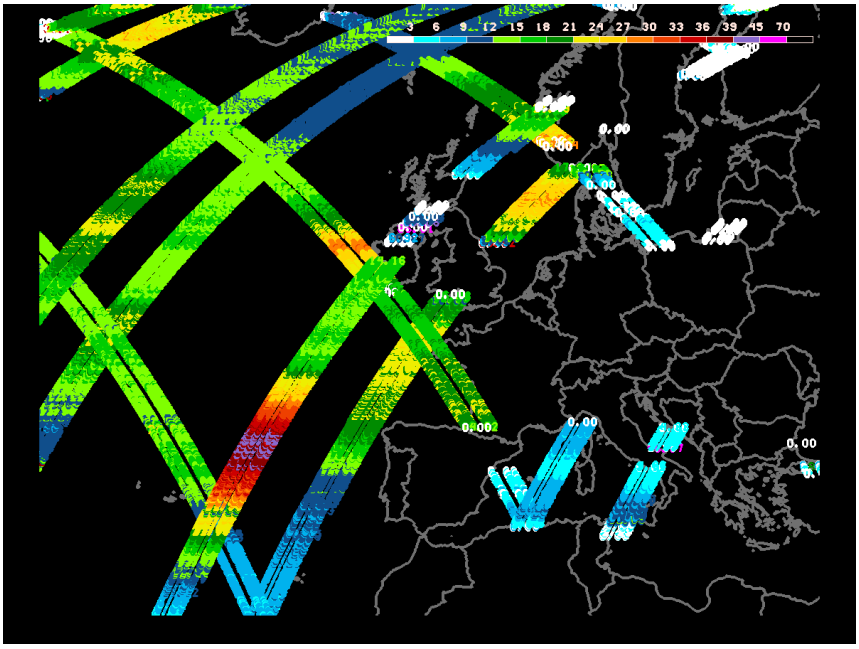
- **ASCT_HI**



- **OSCT_HI**



- **SGWH2**



RIO and WRF-NMM

- Region-Of-Interest (ROI) for the WRF-NMM uses the 30-hour 12km NAM precipitation forecast to objectively-select an area of maximum precipitation accumulation for use as a WRF domain. The final WRF files are converted to GEMPAK grid format, uploaded to our internal data mount, and used to create web products (both for the "floater" WRF and the "Colorado" WRF):
  - Colorado WRF [Simulated Reflectivity], [Surface Precipitation], [Surface Temperature]
  - Floater WRF [Simulated Reflectivity], [Surface Precipitation], [Surface Temperature]

OTHER ACTIVITIES

- **GEMPAK7** released early 2014.
- GEMPAK7 support added for new SSEC satellite image products added to the IDD. A Python script is written which creates **imgtyp.tbl** GEMPAK table entries for McIDAS AREA files.
- GEMPAK7 includes binary packaes for 32- and 64-bit **Linux**, x86 **SunOS**, and Mac **OS X** 10.9 Mavericks.
- Template handling error fixed for **HHC**, problem where the hour signifier "**HH**" in (YYYYMMDD_**HH**NN) conflicted with product identifier.
- **OPC lightning strike** density grids supported.
- Build for SunOS machines significantly re-worked and improved.
- Added **HRRR** grib tables (courtesy K.Tyle, UAlbany)
- `arinfo` now reports sector source number.
- Added _png direct device for `gdplot2`
- Fixed `dcsuomi`, `dcnctrop`, `dccosmic` and `dcacars` bug which would leave empty temporary netCDF files in ~ldm
- Fix for **NEX2GINI** grid generation which overlayed lower Echo Top (topped) values over higher (untopped) values, resulting in "holes" in data coverage over radar sites.
- Due to security issues, web-cgi **GEMPAK manual pages** were replaced by statically-generated pages created by C-shell script.

Prepared March 2014

Unidata Python Efforts

Status Report: October 2013 - March 2014

Sean Arms, Julien Chastang, Ben Domenico, Ward Fisher, Ryan May, Russ Rew

Python has been embraced by the earth science community for analysis, visualization and data exploration. Geoscience professionals are replacing collections of poorly integrated software tools and languages with this general purpose programming language that can handle remote data requests, statistics, analysis, and visualization. As a result, the Unidata 2018 Proposal highlights the Python programming language and ecosystem as an area where Unidata should focus efforts to benefit the core community. To that end, we have initiated Python training and software projects centered around existing Unidata technology.

Strategic Focus Areas

Python activity at Unidata supports the Unidata strategic goals in the following ways:

1. **Enable widespread, efficient access to geoscience data.** Python can facilitate data-proximate computations and analyses through IPython Notebook technology. In particular, IPython Notebook web servers can be co-located to the data source for analysis and visualization through web browsers. This capability in turn, reduces the amount of data that must travel across computing networks.

2. **Develop and provide open-source tools for effective use of geoscience data.** Our current and forthcoming efforts in the Python arena will facilitate analysis of geoscience data. This goal will be achieved by continuing to develop Python APIs tailored to Unidata technologies. For the fall 2013 Unidata training workshop, we developed an API to facilitate data access from a THREDDS data server. This effort was later encapsulated with the new pyUDL (a collection of Python utilities for interacting with Unidata technologies) project. In addition, a project is underway by Unidata staff and collaborators to develop a pyUDL API to access satellite imagery from ADDE servers for subsequent analysis, visualization and integration with other datasets. Moreover, Python technology coupled with HTML5 IPython Notebook technology has the potential to address "very large datasets" problems. In particular, an IPython Notebook can be theoretically co-located to the data source and accessed via a web browser thereby allowing geoscience professionals to analyze data where the data reside without having to move large amounts of information across networks. This concept fits nicely with the "Unidata in the cloud" vision. Lastly, as a general purpose programming language, Python has the capability to analyze and visualize diverse data in one environment through numerous, well-maintained open-source APIs.

