The Integrated Data Viewer
An integrated, interactive and collaborative visualization and analysis tool for research and education

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Presentation Outline

- Challenges of research and education in the geosciences
- Integrated Data Viewer (IDV) features overview
  - Integrator
  - Interactive tool
  - Collaborative tool
- IDV examples
- The future of the IDV
Our Vision:

Geoscience at the speed of thought through accelerated data discovery, access, analysis, and visualization.

Our Mission:

To transform the geosciences community, research, and education by providing innovative data services and tools.
Integrated Visualization at the Speed of Thought


- In the geosciences, data gathering, analysis, and visualization collectively constitute “data friction”

- IDV is dedicated to minimizing data friction and maximizing the science in research, education, and weather service
Challenges of Diverse Geoscience Data

- Complex 1D/2D/3D spatial datasets with time varying data
- Diverse data sources (model output, observation, statistics, databases, ...)
- Expanding data volumes
- Large collections of heterogeneous data
- Lack of conventions and standards
- Multidisciplinary integration
Integrated Data Viewer (IDV)

- Unidata’s visualization and analysis tool for atmospheric data
- Java™ framework and application
- Integrated 2D/3D displays of a wide range of data
- Built on VisAD library
IDV is an Integrator

- Integration of data from disparate data sources
IDV Integrates Diverse Data Sources

**Data Types:**
- Gridded data
- Satellite imagery
- Radar data
- Point observations
- Balloon soundings
- NOAA Profiler Network winds
- ACTF tropical storm
- GIS data
- Quick Time movies
- Web Cams

**Supported Formats:**
- netCDF/HDF
- GrADS
- GRIB
- ADDE
- Vis5D
- KML (Google Earth)

**Access Methods:**
- Local files
- HTTP and FTP
- ADDE and TDS servers
- RAMADDA

**ADDE** = Abstract Data Distribution Environment  
**TDS (THREDDS)** = Thematic Realtime Environmental Distributed Data Services
Challenges of Integration

- Challenges of supporting and integrating many different data sources:
  - Different data formats
  - Different time frequencies
  - Different spatial projections and coverage

- Solutions provided by the IDV:
  - Data model (CDM and ADDE)
  - Auto projection converting
  - Time matching
Data Spatial Projection

- A set of pre-defined map projections is included
- Data on different projections are automatically remapped
  - The projection of existing display can be remapped automatically
  - The same projection can be applied to different displays
The IDV can match display times. This is done by first setting a time driver based on a display or a predefined animation time set, and then setting a display to **Use Time Driver Times**. A display can be set as the time driver or to use time driver times.
Time Matching
Without Time Matching
With Time Matching
Time Matching
IDV - an interactive visualization and analysis tool

- General purpose 2D/3D displays
- Exploration of data details
- Quantitative analysis
IDV Example: 3D Globe View of Sandy

7_Band27_BRIT - Image Display 2012-10-21 18:41:00Z
10_Band4_BRIT - Image Display 2012-10-21 18:00:00Z
Blue Marble - Static - WMS Control
IDV Example: 3D Globe View of Sandy
IDV Example: Crosssection View of Sandy
IDV Example: Sandy storm tracks
IDV Example: 3D Display

- 3D views of Sandy WRF output: PMSL and temperature
IDV Example: 3D Display
IDV Example: 3D Display
IDV Feature: Data Interaction

- Versatile data interaction
  - Probes to interrogate data – time series, vertical profiles, etc.

S-POL Radar Cross section

NOAA Profiler Network station (time height)
IDV Feature: Data Analysis

- Formulas and computation using Jython
- Interactive and script based generation of:
  - Images - JPEG, GIF, PNG, PDF, PS
  - Movies - Quick Time, animated GIF
  - Google Earth KML/KMZ
IDV: a collaborative visualization and analysis tool

- XML configuration and bundling allows collaboration with others
- Direct access to RAMADDA server, allows both downloading and publishing
- Use THREDDS catalogs of data holdings for discovery and usage metadata
- Client-server data access from remote systems
IDV Feature: Bundling

- State of the application (loaded data sources and data depictions) can be saved in XML “bundles”
- Bundles can be loaded at startup or imported on-the-fly
- Bundles can be distributed around the Internet (on web servers or e-mail attachments)

GFS ensemble 4 panels Bundle by Sean Arms
RAMADDA

- Content management system for geoscience data
  - Allows users to create, organize, and share content
- Web based API
- Tagging and Search
- Plugin facility provides easy way to add functionality
- Originally developed at Unidata, now an open-source project
IDV and RAMADDA
IDV and RAMADDA

- The IDV can generate images and bundles that can be published to RAMADDA, and RAMADDA can also run the IDV to post images on the web.

- The IDV and RAMADDA enable users at partnering institutions to contribute and easily share data holdings and products.

- The IDV and RAMADDA empower the community with the ability to create and deploy innovative data services in a collaborative, social network style.
IDV Benefits

- **In Classroom/Research:**
  - More sophisticated presentation of concepts with real data
  - Better prepares students entering the geoscience career field

- **In Operation:**
  - Easy data accessibility
  - High level of interaction with data
  - High efficient image rendering
  - Platform independence allows for real-time collaboration
What’s Up Next for IDV?

- Performance: memory and CPU
- Support for “Big Data”
- Improving the GUI and making it more user friendly
- Integrate the new RAMADDA collection services into the choosers
- Server side functions development and thinner client design
Summary

- IDV, when combined with other Unidata technologies, provides efficient data access, effective data usage, and reduces data friction.
- IDV enables analysis, integration, and visualization of heterogeneous geoscience data.
- IDV enables real-time collaboration.
For more information

- **IDV Homepage:**
  - [http://www.unidata.ucar.edu/software/idv](http://www.unidata.ucar.edu/software/idv)

- **Download IDV package:**
  - [http://www.unidata.ucar.edu/downloads/idv/index.jsp](http://www.unidata.ucar.edu/downloads/idv/index.jsp)

- **IDV Support**
  - Support-idv@unidata.ucar.edu