



## **Data and Information Application Layer [DIAL]**

A powerful and quick technology to build data-rich user interfaces on top of current and proposed NASA server-side and middle-ware data services.

Funded by **NASA ACCESS CA: NNX06AB08A** June, 2006

Project PI: **Bruce Caron** [bruce@nmri.org](mailto:bruce@nmri.org)

Project Technical lead: **Marty Landsfeld** [marty@nmri.org](mailto:marty@nmri.org)

Project Team: **The New Media Research Institute** and

**The Foundation for Earth Science**



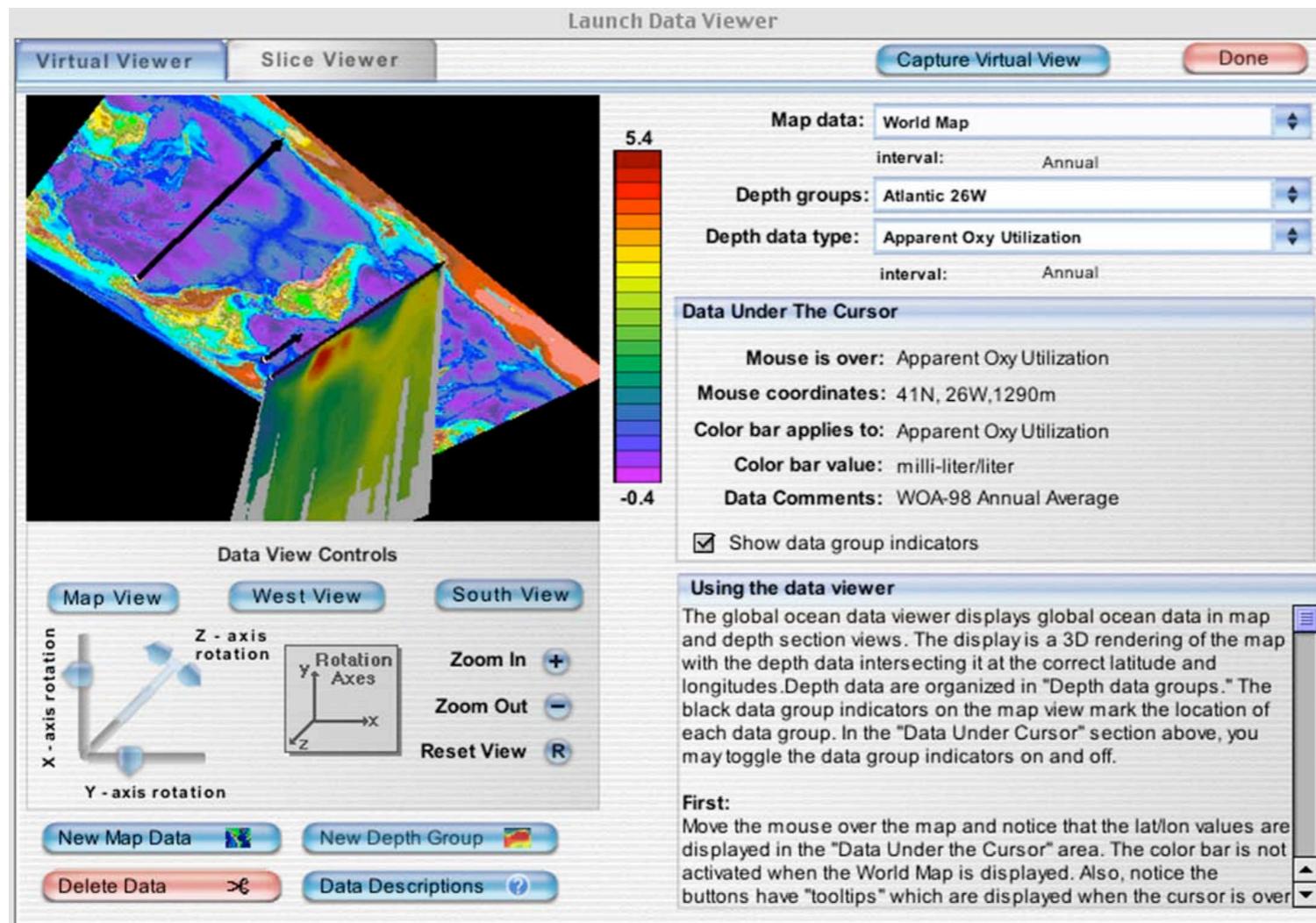
## **We love Open-Source... but we crave speed**

- DIAL is NOT an open-source project... it does provide an open RESOURCE of code that can be used with standard licenses
- DIAL HARNESSSES leading COTS software environments:
  - ITT's IDL™, ESRI's ArcEngine™ (soon), Adobe's Director™
- Some time in the future, open-source might catch up. Until then, there's DIAL.

