



NAC



*Leonardo da Vinci (1452-1519), Virgin and Child with St. Anne
Pinakothek, München*

Data Loading & 3D Visualization

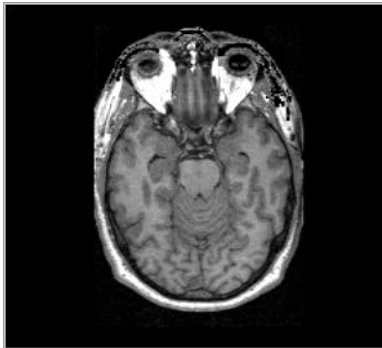
Sonia Pujol, Ph.D.

Surgical Planning Laboratory
Harvard Medical School

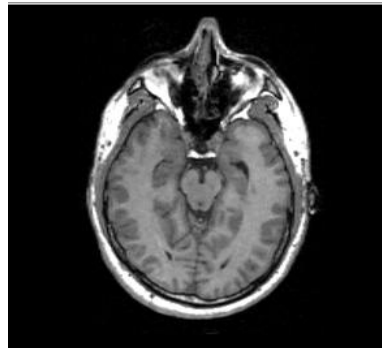
- Slicer3 is a **multi-platform** software that is developed and maintained on:
 - Windows XP
 - Linux x86_64
 - Linux x86
 - Mac OSX – Darwin x86-Intel
 - Mac OSX – Darwin Power PC

3D Visualization dataset

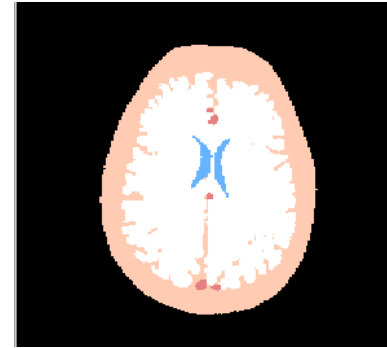
- This course is built upon three datasets of a single healthy subject brain:



MR DICOM
GRASS



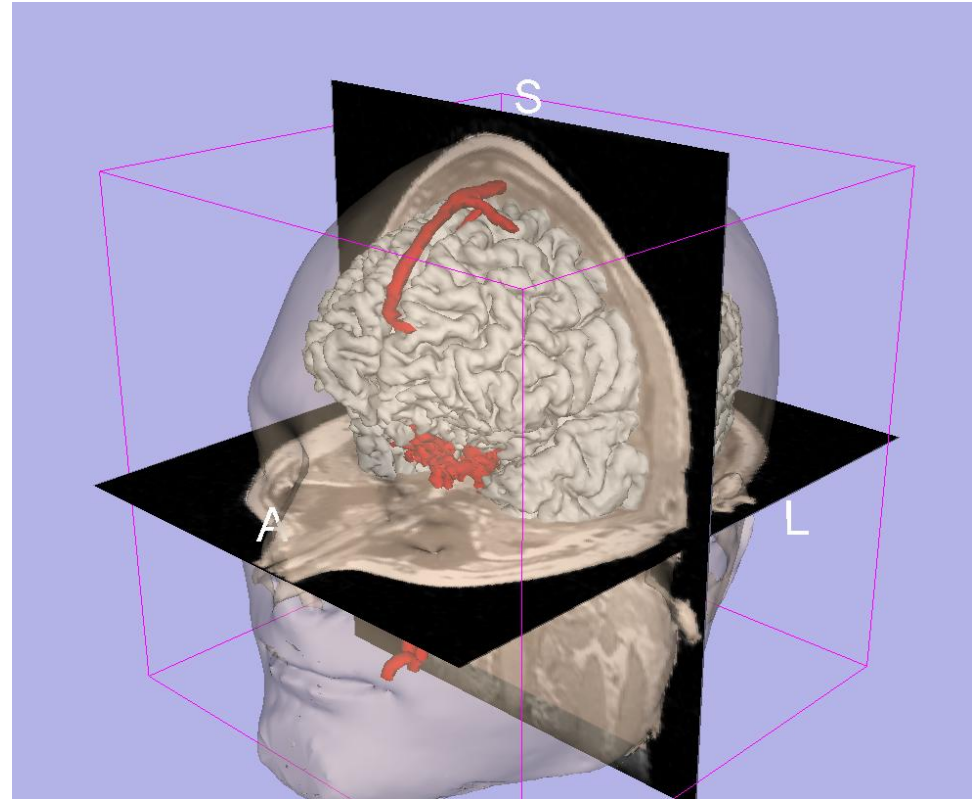
MR Nrrd
SPGR



Pre-computed
Label Map

Learning objective

Following this tutorial, you'll be able to **load and visualize volumes** within Slicer3, and to **interact in 3D** with structural images and models.

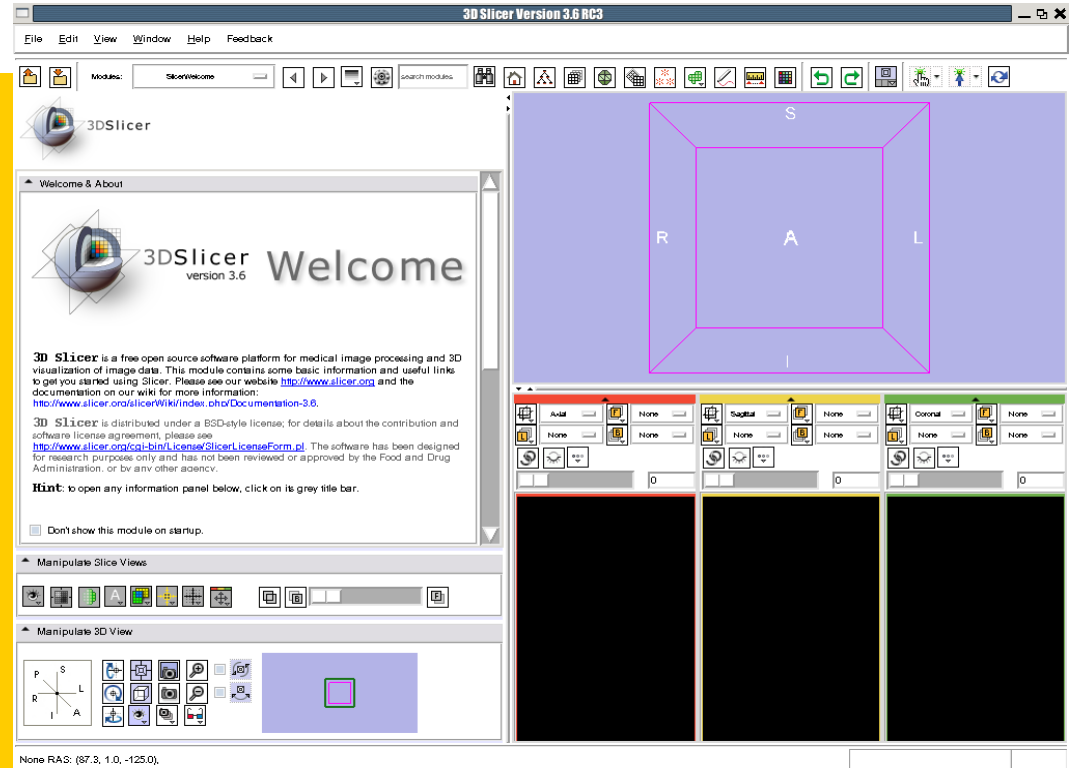




Start Slicer3

Linux/Mac users
Launch the Slicer3 executable located in the Slicer3.6 directory

Windows users
Select
Start → All Programs
→ Slicer3-3.6-2010-08-23 → Slicer3





Slicer Welcome

The SlicerWelcome module is the module displayed by default.

This module gives an overview of the GUI of Slicer3, and data loading & saving functionalities.

The Graphical User Interface (GUI) of Slicer3.6 integrates 8 main components:

- the File Menu
- the Menu Toolbar
- the Module GUI Panel
- the 3D Viewer
- the Slice Viewer
- the Slice Controller
- the 3D View Controller
- the 3D View Controller

File Menu

Menu Toolbar

Module GUI Panel

3DViewer

Slice Controller

Slice Viewer

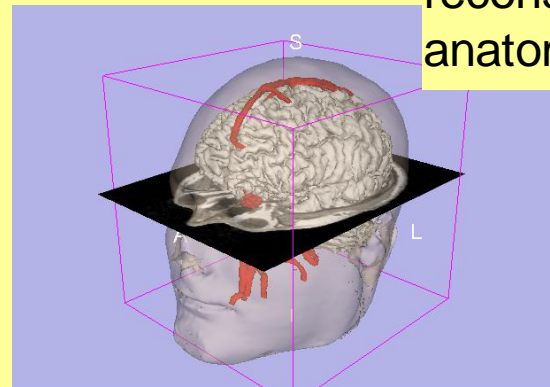
3DView Controller

Progress and Error Log

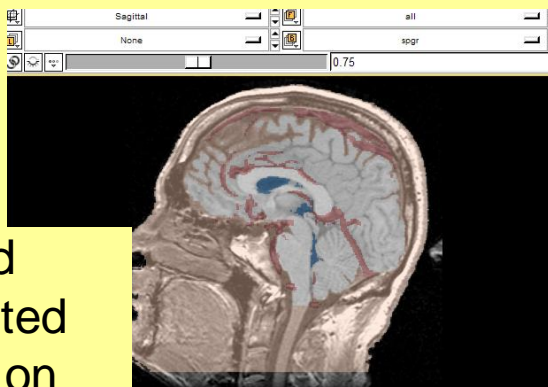
Part 1. Loading and visualizing multiple volumes simultaneously



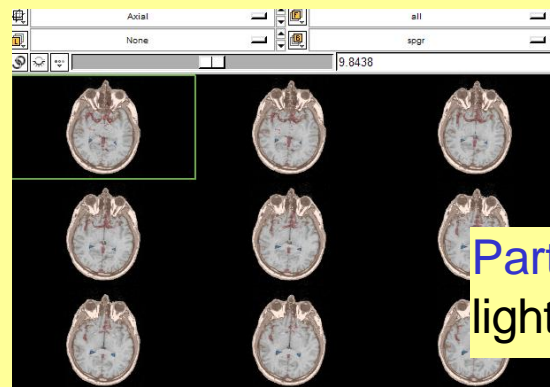
Part 3. Visualizing 3D reconstructions of anatomical surfaces



Part 2. Loading and visualizing segmented structures overlaid on grayscale images

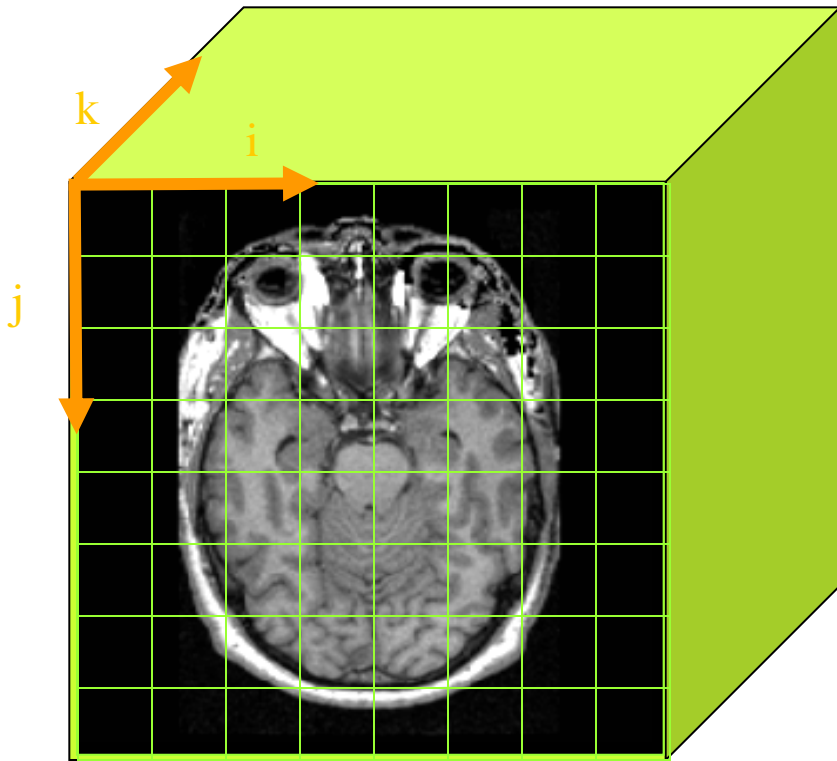


Part 4. The lightbox viewer

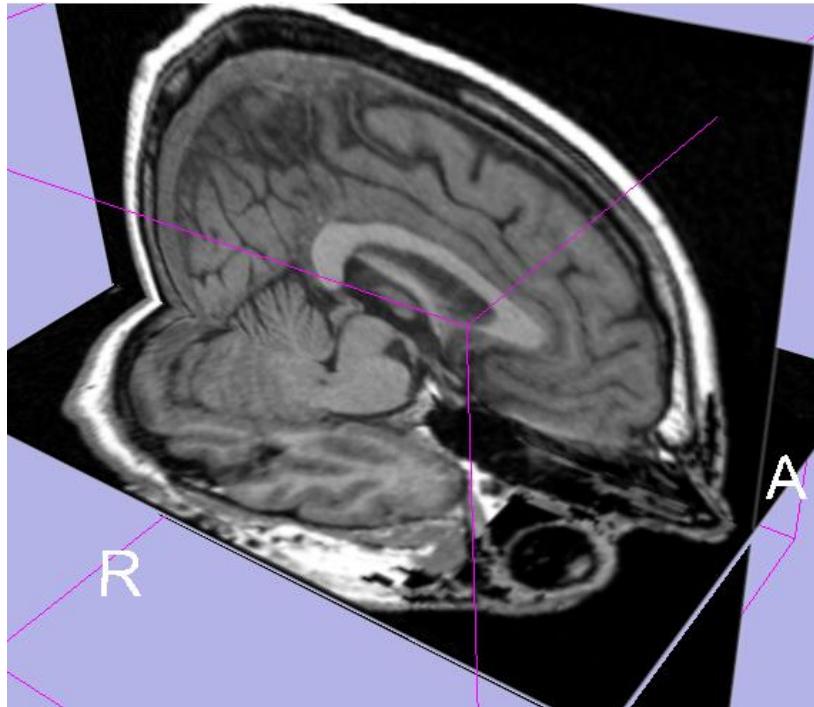


Part 5. Saving data

Data Representation

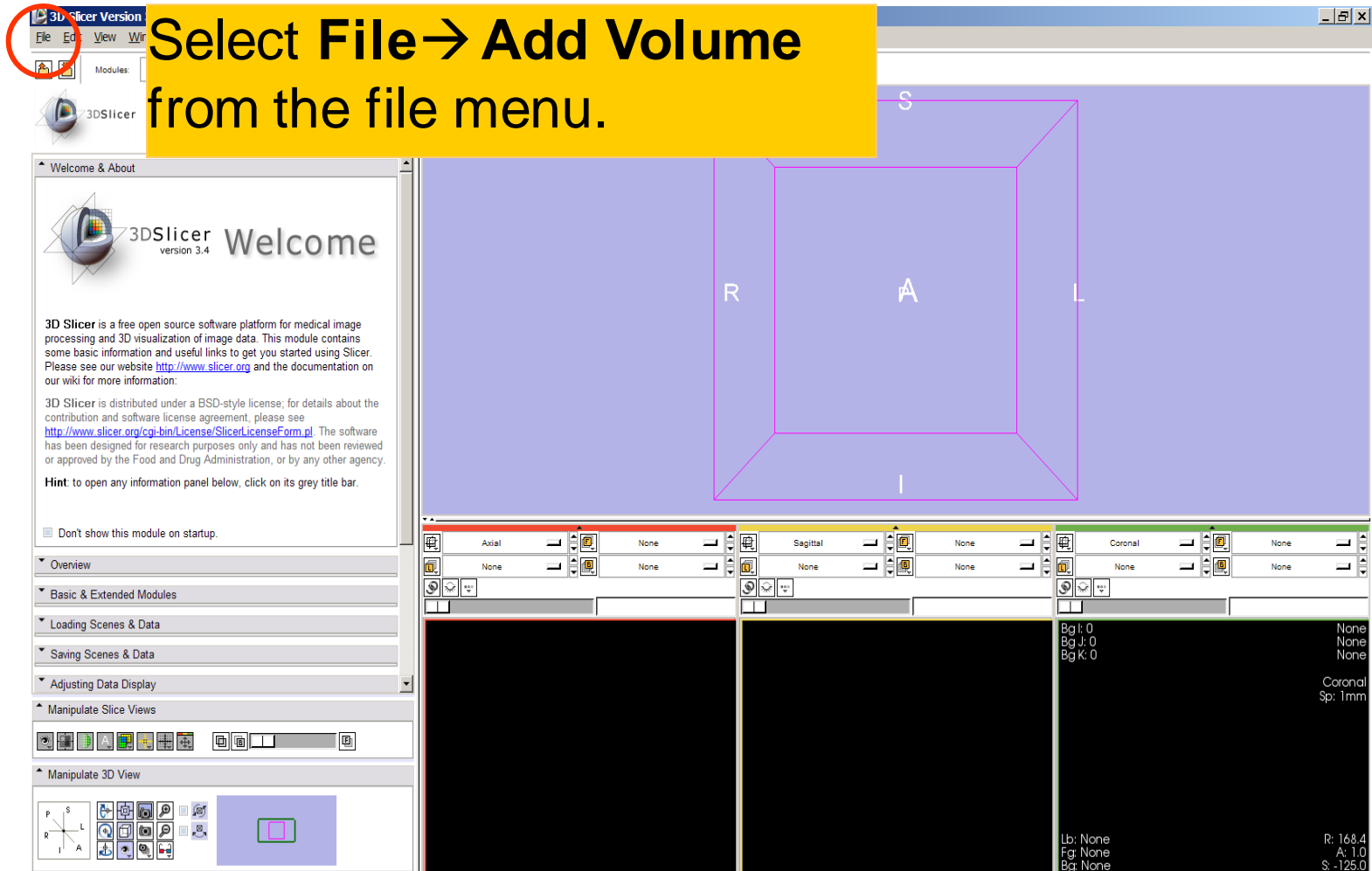


- The result of a volumetric acquisition is a **3D volume of data** related to the patient.
- The 3D raster dataset is sampled on a discrete grid with elements called **voxels** which contain the **signal intensity**.



Part 1: Loading and visualizing multiple volumes simultaneously

Loading Volumes

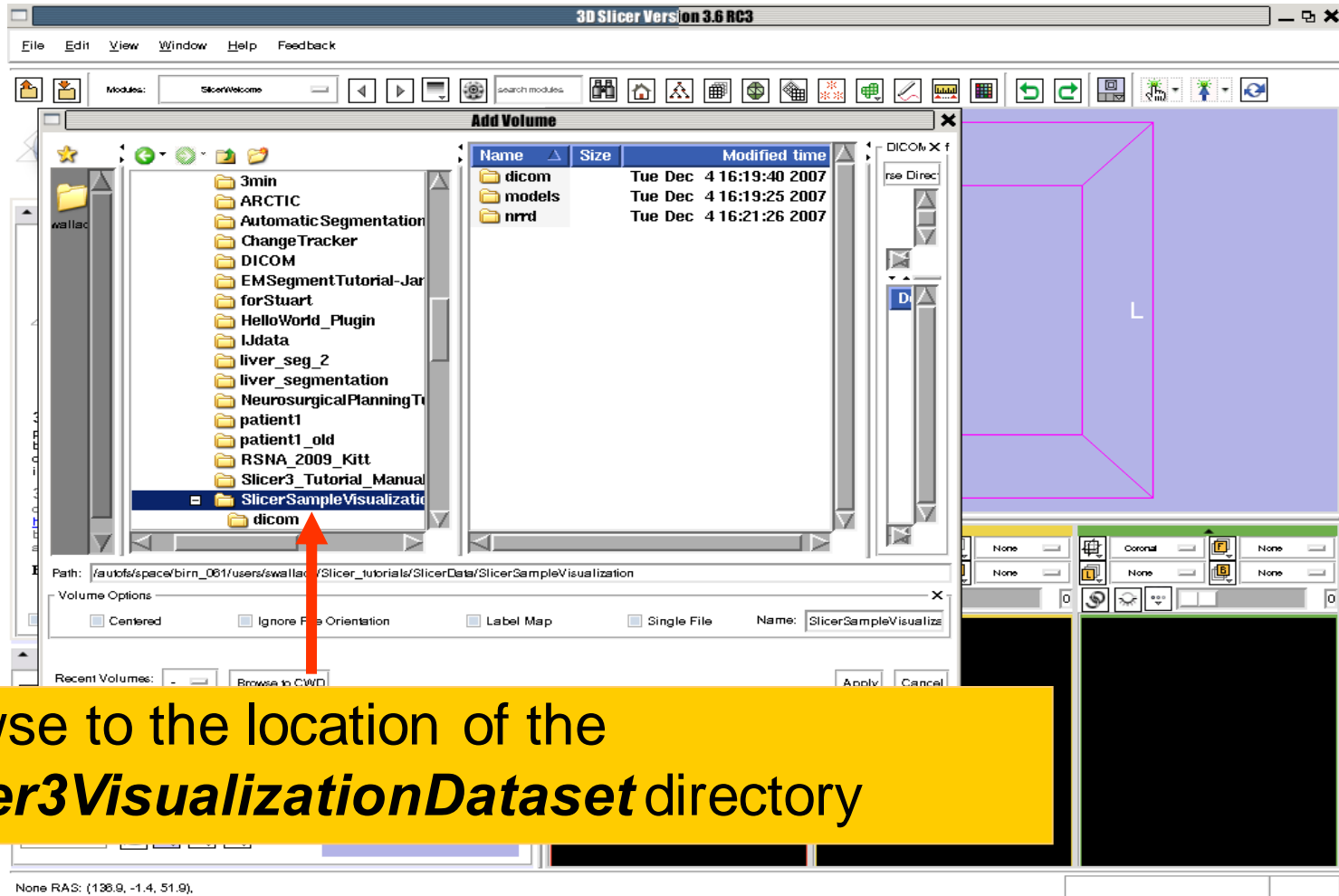


Select File → Add Volume
from the file menu.

