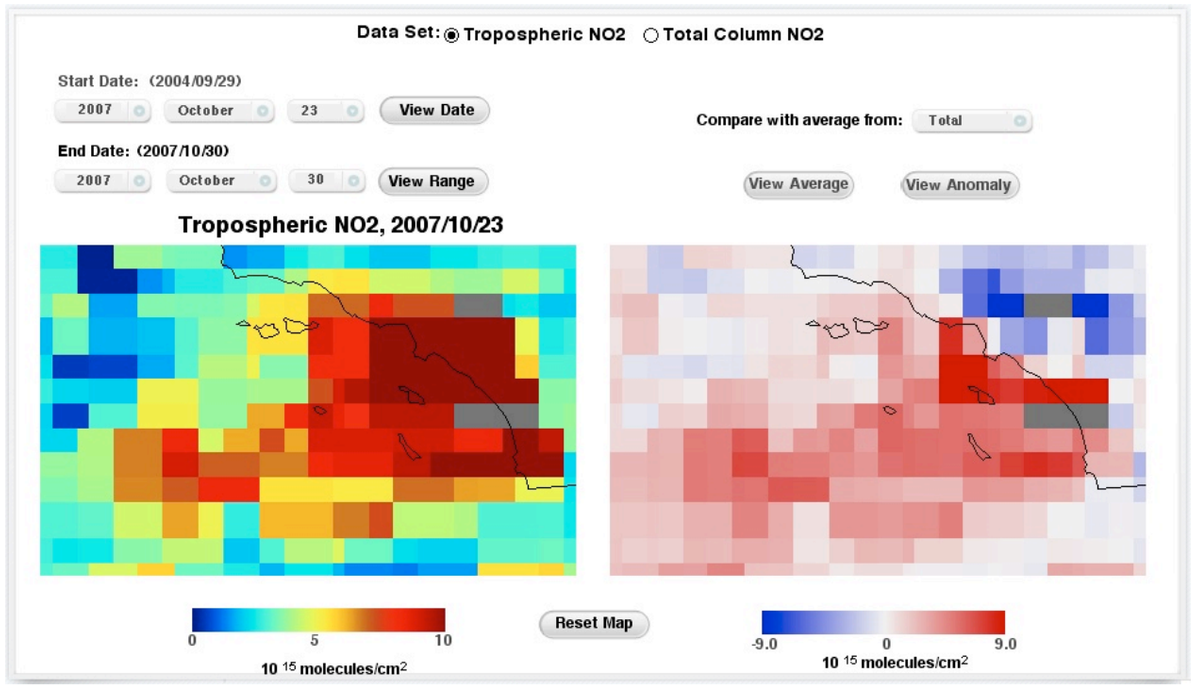
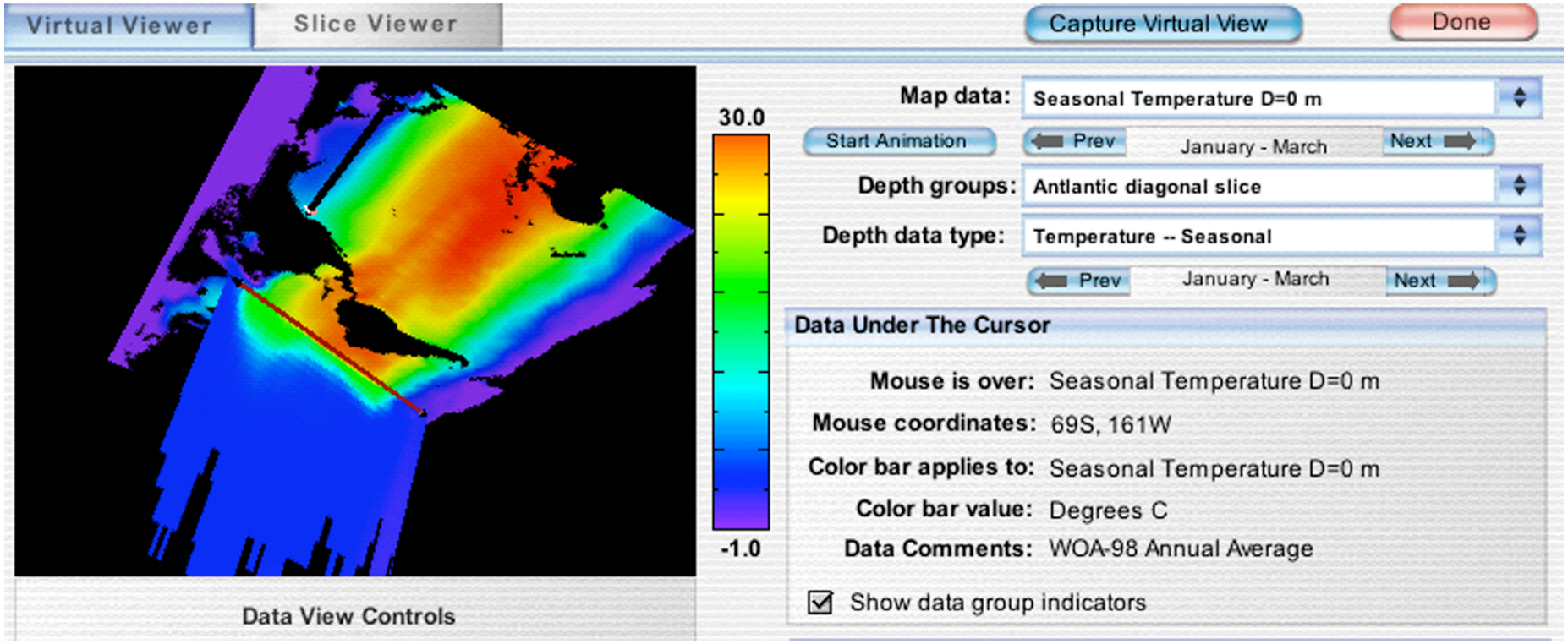