## In the beginning was the ESIP... and it was good. But this is better...

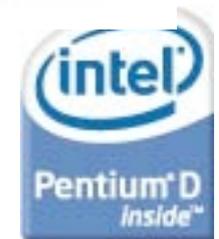
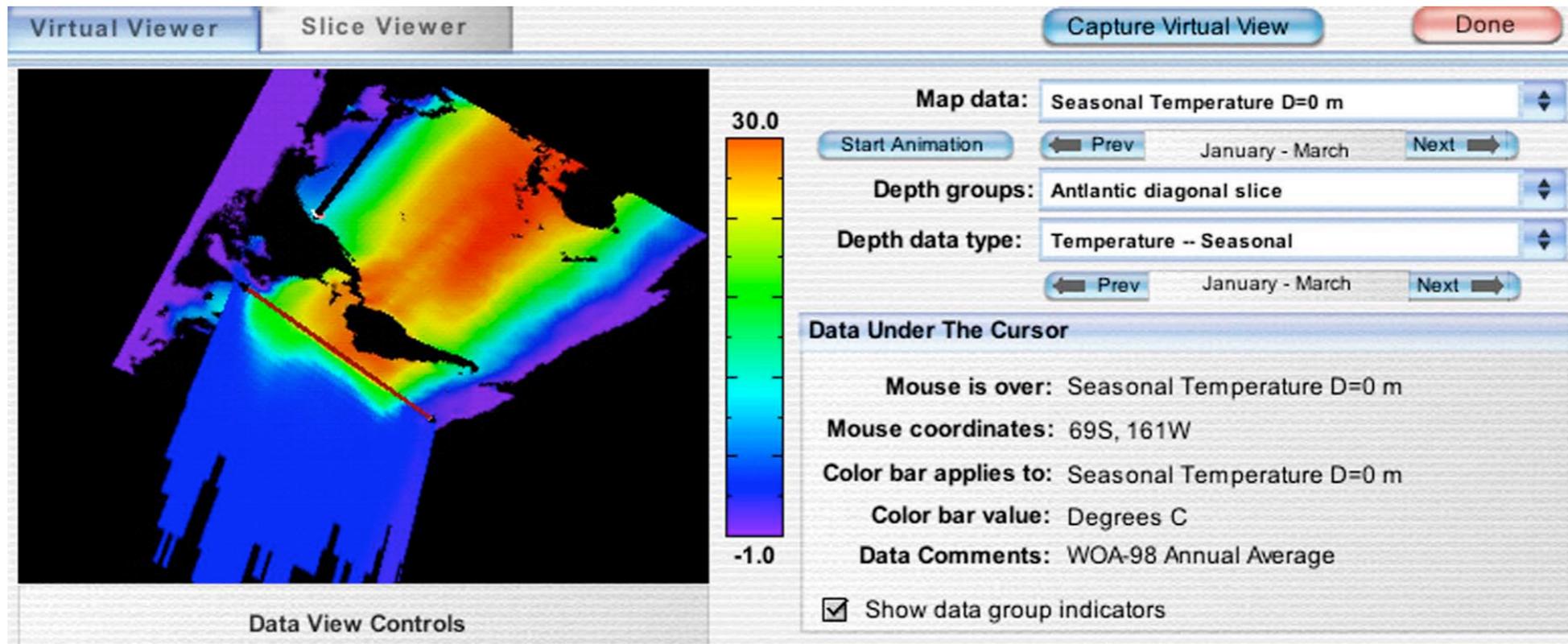
- May 1997 the ESIP CAN...
  - Mission to Planet Earth Education Series ESIP: multimedia production
- NSF SBIR and ESIP Fed support: 2000
  - Moving from multimedia to direct data access: EDM I Xtra
  - Earth Data Discovery Consortium ESIP... new partners
- NSF NSDL support: 2001-2003
  - Building code resources and partnering capabilities
- NASA/ESIP SEEDS grant 2004
  - Demonstrating end-to-end data access with GLCF and OPeNDAP
- NASA ACCESS support: 2006-2008