The screenshot shows the 3DSlicer software interface. A yellow callout box highlights the 'File' menu and the 'Add Volume' option. The main window displays a 3D view of a volume with a purple bounding box and axes labeled R (Right), L (Left), A (Anterior), and P (Posterior). The interface includes a 'Welcome & About' panel on the left, a 'Modules' list, and a 'Manipulate 3D View' section. The bottom right corner shows a status bar with the following information:

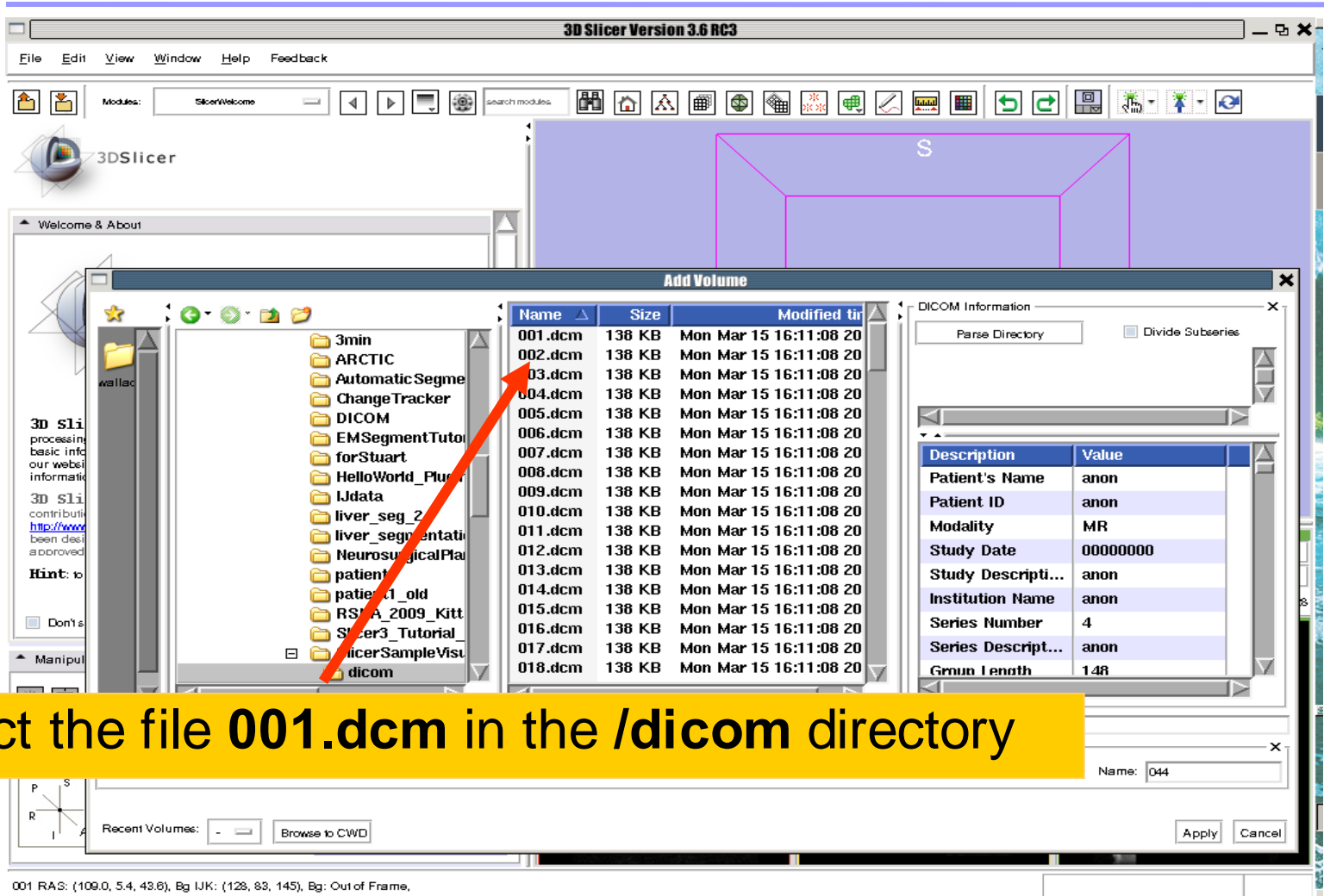
Bg I: 0	None
Bg J: 0	None
Bg K: 0	None
Coronal Sp: 1mm	
Lb: None	R: 168.4
Fg: None	A: 1.0
Bg: None	S: -125.0

Loading Volumes



Browse to the location of the ***Slicer3VisualizationDataset*** directory

Loading Volumes



Add Volume

Name	Size	Modified time
001.dcm	138 KB	Mon Mar 15 16:11:08 20
002.dcm	138 KB	Mon Mar 15 16:11:08 20
003.dcm	138 KB	Mon Mar 15 16:11:08 20
004.dcm	138 KB	Mon Mar 15 16:11:08 20
005.dcm	138 KB	Mon Mar 15 16:11:08 20
006.dcm	138 KB	Mon Mar 15 16:11:08 20
007.dcm	138 KB	Mon Mar 15 16:11:08 20
008.dcm	138 KB	Mon Mar 15 16:11:08 20
009.dcm	138 KB	Mon Mar 15 16:11:08 20
010.dcm	138 KB	Mon Mar 15 16:11:08 20
011.dcm	138 KB	Mon Mar 15 16:11:08 20
012.dcm	138 KB	Mon Mar 15 16:11:08 20
013.dcm	138 KB	Mon Mar 15 16:11:08 20
014.dcm	138 KB	Mon Mar 15 16:11:08 20
015.dcm	138 KB	Mon Mar 15 16:11:08 20
016.dcm	138 KB	Mon Mar 15 16:11:08 20
017.dcm	138 KB	Mon Mar 15 16:11:08 20
018.dcm	138 KB	Mon Mar 15 16:11:08 20

DICOM Information

Parse Directory Divide Subseries

Description	Value
Patient's Name	anon
Patient ID	anon
Modality	MR
Study Date	00000000
Study Descripti...	anon
Institution Name	anon
Series Number	4
Series Descript...	anon
Group Length	148

Name: 044

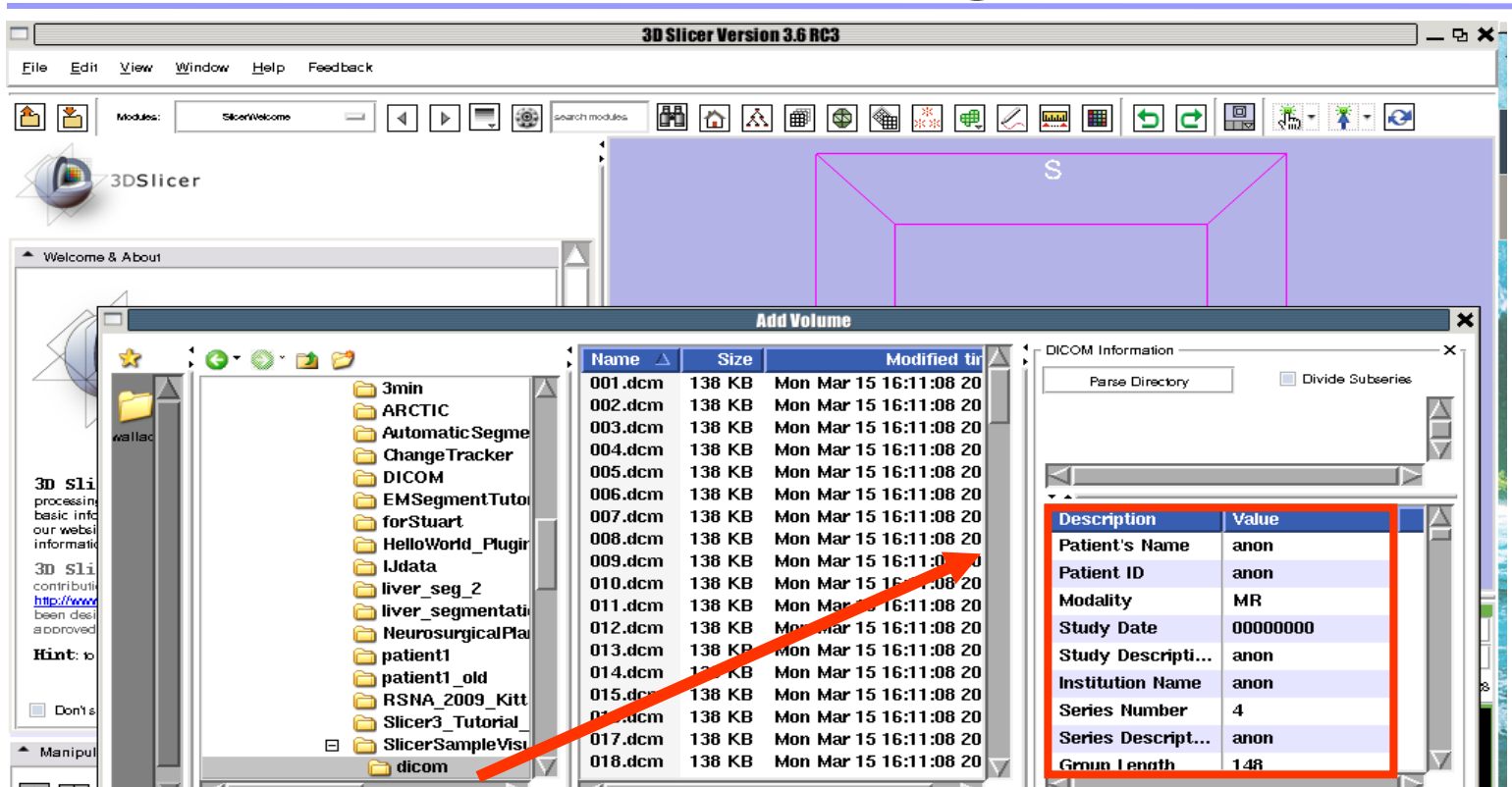
Apply Cancel

Recent Volumes: - Browse to CWD

001 RAS: (109.0, 5.4, 43.8), Bg LJK: (128, 83, 145), Bg: Out of Frame.

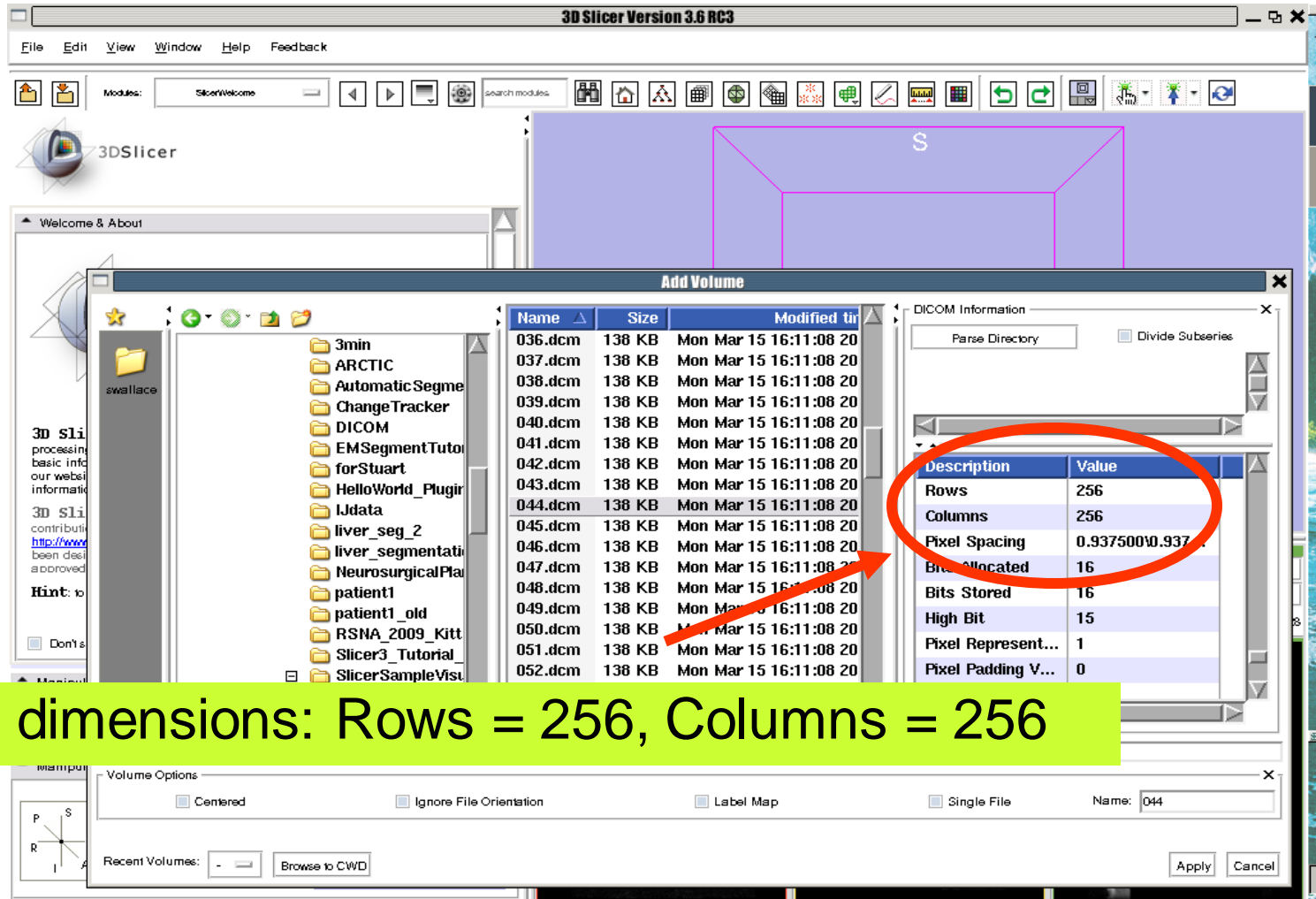
Select the file **001.dcm** in the **/dicom** directory

Loading Volumes



Slicer displays the **Dicom header information** of the images. Browse through the Dicom information panel to display the dimensions of the images.

Loading Volumes



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: SlicerWelcome

Welcome & About

Add Volume

Name	Size	Modified time
036.dcm	138 KB	Mon Mar 15 16:11:08 20
037.dcm	138 KB	Mon Mar 15 16:11:08 20
038.dcm	138 KB	Mon Mar 15 16:11:08 20
039.dcm	138 KB	Mon Mar 15 16:11:08 20
040.dcm	138 KB	Mon Mar 15 16:11:08 20
041.dcm	138 KB	Mon Mar 15 16:11:08 20
042.dcm	138 KB	Mon Mar 15 16:11:08 20
043.dcm	138 KB	Mon Mar 15 16:11:08 20
044.dcm	138 KB	Mon Mar 15 16:11:08 20
045.dcm	138 KB	Mon Mar 15 16:11:08 20
046.dcm	138 KB	Mon Mar 15 16:11:08 20
047.dcm	138 KB	Mon Mar 15 16:11:08 20
048.dcm	138 KB	Mon Mar 15 16:11:08 20
049.dcm	138 KB	Mon Mar 15 16:11:08 20
050.dcm	138 KB	Mon Mar 15 16:11:08 20
051.dcm	138 KB	Mon Mar 15 16:11:08 20
052.dcm	138 KB	Mon Mar 15 16:11:08 20

DICOM Information

Parse Directory Divide Subseries

Description	Value
Rows	256
Columns	256
Pixel Spacing	0.937500 0.937500
Bits Allocated	16
Bits Stored	16
High Bit	15
Pixel Represent...	1
Pixel Padding V...	0

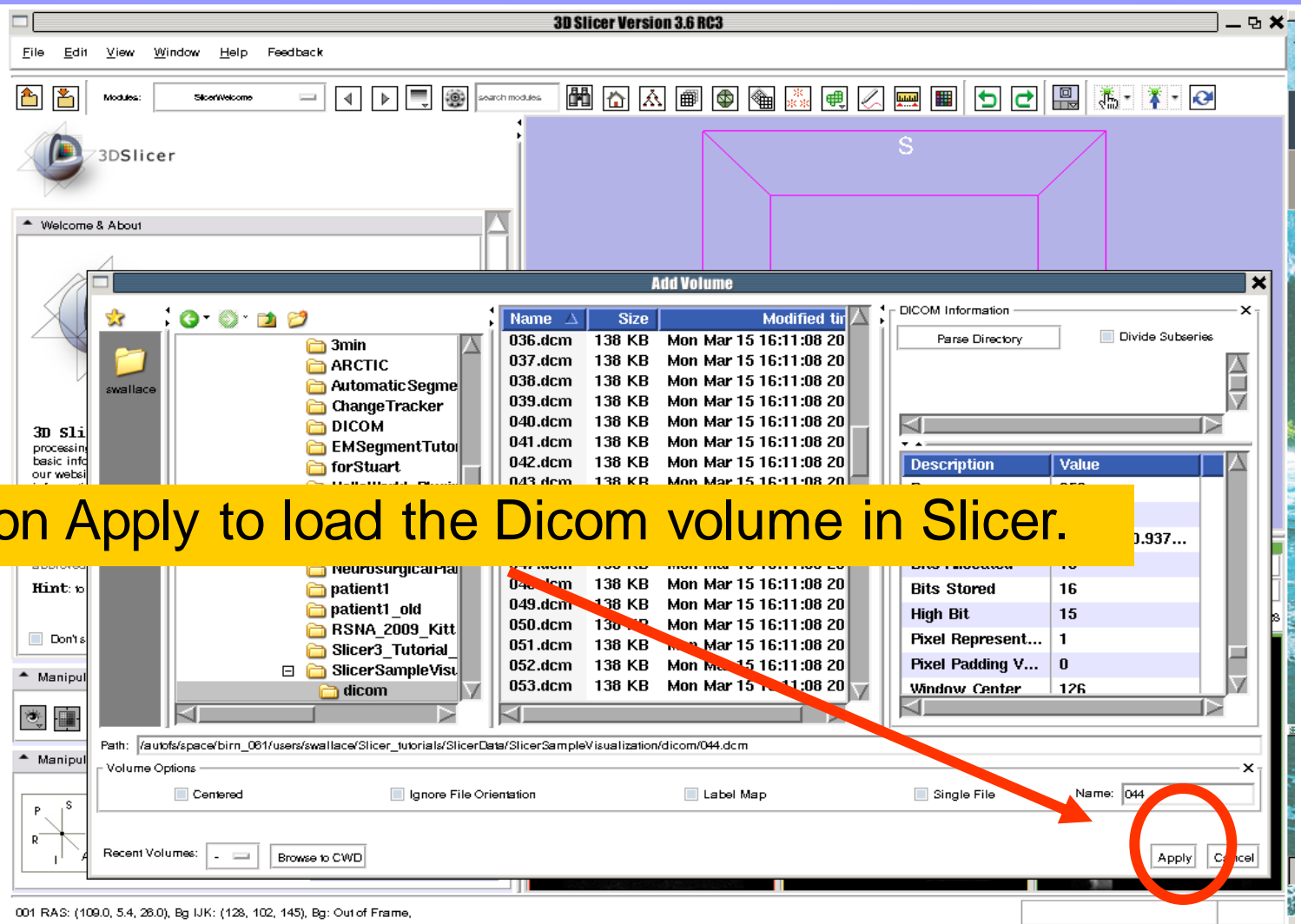
Volume Options

Centered Ignore File Orientation Label Map Single File Name: 044

Recent Volumes:

Image dimensions: Rows = 256, Columns = 256

Loading Volumes



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: SlicerWelcome

3DSlicer

Welcome & About

Add Volume

swallace

- 3min
- ARCTIC
- Automatic Segme
- ChangeTracker
- DICOM
- EMSegmentTutor
- forStuart
- Multi-Planar
- NeurosurgicalPl
- patient1
- patient1_old
- RSNA_2009_Kitt
- Slicer3_Tutorial
- SlicerSampleVisu
- dicom

Name	Size	Modified	Time
036.dcm	138 KB	Mon Mar 15 16:11:08 20	
037.dcm	138 KB	Mon Mar 15 16:11:08 20	
038.dcm	138 KB	Mon Mar 15 16:11:08 20	
039.dcm	138 KB	Mon Mar 15 16:11:08 20	
040.dcm	138 KB	Mon Mar 15 16:11:08 20	
041.dcm	138 KB	Mon Mar 15 16:11:08 20	
042.dcm	138 KB	Mon Mar 15 16:11:08 20	
043.dcm	138 KB	Mon Mar 15 16:11:08 20	
044.dcm	138 KB	Mon Mar 15 16:11:08 20	
045.dcm	138 KB	Mon Mar 15 16:11:08 20	
046.dcm	138 KB	Mon Mar 15 16:11:08 20	
047.dcm	138 KB	Mon Mar 15 16:11:08 20	
048.dcm	138 KB	Mon Mar 15 16:11:08 20	
049.dcm	138 KB	Mon Mar 15 16:11:08 20	
050.dcm	138 KB	Mon Mar 15 16:11:08 20	
051.dcm	138 KB	Mon Mar 15 16:11:08 20	
052.dcm	138 KB	Mon Mar 15 16:11:08 20	
053.dcm	138 KB	Mon Mar 15 16:11:08 20	

DICOM Information

Parse Directory Divide Subseries

Description	Value
Bits Stored	16
High Bit	15
Pixel Represent...	1
Pixel Padding V...	0
Window Center	126

Path: /autofs/space/birn_081/users/swallace/Slicer_tutorials/SlicerData/SlicerSampleVisualization/dicom/044.dcm