Data and Information Application Layer [DIAL]

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.

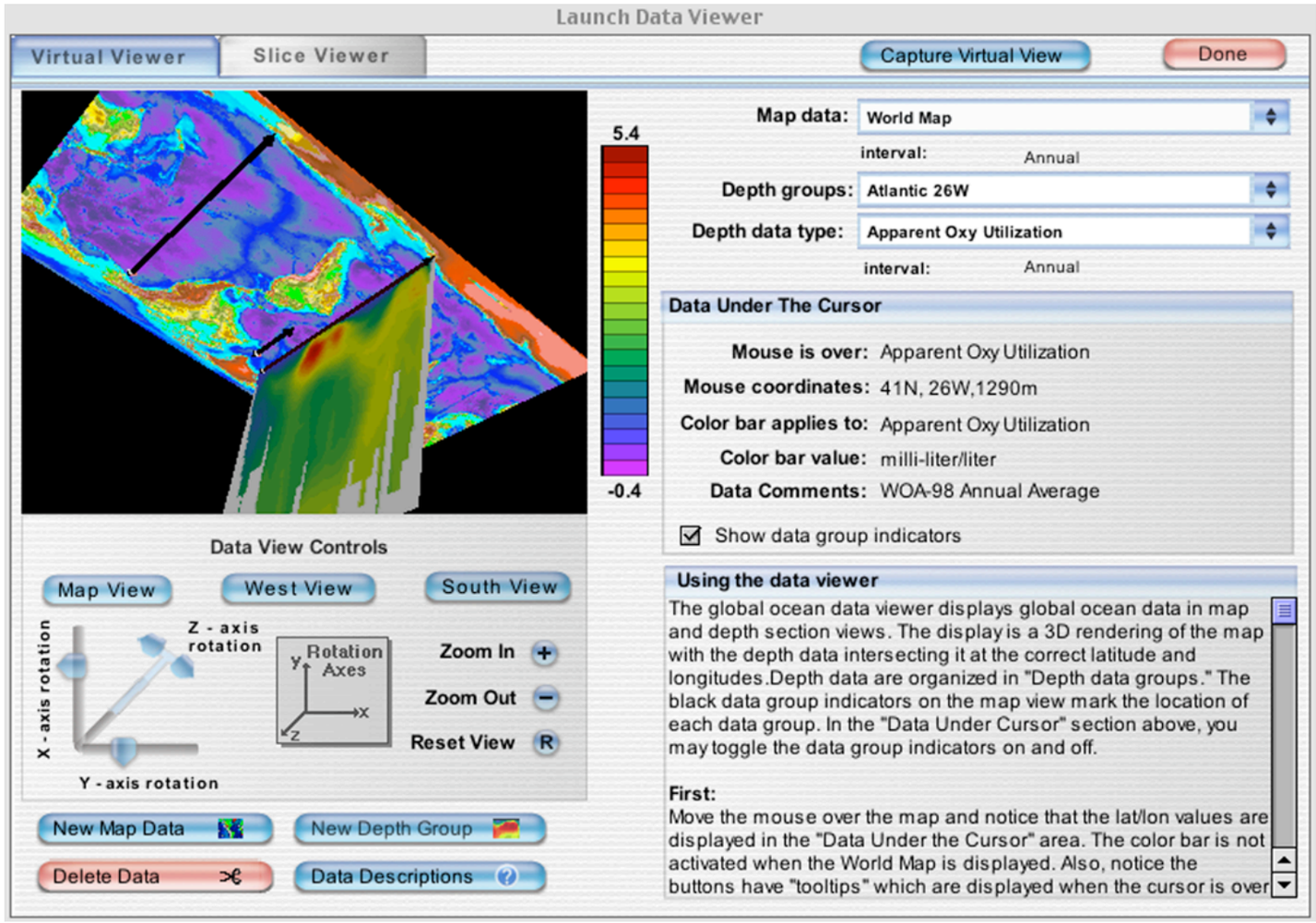
Funded by NASA ACCESS CA: NNX06AB08A September, 2006
Project PI: Bruce Caron bruce@nmri.org
Project Technical lead: Marty Landsfeld marty@nmri.org
Project Team: The New Media Research Institute and
The Foundation for Earth Science