## Proven End-to-end Data Delivery SOLUTION

- OPeNDAP enabled
  - accesses the OPeNDAP IDL Client
- IDL/ArcGIS powered
  - leverages professional data format access tools/scripts
- Adobe simple
  - They DO the GUI for professional/consumer apps...
- Does Windows and Mac OS
  - Adobe, and ITT are cross-platform. ESRI...does some Java...
- Open to new access protocols/standards
  - e.g., the alpha OGC WCS Client, ECHO, web services



## Fueling the User Experience: Moore is More

- 3 GHz, Dual Core, 128m video card, 19" monitor = \$890
- sub 1/10 second response time goal (local interactions)
- download the data as data...
- redraw the visualization locally...
- one data set is worth a thousand pictures
- ergo: distribute the tool and the data and stand back...



## Adobe Director

- 500 lb gorilla app for multimedia APPLICATION AUTHORIZING...
- Spits out STAND-ALONE APPLICATIONS... not just graphics
- JavaScript enabled

### Powerful DVD-Video Capabilities

DVD-Video Support  
DVD Event Manager  
DVD Controller Component

### Time-Saving Enhancements

JavaScript Syntax Scripting  
Sprite and Channel Naming  
New Projector Publishing Panel  
Cross-Platform Projector Publishing  
Improved Lingo Syntax

### Tight Integration with Macromedia MX 2004 Products

Macromedia Flash 7 Support  
Launch and Edit Macromedia Flash MX 2004 Content  
Flash Component Support  
Macromedia Fireworks MX 2004 Integration  
Updated MX User Interface

### Broad Media Support

Integrate Over 40 Media Types  
Apple QuickTime 6 Support  
Windows Media Format Support  
RealMedia Format Support

### Workflow Improvements

Improved Help System  
Stage Docking  
MIAW Docking  
Start Page  
Improved Window Properties

### Improved Performance

Optimized Flash Sprite Handling  
Flash Content Playback Improvements  
Improved XML Parsing

### Accessibility and Standards

Accessibility Support  
Accessibility Behaviors  
Internet Protocol Support



## Director=Multimedia

- Combining video, audio, graphics, 3D objects, and text...
- Creating user interfaces
- Programming user choices into the interface
- + NASA DATA (IDL Xtra)

### Use Director MX 2004 When You Want To:

Create streaming, interactive, multiuser content using:

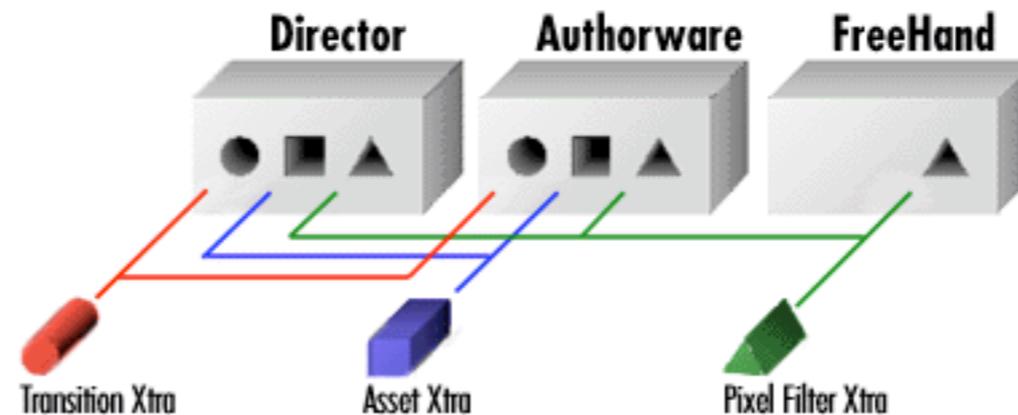
- Interactive 2D and real-time 3D animation
- Video: RealVideo, DVD-Video, Windows Media, Apple QuickTime, AVI
- Sounds: RealAudio, MP3, AIF, WAV
- Graphics: JPG, GIF, PNG, PSD, BMP, and more
- Macromedia Flash
- Text and fonts
- Xtras

**Deploy to fixed media.** The performance, media-handling, and extensibility of Director make it ideally suited for deploying content on CD-ROM, DVD-ROM, kiosks, and other fixed media:

- Get optimal content playback. Fixed media content often involves hundreds of megabytes of data. The advanced dynamic memory management of Director enables quick loading and unloading of this data into system memory for smooth playback.
- Create fully featured applications that can access, launch, and control other applications from within the Director executable.
- Enjoy greater control—such as read/write access to the user's disk—as well as control over devices like joysticks.