Volume Options

Centered Ignore File Orientation Label Map Single File

Name: 044


Recent Volumes: - Browse to CWD

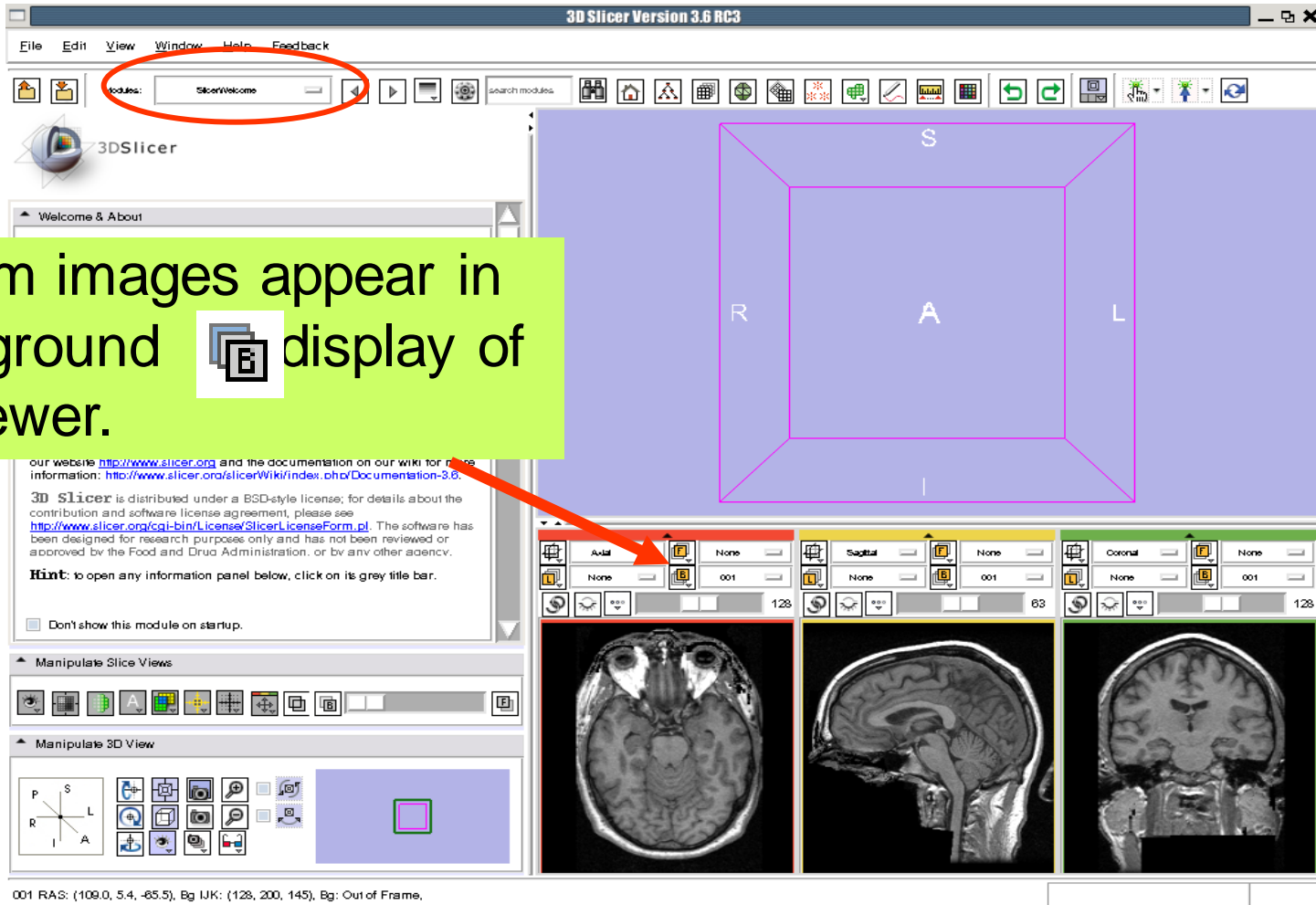
Apply Cancel

001 RAS: (109.0, 5.4, 28.0), Bg LJK: (128, 102, 145), Bg: Out of Frame.

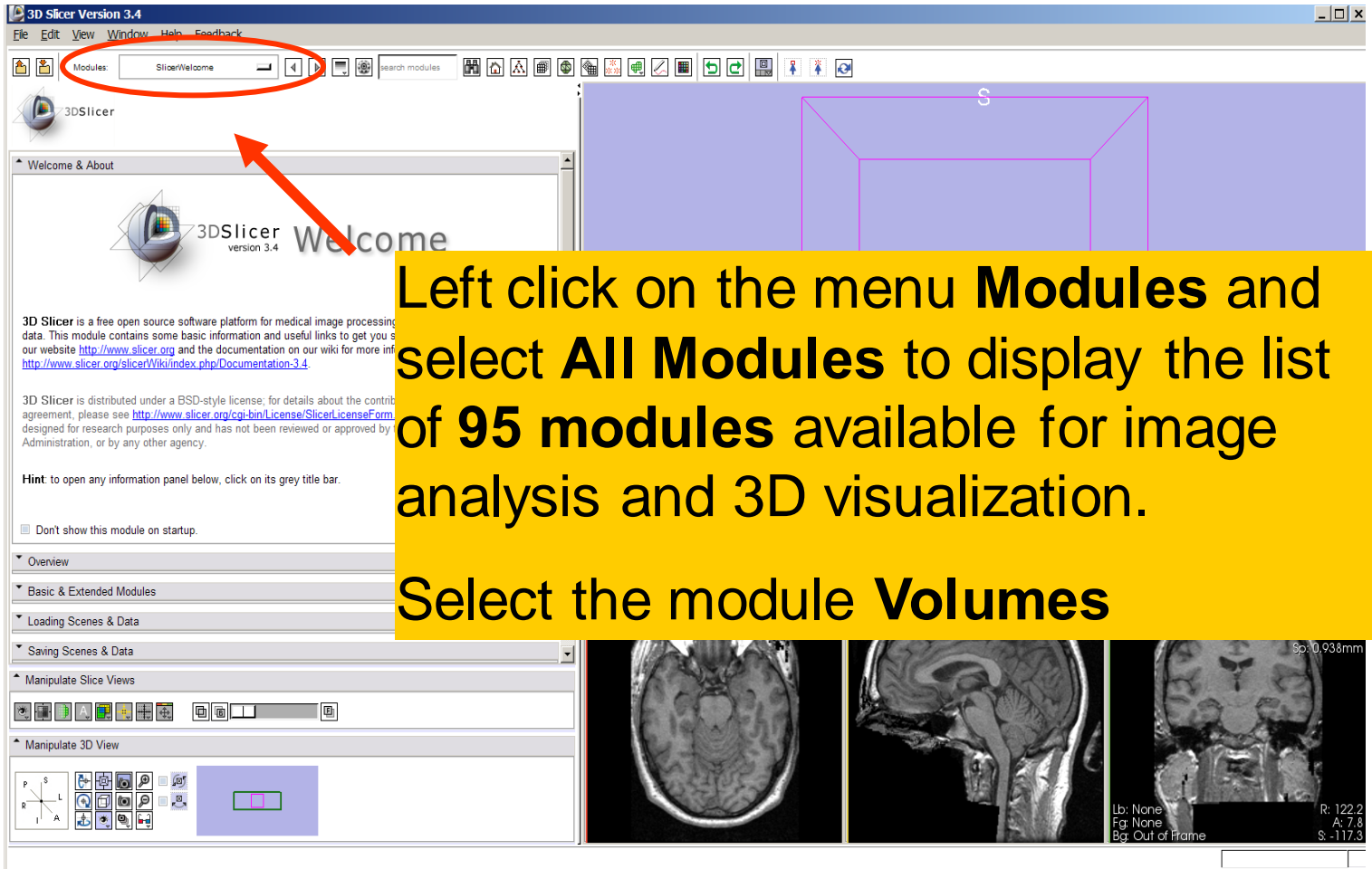
Click on Apply to load the Dicom volume in Slicer.

Loading Volumes

The Dicom images appear in the Background  display of the 2DViewer.



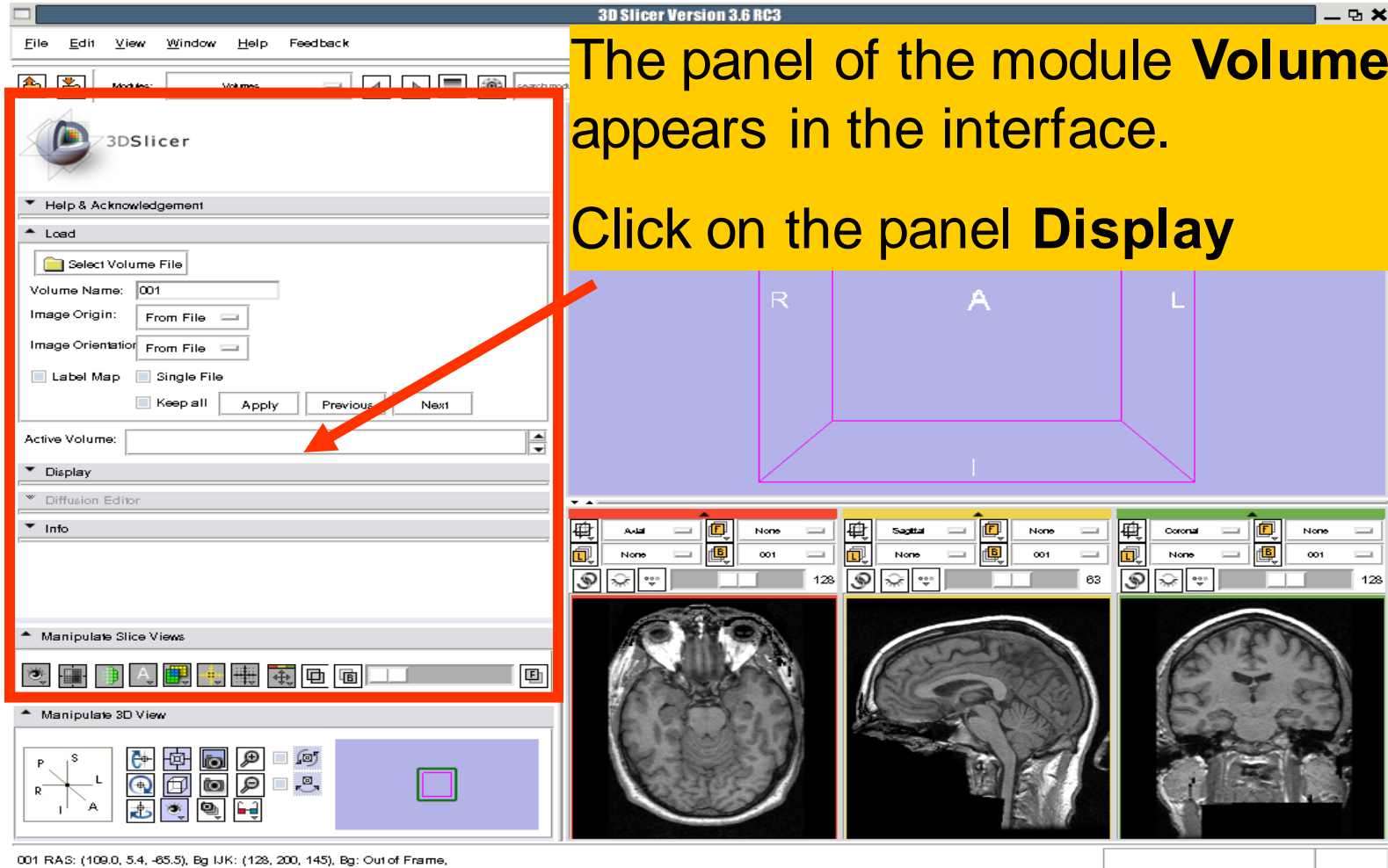
Loading Volumes



Left click on the menu **Modules** and select **All Modules** to display the list of **95 modules** available for image analysis and 3D visualization.

Select the module **Volumes**

Loading Volumes



The panel of the module **Volumes** appears in the interface.

Click on the panel **Display**

001 RAS: (109.0, 5.4, -65.5), Bg IJK: (128, 200, 145), Bg: Out of Frame.

The screenshot shows the 3D Slicer interface with the Volumes module selected. The 'Load' section is highlighted with a red box, and an arrow points to the 'Display' section. The 'Display' section is highlighted with a yellow box. The 3D view shows a brain volume with a purple wireframe bounding box and labels R, A, L, I. The bottom panel shows three slice views: Axial, Sagittal, and Coronal.

Loading Volumes

3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Volumes

3DSlicer

Lookup Table: Grey

Interpolate

Window Level Editor Presets:

Volume Window Level Presets:

Window/Level: Manual 140 70

Threshold: Off 0 293

Update Histogram Interactively

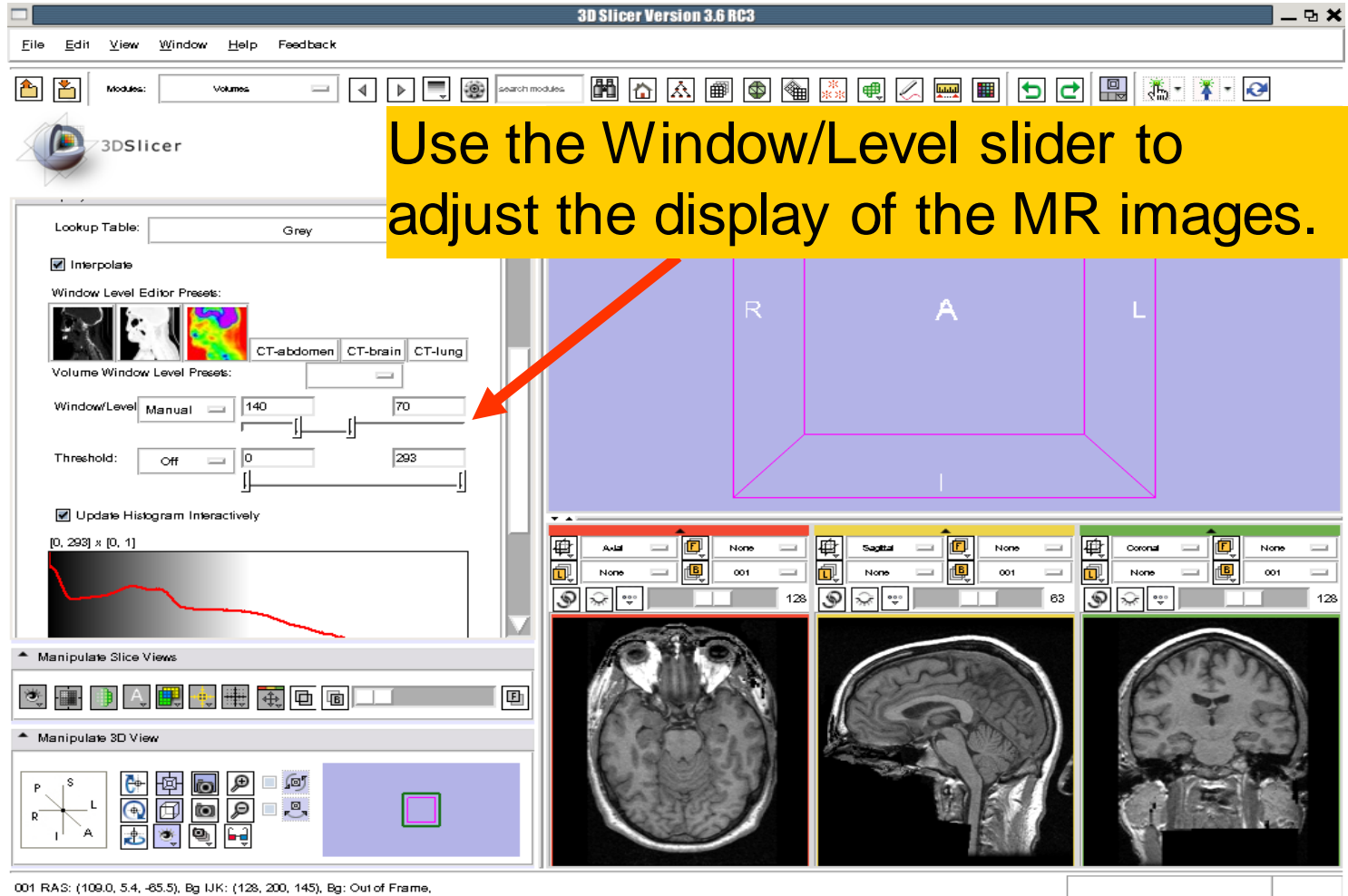
[0, 293] x [0, 1]

Manipulate Slice Views

Manipulate 3D View

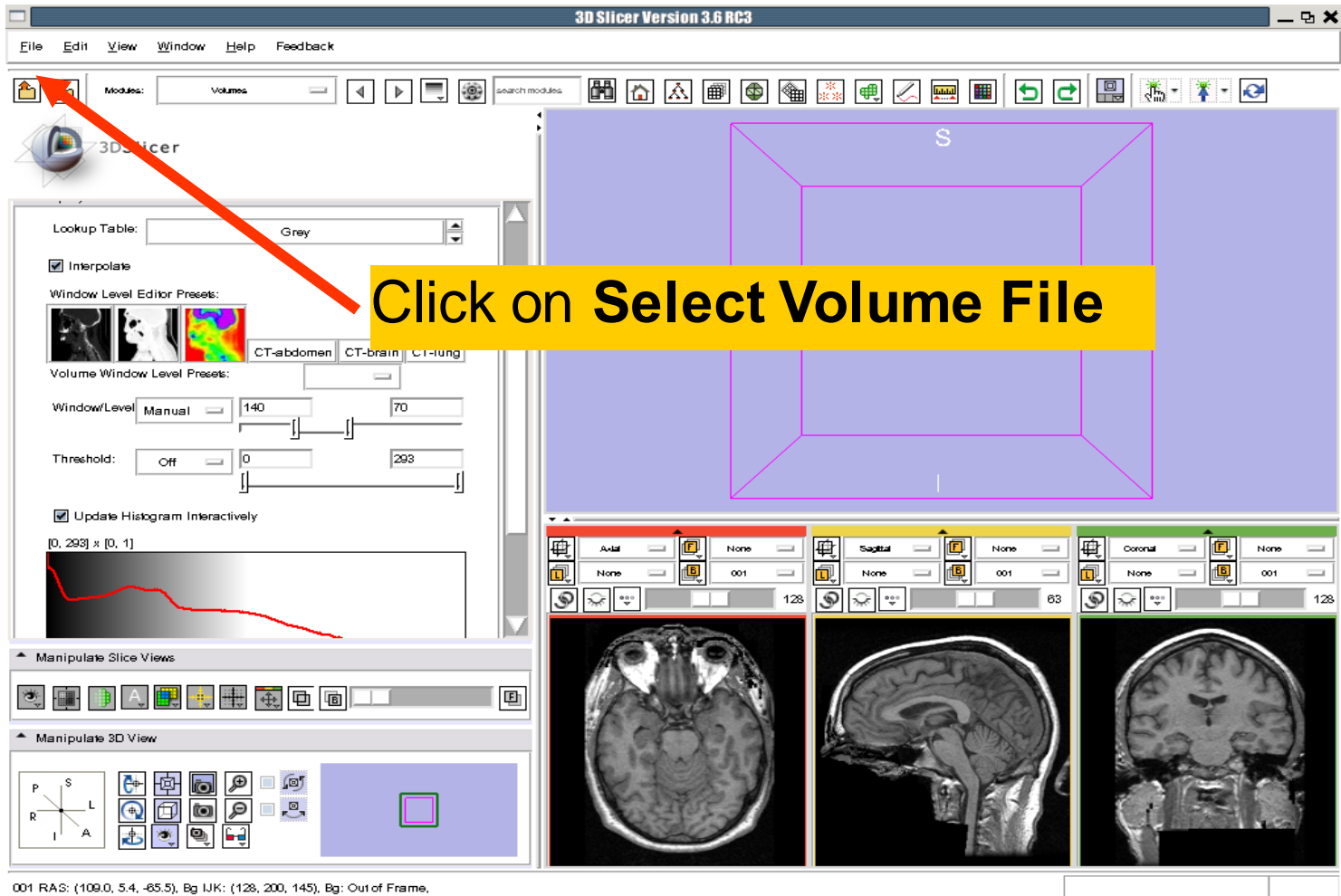
001 RAS: (109.0, 5.4, -85.5), Bg IJK: (128, 200, 145), Bg: Out of Frame.

Use the Window/Level slider to adjust the display of the MR images.



The screenshot displays the 3D Slicer software interface. The top menu bar includes 'File', 'Edit', 'View', 'Window', 'Help', and 'Feedback'. Below the menu is a toolbar with various icons. The 'Modules' dropdown is set to 'Volumes'. The main window is divided into several panels. On the left, the 'Lookup Table' panel is active, showing a 'Grey' lookup table. It includes a 'Window/Level' slider set to 'Manual' with values '140' and '70', and a 'Threshold' slider set to 'Off' with values '0' and '293'. Below this is a histogram showing a red curve. The bottom-left panel shows 'Manipulate Slice Views' and 'Manipulate 3D View' controls. The main 3D view area shows a brain slice with 'R', 'A', and 'L' labels. Below the 3D view are three slice view panels: 'Axial', 'Sagittal', and 'Coronal'. The 'Axial' panel shows a brain slice with a window/level of 'None' and a threshold of '001'. The 'Sagittal' panel shows a brain slice with a window/level of 'None' and a threshold of '001'. The 'Coronal' panel shows a brain slice with a window/level of 'None' and a threshold of '001'. A yellow callout box with a red arrow points to the 'Window/Level' slider in the 'Lookup Table' panel, containing the text: 'Use the Window/Level slider to adjust the display of the MR images.'

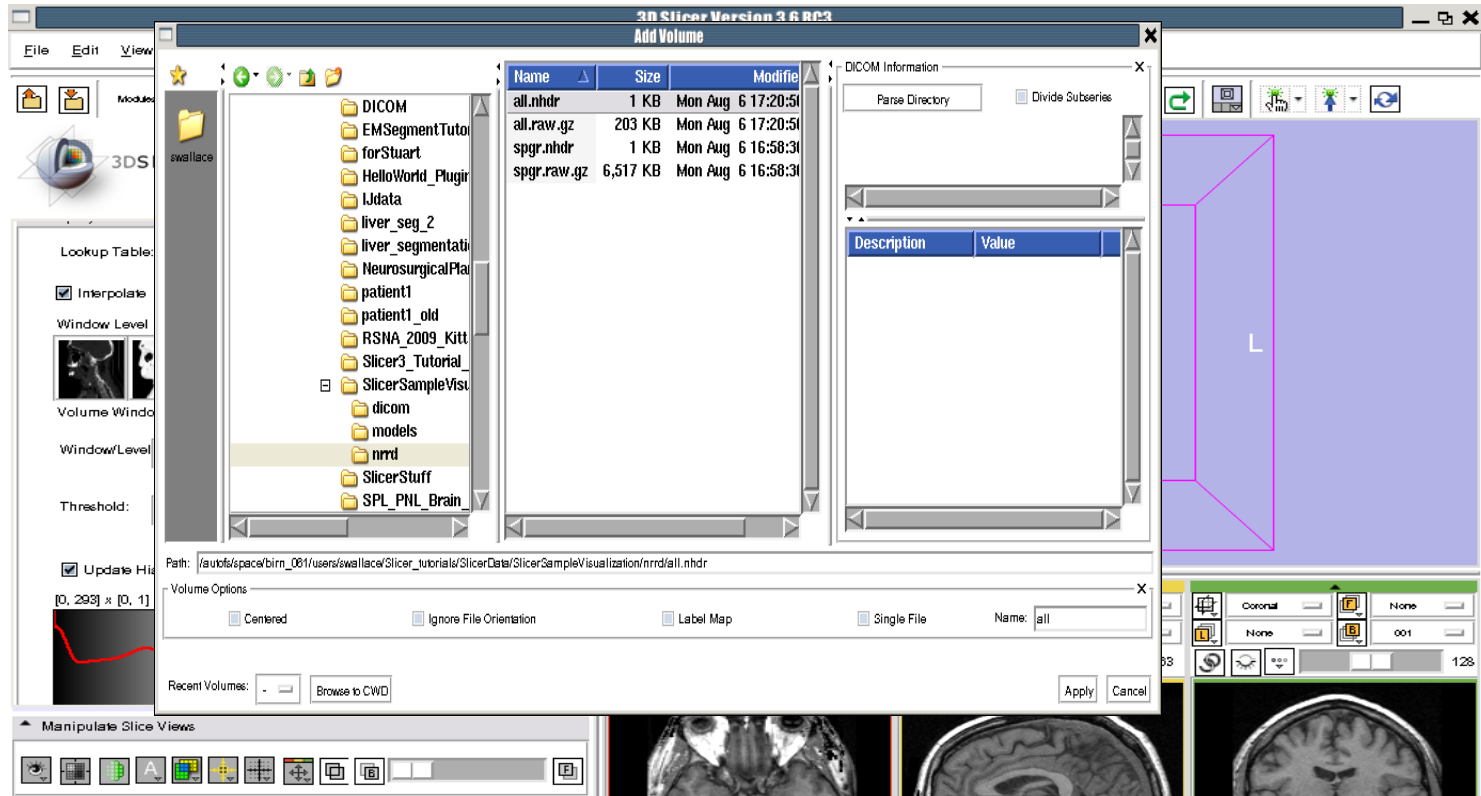
Loading Volumes



The screenshot displays the 3D Slicer software interface. The main window shows a 3D view of a brain volume with a purple wireframe bounding box. The left sidebar contains various toolbars and panels. A red arrow points to the 'Select Volume File' icon (a folder with a plus sign) in the top toolbar. A yellow callout box with the text 'Click on Select Volume File' is positioned over this icon. Below the callout, the 'Volume' panel is visible, showing a histogram and various window level controls. At the bottom, three slice views (Axial, Sagittal, Coronal) are displayed, showing the brain volume in different orientations.

