Continuous VRML output from regional circulation models: a rapid model diagnostic, analysis, and educational tool

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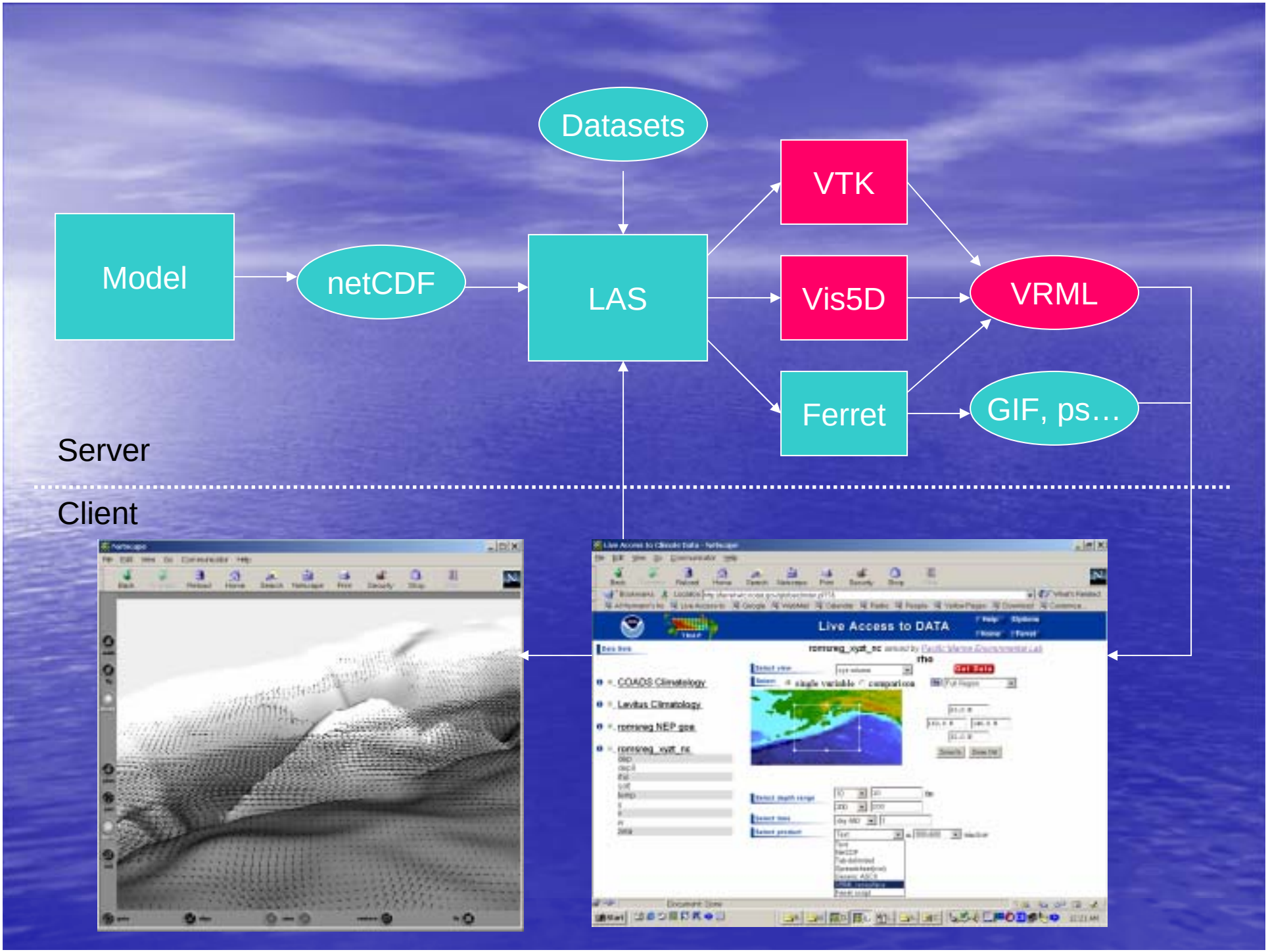
Goals