3. **Provide cyberinfrastructure leadership in data discovery, access, and use.** The TDS catalog crawling capabilities found in pyUDL will facilitate access to data remotely served by the Unidata TDS, as well as other TDS instances around the world. The desired goal of pyCDM is to construct a geoscience focused data model in Python, based heavily on the netCDF-Java implementation of the Common Data Model (CDM). pyCDM is anticipated to provide a simple, pythonic API to the higher level functionality of the FeatureType layer of the CDM.

4. **Build, support, and advocate for the diverse geoscience community.** Based on grassroots interest from the geoscience community, Unidata hosted a one day training workshop aimed at leveraging Python to obtain and analyze data from the THREDDS data server. This training workshop was filled with the maximum number of possible workshop attendees. Because of this promising start, we plan on expanding this training workshop to more broadly explore "Python with Unidata technology" over two days. In addition, we are now hosting Dr. Jeff Whitaker's netCDF-Python API on Unidata's GitHub account. Our aim is to raise the visibility of this project and foster increased code contributions from the geoscience open-source community.

Activities since last fall

TDS Python Workshop

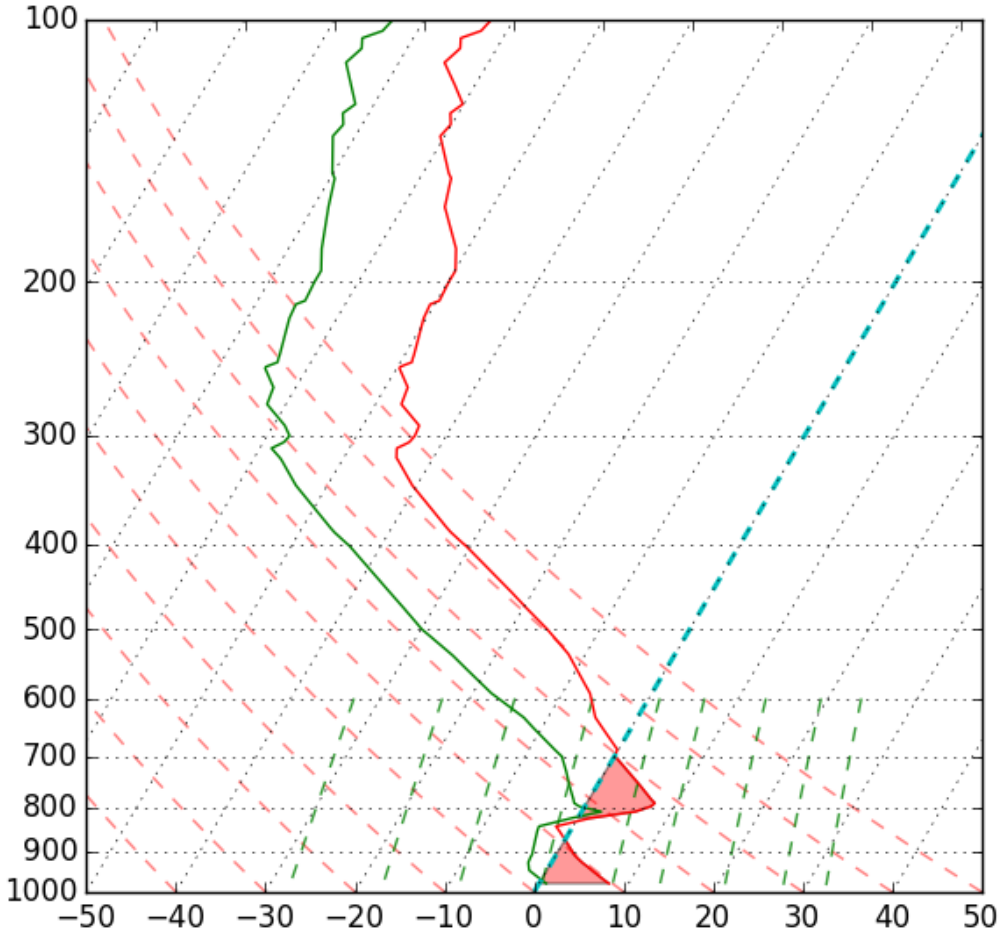
Organized a well attended workshop on Python with TDS technology . This workshop was aimed at geoscience analysis, and visualization centered around Unidata technology and in particular, netCDF and THREDDS.

netcdf4-python

- Designated Jeff Whitaker's netcdf4-python library as the Python language bindings Unidata will recommend for the NetCDF library.
- Migrated the project from Google Code to GitHub under the Unidata organization.
- Moved the project from subversion to git as well as imported old issues into GitHub's issue tracker
- Unidata plans to help with support and open source management of the project, including hosting release downloads.
- Shortly after moving to GitHub, the project already had pull requests (code contributions in git version control parlance) from the community, including one to enable automated testing.

