**Paraview Tutorial: TA tomography and wavefield imaging results**

Open this web page as a supplement to my blabbering

<http://www.psc.edu/general/software/packages/paraview/tutorial/>

1. Launch paraview found in the Applications folder on these Macs.
2. There is an annoying default for this application you will want to fix immediately. Got to top menu and select Paraview->Preferences and click on the check box labeled “auto accept”.
3. Click File→Open and browse to directory where you found this file. Select coast.vtk
4. Repeat for boundaries.vtk and water.vtk.
5. [Optional] Load the files with the same base name with the \_400 appendage. These are the same data projected to 400 km depth.
6. Try turning this scene by holding down MB1 and moving it around to get the feel of the controls. You will note these data show true earth geometry with curvature. Also notice that the wheel (MB2) zooms in and out and shift-MB3 allows translation of the scene in a pseudo3D fashion.
7. Understand the controls for turning a particular object on and off. Select the pipeline browser window on the left side of the display and click the eye shaped icon for boundaries.vtk. That icon is a toggle. Notice how the state and national boundaries in the scene appear or disappear when you click on this icon. This feature is used a lot to turn various element of a scene on and off.
8. (OPTIONAL) Now or later you may want to experiment with changing the colors on some of these items to allow you to distinguish what is what. E.g. we might think rivers should be blue. Make sure the “Pipeline Browser” is visible and select “water.vtk”. Then in the “Object Inspector” window select “Display”. This interface keeps changing between versions but in the version I’m using there is an item labeled “Set Solid Color”. Avoid the pulldown and just click on that button. A color panel will appear. Select blue and then push ok. You can repeat this for all other scene elements.
9. Now load the scattered wave image volume data by opening the file fzak135\_avg\_1.vts. This file contains an update of the 3d converted wave image from a recent paper by Pavlis (2011, Geosphere). This is the radial component data. You can load the transverse result if you want too. It is called fzak135\_avg\_0.vts. If you do load transverse, make sure you click the radial file before going to the next step.
10. Click on the icon that looks like this:  or the menu item Filter->Slice
11. In the “Object Inspector” “Display” and push “Edit Color Map”. For seismic data autoscaling frequently make a lousy display. Make sure the “Automatically scale to Fit Data Range” is off. Then push the “Rescale range” button. For this data volume a good range is -0.2 to 0.2.
12. Explore the volume by dragging the window shade around. You can change the orientation by grabbing the arrow or “X normal”, “Y normal” , or “Z normal” buttons. (This is a full 3d migration of all receiver functions produced by the EARS project. The data you are examining is the generalization of the radial component scattered wave potential. That is each sample is rotated to resolve to the radial component for specular reflection from a dipping horizon at the scattering point.)
13. (OPTIONAL) How to lie with color maps. Results of sectioning like this are heavily dependent on color maps. Both the scattered image data and the tomography models you will look at next can be enhanced a lot with the right choice of a color map. For the scattered wave image try this: (a) Make sure you have selected the slice you want to tweek in the Pipeline Browser; (b) Select Display in the Object Inspector pane; (c) select “Edit Color Map”; (d) Select “Choose Preset”; and (e) choose one of the other color maps. You may need to change the scaling for some choices of the color map.
14. Load one or all of several TA tomography models here: Karin Sigloch’s newest P wave model=sig11.vts; latest P model from MIT group-mit11.vts; three variants of the UC Berkeley models-UCB10dVS.vts, UCBdVP.vts, UCBdvS.vts; or Suzan’s model = NA07.vts.
15. Slice this model as you did before in step 9. You will also definitely need to mess with the color scale and the color map. Most people prefer the standard rainbow color map with red negative and blue positive.
16. (Optional) explore one of these models with an isosurface. Select the model you chose to load and follow this menu series: Filters->Common->Contour. You may want to change the isosurface value. In the object inspector push “Delete All” and then “New Value” For most of these models a value around 1.0 produces something that is a bit better than the default. In my experience, however, isosurfaces are generally not a great way to view most tomography models.
17. (Optional) If you did step 16 turn off the isosurface and try volume visualization. This is very slow on these machines, so be patient. Select the tomography model you want to visualize and then following this menu chain: Filters->Alphabetical->Tetrahedralize. Make sure the Tetrahedralize filter is selected in the Pipeline Browser then select “Object Inspector” and “Display”. In the display menu find the “Representation” button. This is a pulldown menu. Select “Volume”. You will definitely need to tweek the color map a lot to make this useful, particularly what parts you make transparent. Useful graphics for publication in this mode will require a movie that combines some for of stripping and/or camera movement. There are tutorials you can consult online that can get you started on doing that kind of graphic.
18. This is an infinite sink for time from here on. Consult the tutorial above to explore the full range of gizmos supported by paraview

*Option if time is available: stereo viewing*

Paraview has full support for stereo pairs. If you have a geowall or similar system you can use this in full color mode. For a desktop or laptop it can be useful to do red-blue stereo pairs. This is a demo of that capability.

1. First, let’s see an example of a polished output from this approach. Double click the movie file in the working folder for this tutorial called sig11v2.mov. Put on the funky glasses and play with the movie.
2. You need to exit paraview and restart it in stereo mode. For this lab use: /Applications/Paraview\ 3.10.1.app/Contents/MacOS/paraview -- stereo -- stereo-type=Anaglph
3. Load the coastline and boundaries as before. You should be able to see them in 3d if you wear the funky glasses.
4. For more fun load these files: calif\_flowlines.vtk, valif, calif\_edgemodel.vtk, and pnw\_flowlines.vtk. These are a model for a single surface defining the top of the Farallon slab. It is a model, but the point is that this surface is very much a 3d object that can be understood much more easily with stereo pairs.