- *Immersive* visualization of numerical model run, during or after execution
- *Accessible* to any scientist/educator anywhere, through the web
- *Inexpensive* methods

Implementation

- Store model results in netCDF format
- Interrogate through the web via Live Access Server (LAS) - choose variable and volume to view
- Generate Virtual Reality Modeling Language (VRML) world on LAS; sent to client browser
- Render the world with VRML plug-in
- View immersively with low-cost graphics hardware
- Navigate through 3D world with joystick


Datasets
Model
netCDF
LAS
VTK
Vis5D
Ferret
VRML
GIF, ps…
Server
Client
Live Access to DATA

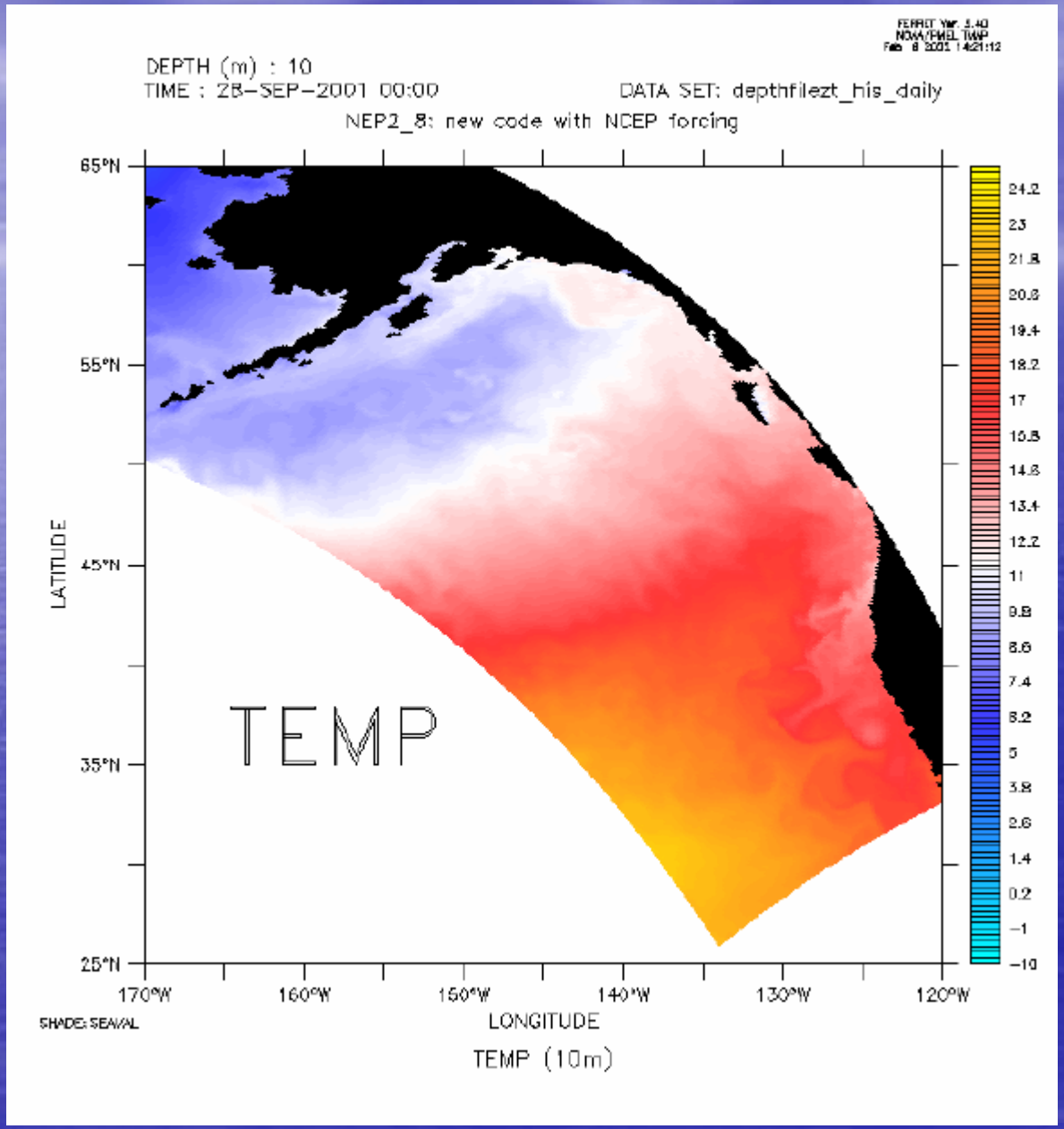
Low-cost Immersive Gear

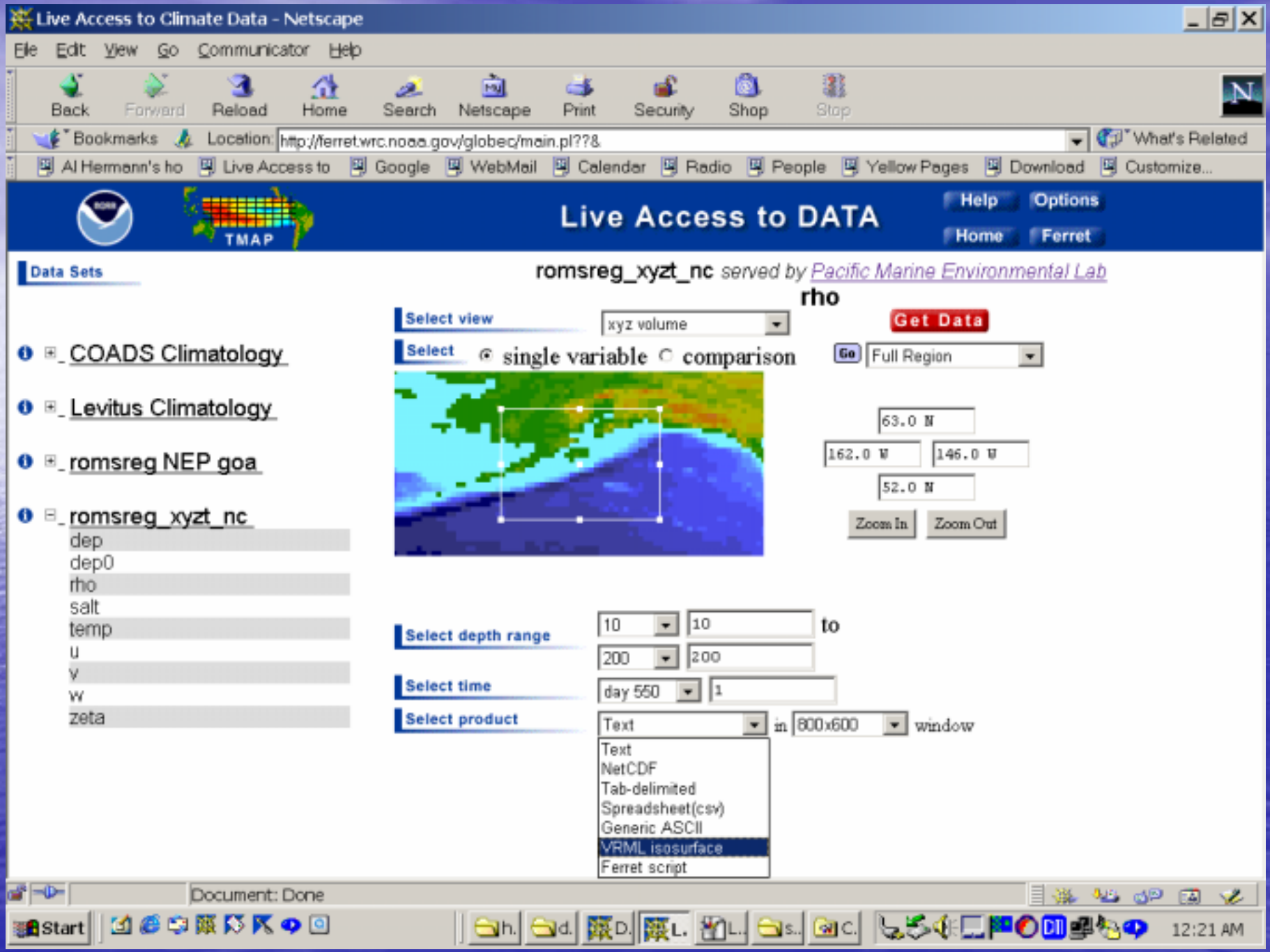
- Desktop or laptop PC with web browser
  - High speed/large RAM not essential
- VRML client for web browser
  - Download free viewer (which supports stereo) at http://www.parallelgraphics.com/products/cortona/
- Graphics card with stereo driver
  - Widely available for gaming market
  - May already be present in your PC
- Shutterglasses *or* Red/Blue anaglyph glasses
  - Many inexpensive graphics cards now include shutterglasses to support stereo-enabled games in full color
- Joystick
  - Programmable buttons nice, but not essential
- For example.....