Teaching with New Geoscience Tools
On the Cutting Edge
Professional Development for Geoscience Faculty
Amherst MA



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...



Proven End-to-end Data Delivery SOLUTION

- OPeNDAP enabled
  - accesses the OPeNDAP IDL Client
- IDL/ArcGIS (soon) 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

Adobe Director

- 500 lb gorilla app for multimedia APPLICATION AUTHORING...
- 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:

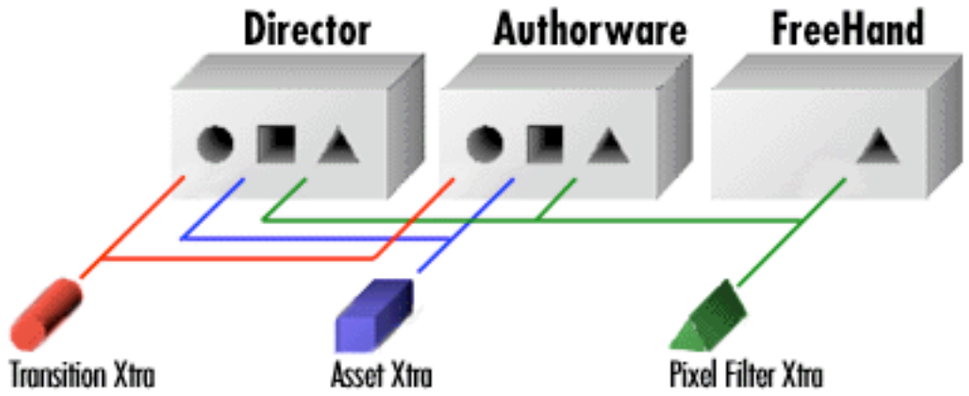
- Get optimal content playback. Fixed media content often involves hundreds of megabytes of data. The advanced dynamic memory management of Director enables quick loading and unloading of this data into system memory for smooth playback.
- Create fully featured applications that can access, launch, and 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.

Adobe Director (cont.)

