

Site Highlight: North Carolina State

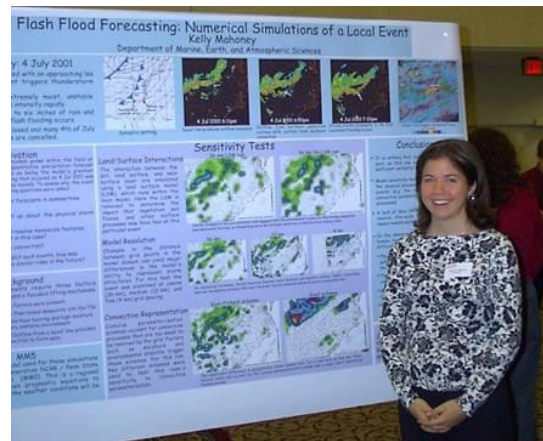
Unidata Visualization in University Research

Gary Lackmann

I recently had the honor of speaking at Unidata's commemorative 25th anniversary event, held in Boulder, CO on 15-16 October 2009. The presentations served to inspire tremendous respect for the foresighted individuals who founded Unidata, and they illustrated the remarkably broad and transformative reach of Unidata across the geoscience community. The historical focus of the Unidata program has been the university classroom; from the use of archived case-study data in student term-paper projects, to the utilization of realtime data for instructional analysis and forecasting exercises, the value of Unidata software and data in the classroom is widely recognized.

However, Unidata's role in university research activities *outside* the classroom may not be as fully appreciated in the broader geoscience community. My presentation highlighted the benefits afforded by Unidata products, services, and community leadership to undergraduate, graduate, and faculty research.

The prospect of conducting independent research is daunting to many undergraduate students. Initially, many beginning undergraduate researchers possess vague ideas regarding the requisite level of rigor for scientific research, the scientific method itself, and the "tools of the trade" used in research. Despite this initial intimidation, it isn't hard to recruit interested students, especially if the project involves winter storms, hurricanes, or severe weather. In my research group, once students progress to the data analysis stage of a project, Unidata visualization software and data sources are typically involved. When students realize that they can undertake meaningful analyses and create



Then-undergraduate researcher Kelly Mahoney presents a poster at the NC State University Undergraduate Research Symposium in 2003.

professional-quality graphics within a short period of time, they are encouraged, and their initial trepidation diminishes. In this sense, Unidata products and services “lower the entry barrier” for undergraduate research. Many of the undergraduate research ventures culminate in a presentation; these presentations invariably feature graphics generated using Unidata software. A large fraction of undergraduate researchers go on to attend graduate school; positive undergraduate research experiences can facilitate ambitious career paths.

The benefit of Unidata visualization software in the university research arena is by no means restricted to undergraduates. The ease with which vertical and horizontal grid interpolations and on-the-fly diagnostics can be computed using tools such as GEMPAK has long appealed to advanced atmospheric research groups. The availability of well-tested diagnostic capabilities, including correct use of map-scale factors in the computation of spatial derivatives, has saved many a graduate student from re-inventing the wheel. The recent addition of many GEMPAK functionalities to the Unidata integrated data viewer (IDV), and the ease with which model output can be visualized, make this tool another useful option for graduate research. In my group, most of the graduate students actively use GEMPAK and IDV (along with other display packages). At a recent AMS conference, one of my former students, Kelly Mahoney, presented 3-D IDV visualizations of a numerically simulated convective storm. After the presentation, several people asked “What software was used for those visualizations?” We were more than happy to explain that the software was free and easy to use.

In addition to extensive use in teaching, I use Unidata software and data for my research, in particular, to visualize output from the Weather Research and Forecasting (WRF) model. In surveying the published literature in AMS journals, one finds an abundance of graphics produced by Unidata software. The adoption of the netCDF data format in the climate and research community speaks for itself.

So, when you think of Unidata, if you didn't already, think about teaching *and* research!