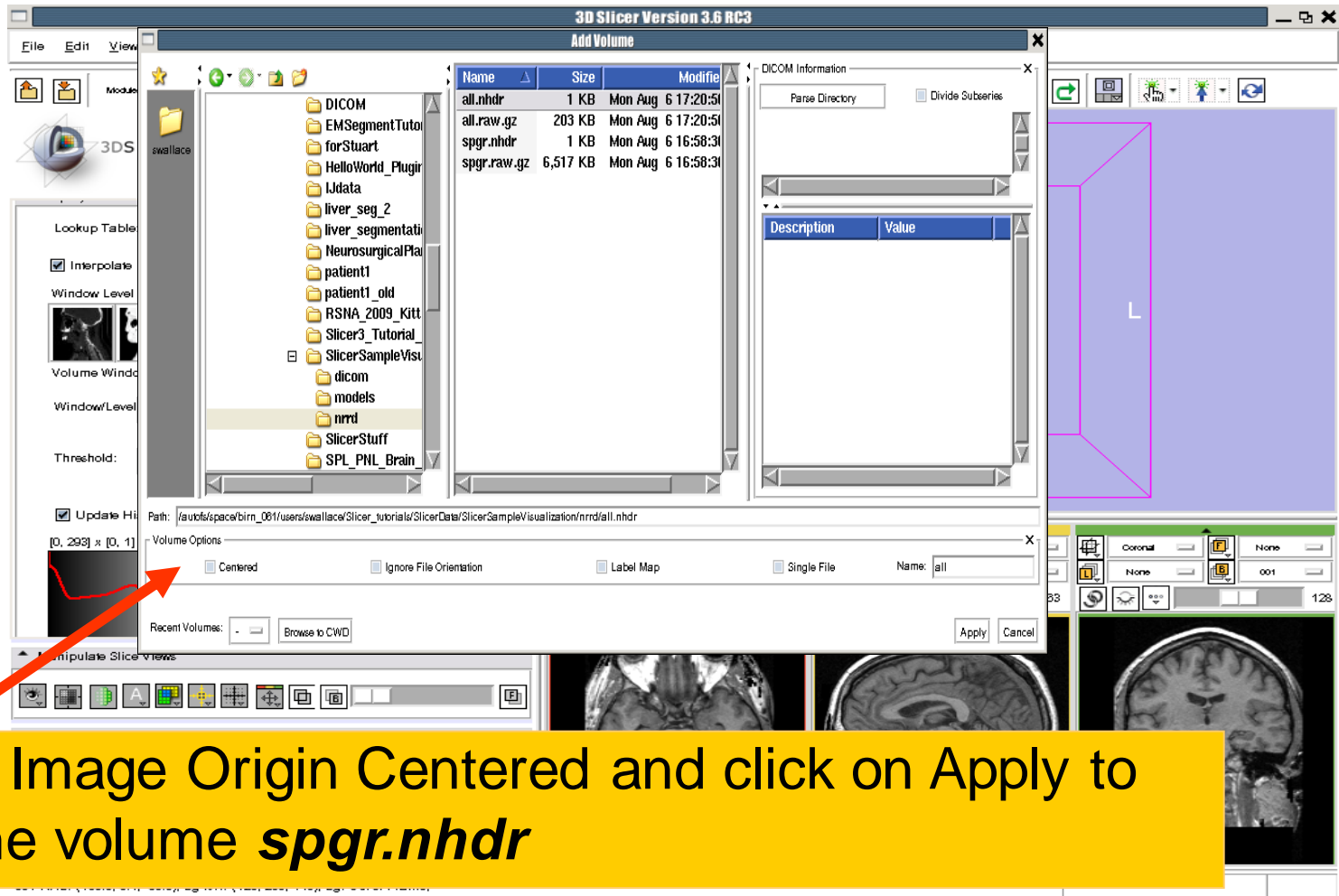
001 RAS: (109.0, 5.4, -85.5), Bg IJK: (128, 200, 145), Bg: Out of Frame.

Loading Volumes



Browse to find the header file of the spgr volume *spgr.nhdr* located in the directory *Slicer3VisualizationDataset/nrrd* and click on **Open**.

Loading Volumes



3D Slicer Version 3.6 RC3

Add Volume

Name	Size	Modified
all.nhdr	1 KB	Mon Aug 6 17:20:51
all.raw.gz	203 KB	Mon Aug 6 17:20:51
spgr.nhdr	1 KB	Mon Aug 6 16:58:31
spgr.raw.gz	6,517 KB	Mon Aug 6 16:58:31

Path: /autofs/pace/birn_081/users/swallace/Slicer_tutorials/SlicerData/SlicerSampleVisualization/nrrd/all.nhdr

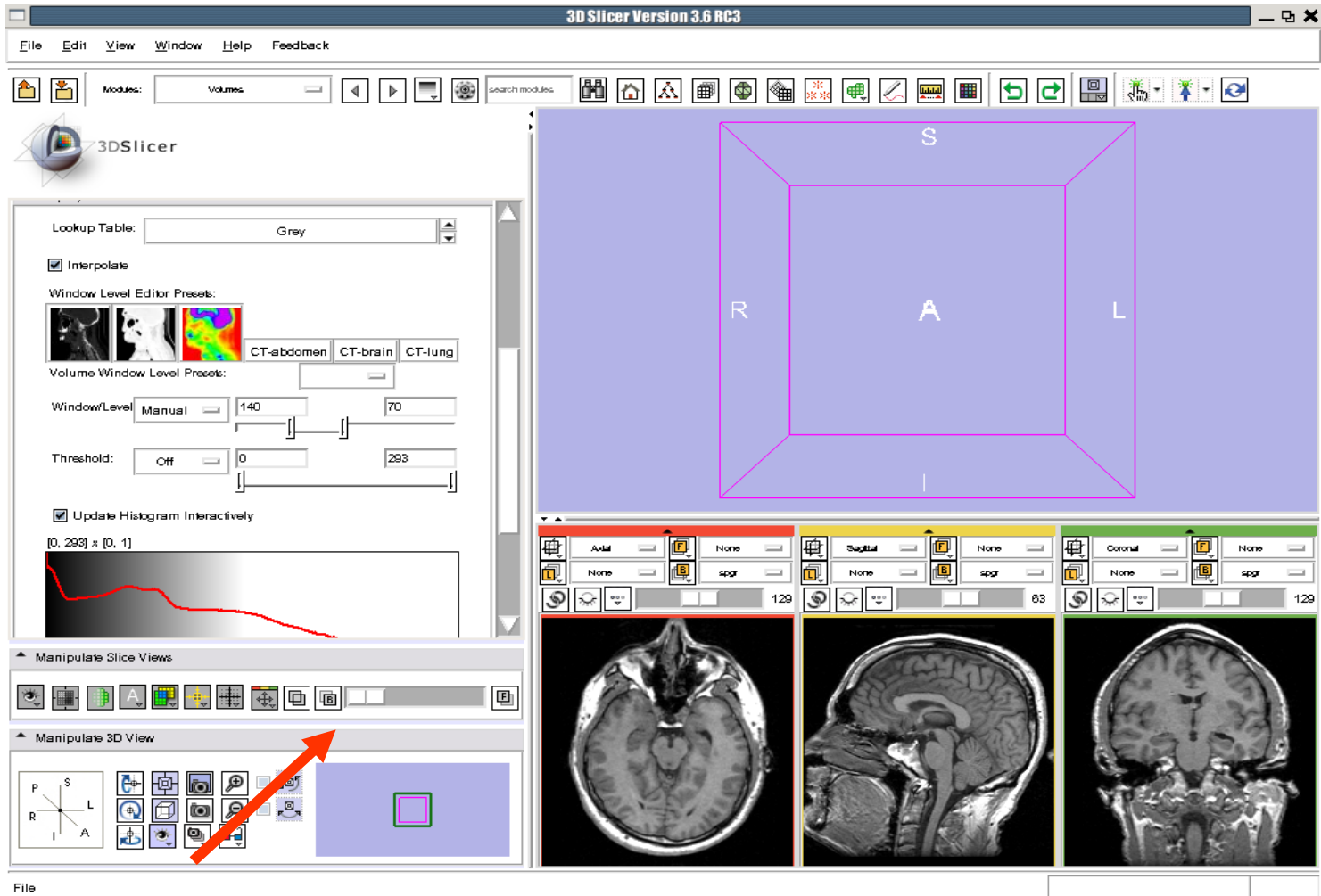
Volume Options

Centered Ignore File Orientation Label Map Single File Name: all

Recent Volumes: - Browse to CWD Apply Cancel

Select Image Origin Centered and click on Apply to load the volume *spgr.nhdr*

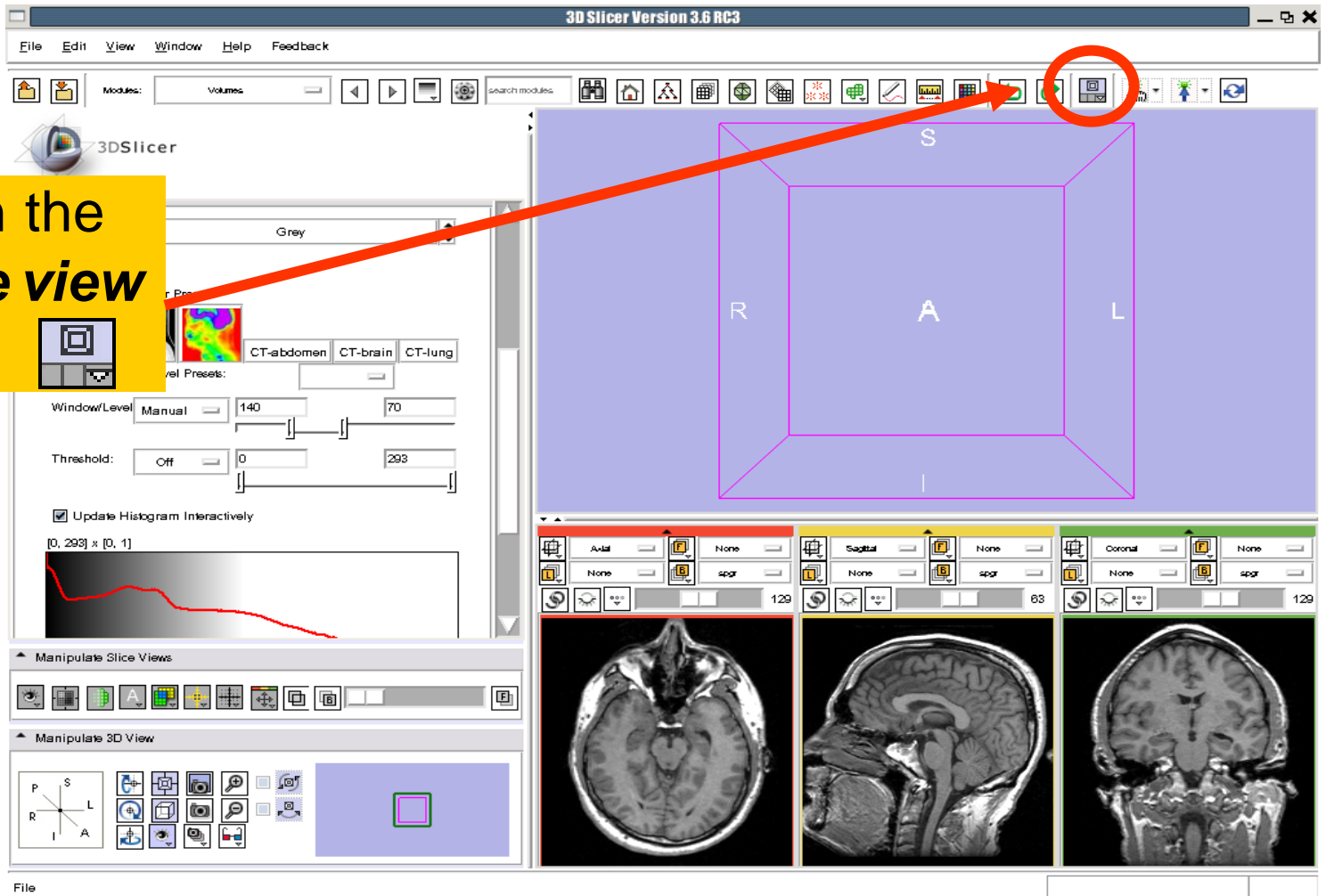
Loading Volumes



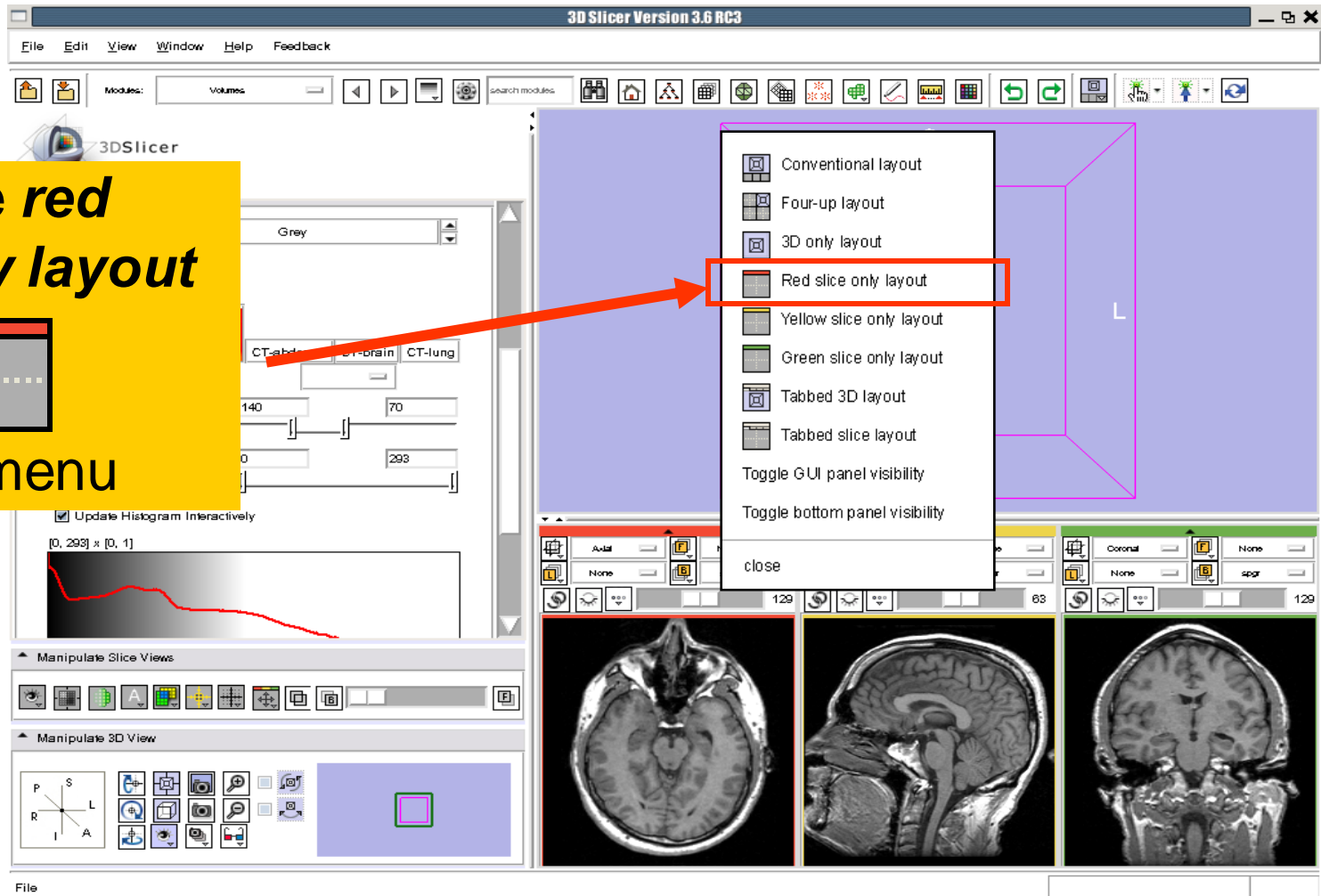
The spgr volume appears in the Background display of the 2D Viewer.

Exploring the data

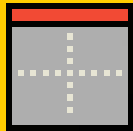
Click on the
choose view
icon



Exploring the data



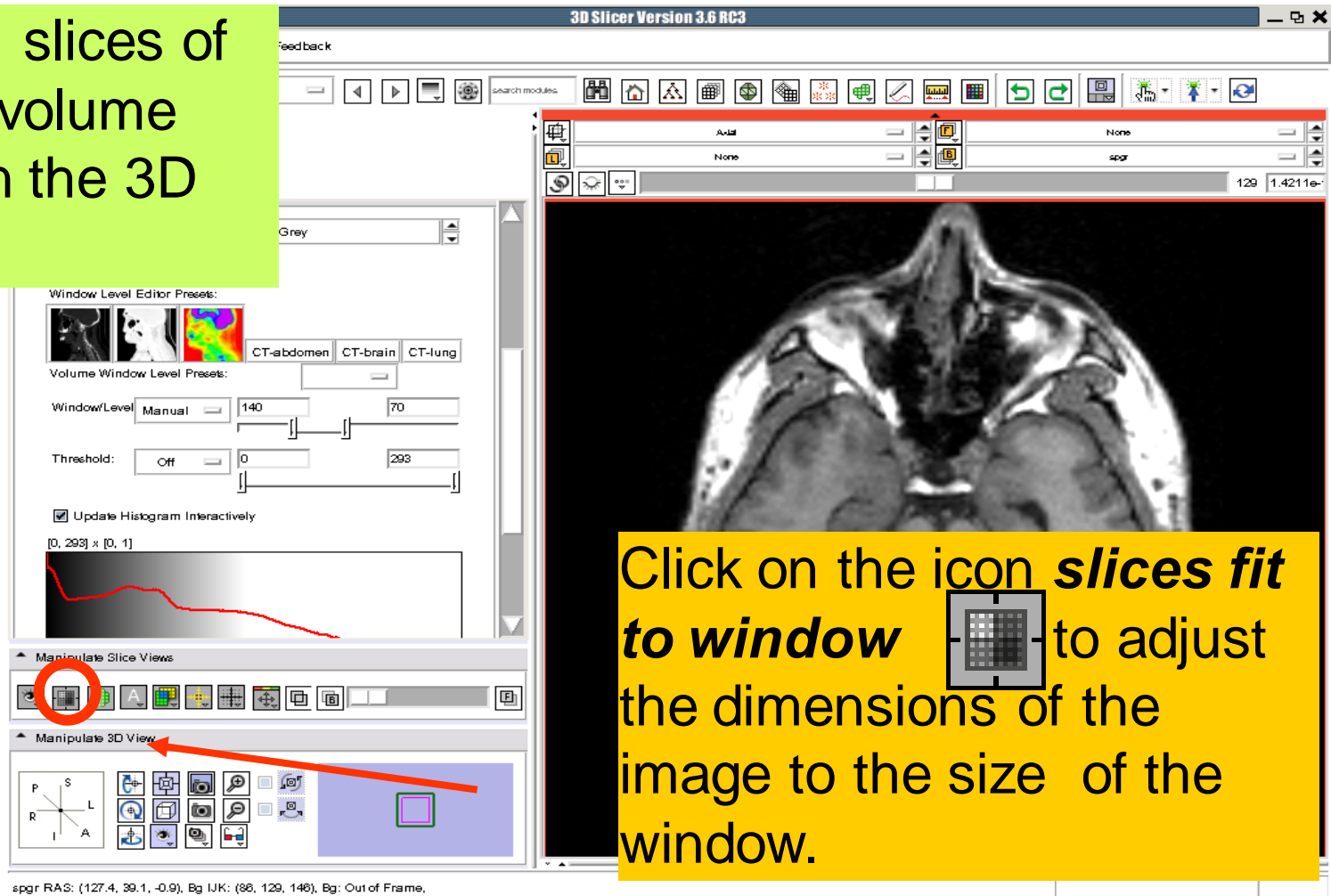
Select the *red slice only layout*



from the menu

Exploring the data

The axial slices of the spgr volume appear in the 3D viewer.



The screenshot shows the 3D Slicer interface. On the left, the 'Window Level Editor' is open, showing a histogram and various controls. A red circle highlights the 'Slices Fit to Window' icon in the 'Manipulate Slice Views' section. A red arrow points from this icon to the 3D viewer, which displays an axial MRI slice of a head. A yellow callout box with a grid icon and text explains the function of the icon.