A virtual ocean on your laptop!

Demonstration

- 2D snapshot of temperature from regional coastal model (10 m depth)
- LAS interrogation of model output; requesting VRML iso-surface of density
- VRML world returned; opens up viewer
  - Greyscale world is used for best red/blue stereo
- Viewer in full-screen stereo mode
  - Try the glasses!


DEPTH (m) : 10
TIME : 28-SEP-2001 00:00
DATA SET: depthfilezt_his_daily
NEP2_8: new code with NCEP forcing
65°N
55°N
45°N
35°N
25°N
LATITUDE
TEMP
24.2
23
21.8
20.6
19.4
18.2
17
15.8
14.6
13.4
12.2
11
9.8
8.6
7.4
6.2
5
3.8
2.6
1.4
0.2
-1
-10
170°W
160°W
150°W
140°W
130°W
120°W
LONGITUDE
SHADE: SEAVAL
TEMP (10m)


Live Access to Climate Data - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: http://ferret.wrc.noaa.gov/globec/main.pl??&
What's Related
Al Hermann's ho Live Access to Google WebMail Calender Radio People Yellow Pages Download Customize...
TMAP
Live Access to DATA
Help Options
Home Ferret
Data Sets
romsreg_xyzt_nc served by Pacific Marine Environmental Lab
rho
COADS Climatology
Levitus Climatology
romsreg NEP goa
romsreg_xyzt_nc
dep
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salt
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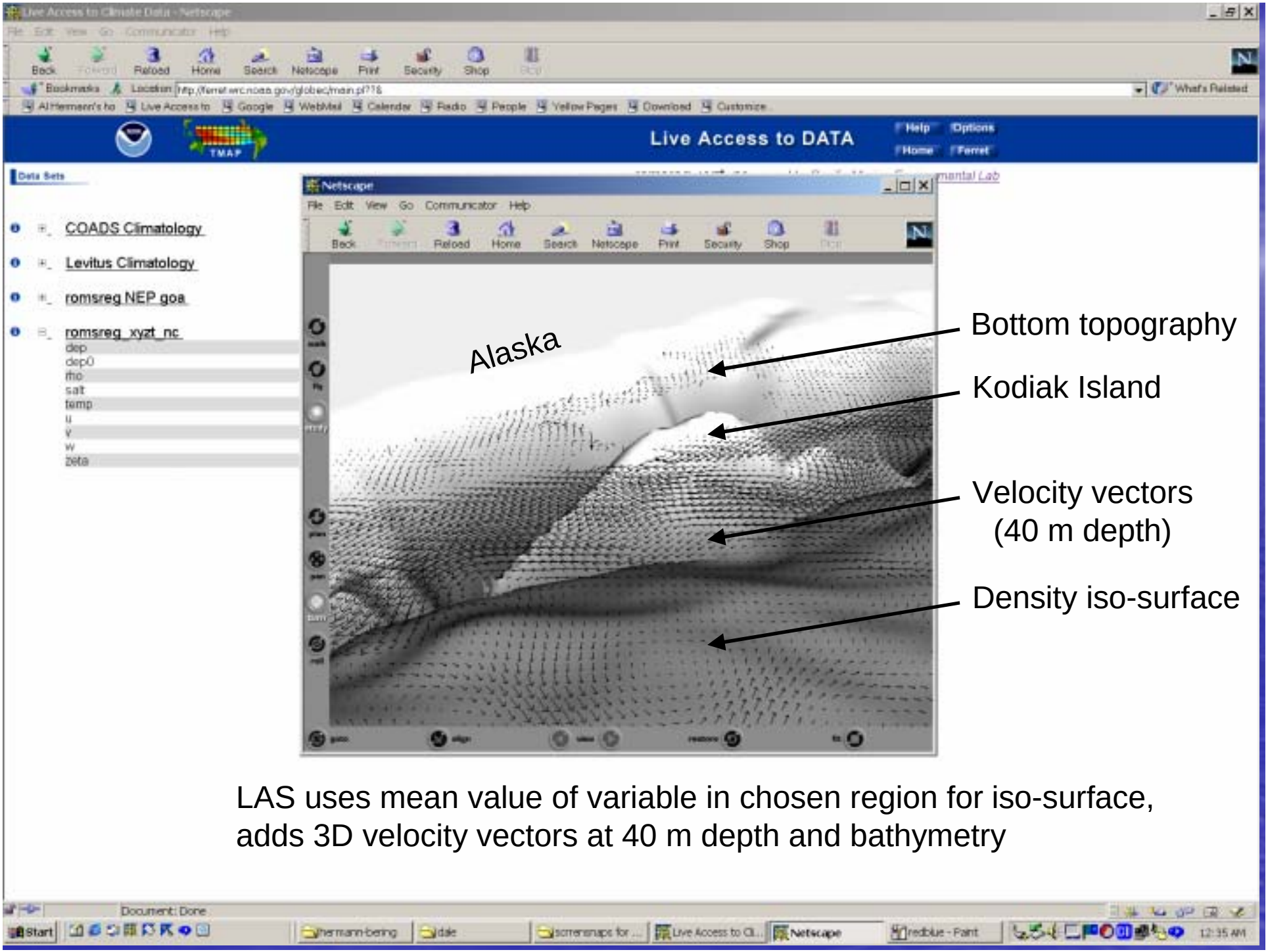
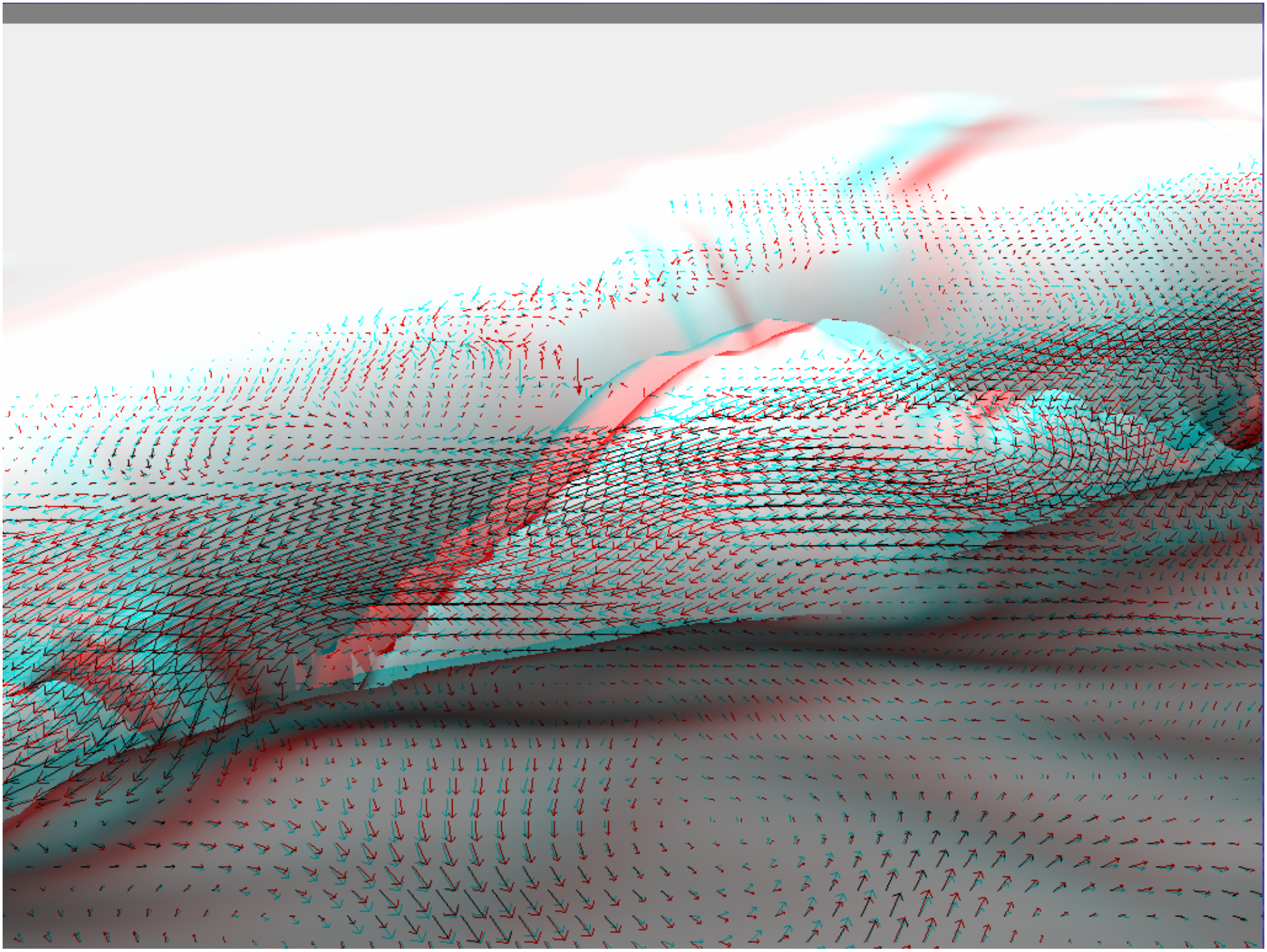
v
w
zeta
Select view
xyz volume
Get Data
Select
single variable
comparison
Go
Full Region
63.0 N
162.0 W
146.0 W
52.0 N
Zoom In
Zoom Out
Select depth range
10
10
to
200
200
Select time
day 550
1
Select product
Text
in
800x600
window
Text
NetCDF
Tab-delimited
Spreadsheet(csv)
Generic ASCII
VRML isosurface
Ferret script
Document: Done
Start
12:21 AM



LAS uses mean value of variable in chosen region for iso-surface, adds 3D velocity vectors at 40 m depth and bathymetry



Anticipated Improvements

- Implement user menu to control iso-surface values and depth of vectors
- Determine fastest method of VRML generation (Ferret vs. vis5D vs. VTK...)
- Compress VRML files prior to download
- Project color stereo images for groups (e.g. using low-cost passive polarization system)

- Try it at http://ferret.pmel.noaa.gov/globec !