Foundation work for Skew-T support in Matplotlib

- Finally incorporated long term pull request #1664 into matplotlib which paves the way for support of Skew-T plots in matplotlib.
- This feature should appear in matplotlib's 1.4.0 release.
- An example use of this new feature is shown below:



pyUDL Library

- The library is currently focused on TDS access. It was originally spun off from TDS Python workshop and later encapsulated into its own library.
- There is functionality in place to interface McIDAS ADDE servers. This work is in progress but will eventaully enable satellite data viewing capability in a Python and IPython environment.
- Pyudl is now hosted on GitHub.

pyCWT

- Developed a library for computation of Continuous Wavelet Transforms using Python currently hosted on GitHub.

Cloud-based collaborative python development

- Wakari is a software vendor that provides web-based Python data analysis. As part of Unidata's first training workshop on software development using Python, we began to experiment with the Wakari cloud-hosted development solution. The objective here to enable server-side data-proximate analysis as well as to facilitate the Python software installation process for our user community. This work has continued albeit at a slower pace due to the departure of one of the main contributing software engineers.

Planned Activities

Ongoing Activities

We plan to continue the following paths of development and community engagement:

- netcdf4-python
  - Help develop full support of the netCDF-4 data model.
  - Expose the ability to access data from the TDS using the CDM Remote access protocol.
- OWSlib and Brokering
  - Since the training workshop, the cloud-based development has been focused on using community supported OWSlib tools for accessing data from OPeNDAP servers via a brokering layer that makes the data available via other standard interfaces, especially Web Map Service (WMS) and Web Coverage Serviced (WCS).
  - This collaborative effort continues as resources allow.
  - Unidata has been invited to participate in the Research Data Alliance (RDA) as a member of the brokering middleware governance working group.

New Activities

We plan to contribute to the Python ecosystem with the following effort:

- pyCDM
  - Create an implementation of the Common Data Model (CDM) in python.
  - Starting work on a proposal in anticipation of future RFPs.
  - Looking for collaborators.

Relevant Metrics

14 new issues created for netcdf4-python in 14 days after moving to GitHub, compared to 217 in the total life of the project. This represents a significant increase in community participation in the project.

Prepared March 2014

Rosetta

Status Report: October 2013 - March 2014

Sean Arms, Jen Oxelson, Jeff Weber

Strategic Focus Areas

The Rosetta group's work supports the following Unidata funding proposal focus areas:

1. **Enable widespread, efficient access to geoscience data**

   The initial goal of Rosetta is to transform unstructured ASCII data files into the netCDF format; once in this format, standard tools, such as the THREDDS Data Server, IDV, Python, and other analysis packages, can take advantage of these datasets with relative ease.

2. **Develop and provide open-source tools for effective use of geoscience data**

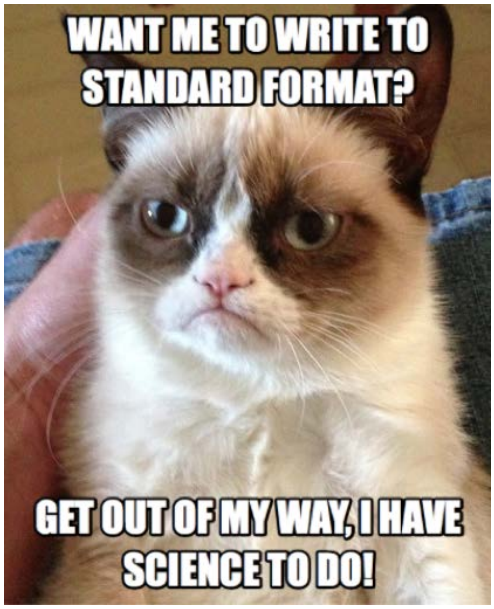
   Although the primary goal of Rosetta is to get data into the netCDF format, the transformation process does not stop there. The Rosetta group realizes that not everyone knows how to work with netCDF files, and may feel more comfortable working with other formats. Therefore, Rosetta includes the ability to transform from one format to another (e.g. netCDF to .xls), thereby reducing data friction.

3. **Provide cyberinfrastructure leadership in data discovery, access, and use**

   Metadata contained in netCDF format file (no longer locked away in a separate README file) can be automatically extracted, facilitating the discovery of data in these files. Additionally, the Rosetta development plan includes the creation of a standard ASCII and spreadsheet representations of the CF-1.6 DSGs.

4. **Build, support, and advocate for the diverse geoscience community**

   Promote the use of standard formats in the dissemination of data, while allowing flexibility to transform into other formats, as needed, to enable users to "do science". For commonly used formats, such as User Defined ASCII format or an unstructured spreadsheet, create and advocate for the use of a standard representations based on the CF-1.6 DSGs.



