P1.4 DISPLAYING AND ANALYZING LEVEL II DATA WITH THE UNIDATA INTEGRATED DATA VIEWER (IDV)

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1. INTRODUCTION

The Unidata Program Center's new Integrated Data Viewer (IDV) is a freely available, cross-platform, meteorological display and analysis application. The latest IDV release reads WSR-88D Level II data files and provides many of the displays used in radar investigations. Other common meteorological data sources can be combined with the Level II radar displays and in data analysis computations.

2. DATA ACCESS

The National Weather Service (NWS) is collecting and distributing Level II WSR-88D data in near-real-time from 123 NWS sites and from selected DOD sites via the Internet 2 – Abilene backbone for use at the National Centers for Environmental Prediction, and to archive the data at the National Climate Data Center (NCDC). During 2004 the NWS will complete the full operational capability, leveraging the existing Collaborative Radar Acquisition Field Test (CRAFT) project at the University of Oklahoma, with 132 NWS sites and 11 DOD sites (AMS 2003; Crum 2003). The Unidata Program Center has been working with CRAFT, the NWS, and Internet 2 to facilitate Level II data distribution. Unidata LDM 6.0 software is central to the Level II data network operation. The Level II data is available in near-real-time to the Unidata community of over 100 academic and research institutions, on the existing Unidata Internet Data Distribution (IDD) system. When complete, three or four top-tier LDM servers will be placed at universities on Abilene to ingest the Level II files into the IDD. Archived data will be available from the NCDC.

3. LEVEL II DATA FILES

Level II native data files are read from disk by the IDV. Each data file has all azimuth sweeps for one volume scan. The bin values, ranges and beam azimuths are provided for three moments, reflectivity, radial velocity, and spectrum width. Data times for the entire volume scan and for every sweep and beam are included. No station location information is provided.

4. IDV DISPLAYS OF LEVEL II DATA

The IDV has a 3-D display window for meteorological data with background maps on the surface level.

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4.1 *Sweep Displays in 2-D and 3-D*

The IDV makes conventional PPI plots of Level II azimuthal sweeps as colored images on the map level.

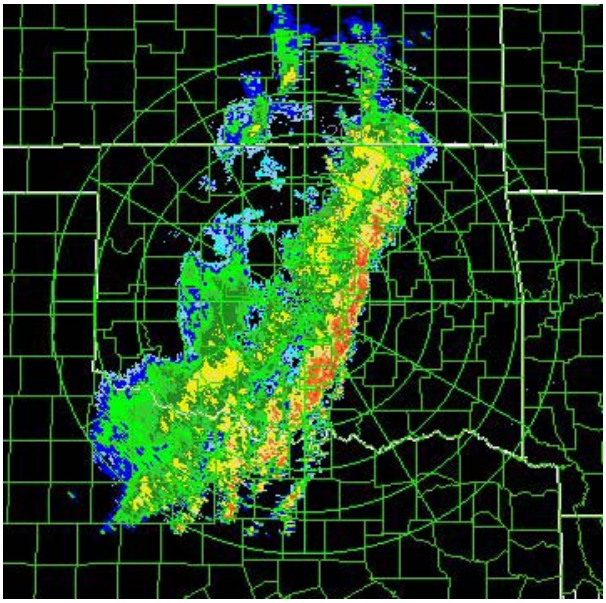

Figure 1. Reflectivity from the 0.5 degree sweep at KLTX, 1300 UTC, 9 September, 2003.

The IDV also can plot single sweeps at their true location in the atmosphere (Fig. 2).

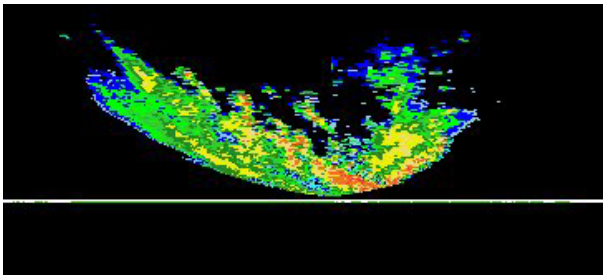

Figure2. The same data viewed in 3-D from the south.

Rotation of the IDV window shows the display from any viewpoint for examining data character. You can select any sweep tilt. Time animation and range rings are available. The IDV uses the data's range-azimuth coordinate system to make displays, showing individual bins in displays.

The IDV can also display all sweeps in a volume scan at once, with every bin a pixel colored by data

value, making a 3-D cloud of radar data in the atmosphere.

4.2 Pseudo-RHI plots in 2-D and 3-D

The IDV constructs pseudo-RHI plots from the azimuthal sweep data. Plots are shown in conventional 2-D diagrams (Fig. 3), and in the 3-D display of the atmosphere (Fig. 4).