3D Slicer Version 3.6 RC3

Window Level Editor Presets: CT-abdomen CT-brain CT-lung

Volume Window Level Presets: spgr

Window/Level Manual 140 70

Threshold: Off 0 293

Update Histogram Interactively

[0, 293] x [0, 1]


Manipulate Slice Views

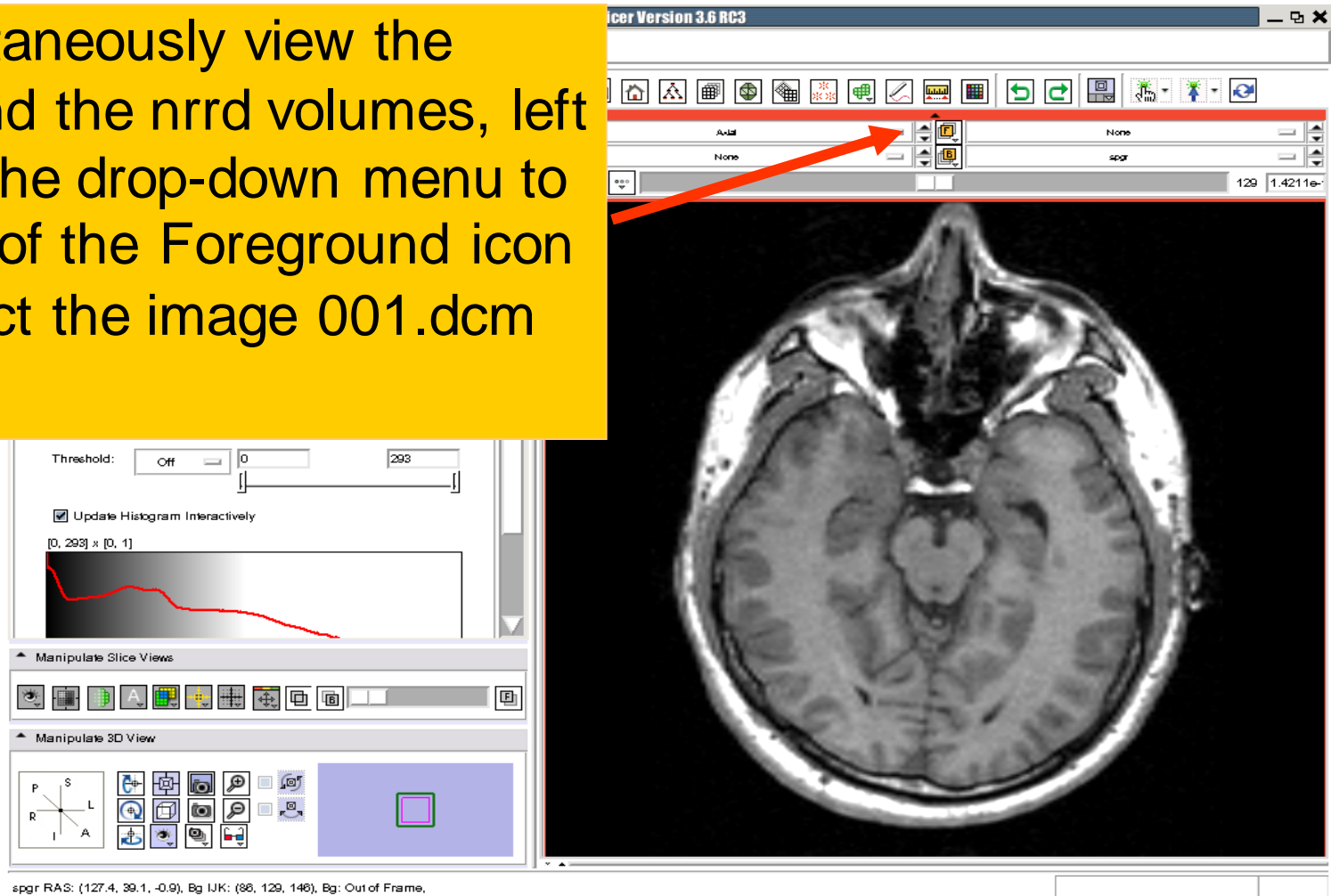
Manipulate 3D View

spgr RAS: (127.4, 39.1, -0.9), Bg IJK: (86, 129, 146), Bg: Out of Frame.

Click on the icon **slices fit to window** to adjust the dimensions of the image to the size of the window.



Exploring the data

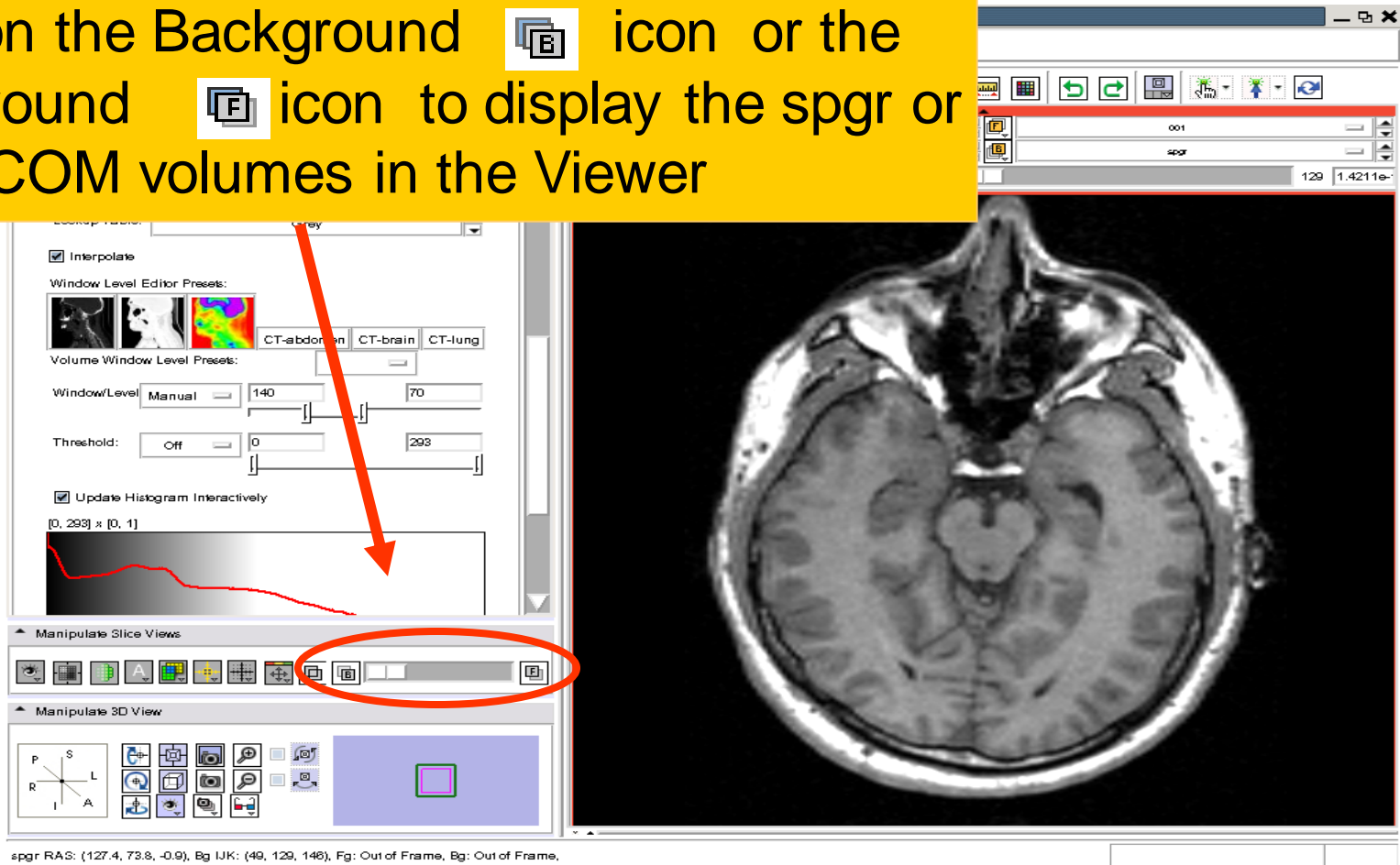
To simultaneously view the dicom and the nrrd volumes, left click on the drop-down menu to the right of the Foreground icon  select the image 001.dcm



The screenshot shows the 3DSlicer interface. At the top, the title bar reads "3DSlicer Version 3.6 RC3". Below it is a toolbar with various icons. A red arrow points to a drop-down menu in the foreground toolbar, which is currently set to "None". To the right of this menu is another drop-down menu set to "sgr". Below the toolbars is a large 3D view window displaying an axial brain MRI slice. On the left side of the interface, there is a panel with a "Threshold" slider set to "Off" with values from 0 to 293. Below the slider is a checkbox labeled "Update Histogram Interactively" which is checked. Underneath is a histogram plot showing a red curve. Below the histogram are two sections: "Manipulate Slice Views" and "Manipulate 3D View". The "Manipulate 3D View" section includes a 3D orientation compass with labels P, S, L, R, I, A and a set of manipulation icons. At the bottom of the interface, there is a status bar with the text: "sgr RAS: (127.4, 39.1, -0.9), Bg IJK: (86, 129, 146), Bg: Out of Frame."

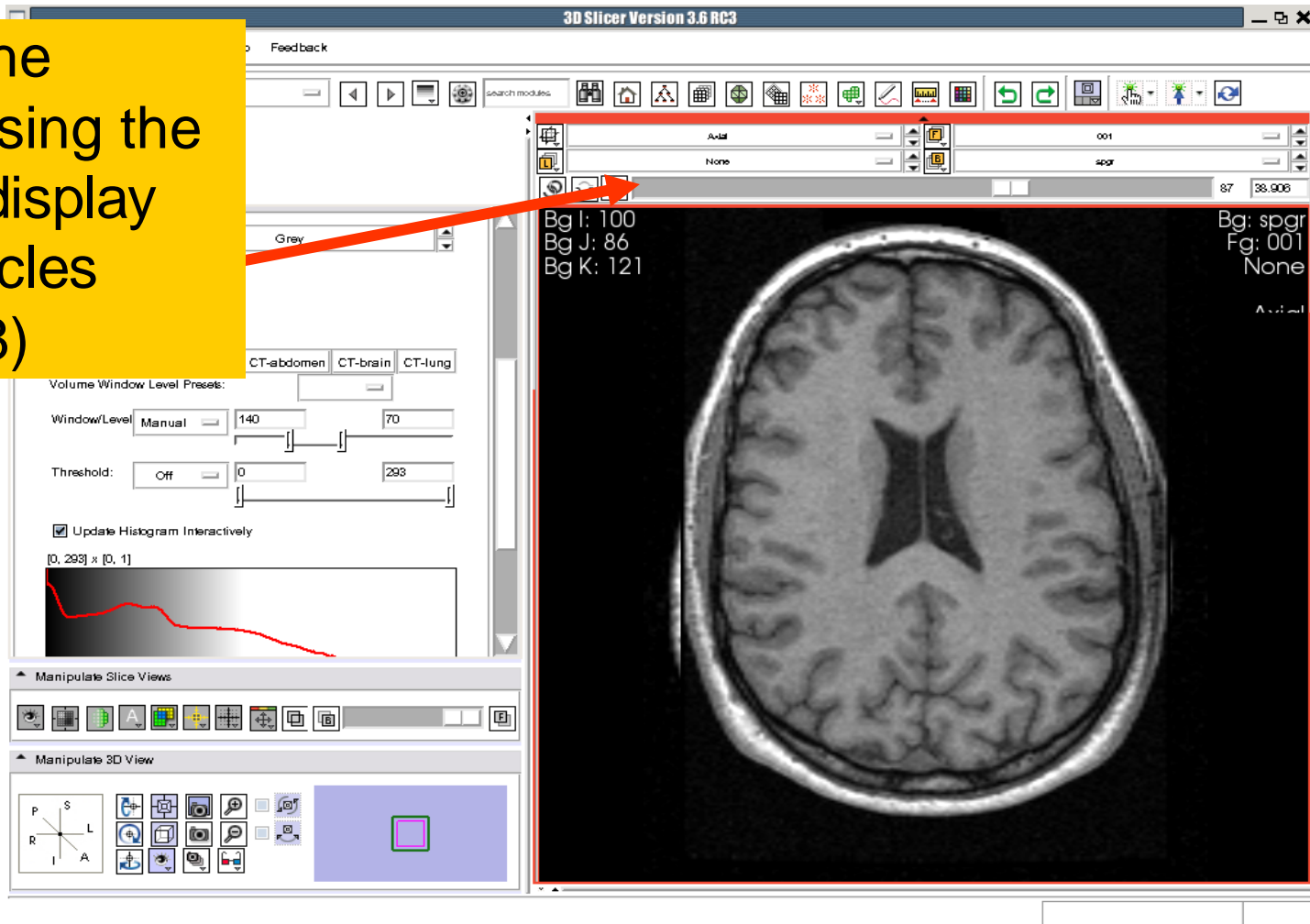
Exploring the data

Click on the Background  icon or the Foreground  icon to display the spgr or the DICOM volumes in the Viewer

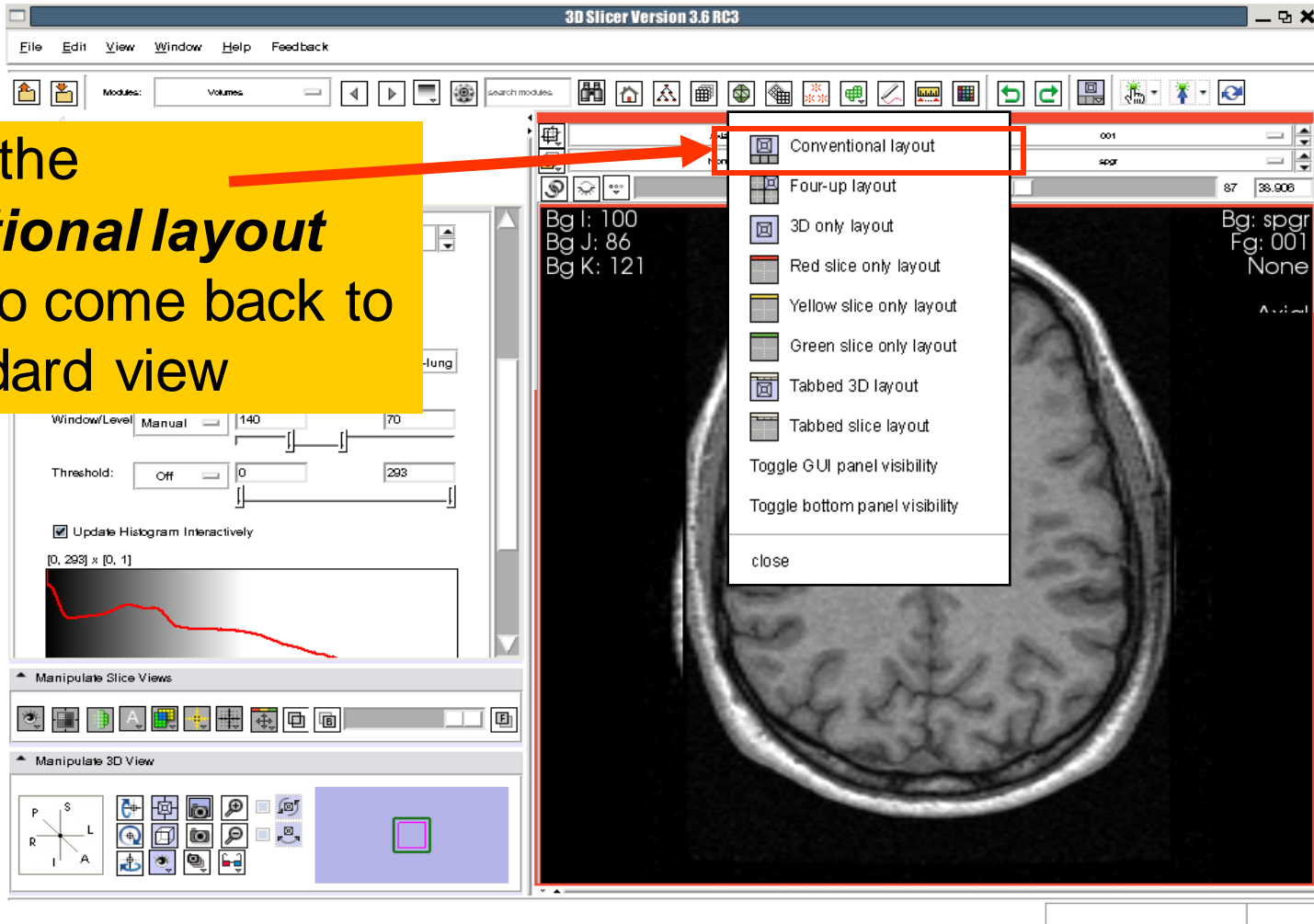


Exploring the data

Browse the images using the slider to display the ventricles (~slice 38)




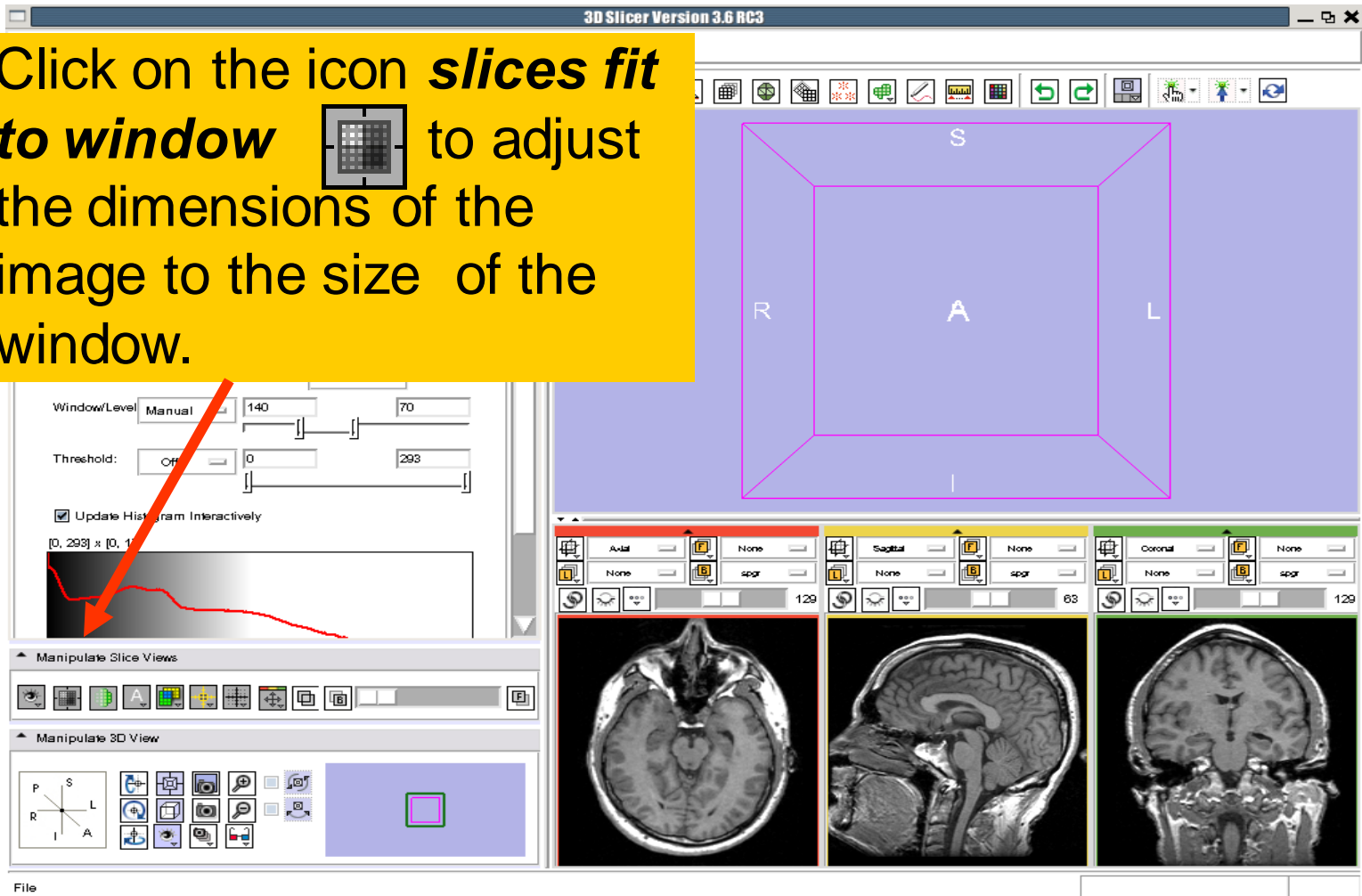
Exploring the data

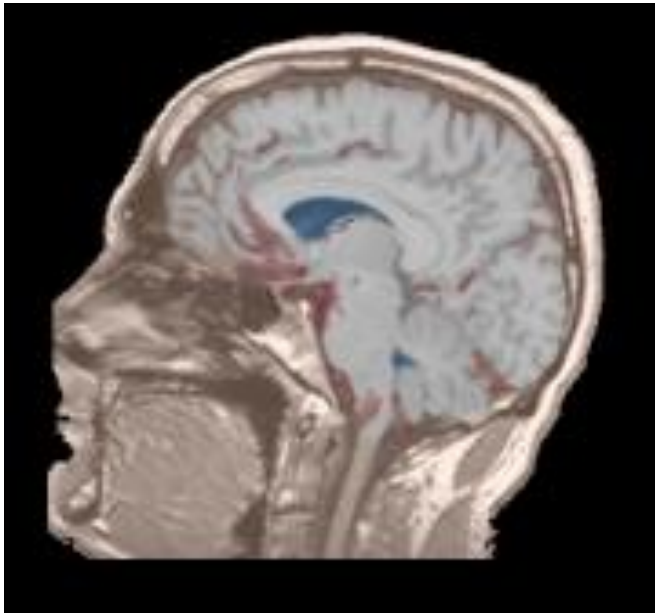


Click on the **conventional layout icon**  to come back to the standard view

Loading Volumes

Click on the icon **slices fit to window**  to adjust the dimensions of the image to the size of the window.

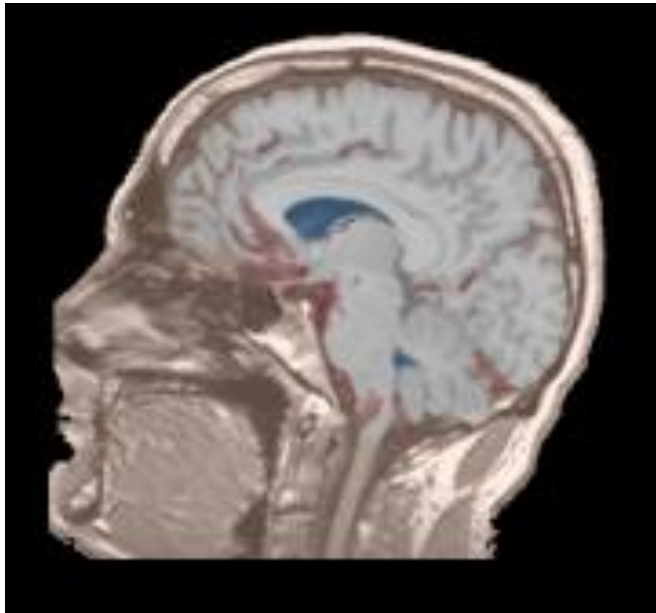




Part 2: Loading and visualizing segmented structures overlaid on grayscale images

Label map

Image segmentation is the extraction of structural information of particular interest from surrounding image.

