7B.5 THE IDV AT 5: NEW FEATURES AND FUTURE PLANS

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1. INTRODUCTION

Unidata's Integrated Data Viewer (IDV) was first released in June of 2003. The IDV consists of a software framework for developing applications and a "reference application" that presents an overview of many of the features of the underlying framework. Over the past 5 years, it has been continually improved and adapted to suit the needs of the geoscience community.

2. BACKGROUND

The IDV reference application is a geoscience display and analysis software system with many of the standard data displays that other meteorological software (e.g., NCL, GrADS, GEMPAK, McIDAS, Vis5D) provide. Yet the IDV is unique in its ability to integrate a wide range of multi-disciplinary data from local and remote sources, producing three dimensional (3D) displays that provide unique insights into the structure of the earth system. The IDV allows users to interactively slice and probe the data, creating cross-sections, profiles, animations and value read-outs of multi-dimensional data sets. This easily installed, platform-independent application runs on most operating systems and allows anyone with an internet connection anywhere to access a range of atmospheric data from a variety of sources. Additionally, the IDV can be used to visualize and analyze non-meteorological data from mantle convection simulations and earthquake locations to oceanographic model output and observation data.

3. NEW APPLICATIONS

The open-source IDV framework is highly customizable and allows new applications to be tailored to specific datasets or provide customized user interfaces for different tasks. The GEON-IDV (http://geon.unavco.org/unavco/IDV_for_GEON.html) is an extension of the framework supporting geophysical visualizations. The robustness of the framework and the support of the developers led the University of Wisconsin/SSEC to use it as the basis for the next version of McIDAS to provide tools for hyper-spectral image visualization and analysis. The Unidata Program Center and the Shanghai Tropical Institute are developing the Tropical Cyclone IDV (TC-IDV) for use by researchers and forecasters in studying typhoons and hurricanes.

4. NEW FEATURES

With the impending move of NAWIPS/GEMPAK to the AWIPS II environment, the Unidata community has been looking to the IDV as a replacement for some of the functionality provided by that package. In an effort to include some of the commonly used features of NAWIPS/GEMPAK in the IDV, the IDV developers have focused on that task over the past year. The IDV now reads in GEMPAK grid files and can display these in 2-D or 3-D displays. Many of the GEMPAK grid diagnostics are now available in the IDV as well. Support for scalable vector (PDF, PostScript, SVG) output of the displays was added in the December, 2008 2.6 release, based on work done by the Australian Bureau of Meteorology (ABoM). An objective analysis module, also based on work by the ABoM, was also included in this release for gridding in-situ observations on the fly. Users can now access weather text bulletins from their local GEMPAK repositories or from a remote ADDE server in an NWX-like interface. Requirements gathered by the Unidata User's Committee and the IDV Steering Committee will be used to prioritize future development in this area.

In addition to the NAWIPS/GEMPAK functionality, other work has been focused on incorporating new data sets and/or remote access to other datasets. The IDV can now access

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NEXRAD Level II (including super resolution) and Level III and TDWR data from a THREDDS Data Server (TDS). This provides on the fly access to an important dataset that traditionally required a continual, high bandwidth connection. Support for version 4.0 of that package has improved the efficiency and capabilities of netCDF file access and aggregation. Improvements in the import/export of Google Earth KML have been made also over the past year.

5. AN EXPANDING USER COMMUNITY

The software is now used in over 30 UCAR member and affiliate institutions, in both undergraduate and graduate courses. Outside UCAR, IDV use ranges from international centers like EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites) and CMA (China Meteorological Administration) for training, research and forecasting to the general public who want to follow the weather using real data instead of web based images.

6. THE FUTURE

In the short term, more GEMPAK functionality will be incorporated into the IDV to support the needs of that community. Some high priority items include support for isentropic coordinates and ensemble grids. We are also investigating better time matching of data using some of the ideas in the GEMPAK/NAWIPS software.

Work is already in progress on accessing point data from the TDS using the new scientific features library of the Java netCDF package. This will allow for easy subsetting and querying of existing data holdings.

The IDV developers continually strive to improve the performance of the programs. As datasets get larger with higher resolution data, this becomes increasingly important. Several strategies are under consideration for automatic subsetting and sampling as displays are zoomed. Also better memory management for satellite images is being worked on as part of the McIDAS-V development.

As Unidata's RAMADDA system evolves, work will be undertaken to integrate some of the features it provides (e.g., data collection services) to provide the same browsing and selection functionality for local datasets as we have for remote data sources. The publishing capability of RAMADDA has already been integrated as a plugin and we expect that IDV users will use this to share favorite data displays and case studies.

7. SUMMARY

The IDV has evolved steadily over the past 5 years to support the needs of the educators and researchers in the atmospheric and related sciences. Over the next 5 years, we expect this evolution to continue with new features, access to new types of data and new and innovative visualization techniques.

8. WEB SITES

Unidata Integrated Data Viewer:
http://www.unidata.ucar.edu/software/idv
GEON-IDV:
http://geon.unavco.org/unavco/IDV_for_GEON.html
McIDAS-V
http://www.ssec.wisc.edu/mcidas/software/v/
VisAD
http://www.ssec.wisc.edu/~billh/visad.html

9. REFERENCES

Ho, Y., J. McWhirter, D. Murray, X. Liang, X. Lu, and Y. Yin, 2009: TC-IDV — A New Tool for Tropical Cyclone Forecasting and Research. 25th Intl Conf. on IIPS for Meteorology, Oceanography and Hydrology.

Murray, D., J. McWhirter, S. Wier, S. Emmerson, 2003: The Integrated Data Viewer: a Web-enabled application for scientific analysis and visualization. Preprints, 19th Intl Conf. on IIPS for Meteorology, Oceanography and Hydrology.

Weber, J and J. McWhirter, 2009: Earth system case studies for research and education. 25th Intl Conf. on IIPS for Meteorology, Oceanography and Hydrology.