Activities Since the Last Status Report

Live demos to various groups

AMS 2014 Presentation

Arms, S. C., J. O. Ganter, J. Weber, and M. K. Ramamurthy, 2014: Rosetta - Unidataâ€™s Web-based Translation Tool: Progress and Future Plans. 30th Conference on Environmental Information Processing Technologies, 94th AMS Annual Meeting, Atlanta, GA, A.84. Available online at https://ams.confex.com/ams/94Annual/webprogram/Paper240011.html

Basic Documentation

http://www.unidata.ucar.edu/software/rosetta/site/

Accomplishments of Note

- Added the ability to publish converted files directly to RAMADDA and the ACADIS Gateway
- Live instance of Rosetta hosted at Unidata for testing
- Released the Rosetta source code on github

Planned Activities

Ongoing Activities

We plan to continue the following lines of development:

- Increase the number of CF-1.6 discrete sampling geometries handled by Rosetta
- Begin collecting metrics for the instance of Rosetta hosted at Unidata
- Continue documentation efforts, including the creation of screencasts for User documentation
- Solicit examples from the community (*hint, hint...that's you guys!*)

New Activities

We plan to enhance Rosetta in the following ways:

- Investigate csv and xls(x) representations of the CF-1.6 Discrete Sampling Geometries
- Enable Desktop (local) use of Rosetta
- Incorporate TDS capabilities into Rosetta, allowing for TDS services (like point subsetting of grids)

to easily be applied to local files

Relevant Metrics

We've received a handful of support questions regarding the availability of Rosetta, as well as requests for demonstrations.

Prepared March 2014

User Support

Status Report: October 2013 - March 2014

Tom Yoksas, Jen Oxelson, UPC Staff

Strategic Focus Areas

The Support group's work supports the following Unidata funding proposal focus areas:

1. Enable widespread, efficient access to geoscience data
   Unidata User Support enables access to geoscience data by supporting the use of tools created and/or supported by the UPC.
2. Build, support, and advocate for the diverse geoscience community
   The user support provided by the UPC is recognized throughout the atmospheric science community. Unidata's outreach efforts are routinely called out in surveys of the NCAR/UCAR community.

Activities Since the Last Status Report

Training

- The UPC hosted an IDV Short Course at the AMS Annual Meeting in Atlanta, GA in February. The workshop included a presentation and hands-on session showcasing the GEOScience Probe of Discovery (GEOPOD), a National Science Foundation funded project that leverages Unidata's IDV to create an interactive 3-D learning environment where students can navigate a virtual probe through real geophysical data and actuate devices to explore and discover the atmosphere. The course was well atended (22 participants) by university, government, international and commercial users.

- The UPC will participate in a regional workshop hosted by the University of Miami on April 18-19.

Relevant User Support Metrics

Since January 26, 2006 over 40000 user support "transactions" (new inquiries and follow-ups) have been processed through the Unidata inquiry tracking system.

Support by Category

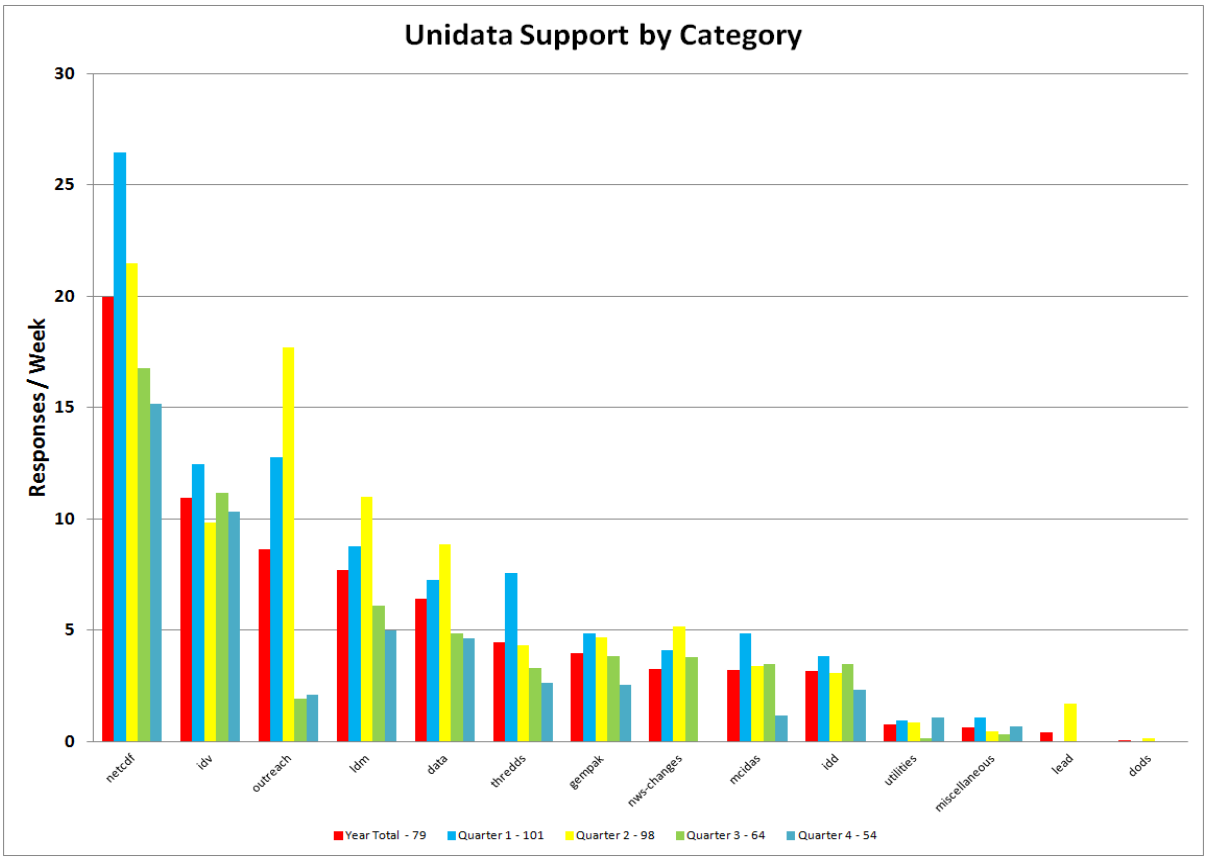


Fig. 1: Above are histograms that portray the number of Unidata email responses for categories of support for a one year period ending March 15, 2014. The histograms are arranged by yearly activity averages with the highest on the left and lowest on the right. Each quarter year within the period is depicted from oldest to newest from left to right. The number of responses has been normalized to weekly averages so that the support load over the various periods can be easily compared.