**Deploy cross-platform accessible content that does not require a screen reader.** Director MX 2004 is ideal for creating accessible CD/DVD-ROMs, kiosks, and web-based applications that run on both Apple Macintosh and Microsoft Windows-based systems. Visually impaired web users frequently use screen-reading software, which reads aloud the contents of a web page. Because Director MX 2004 uses native text-to-speech capabilities within the OS, you can create accessible self-voicing content that works without screen readers or other assistive technologies. This is important in situations where it's impractical to install expensive screen readers, such as in public libraries and museum kiosks.

**Get maximum performance with large files.** Quickly load and unload hundreds of megabytes of data into system memory with advanced memory management of Director. The result? A consistent, smooth playback for end users.



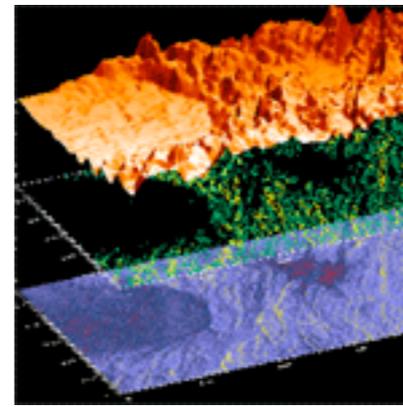
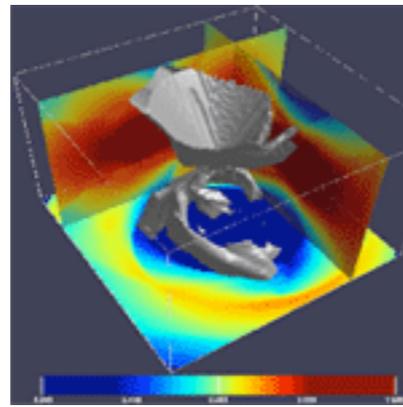
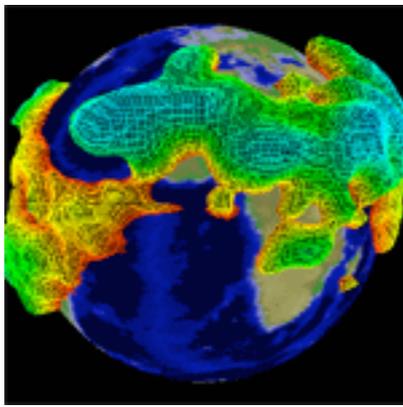
Transition Xtras and Asset Xtras can be used across Director and Authorware. Pixel Filter Xtras can be used in FreeHand as well as Director and Authorware.

Xtras are the most visible and tangible result of the Macromedia Open Architecture for day-to-day users of Macromedia products. Some Xtras are product-specific, while others are designed to work across multiple applications. The table below provides a sampling of how the Xtras can be supported in Macromedia applications and where those Xtras appear in each application's user interface.

## Adobe Director (cont.)

- Open Architecture API
  - uses COM compatible for both Windows and Mac
- Xtras=Plug-ins
- IDL Xtra...ESRI Xtra

Director Xtras	Appears In	Behavior
Transition	Transition Dialog	Performs screen transition effect.
Asset	Insert Menu	Creates an instance of an add-in media type.
Pixel Filter	Auto Filter, Paint	Runs filters (Photoshop and others) that can modify single bitmaps or a range of bitmaps over time (in the Paint or Cast window).
Scripting	Lingo scripting language	Provides additional functions and objects in the Lingo scripting language



## ITT Visual Solution's IDL software

- IDL, MATLAB, and the rest: it's what researchers use.
- Runtime code version 6.3
- Massive amount of code we don't need to debug or update...
- Command-line interface

### > Data Access

IDL supports virtually every data format, type and size so you can focus on interpreting your data, not trying to read it in

### > Data Analysis

Leverage IDL's built-in library of math, statistics, image processing and signal processing routines or build your own much more easily than with C or FORTRAN

### > Data Visualization

From simple 2D plots to OpenGL-accelerated 3D graphics, IDL gives you the tools you need to easily create powerful visualizations

### > GUI Toolkit & Builder

Take advantage of IDL's complete, native UI toolkit and convenient drag-and-drop GUI builder to quickly build the ideal interface for your end-user

### > Development Environment

Reduce your design-compile-link-test cycle by issuing commands on the fly and seeing results immediately with IDL's interpreted language.