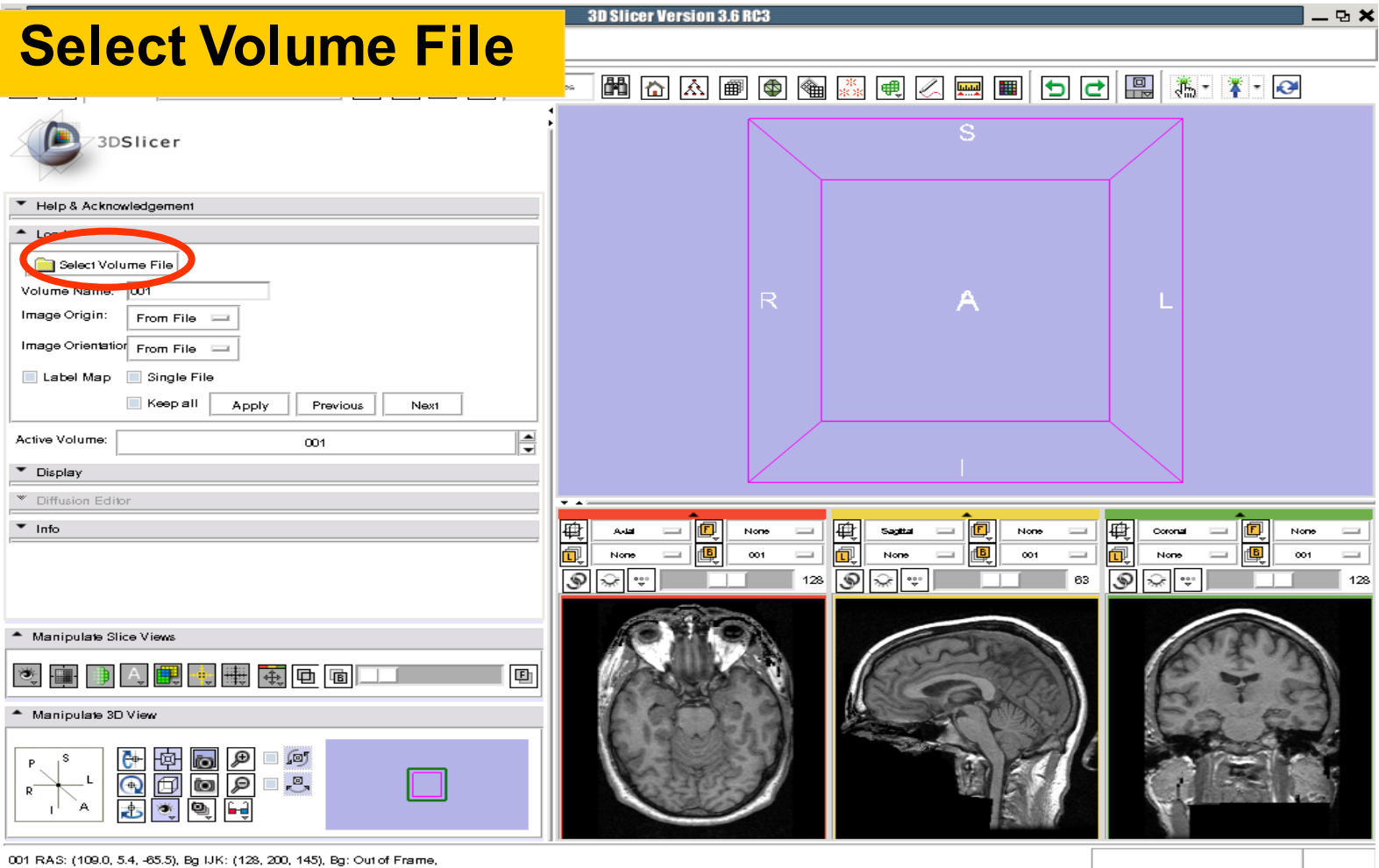


Each pixel is assigned a specific **label value** which corresponds to the anatomical structure that it belongs to.

The three-dimensional result of the segmentation is a binary array called a **label map**.

Loading a label map

Click on **Select Volume File**



3D Slicer Version 3.6 RC3

3DSlicer

Help & Acknowledgement

Load

Select Volume File

Volume Name: 001

Image Origin: From File

Image Orientation: From File

Label Map Single File

Keep all

Active Volume: 001

Display

Diffusion Editor

Info

Manipulate Slice Views

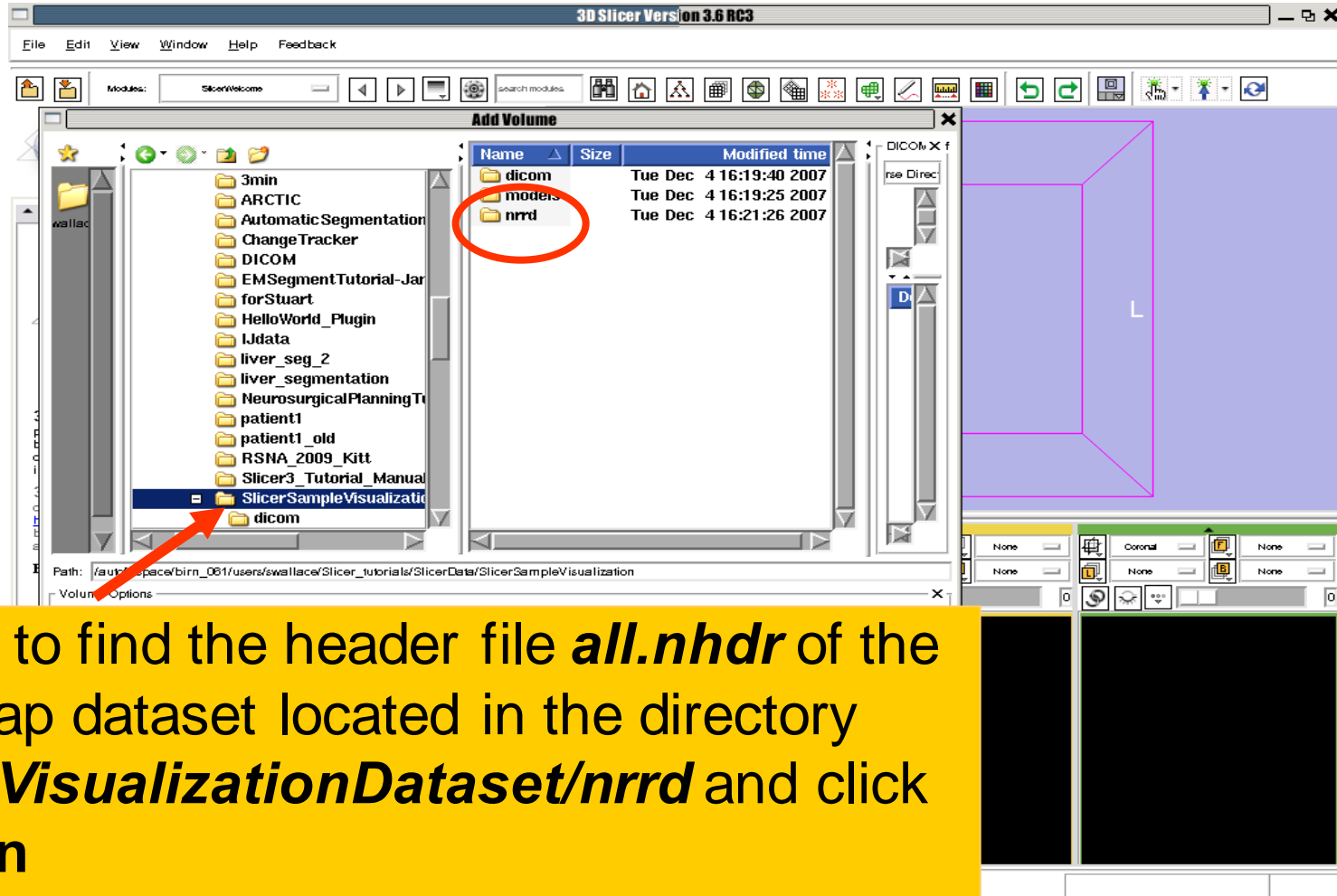
Manipulate 3D View

001 RAS: (109.0, 5.4, -65.5), Bg IJK: (128, 200, 145), Bg: Out of Frame.

001 RAS: (109.0, 5.4, -65.5), Bg IJK: (128, 200, 145), Bg: Out of Frame.

001 RAS: (109.0, 5.4, -65.5), Bg IJK: (128, 200, 145), Bg: Out of Frame.

Loading a label map



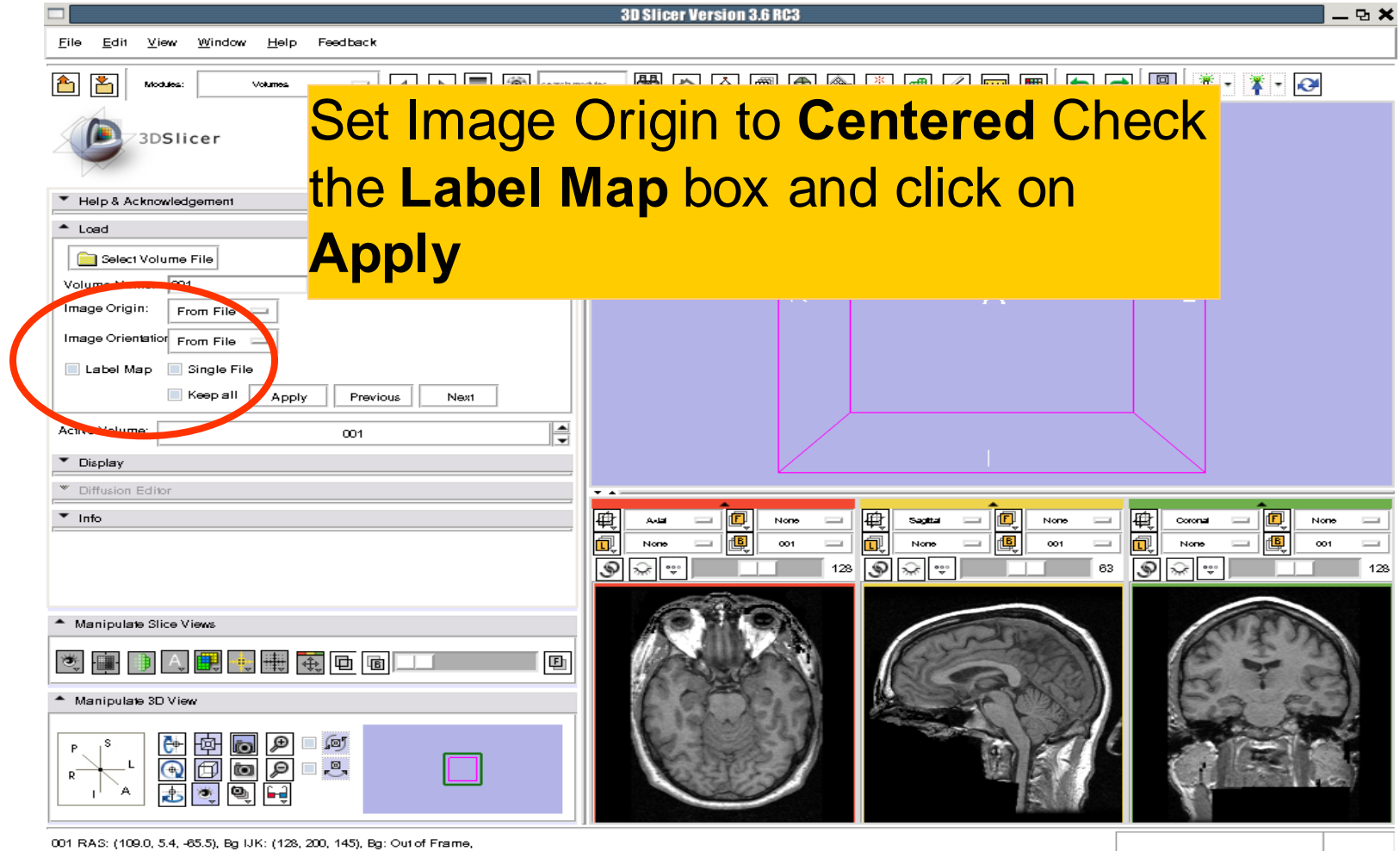
The screenshot shows the 3D Slicer interface with the 'Add Volume' dialog box open. The dialog box has a table with the following data:

Name	Size	Modified time
dicom		Tue Dec 4 16:19:40 2007
models		Tue Dec 4 16:19:25 2007
nrrd		Tue Dec 4 16:21:26 2007

The 'nrrd' folder is circled in red. A red arrow points to the 'SlicerSampleVisualization' folder in the file tree on the left. The main 3D view shows a purple volume with a white 'L' label.

Browse to find the header file *all.nhdr* of the label map dataset located in the directory *Slicer3VisualizationDataset/nrrd* and click on **Open**

Visualizing a label map



Set Image Origin to **Centered Check the **Label Map** box and click on **Apply****

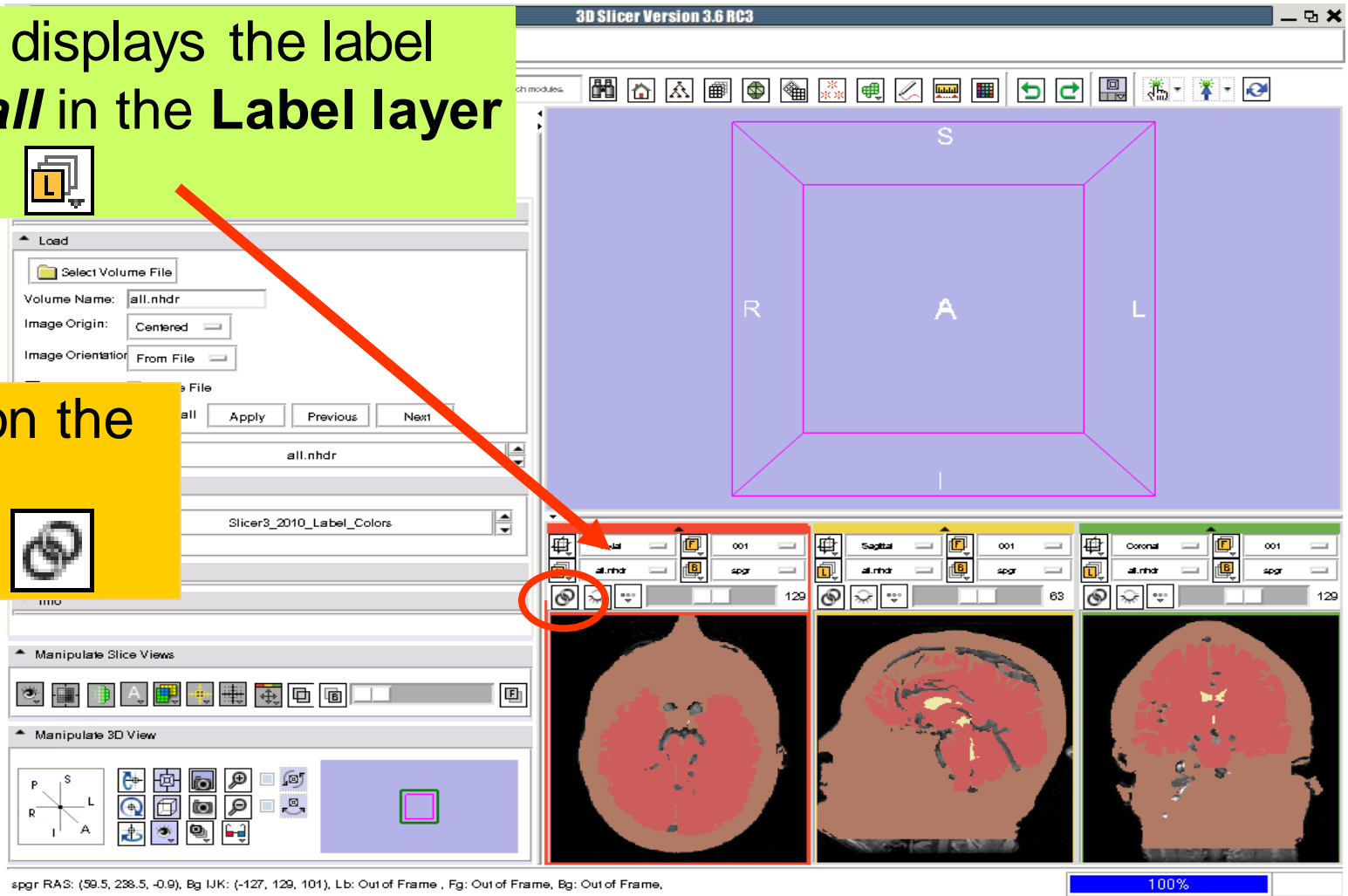
001 RAS: (109.0, 5.4, -85.5), Bg IJK: (128, 200, 145), Bg: Out of Frame,

Visualizing a label map

Slicer displays the label map *all* in the **Label** layer



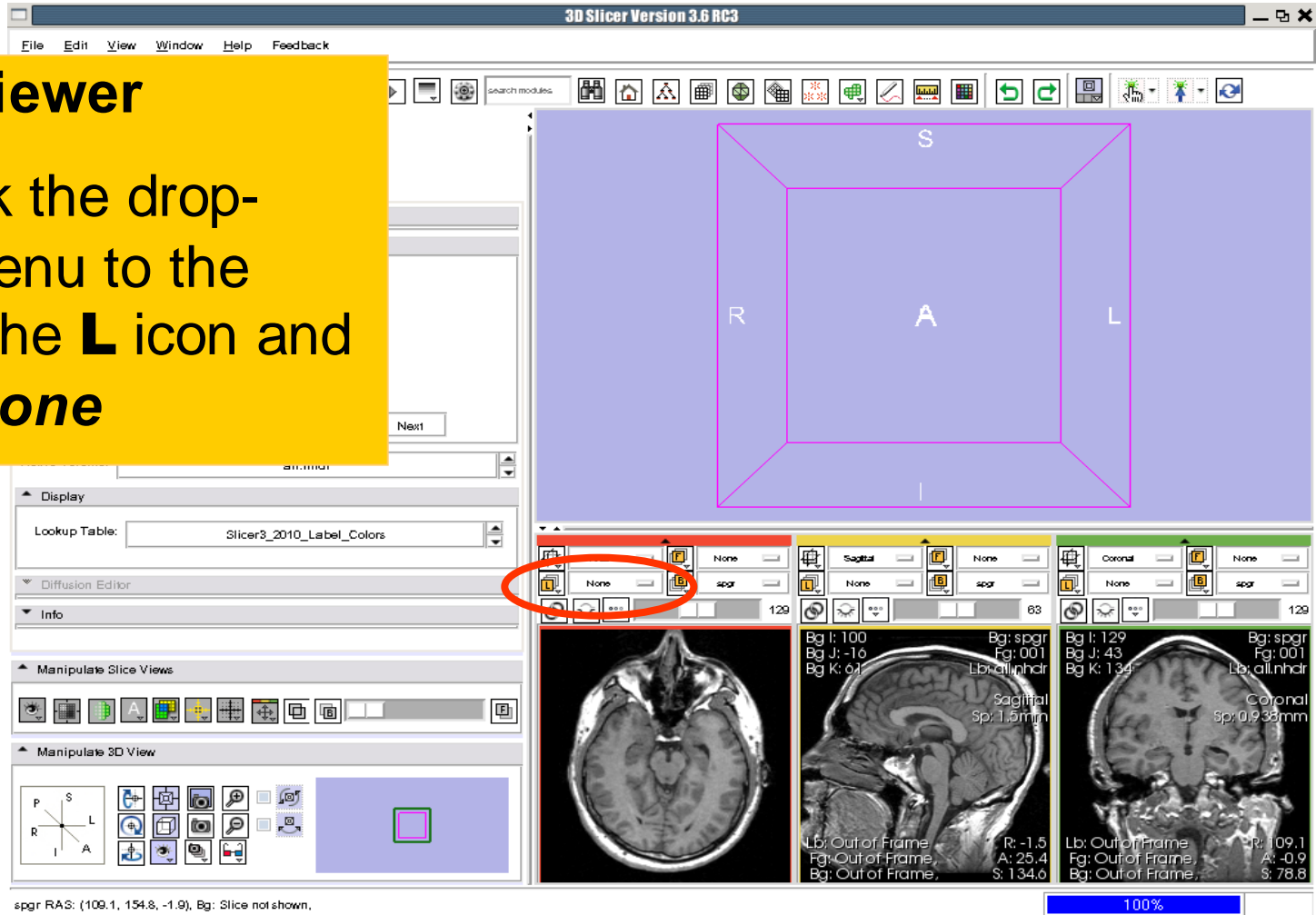
Click on the *links* icon.



Visualizing Multiple Volumes

Label Viewer

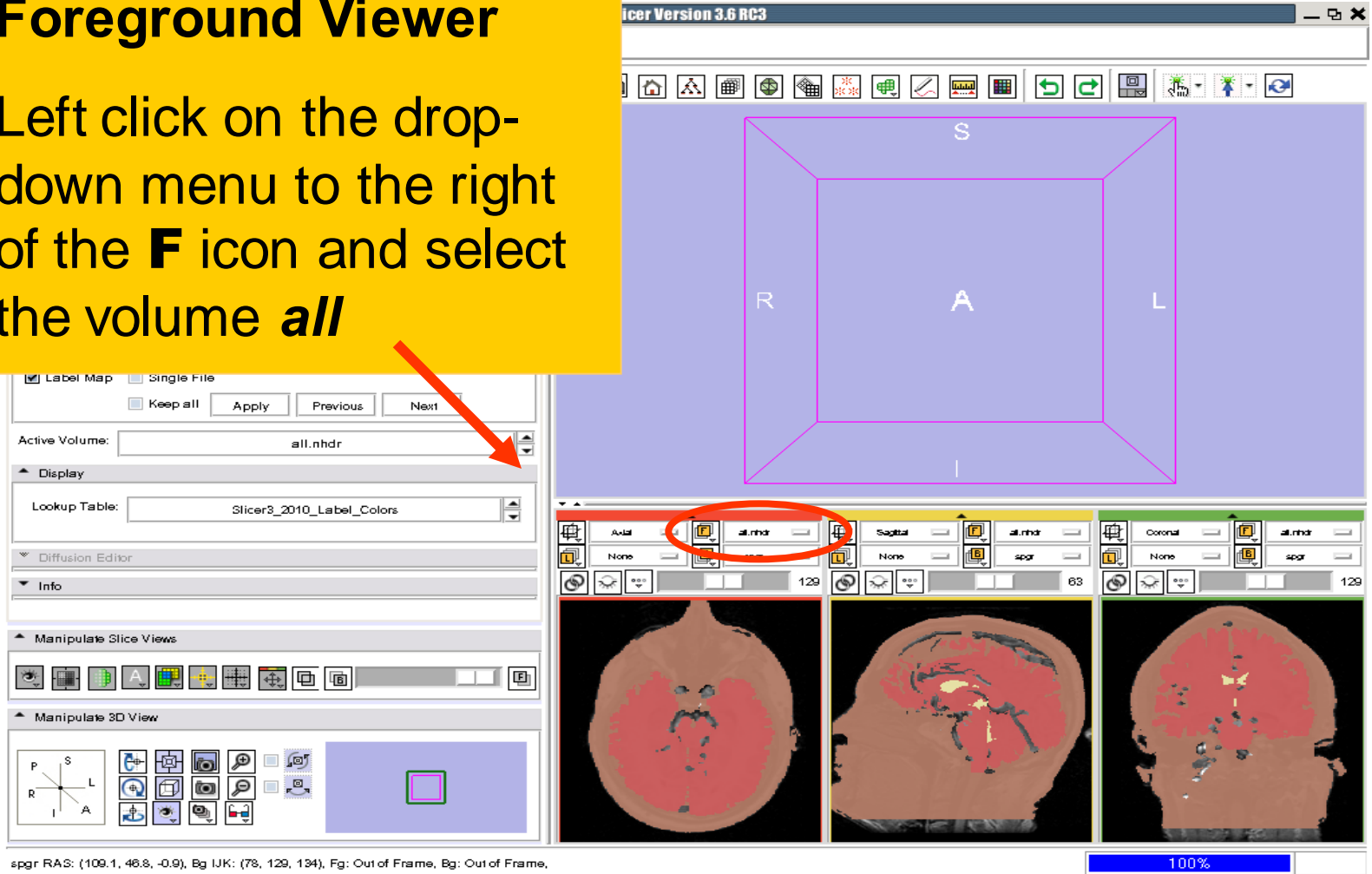
Left click the drop-down menu to the right of the **L** icon and select **None**