Individual support activities included in the categories depicted above are listed in the following table.

Category	Packages, Groups, and Lists
data	casestudies, casestudies-list, conduit, c2-linda, craft, craft-nws, craft-ty, datastream, difax, level2, level2-linda, level2-ty, noaaport, noaaport-ty, noaaportldm
dods	dods, dods-core, dods-list, dods-tech, dods-team, linda-dods, opendap, opendap-core, opendap-list, opendap-tech, opendap-team
gempak	gempak, gembud-list
ldm	ldm, ldm-users-list
lead	lead, leadusers
idd	cluster, idd, idd-antarctic, idd-brasil, idd-caribe, idd-inject, idd-status, scoop, suominet, tigge
idv	idv, idvlist, idvsteering, metapps, visad-list, visad-renderer
mcidas	mcdevelop, mcidas, mcidas-list
miscellaneous	esupport, fxlinux, license, misc, network, notrack, platforms, wxp, wxp-list
netcdf	data-models, libcf, ncml, netcdf, netcdf-misc, netcdfgroup-list, netcdf-hdf-list, netcdf-java, netcdf-perl
nws-changes	nws-changes

outreach	agu-linda, agu-ty, ams-linda, announce, argentina-ty, barbados-ty, brazil-ty, cbmet-ty, chile-ty, egrants, egu-linda, external, iai-ty, meteoforum-ty, mexico-ty, noaa-linda, nws-linda, unidata, workshop
thredds	java-dev, java-dev-list, thredds
utilities	decoders, ldm-mcidas, udunits

Support by Topic

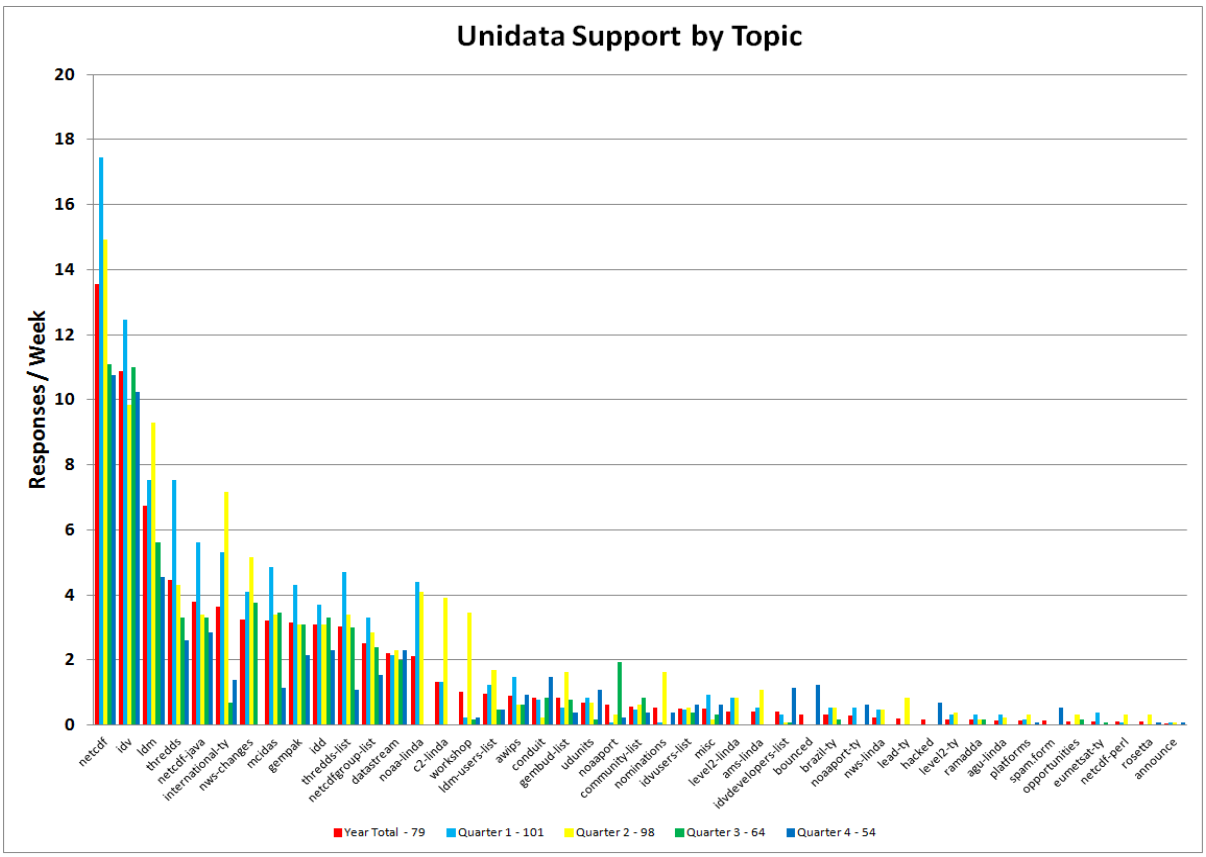


Fig. 2: Above are histograms that portray the number of Unidata email responses for individual topics of support for a one year period ending March 15, 2014. The histograms are arranged by yearly activity averages with the highest on the left and lowest on the right. Each quarter year within the period is depicted from oldest to newest from left to right. The number of responses has been normalized to weekly averages so that the support load over the various periods can be easily compared.