### > Integrated External Languages

Call programs and libraries written in other languages from IDL, use IDL as an ActiveX control and an ActiveX container and access Java objects from within IDL code

### > Application Distribution/Code Sharing

Distribute your programs without revealing your source code via the free IDL Virtual Machine and share code over the Web with ION

### > Training and Consulting

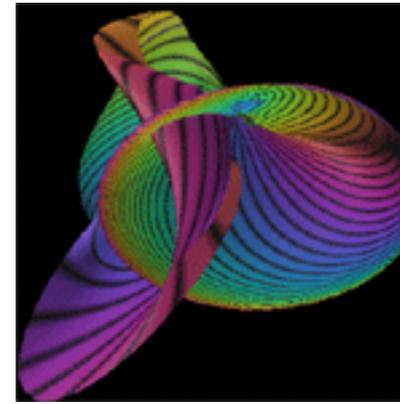
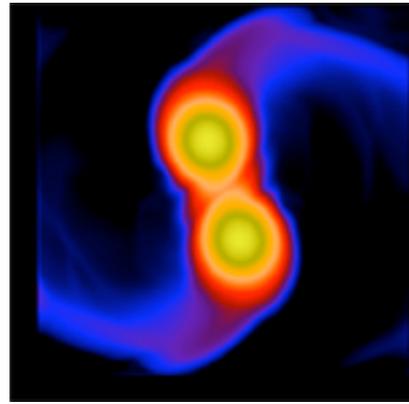
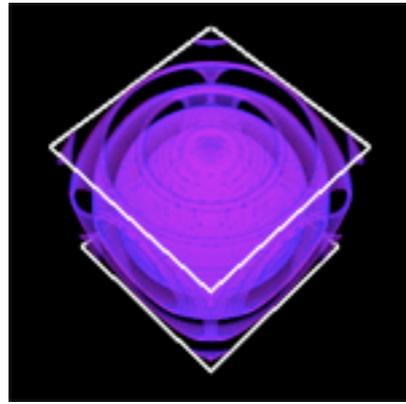
Get up to speed faster with RSI's numerous and customizable training classes and take advantage of RSI's 25 years of experience delivering solutions on time and within budget

### > Platform Support

The complete list of platforms supported in the current release of IDL

### > Complete Functional Summary

A detailed summary of functionality in the current release of IDL



## IDL: Data access and more

- IDL reads ALL NASA data (please let me know if this is not so)...
- IDL handles 3D, 4D, and 5D data...
- IDL does the math too...
- IDL runs the OPeNDAP client

Virtual Viewer
Slice Viewer
Capture Map
Capture Slice
Done

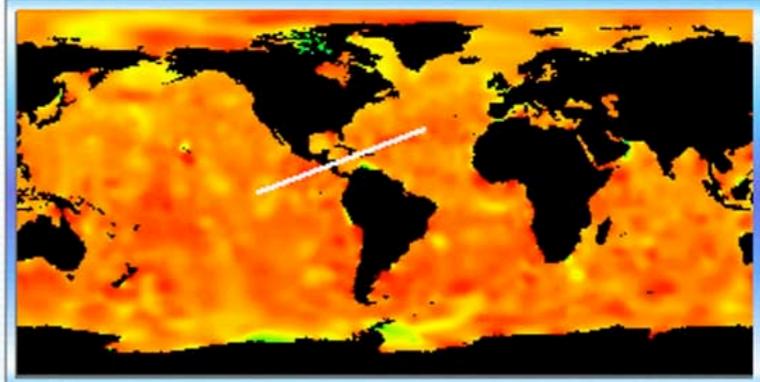
Data:

Date:

Click and drag the mouse on the map to create a cross-sectional view

Colorbar:

The cross section plot (bottom) is oriented so that the left side is the start point of the profile and the right side is the end point of the profile. So, a mouse drag from top to bottom will look flipped (left to right) from a profile made with a mouse drag from bottom to top. If you capture an image, note the maximum depth, because the label is not captured.