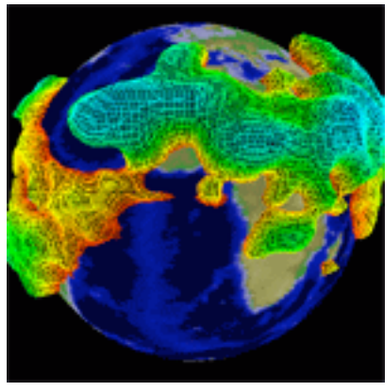
- Open Architecture API
  - uses COM compatable for both Windows and Mac
- Xtras=Plug-ins
- IDL Xtra...ESRI Xtra

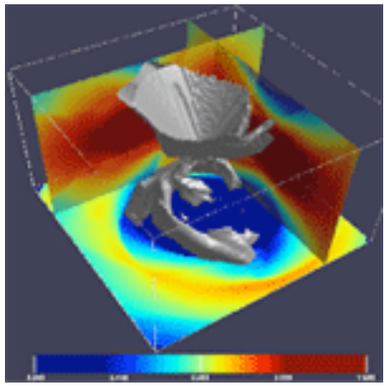


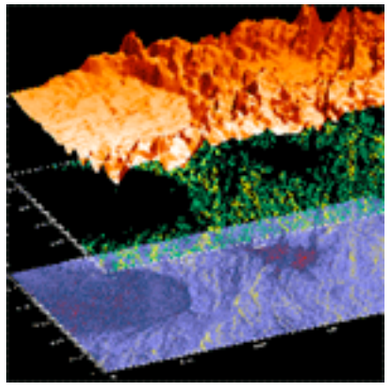
Transition Xtras and Asset Xtras can be used across Director and Authorware. Pixel Filter Xtras can be used in FreeHand as well as Director and Authorware.

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.

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







DIAL

ITT

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

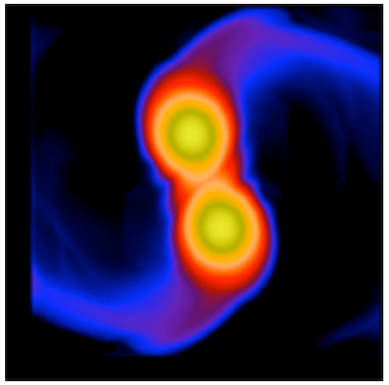
Get up to speed faster with RSI's numerous and customizable training classes and take advantage of RSI's 25 years of experience delivering solutions on time and within budget