Comments

- The marked decrease in the average number of weekly support transactions reflects the decrease in outreach activities formerly performed by Linda Miller who retired in November, 2013, and in international activities that decreased significantly when the UCAR Africa Initiative Google Meningitis project ended.
- The total support provided by the UPC remains high, and yearly totals have been relatively constant for the past two years. Overall support activities vary by somewhat by quarter. Spikes in support for individual packages is largely correlated with the release of new distributions, and, for the IDV in particular, jumps after training workshops.
- Support for netCDF continues to be substantial, and is understandable given the **large** number of users of the package worldwide.
- The IDV support load is second only to that for netCDF; no large increases have been seen over the past 6 months.
- Support for netcdf-java continues to grow steadily.
- Support for the legacy visualization packages GEMPAK and McIDAS continues to be substantial.
- Support for LDM, IDD, and data continues at a high level and shows some variability throughout the year.
- Taken as a whole, the support required for visualization packages (GEMPAK, IDV, and McIDAS) is

comparable to the support related to data reception (LDM, IDD, noaaport).
- The high numbers for outreach reflect the high level of activity in a variety of activities including organizing sessions at various national meetings.

Notes

These numbers and conclusions should not be taken too literally, for several reasons:

- For some packages, multiple responses in the same thread may be bundled into a single archived email. Other packages have each response in a thread counted separately.
- After a new release of software, there may be a flurry of the same or similar questions, which can be answered in separate emails or in a single mailing list posting.
- The graph primarily represents support of end users and site administrators, not developers. Support for non-Unidata developers in projects such as THREDDS, IDV, GEMPAK, and McIDAS requires significant resources, but is difficult to assess.
- Not all support records were indexable for this report. Given this, the above numbers are an ***underestimate*** of the actual support being provided by the UPC.

Additional User Support Inquiry Metrics

Updated: March 17, 2014

The Unidata Program Center is a member of the UCAR Community Programs, is managed by the University Corporation for Atmospheric Research, and is funded by the National Science Foundation.

THREDDS

Status Report: Oct 2013 - May 2014

John Caron, Ethan Davis, Dennis Heimbigner, Sean Arms, Lansing Madry, Christian Ward-Garrison, and Ryan May

Strategic Focus Areas

The *THREDDS* group's work supports the following Unidata funding proposal focus areas:

1. **Enable widespread, efficient access to geoscience data**

   The work of the THREDDS group is comprised of two main areas: the THREDDS Data Server (TDS) and the Common Data Model (CDM) / netCDF-Java library. The TDS provides catalog and data access services for scientific data using OPeNDAP, OGC WCS and WMS, HTTP, and other remote data access protocols. The CDM provides data access through the netCDF-Java API to a variety of data formats (e.g., netCDF, HDF, GRIB). Layered above the basic data access, the CDM uses the metadata contained in datasets to provide a higher-level interface to geoscience specific features of datasets, in particular, providing geolocation and data subsetting in coordinate space. The CDM also provides the foundations for all the services made available through the TDS.

   The data available from the IDD is a driving force on both the TDS and netCDF-Java development. The ability to read all the IDD data through the netCDF-Java library allows the TDS to serve that data and provide services on/for that data.

2. **Develop and provide open-source tools for effective use of geoscience data**

   Unidata's Integrated Data Viewer (IDV) depends on the netCDF-java library for access to local data, and on the THREDDS Data Server (TDS) for remote access to IDD data. At the same time, the CDM depends on the IDV to validate and test CDM software. Many other tools build on the CDM / netCDF-Java library (eg ERDDAP, Panolpy, VERDI, etc) and on the TDS (LAS, ncWMS, MyOcean, etc).

3. **Provide cyberinfrastructure leadership in data discovery, access, and use**

   The Common Data Model (CDM) / netCDF-Java library is one of the few general-purpose implementations of the CF (Climate and Forcast) metadata standards. Current active efforts in CF that we are involved with include draft Satellite and Radar Conventions.

   The TDS has pioneered the integration of Open Geospatial Consortium (OGC) protocols into the earth science communities. Strong international collaborations have resulted in WCS and WMS services as part of the TDS.

   The CDM and TDS are widely used implementations of the OPeNDAP DAP2 data access protocol. Unidata is working with the OPeNDAP group to design, develop, and implement a new version of the DAP specification, DAP4.

Activities Since the Last Status Report

Release Status of CDM and TDS

- CDM and TDS 4.3.21 are the current stable releases.
- CDM and TDS 4.5 is available as a Beta release. (See below for a list of major changes.)
  - After extensive testing, TDS 4.5 was deployed to Unidata's demonstration TDS server (thredds.ucar.edu). This uncovered a number of bugs not found by earlier testing which led to rolling back the server to TDS 4.3. As a result of this situation, Unidata has decided to implement a number of changes to our server upgrade process. (More details are available here.)