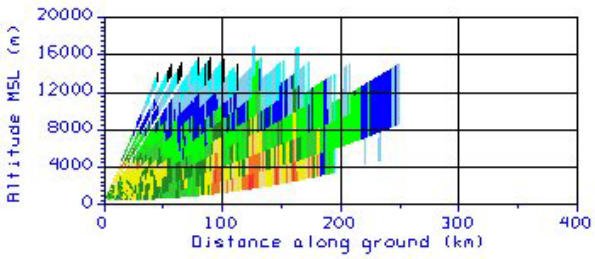

Figure 3. 2-D Plot of a pseudo-RHI

The 3-D RHI plots show the beams and beam widths at their true altitudes in the atmosphere, and above their true location on the map (Fig. 4). Users can interact with the RHI displays by choosing specific azimuths or by an auto-rotation option which will step through the azimuths at a specified interval.

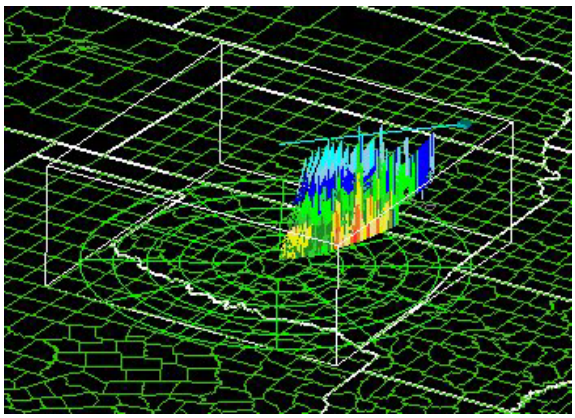

Figure 4. The same pseudo-RHI in the 3-D window

4.3 Isosurfaces

The IDV can show isosurfaces of constant parameter value, such as the 45 dBz reflectivity isosurfaces in Fig. 5, showing most of Oklahoma in an oblique view from the southeast. A line of thunderstorms extending across the state is apparent.

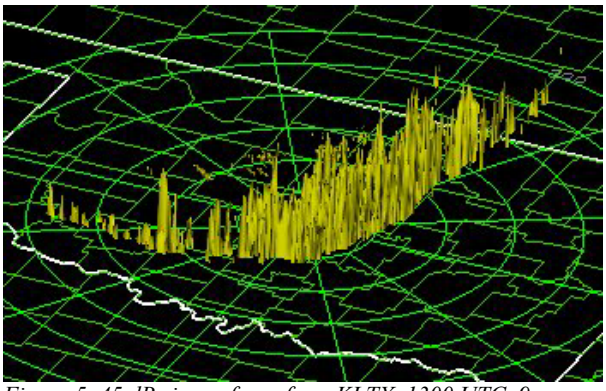

Figure 5. 45 dBz isosurfaces from KLTX, 1300 UTC, 9 September, 2003.

5. COMBINED DISPLAYS WITH LEVEL II DATA AND OTHER METEOROLOGICAL DATA

The IDV displays many other kinds of meteorological data in 2-D and 3-D, including numerical weather prediction model output, NOAA Profiler Network winds, satellite imagery, WSR-88D Level III imagery, and surface station observations. These data can be displayed with Level II data, allowing easy visual comparisons of data from different sources.

6. DATA ANALYSIS

A data sampling tool lets users probe bin data values. You can use the IDV's computational capabilities to calculate data-based derived quantities and display the results. Users can write simple formulas for data processing, or create libraries of Jython procedures. Figure 6 shows a pseudo-colored image of rainfall rate estimated from the reflectivity data shown in the previous figures, using a Marshall-Palmer relationship.

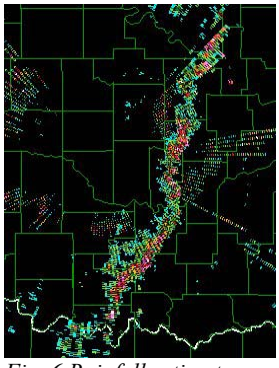

Fig. 6 Rainfall estimate

Since the IDV uses VisAD's universal data model (Hibbard, 1998) which supports virtually any numeric data, it is easy for users to perform mathematical calculations between the radar data and other data such as numerical model output. In such a case the IDV automatically re-samples and interpolates data from one data source to the locations of the other data source,

and handles unit conversions of the data where necessary.

9. SUMMARY

The IDV being developed by Unidata is a new application for investigations of Level II data. It provides conventional radar displays, new 3-D displays with data points at their true location in the atmosphere, the ability to combine Level II displays with displays of several common types of meteorological data, and computational facilities. The IDV is available for download at my.unidata.ucar.edu/content/software/IDV/.

10.REFERENCES

American Meteorological Society, 2003: National Weather Service Plans To Collect, Archive, and Distribute Level II Radar Data In Near Real Time. *AMS Newsletter*, 4(5)

Crum, T. and K. Kelleher, P. Cragg, J. Barna, F. Toepfer, W. Blanchard, T. Sandman, K. Droegemeier, G. Almes, and L. Miller, 2003: Progress In Implementing Electronic Collection And Distribution Of WSR-88D Level II Data. *31st International Conference on Radar Meteorology*.

Hibbard, W., 1998: VisAD: Connecting people to computations and people to people. *Computer Graphics,* **32**(3), 10-12.