Visualizing Multiple Volumes

Foreground Viewer

Left click on the drop-down menu to the right of the **F** icon and select the volume *all*



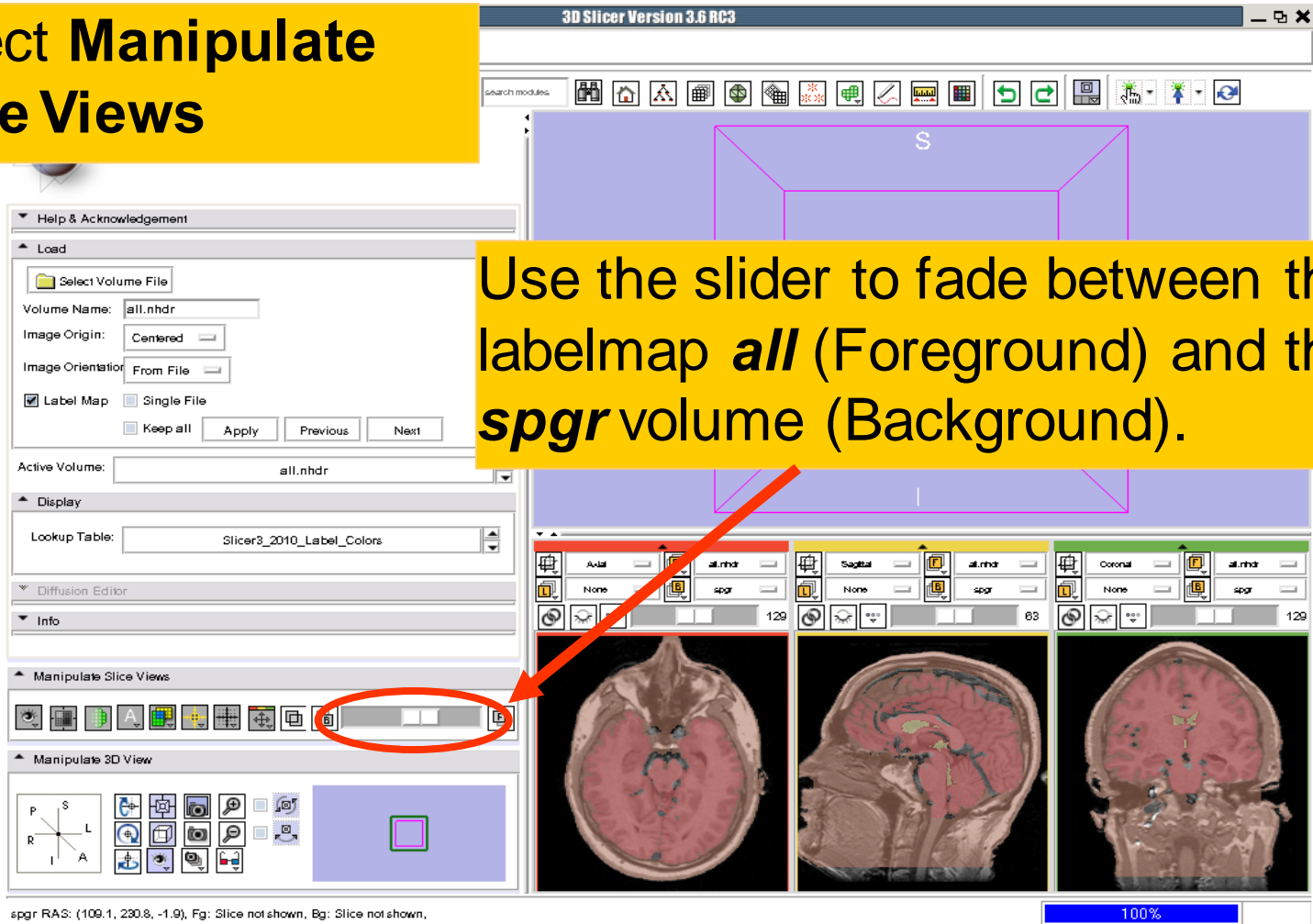
The screenshot displays the 3DSlicer interface. The main 3D view shows a brain volume with a purple bounding box and axes labeled S (Superior), I (Inferior), R (Right), and L (Left). The foreground viewer panel on the left shows the 'Active Volume' set to 'all.nhdr' and the 'Lookup Table' set to 'Slicer3_2010_Label_Colors'. A red arrow points to the drop-down menu next to the 'F' icon in the foreground viewer, which is circled in red. The foreground viewer also shows three slice views: Axial, Sagittal, and Coronal, each with a volume selection dropdown set to 'all.nhdr'. The status bar at the bottom indicates the current volume is 'all.nhdr' and shows a 100% zoom level.



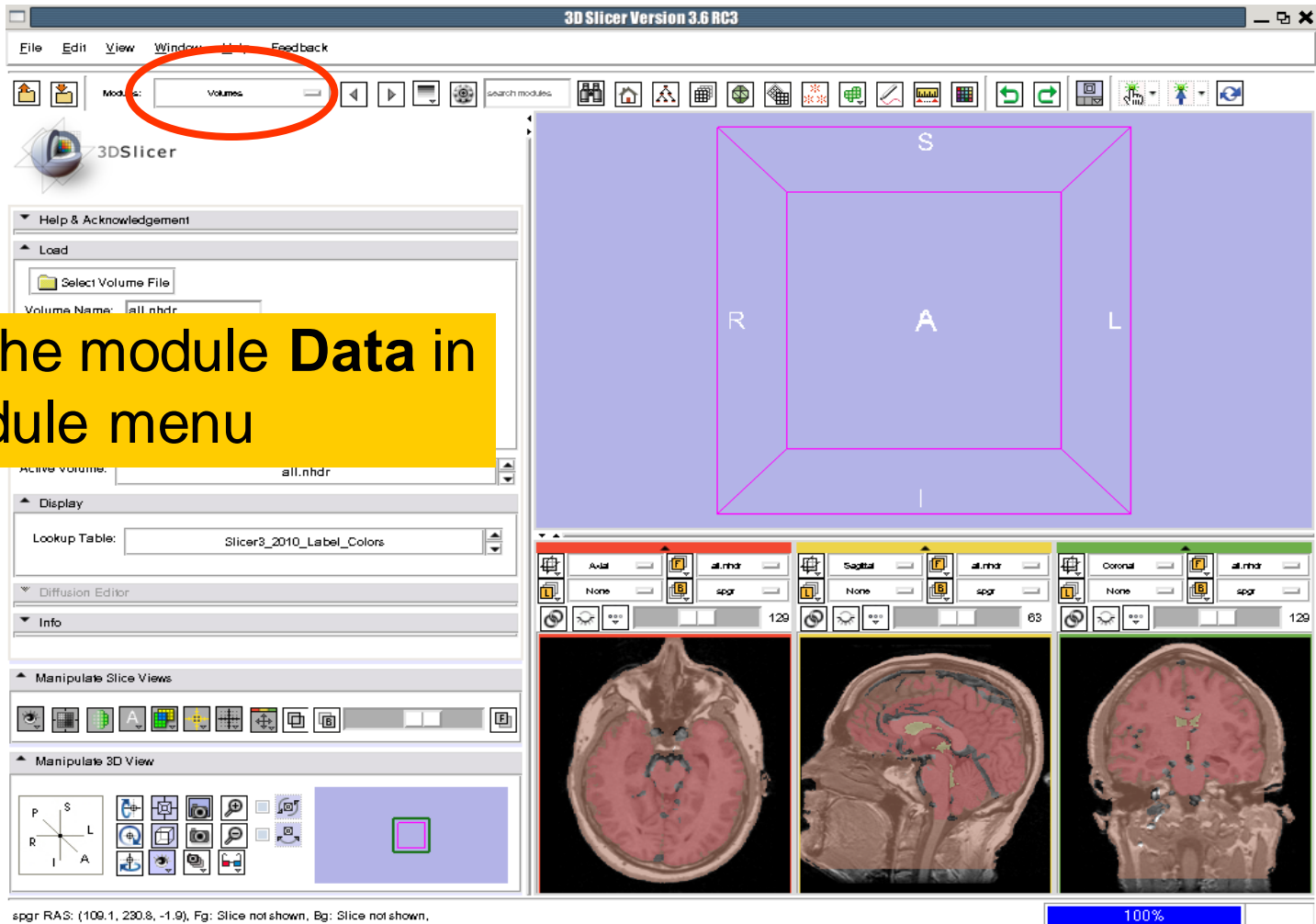
Visualizing Multiple Volumes

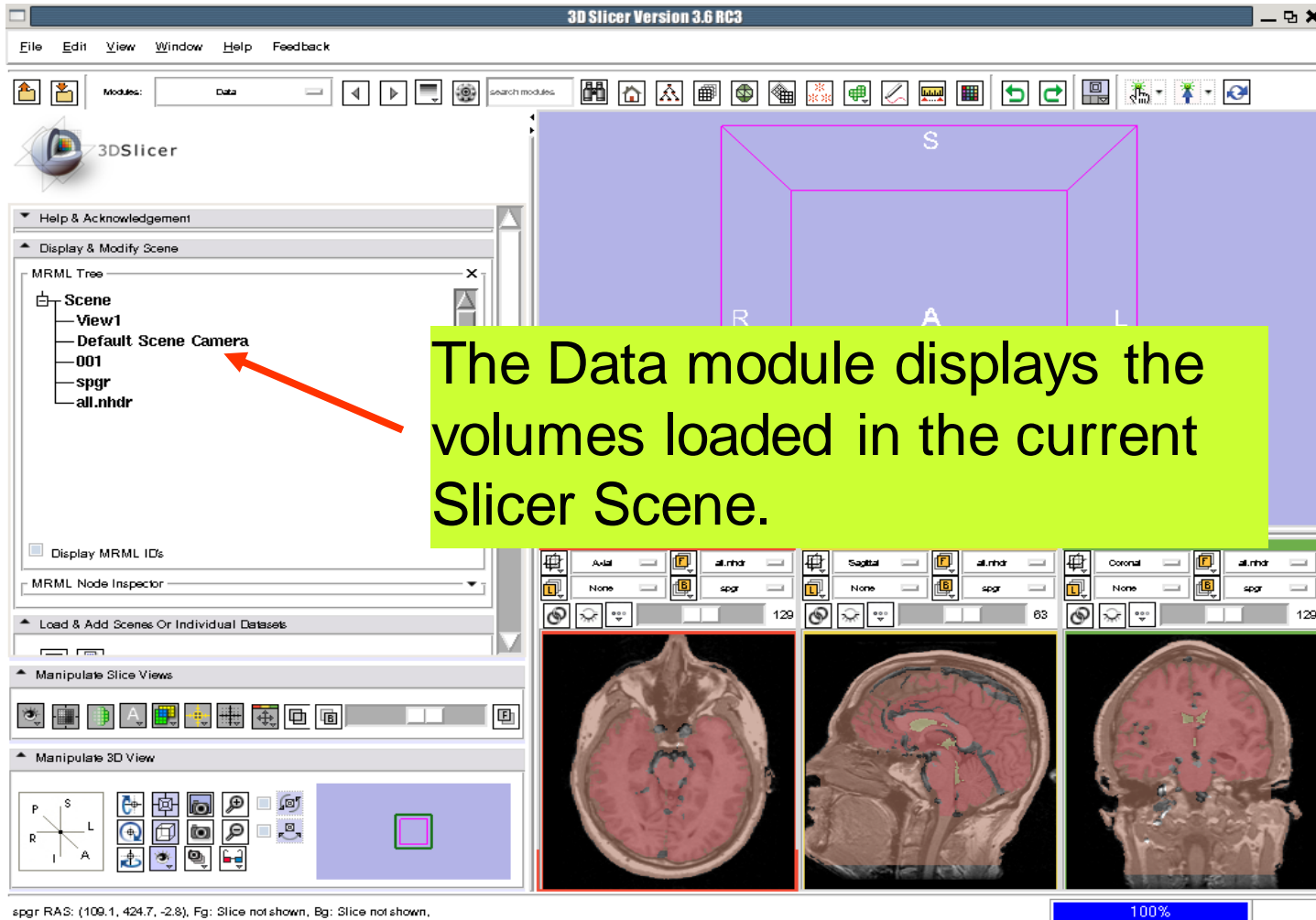
Select Manipulate
Slice Views

Use the slider to fade between the labelmap *all* (Foreground) and the *spgr* volume (Background).



Select the module **Data** in the module menu





The screenshot displays the 3D Slicer software interface, version 3.6 RC3. The main window shows a 3D visualization of a brain scan with a yellow callout box containing the text: "The Data module displays the volumes loaded in the current Slicer Scene." An orange arrow points from the callout box to the "Default Scene Camera" node in the MRML Tree. The MRML Tree shows a hierarchy: Scene -> View1 -> Default Scene Camera -> 001 -> spgr -> all.nhdr. The interface also includes a menu bar (File, Edit, View, Window, Help, Feedback), a toolbar, and various panels for scene manipulation and visualization.

3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Data

3DSlicer

Help & Acknowledgement

Display & Modify Scene

MRML Tree

- Scene
 - View1
 - Default Scene Camera
 - 001
 - spgr
 - all.nhdr

Display MRML IDs

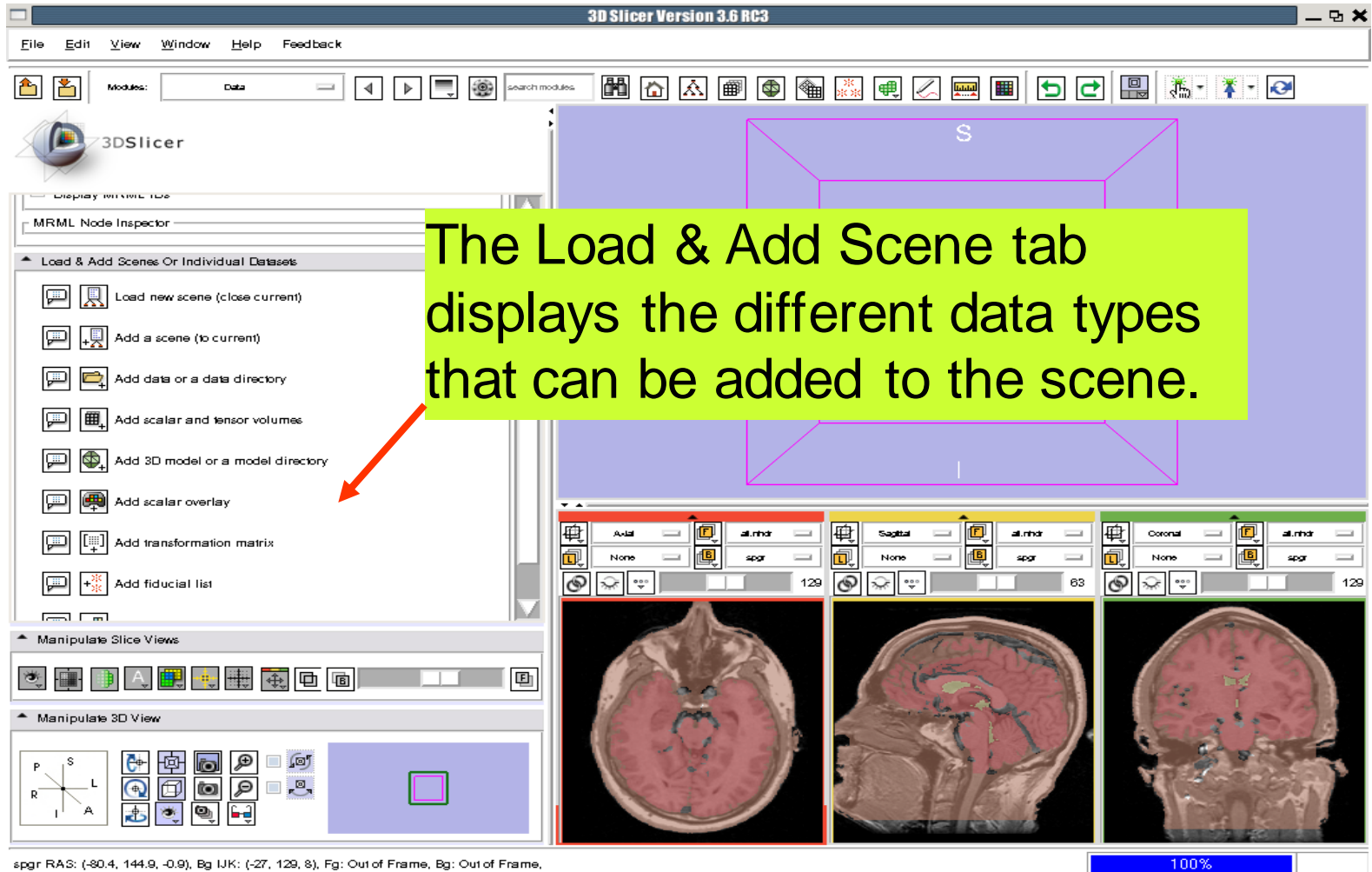
MRML Node Inspector

Load & Add Scenes Or Individual Datasets

Manipulate Slice Views

Manipulate 3D View

spgr RAS: (109.1, 424.7, -2.8), Fg: Slice not shown, Bg: Slice not shown, 100%



The screenshot shows the 3D Slicer Version 3.6 RC3 interface. The 'Load & Add Scene Or Individual Datasets' panel is active, displaying various options for adding data to the scene. A red arrow points from a text box to this panel. The 3D visualization area shows a brain scan with three orthogonal views: Axial, Sagittal, and Coronal. The status bar at the bottom indicates the current slice position and zoom level.

3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Data

3DSlicer

MRML Node Inspector

Load & Add Scene Or Individual Datasets

- Load new scene (close current)
- Add a scene (to current)
- Add data or a data directory
- Add scalar and tensor volumes
- Add 3D model or a model directory
- Add scalar overlay
- Add transformation matrix
- Add fiducial list

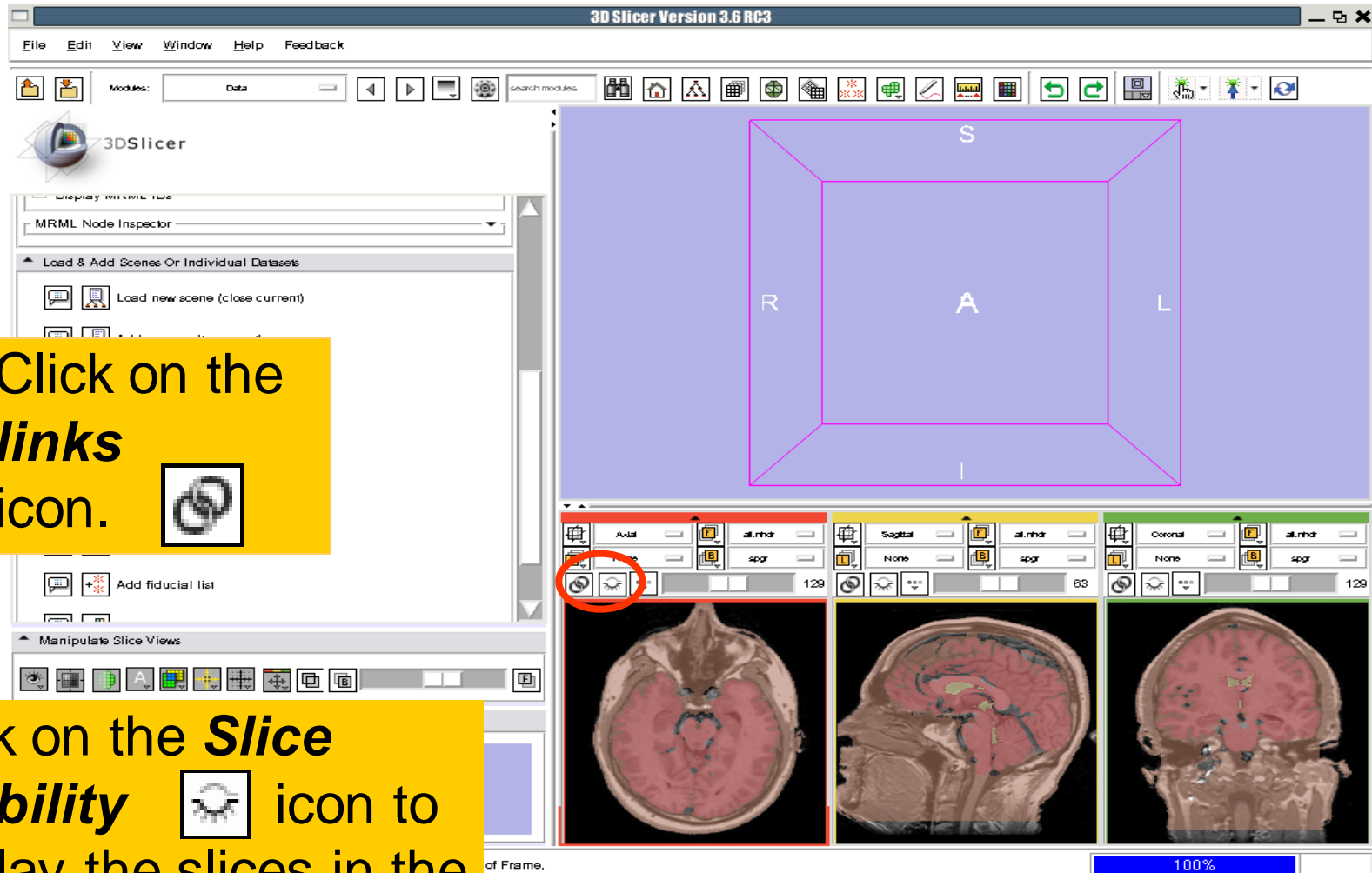
Manipulate Slice Views

Manipulate 3D View

spgr RAS: (-80.4, 144.9, -0.9), Bg IJK: (-27, 129, 8), Fg: Out of Frame, Bg: Out of Frame.

100%

The Load & Add Scene tab displays the different data types that can be added to the scene.