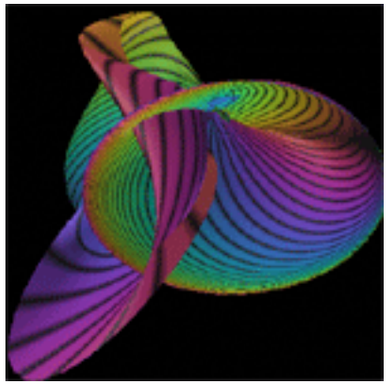
> Platform Support

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

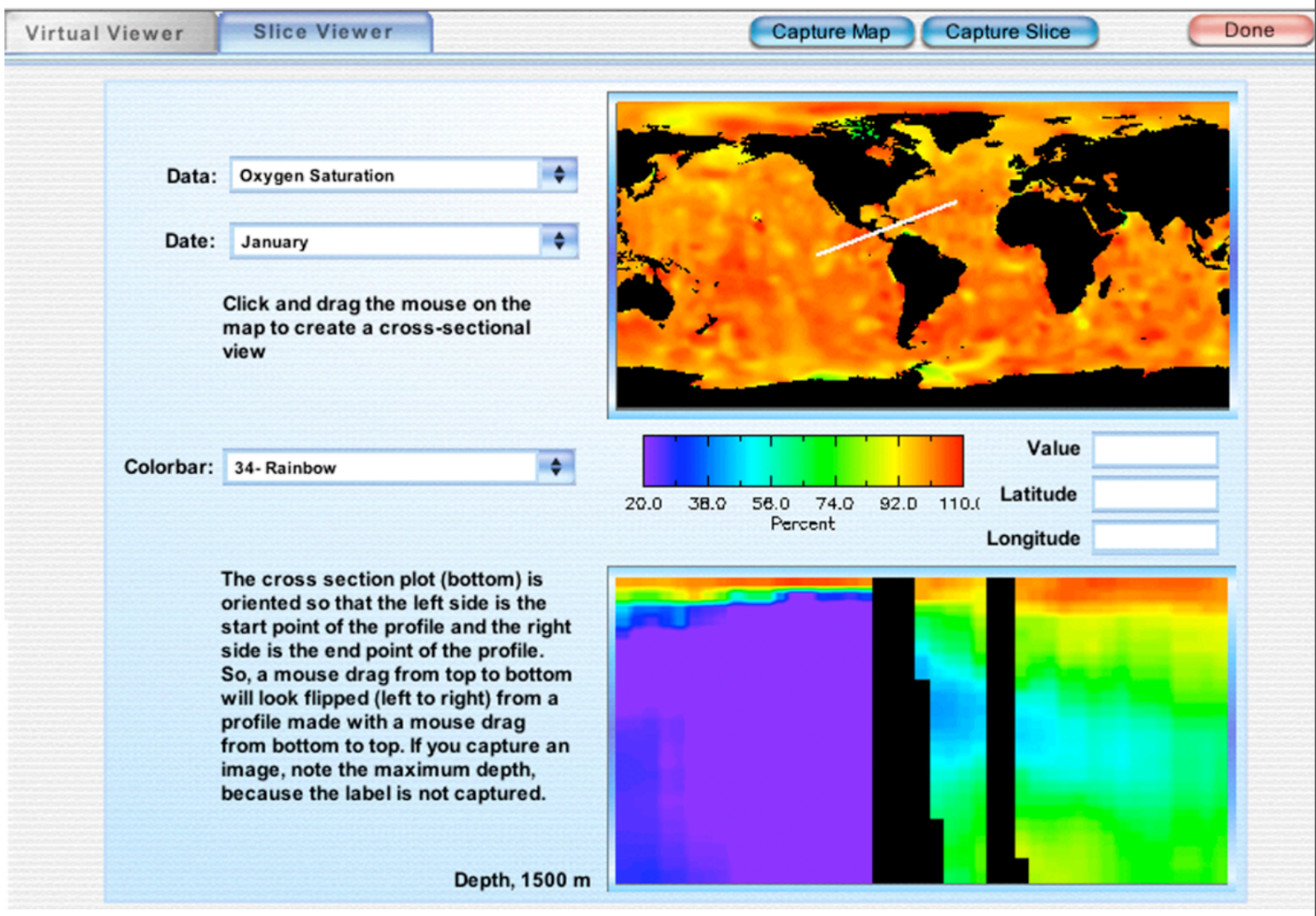