[More Images>](#)

The Data Series: NEXRAD Level III Radar Data

Level III data are radar products generated from the Level II base data. The products are used to assist forecasters and others in weather analysis, predictions and warnings. Level III products used to be recorded on WORM Optical Disks at NWS sites in the early 1990s. Currently, the required products are provided electronically in near real-time to an NWS Central Collection Facility. When products were written to the WORM Optical Disks, all products were saved and have been archived. Now, only required products are collected at the CCF and then archived by NCDC. Regardless of how the Level III products have been received, the NCDC archives the products in compressed tape archive format on the NCDC Hierarchical Data Storage System (HDSS). The Level III Products

archive is made available via the World Wide Web on the NCDC Home Page.

http://www.roc.noaa.gov/wsr88d/Level_III/Level3Info.aspx

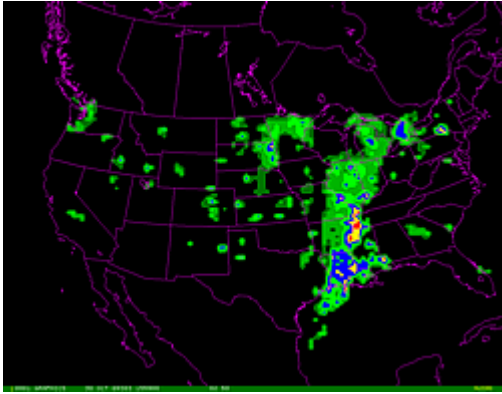
Unidata's distribution of the data began a good many years back, 1994 specifically. Initially its use met with substantial resistance by the universities. After all the Manually Digitized Radar satellite distribution data was satisfactory enough, and it was free--very important for often financially-strapped departments. Unidata knew that Level III data would be a bonanza for its community, and working with WSI, a commercial business specializing in weather solutions for businesses, which won a contract in a competitive bidding process. WSI provided Level III (NIDS) products with Internet data service, ranging from one radar, to the entire suite of radars, for universities that subscribed. (See: <http://www.unidata.ucar.edu/data/tierdef.html>)

Since those early days the use of Level III products from the WSR-88D network of 158 radars has grown to its present usage level of 74 organizations and 135 computers (NEXRAD3) distributed by Unidata's Internet Data Distribution system. In addition, Unidata also distributes national mosaics of Level III products created by the UPC every five minutes. These composite products are received by 72 organizations and 128 computers (FNEXRAD).

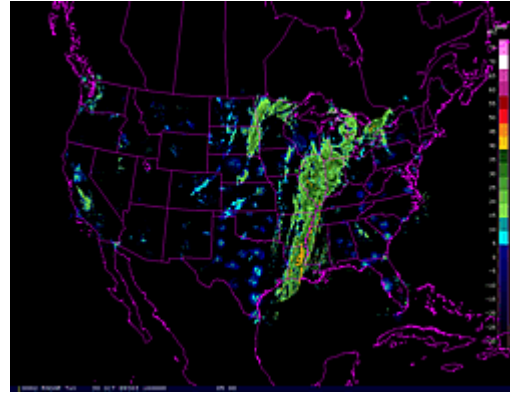
Jim Steenburgh, University of Utah and Policy Committee member probably is representative of Level III data users. He writes:

In the classroom, we use Level III data for quick look radar analysis and sometimes to produce multi-radar composites over complex terrain. We use the composites quite a bit as they can be accessed easily and quickly with NMAP2, which enables quick access for map discussions. We use the composite rather than the products most as it is quick access from NMAP2.

And since Jim is in ski country, his ski outing nowcasting leads him to use whatever loads fastest on his home computer which usually means studying Level-III derived radar reflectivity products on the web.



This MDR image shows base reflectivity for the CONUS on October 30, 2009 at an 10 km resolution on the LFM (Local Fine Mesh) grid. The data were available once each hour.



The Level III image is a visualization of the same weather information from the Unidata-created 1-km composite of Level III base reflectivities.

Here is a link to a [list of radar products](#) available through the NOAAPORT satellite broadcast.

25th Anniversary

On 15-16 October Unidata marked its 25th anniversary by holding a day and a half program included reminiscences from founding fathers, early community activists, sponsors, and key partners, as well as reflections on what the community created a quarter of a century ago. It was a festive event bringing old friends into renewed contact with one another, allowing newer community members the opportunity to meet and greet and celebrate both with those old friends and with Unidata staff, present and past.

We provide a glimpse into the festivities with a slide show, below.

Unidata's Annual Report

The program center recently submitted its report for 2009 to its sponsor, the National Science Foundation. The year has been solidly packed with activity with, among others, a triennial Users workshop, the annual training workshops, and of course the hallmark event of the year, the 25th anniversary program.

[Report](#)

Follow Us:WAYS YOU CAN GET US: RSS | Newsletters and Alerts |



Facebook



Twitter