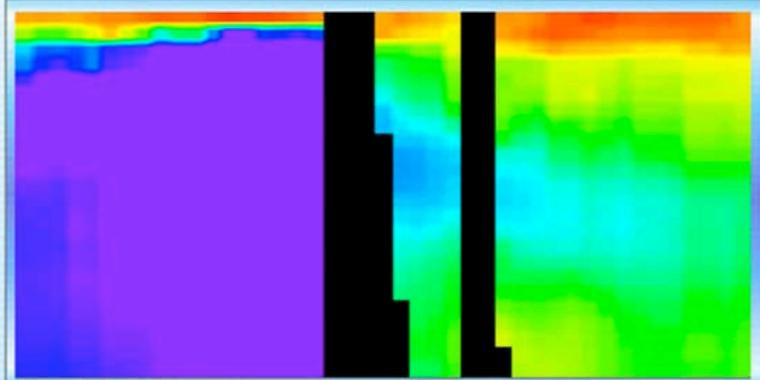


20.0 38.0 56.0 74.0 92.0 110.0  
Percent

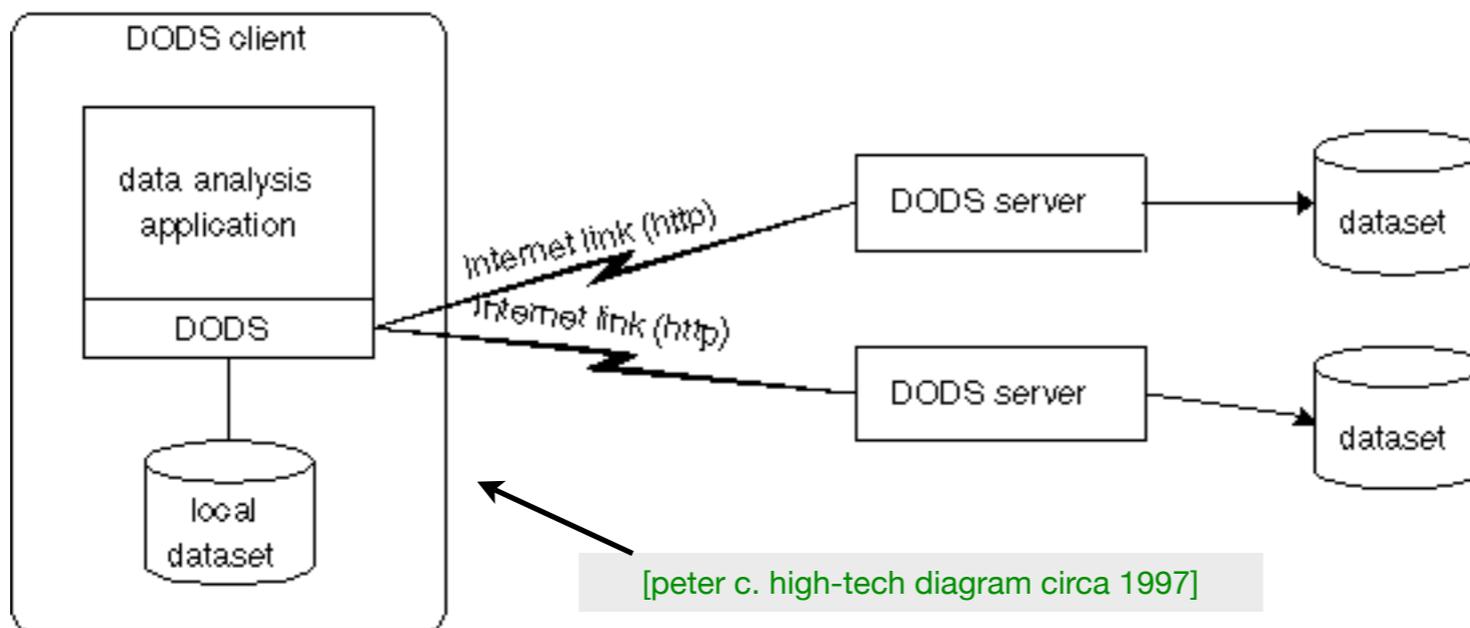
Value

Latitude

Longitude



Depth, 1500 m



## OPeNDAP and IDL

- OPeNDAP: Open Source Project for a Networked Data Access Protocol
- IDL client access's OPeNDAP (DODS) servers
- Many NASA/NOAA data centers use OPeNDAP

```

; IDL-OPENPAP interface.
; Written by Patrick C. West - UCAR/HAO
; Based on IDL-DODS Written by Daniel J. Carr - Research Systems, Inc.
; Copyright 2005, UCAR
;
; Main interface routine for IDL-OPENPAP link.
; opendap_get sets up the environment, and then calls
; opendap_get_das or opendap_get_data to establish a connection and
; return the appropriate OPeNDAP data.
;
; url - (Input )
;       URL location to connect to.
; ce - (Input )
;       Data constraint expression.
; opendap_data - (Output)
;       Returns the requested DODS data as an IDL structure.
; deflate - (Optional input flag)
;           ACCEPT_DEFLATE flag (1=yes (default), 0=no).
; mode - (Optional input flag)
;         Flag for the type of data to retrieve
;         (0 or 'DATA' for the data (default), 1 or 'DAS' for the DAS)
; seq_blocksize - (Optional input flag)
;                 How many elements should be allocated at once for sequence data
;                 Default: 4096
;
; returns -
;           Status (1=ok, 0=fail).

```



**POWERED BY**

**IDL**

**This educational software is Powered by IDL™**

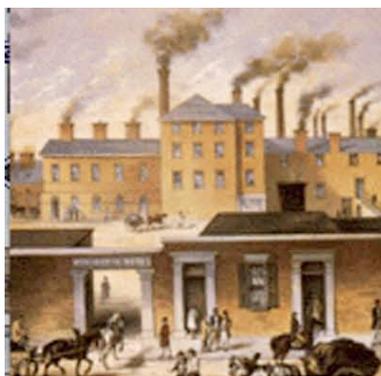
For more information about IDL, visit the RSI Website:  
**[www.rsinc.com](http://www.rsinc.com)**

IDL is a registered trademark of ITT Industries.  
RSI disclaims all warranties, whether expressed or implied, regarding the use of this product.