Collaboration Activities

- Recent non-core awards that involve THREDDS development:
  - EarthCube Building Blocks award: "Integrating Discrete and Continuous Data" with Univ of Texas, Austin and others. Period of performances: Oct 2013 - Sept 2015.
  - EarthCube Building Blocks award: "Specifying and Implementing ODSIP, A Data-Service Invocation Protocol" with OPeNDAP, Inc.
  - EarthCube Building Blocks award: "Deploying Web Services Across Multiple Science Domains" with IRIS, UNAVCO, and others. Period of performances: Oct 2013 - Sept 2015.
  - NASA ROSES ACCESS award: "High Performance Multidisciplinary Open Standard Data Services to Serve Terrestrial Environmental Modeling" with USGS CIDA. Period of performances: 1 Jan 2014 - 31 Dec 2015.
- Work continues on OPULS (OPeNDAP-Unidata Linked Servers) project:
  - Demonstrated to the NOAA DMIT the interoperability between the OPeNDAP developed server, the Unidata developed server, and the Unidata developed client library.
  - Currently integrating DAP4 server into TDS 4.5
  - The third and final year of OPULS funding ends 30 Sept 2014.
- Work continues on project to scale-up the TDS to handle large collections of GRIB files continues, "Project to Improve Model Data Access under Unidata's THREDDS Data Server (TDS) in support of NOAA's National Climate Model Portal (NCMP)". Funded by NOAA/NCDC.
- Working with NCAR/CISL DSS group to make some of their large GRIB model collections available using the new TDS 4.5 Feature Collections.
- Renewed effort with NOAA/ESRL/GSD to check the GRIB tables used with HRRR and FIM data.
- ncSOS plug-in developed by ASA (Applied Science Associates) and USGS CIDA provides OGC SOS service for data conforming to the CF Discrete Geometries data types. Looking at distributing with the TDS version 4.6.

International Standards Development

- Track and participate in OGC MetOcean Working Group discussion.
- Track and participate in OGC WCS development.
- Track and participate in OGC CF-netCDF development.

THREDDS Team

- Christian Ward-Garrison started at Unidata in early December 2013. He is working on THREDDS project, including work on the EarthCube Building Blocks - Integrating Discrete and Continuous Data project.
- Ryan May started at Unidata in early January 2014. He is working on the THREDDS project and looking into several Python projects.

Planned Activities

CDM/TDS 4.5 Development (underway)

We are skipping the release of 4.4 to focus on getting some important 4.5 changes out

- Further improvements to the TDS for handling of GRIB collections, including a return of the two time dimension view for forecast models.
- Improve the TDS handling of collections of point, station, and sounding data. Move (and harmonize) the resulting services under the NCSS interface.
- Include in the TDS an alpha version of the DAP4 service.
- Ugrade CDM/TDS use of HttpClient from 3.x to 4.x (3.x is end-of-life)
- Refactor TDS catalog caching for Earth System Grid (ESG).
- Require Java 7 and Tomcat 7 (start using java.nio.file)

CDM/TDS 4.5.x Development

- Add WaterML as output format from NCSS point service
- Improve the TDS RadarServer services and harmonize it with the NCSS interface.
- Simplify process for adding new TDS web services. Document simplified process so third-party development groups can more easily add new web services to the TDS.
- Work with ncWMS group and others to add features to the version of ncWMS used by TDS.
- Add WRF initialization service to NCSS
- Port Earth System Grid (ESG) requested enhancements from TDS 4.2 (see TDS-213)

CDM/TDS 4.6 Development

- Grid Feature Collection (assimilate FMRC?)
- Experiment in TDS with various server-side processing capabilities.
- Experiment in TDS with Asynchronous responses
- Work on providing FMRC Constant Forecast Offset/Hour funtionality for large datasets. (Possibly as NCSS-like service rather than as index based access.)
- Provide NCSS access for all CF-DSG feature types.

CDM / TDS 5.0 Development

- Catalog 2
- TDS configuration refactor (ease of use and support dynamic re-init)
- Refactor GridDatatype to Coverage
  - Swath/Image
  - Unstructured Grid
  - Time-dependent coordinate system
  - Cross-seam lat/lon data requests
- Improved metadata harvesting support
- Search/discovery service?

Unidata Outreach Accomplishments and Challenges

Ben Domenico, March 2014

Relationship to Current Unidata Strategic Plan

Below are a few excerpts from the current Unidata Strategic Plan that highlight the importance of the outreach activities summarized in this status update?

- ... to build infrastructure that makes it easy to integrate and use data from disparate geoscience disciplines
- Data formats like netCDF, together with community-based data standards like the Climate and Forecast metadata convention and the Common Data Model are enhancing the widespread usability and interoperability of scientific datasets.
- Advance geoscience data and metadata standards and conventions
- ... our experience shows us that robust solutions arise from community and collaborative efforts
- ... close partnerships and collaboration with geoscience data providers, tool developers, and other stakeholders, and the informed guidance of our governing committees

Summary of Recent Progress and Near-term Goals

Cloud-based Collaborative Python Development

As part of Unidata's first training workshop on software development using Python, experimentation began with the Wakari cloud-hosted development environment. This work has continued since then but at a slower pace due to the departure of software engineer, Marcus Hermida. Since then, the work has been focused on the use of the community supported OWSlib tools for accessing data from OPeNDAP servers via a brokering layer that makes the data available via other standard interfaces, especially Web Map Service (WMS) and Web Coverage Serviced (WCS).