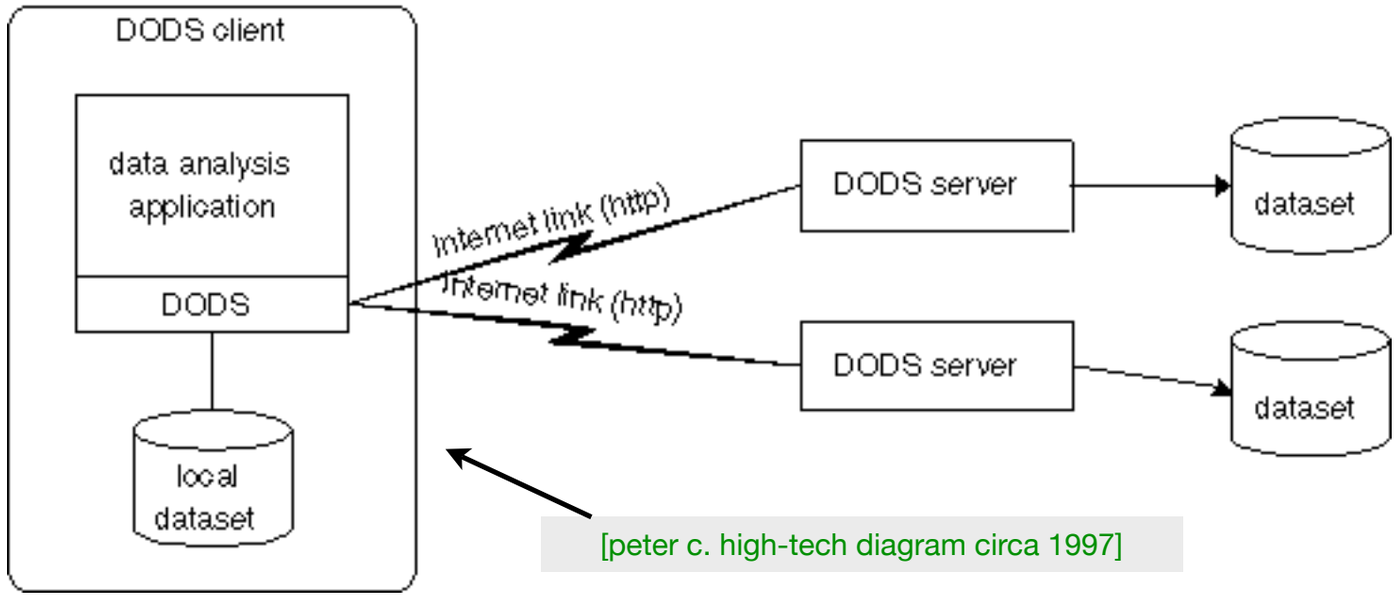


DIAL

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



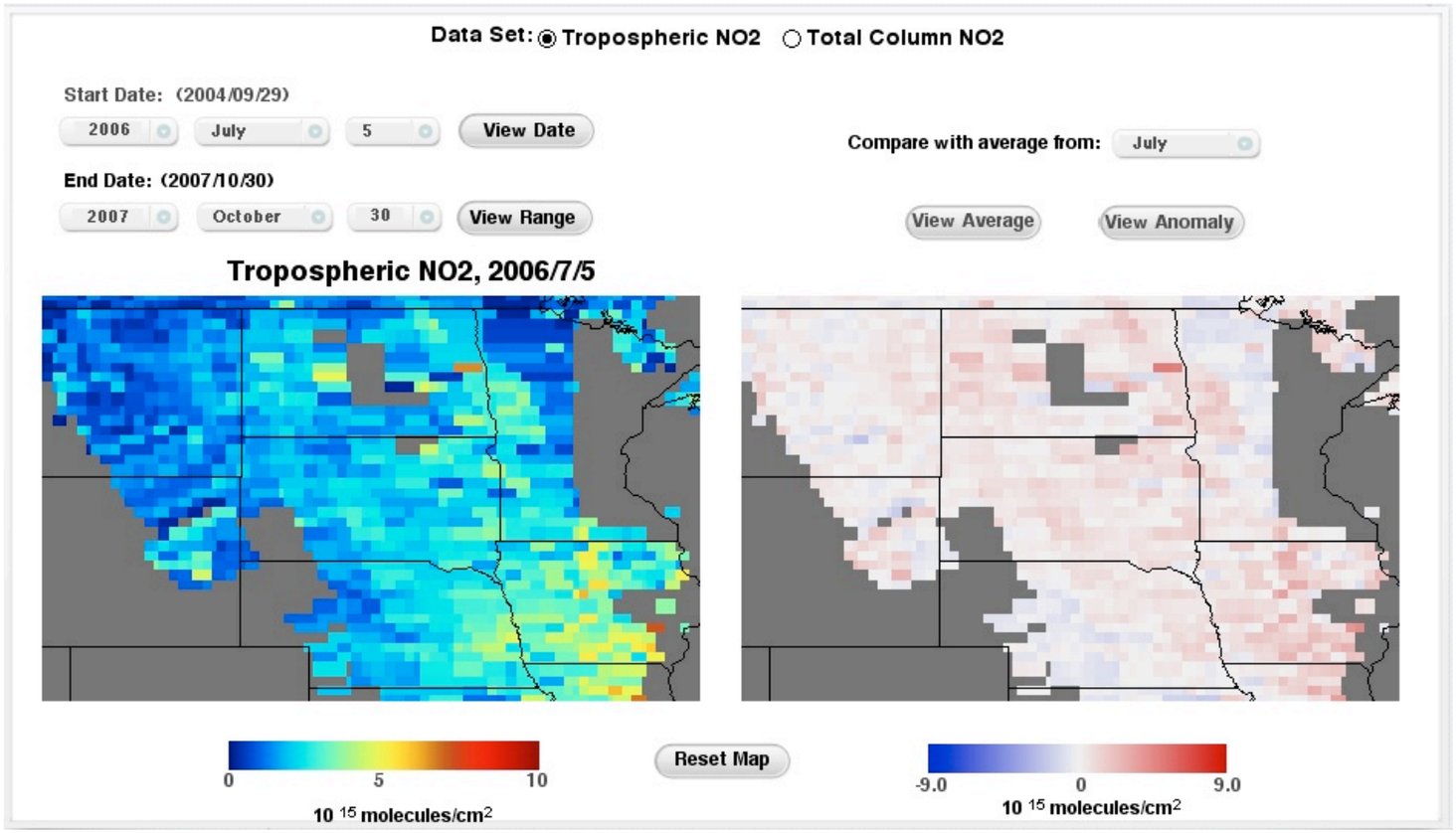


[peter c. high-tech diagram circa 1997]