## Licensed for Education—licensable for any use

- Generous donation of the runtime distribution license from ITT Visual Solutions gives us the means to build a community of developers working to spread data literacy and data use to classrooms, museums, and other educational outlets
- Education User cost: free
- Other User cost: ITT Visual Solutions will work with any developer to license the runtime IDL code on a per-application basis: Please Contact Keith Nicholson at ITT Visual Solutions: [keithn@rsinc.com](mailto:keithn@rsinc.com)
- The EDM I Xtra is available for free for all non-commercial uses.
- Development requires STANDARD IDL and Adobe Director licenses



## Data Discovery Toolkit and Foundry

[Find an Application](#)

[I want to get INVOLVED](#)

[Request an Application](#)



Foundry  
Floor



### Community

[K-12 Teachers](#)

[College Teachers](#)

[Museum Staff](#)

### Welcome to the Foundry!

The New Media Studio and friends, with the support of the National Science Foundation [Grant #DUE-0121550] are creating this service. Use the buttons on the left to explore how this technology can help you bring data to your students and or other data users. [Foundry picture source: Library of Congress]



The New  
Media Studio

[Click HERE to go directly to available products](#)

Latest Foundry News and Product/Partner Events

### Foundry Partners



## NEXT STEPS: Technology integration with NASA

- Working with the Tech. Integration Working Group
- Building from the NSDL Data Discovery Toolkit and Foundry CVS system and Wiki
- Creating a new community web portal (nmri.org/DIAL ?)
- Doing the plug-in to ESRI ArcEngine...