This work will continue as resources allow.

Progress on OGC standardization of CF-netCDF

As the official UCAR representative to the OGC Technical Committee, Unidata participates in 3-4 technical committee meetings per year to ensure that Unidata and UCAR needs are met in the emerging international standards.

Since the establishment of the netCDF Classic data model as the OGC core netCDF standard as the first OGC binary encoding format, extension standards have been added for the enhanced (netCDF 4) data model and the Climate and Forecast (CF) conventions.

The OGC-adopted standards documents are available at

http://www.opengeospatial.org/standards/netcdf

This completed the primary objectives we had laid out for the CF-netCDF standards initiative in the OGC. However, several additional netCDF-related topics will be discussed at the next OGC Technical Committee meeting at Lockheed Martin - Global Vision Center in Arlington, VA. TheCF-netCDF SWG Session will cover the following topics:

Clarification of mappings among data models: CF-netCDF, ISO 19123, GML-COV
Extension to OWS Common for CF-netCDF data exchangeExtension to WCS 2.0 core DescribeCoverage for CF-netCDF data description

MetOC candidate profile for WCS2.0 (relation to above topics)
https://portal.opengeospatial.org/files/?artifact_id=51697&version=1

NetCDF Uncertainty Conventions (netcdf-u)
Discussion paper:

https://portal.opengeospatial.org/files/?artifact_id=46702

Wiki:

http://external.opengeospatial.org/twiki_public/NetCDFu/WebHome

Email list sign up page:

https://lists.opengeospatial.org/mailman/listinfo/netcdf-u

NetCDF GML Encoding

Unidata will chair the CF-netCDF Standards Working Group session as well as the Earth System Science Domain Working Group sessions at these meetings.

ODIP

The ODIP (Ocean Data Interoperability Platform) was funded by the European Commission and we continue to work with San Diego Supercomputing Center and Woods Hole to get the US part of the project funded by NSF. Unidata's technologies (especially THREDDS and netCDF) are part of the project and we also maintain a liaison role and serve on the steering team.

to make out community aware of the work an possible applications. Unidata participated in the initial workshop and in the special ODIP session at the IMDIS conference September and the second ODIP Workshop and steering team meeting at Scripps Institute for Oceanography in December.
http://www.odip.org/content/news_details.asp?menu=0100000_000001
http://seadatanet.maris2.nl/newsletter.asp#70

There will be and ODIP splinter session at the EGU and the next ODIP workshop and steering team meetings are scheduled for August.

EarthCube Discrete Continuous Building Block Project.

Unidata has an active role in this new EarthCube initiative. From the project description:

> Geoscience information is defined on both discrete and continuous spatial domains. **Discrete spatial domains** include point locations of observations at measurement sites and GIS coverages of point, line and area features used for observation and data interpretation. **Continuous spatial domains** are used in geophysical fluid sciences such as for the atmosphere, oceans, and land subsurface to describe arrays of measured or modeled variables defined on a mesh of uniformly spaced points. Data defined on either discrete or continuous spatial domains **may also vary discretely or continuously in time**, ranging from one-time samples, to samples at random points of time, to samples at regularly spaced intervals of time. This proposal builds upon previous work called “Crossing the Digital Divide” focused on integrated discovery of common information themes including precipitation in discrete data from the **CUAHSI hydrologic information system** and continuous data from the **Unidata THREDDS data server**. This project will advance that work by investigating **in the first year** creating new technologies for publishing and discovery of information through the **Global Earth Observation System of Systems (GEOSS)** Common Infrastructure, the definition of a **Common Information Model for discrete and continuous data**, development of **shared software tools** for using this Common Information Model, and extension of the concepts to similar information in the **Polar, Ocean and Solid Earth Sciences**.

Active and Ongoing Collaborations:

- NCAR GIS Program
- Collaboration with ESSI Labs to experiment with their brokering layer in conjunction with THREDDS Data Servers
- UCAR wide representative to OGC Technical Committee
- Australian Navy THREDDS Use

Relatively New Emerging Collaborations

- co-PI on GMU EarthCube Proposal: “CyberConnector: An EarthCube Building Block Bridging the Earth Observations and Earth Science Modeling for Supporting Model Validation, Verification, and Inter-comparison”
- ESSI Labs collaboration on cloud-based client and server approaches
- Collaborative European / US / Australian effort on the Ocean Data Interoperability Platform (ODIP)
- Australian Bureau of Meteorology Climate Data
- Google Earth Engine
- Wakari Cloud-based Collaborative Python Development Environment

Areas of Reduced Commitment

- Marine Metadata Interoperability (MMI) Project Steering Team
- NOAA Climate Prediction and Projection Pilot Platform (NCPP)
- CUAHSI Standing Committee

- AGU ESSI Focus Group Board
- ESIN Journal Editorial Board
- Liaison to OOI Cyberinfrastructure Project
- Collaborations with EarthCube teams
- Potential collaboration with SDSC team on annotating datasets with information gained from support archives
- U of Texas EarthCube Building Blocks project