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-OPENDAP 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-OPENDAP 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).
```



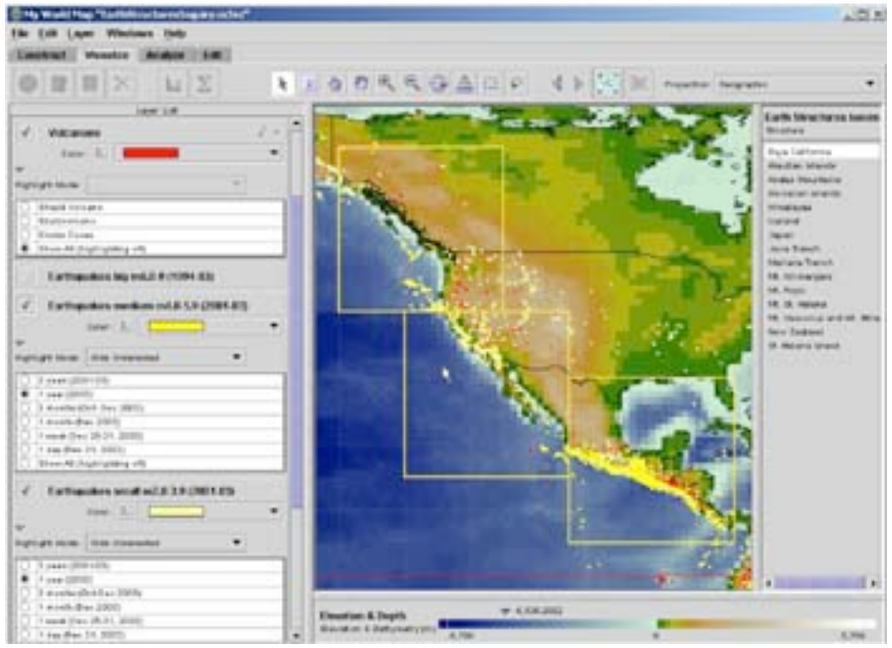
We love Open-Source... but we crave speed

- DIAL is NOT an open-source project... it does provide an open RESOURCE of code that can be used with standard licenses
- DIAL HARNESSES 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.

DIAL

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
- The EDMI Xtra is available for free for all non-commercial uses.
- Development requires STANDARD IDL and Adobe Director licenses



Some Lessons Learned

- Non-scientists have high expectations for GUI features and performance: Button execution delay is a huge problem for general user.
- Google Earth raises the bar: people expect data to download quick, like a data image: Not the kind of performance a DAAC/ OPeNDAP server can provide
- NOTHING IS TOO SIMPLE, almost everything is too complex

VS

Designing User-Near Applications

- Specialty shop, not a supermarket
- NO MENUS: flatline the learning curve
- Share GUI patterns for familiarity: borrowing from Apple, etc.