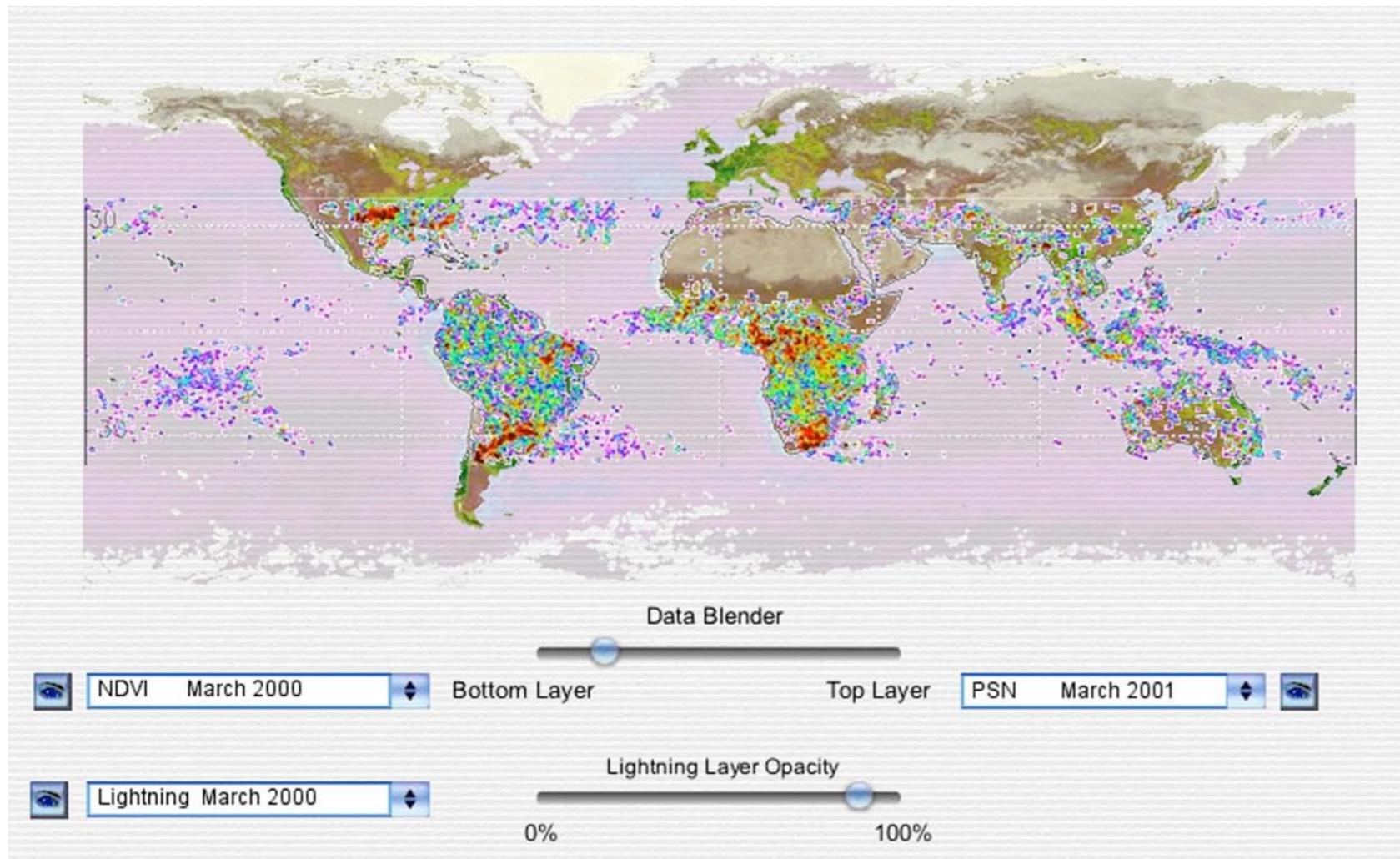


**ArcGIS Engine**  
Create Custom GIS Desktop Applications



## **DOING the ESRI Xtra... mapping data**

- Calling the ArcGIS Engine Runtime Environment
- Standard GIS framework, ArcObjects, on which the ArcGIS family is built
- Cost-effective deployment requiring only an ArcGIS Engine Runtime or ArcGIS Desktop license per computer
- Developer controls available in ActiveX, .NET, and Java that simplify application development
- A choice of standard developer languages including COM, .NET, Java, and C++ as well as a choice of Windows, Linux, and Solaris computing platforms
- Extensive developer resources including object models, utilities, samples, and documentation



## Support for WCS in IDL and ArcGIS

- The IDL WCS Client (now in alpha) provides access to gridded data from WCS servers
- ArcGIS includes WMS and WFS support
- Director promotes layer transparency control