- Lots of little software tools instead of one complex tool
- Wrap the tool with information: datasheet and EET
- Please some people all the time...

PROBLEMS with USER-NEAR Strategy

- Growing inventory of software tools on desktops
  - upgrades become problematic
  - metrics are not well captured

Community

K-12 Teachers

College Teachers

Museum Staff

Data Discovery Toolkit and Foundry

Find an Application | I want to get INVOLVED | Request an Application

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

NSDL THE NATIONAL SCIENCE DIGITAL LIBRARY

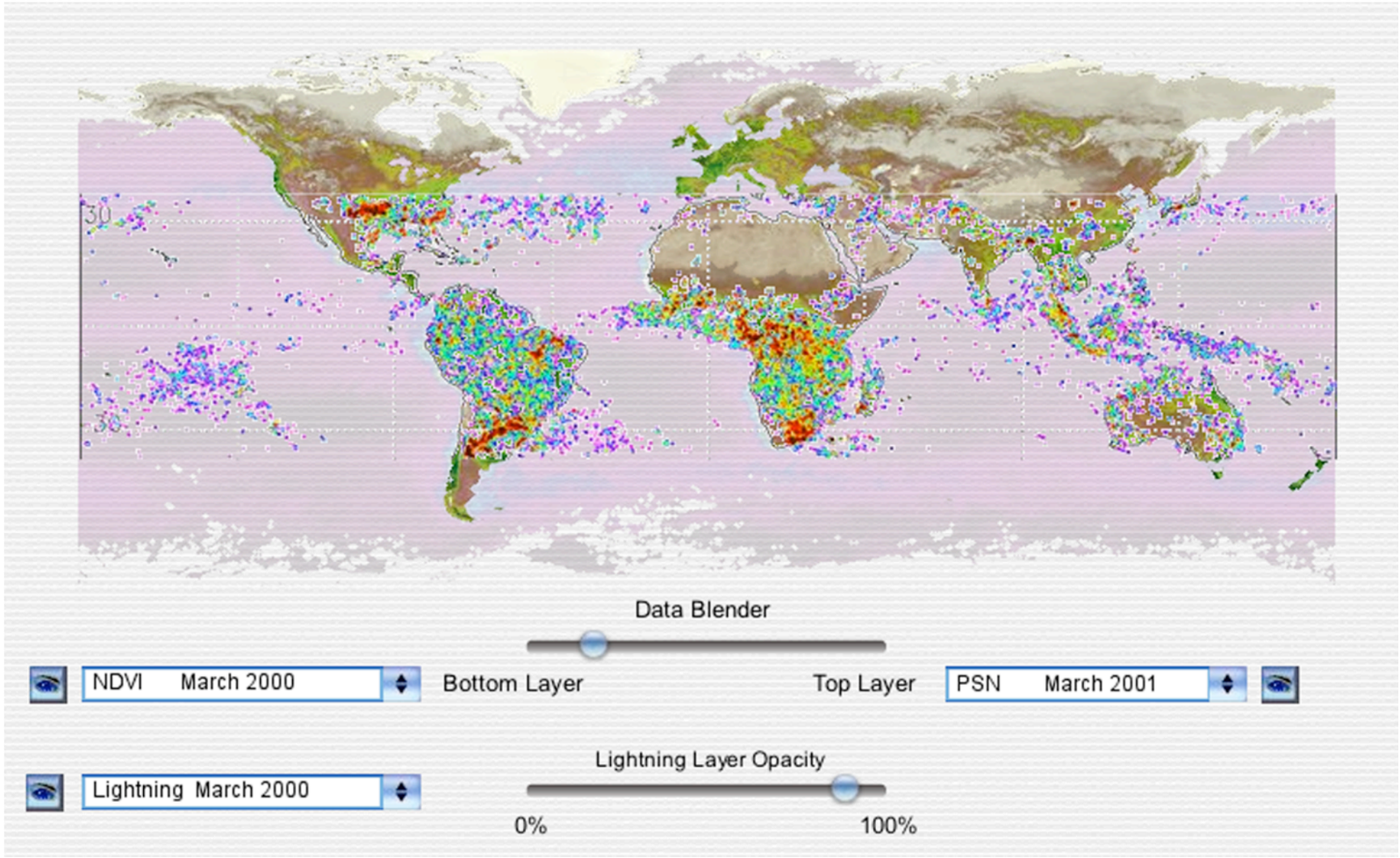
Foundry Floor

Foundry Partners

DIAL

Technology integration with NASA

- Working with the Tech. Integration Working Group
- Community web portal using DRUPAL
- Supporting Annual workshops at ESIP summer meetings
- Developer portal on BASECAMP



Support for WCS in IDL and ArcGIS

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

This technology is yours...

- Come to the Workshop at the Summer ESIP Meeting...
- Get a copy and play with it
- Build an application and connect to data
- Distribute cd/dvds with data and application, or
- Grab data on the fly through opendap/wcs
- RUN WITH iT!