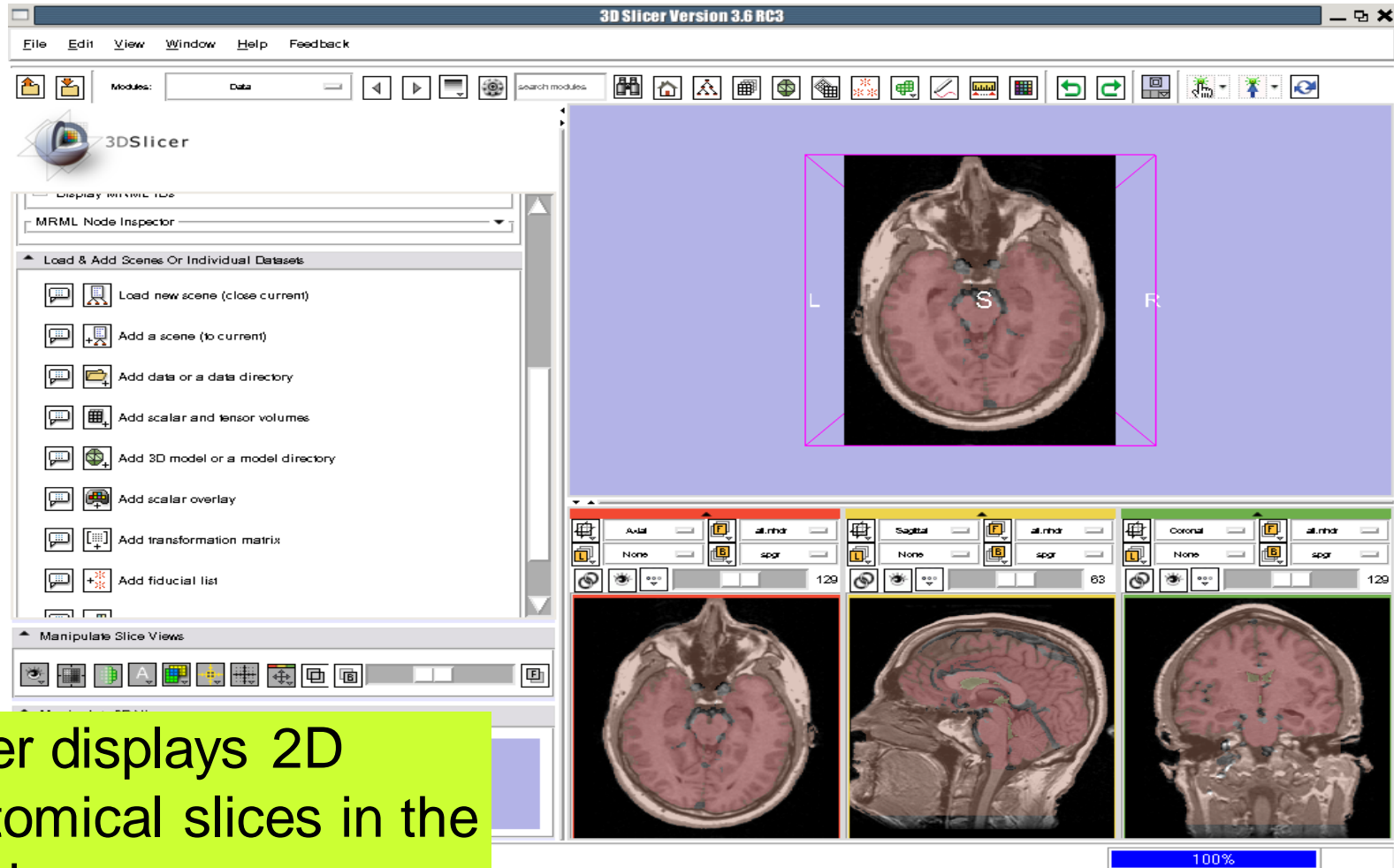


Click on the **links** icon.



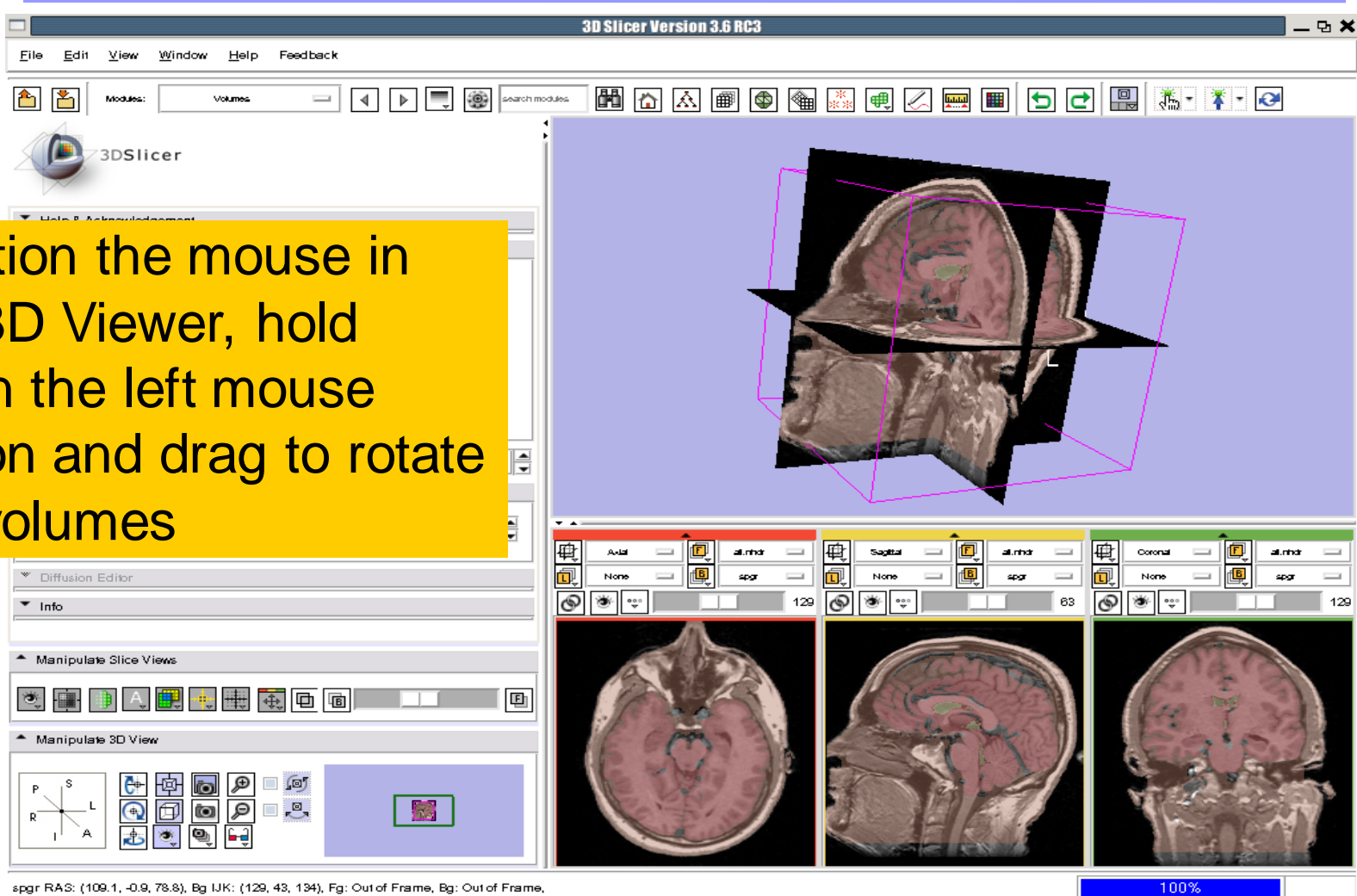
Click on the **Slice Visibility** icon to display the slices in the 3D Viewer

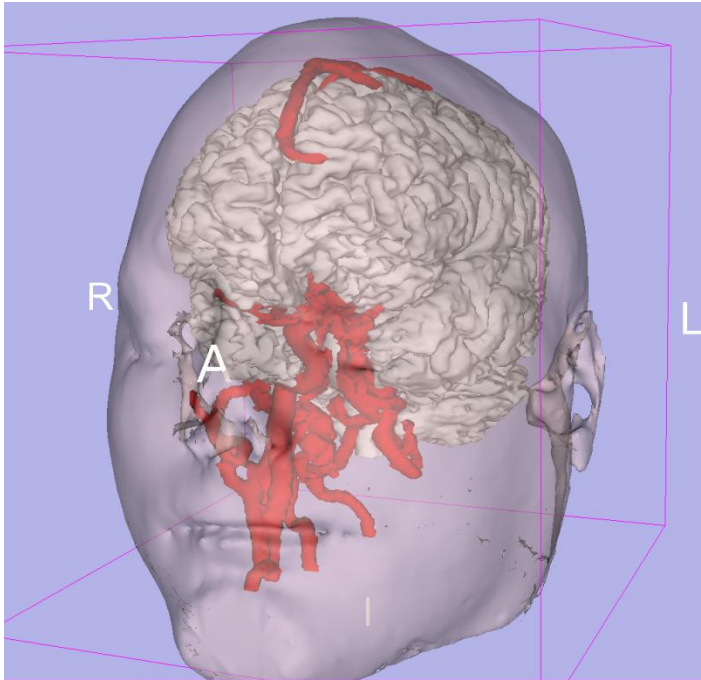




Slicer displays 2D anatomical slices in the 3D viewer

Position the mouse in the 3D Viewer, hold down the left mouse button and drag to rotate the volumes

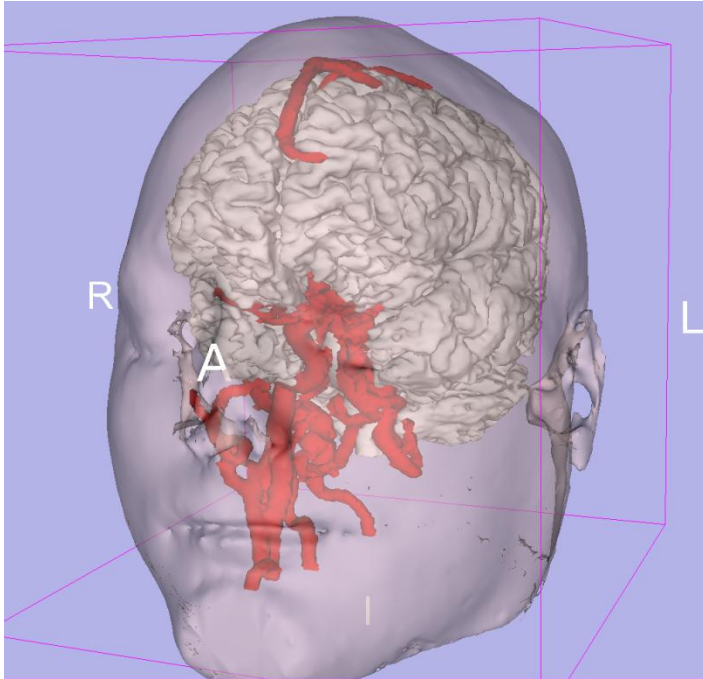




Part 3: Loading and visualizing 3D models of the anatomy

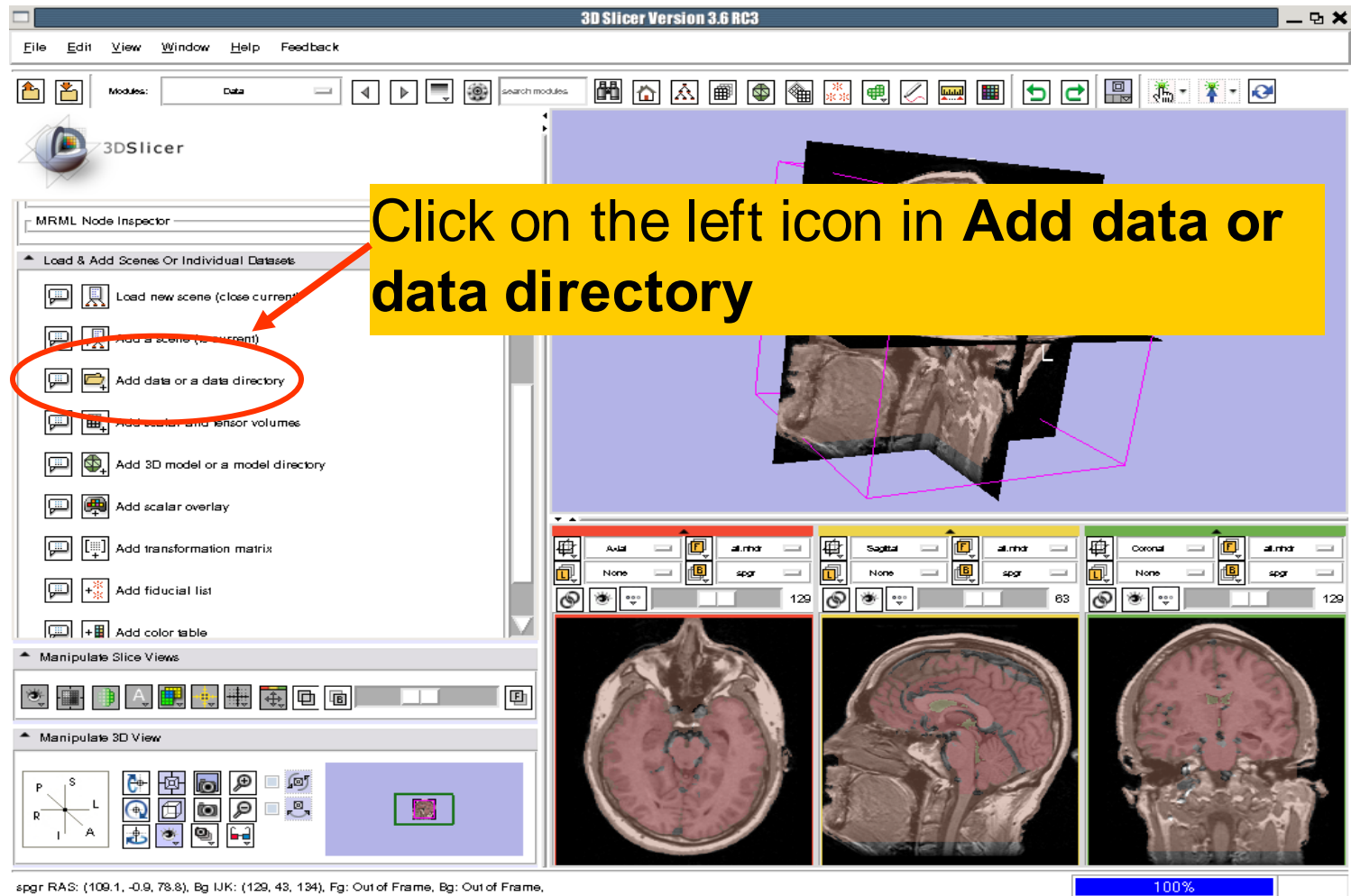
3D models

A **3D model** is a surface reconstruction of an anatomical structure.



The model is a **triangular mesh** that approximates a surface from a 3D label map.

The scalar values for surface models are integers which correspond to the **label** that had been assigned in the segmentation process.



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Data

MRML Node Inspector

Load & Add Scenes Or Individual Datasets

- Load new scene (close current)
- Add a scene (no current)
- Add data or a data directory**
- Add scalar and tensor volumes
- Add 3D model or a model directory
- Add scalar overlay
- Add transformation matrix
- Add fiducial list
- Add color table

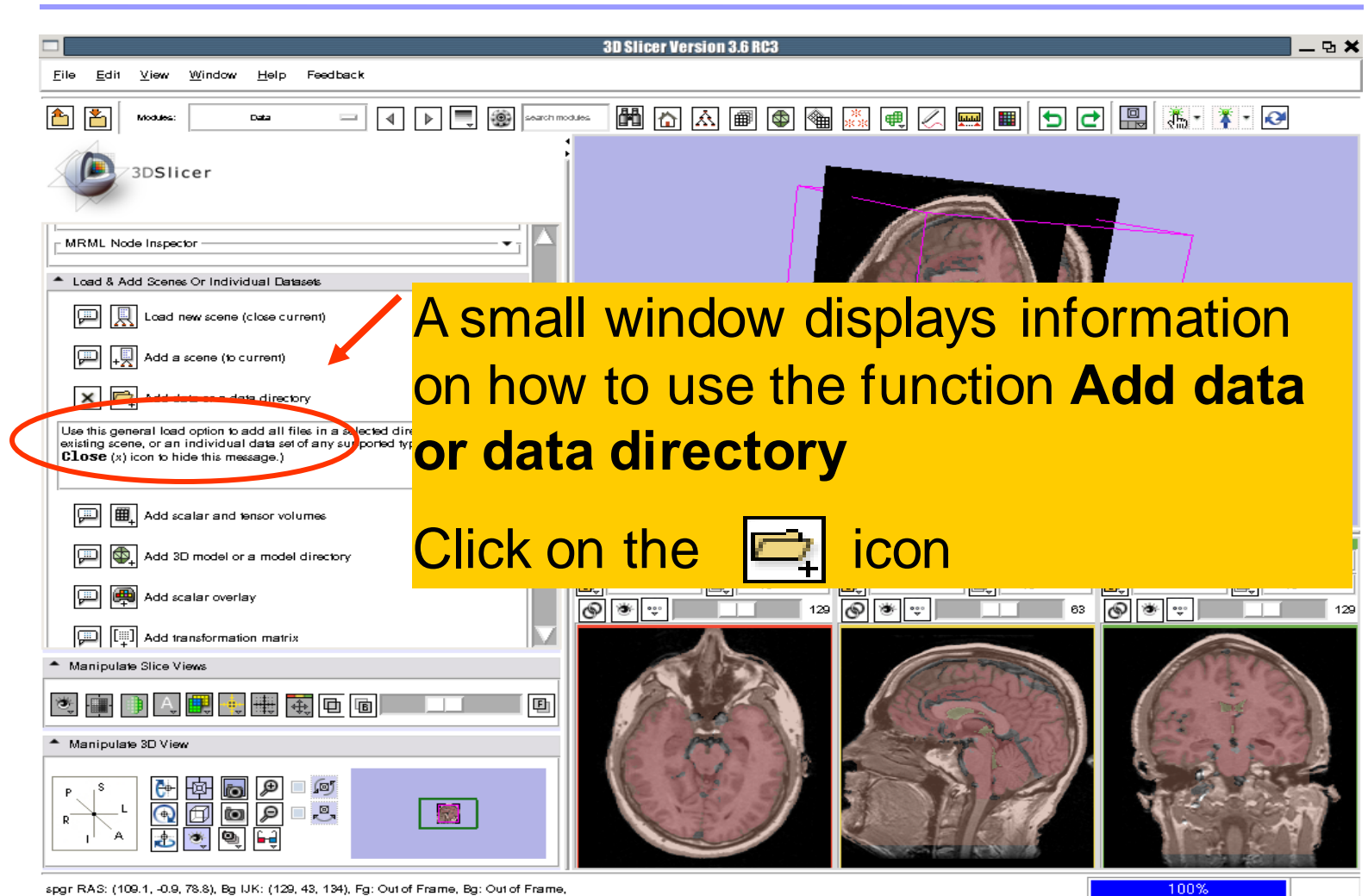
Manipulate Slice Views

Manipulate 3D View

spgr RAS: (109.1, -0.9, 78.8), Bg IJK: (129, 43, 134), Fg: Out of Frame, Bg: Out of Frame

100%

Click on the left icon in Add data or data directory



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Data

MRML Node Inspector

Load & Add Scenes Or Individual Datasets

- Load new scene (close current)
- Add a scene (to current)
- Add data or data directory**

Use this general load option to add all files in a selected directory to an existing scene, or an individual data set of any supported type. **Close** (x) icon to hide this message.)

Add scalar and tensor volumes

Add 3D model or a model directory

Add scalar overlay

Add transformation matrix


Manipulate Slice Views

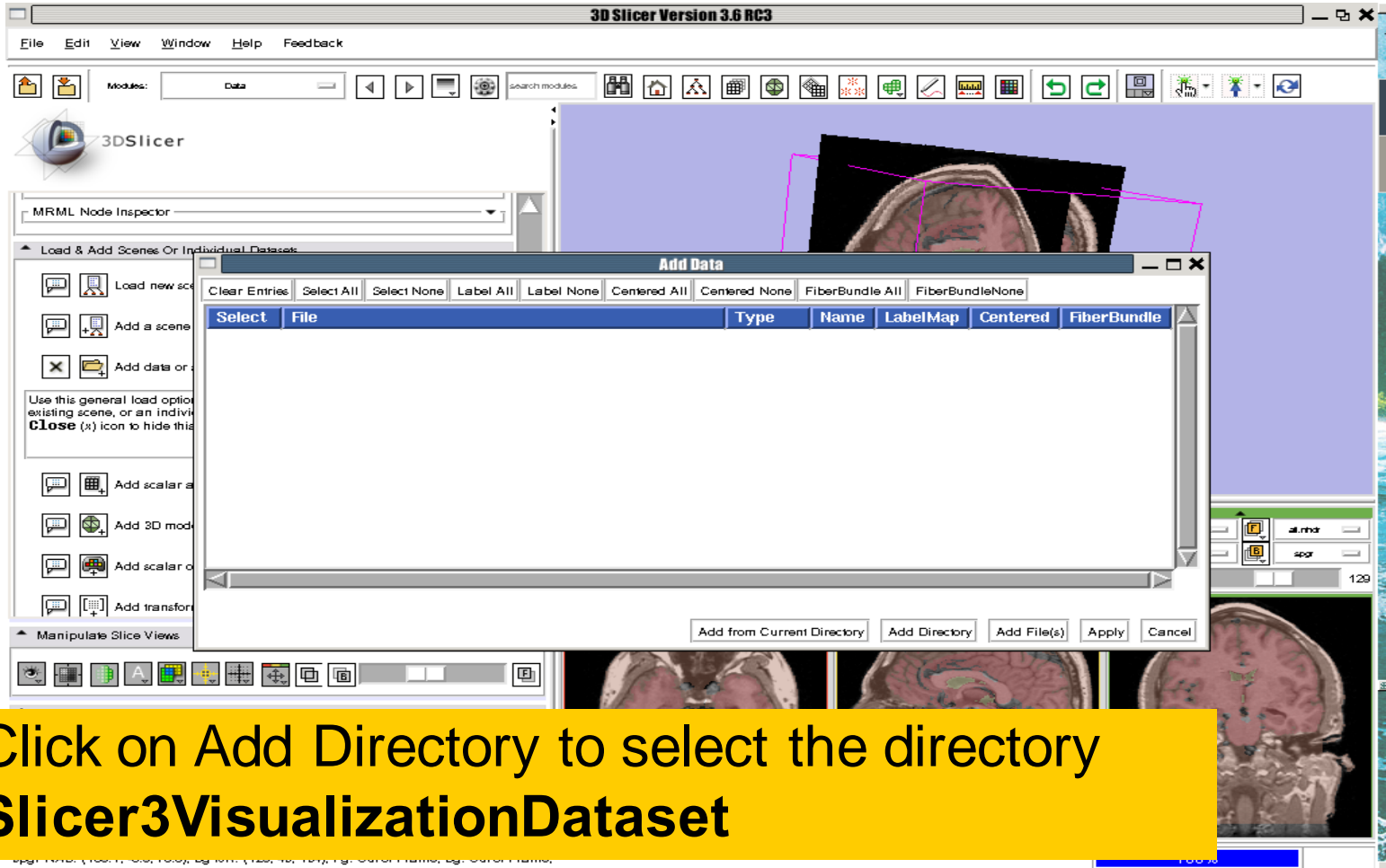
Manipulate 3D View

spgr RAS: (109.1, -0.9, 78.8), Bg IJK: (129, 43, 134), Fg: Out of Frame, Bg: Out of Frame.

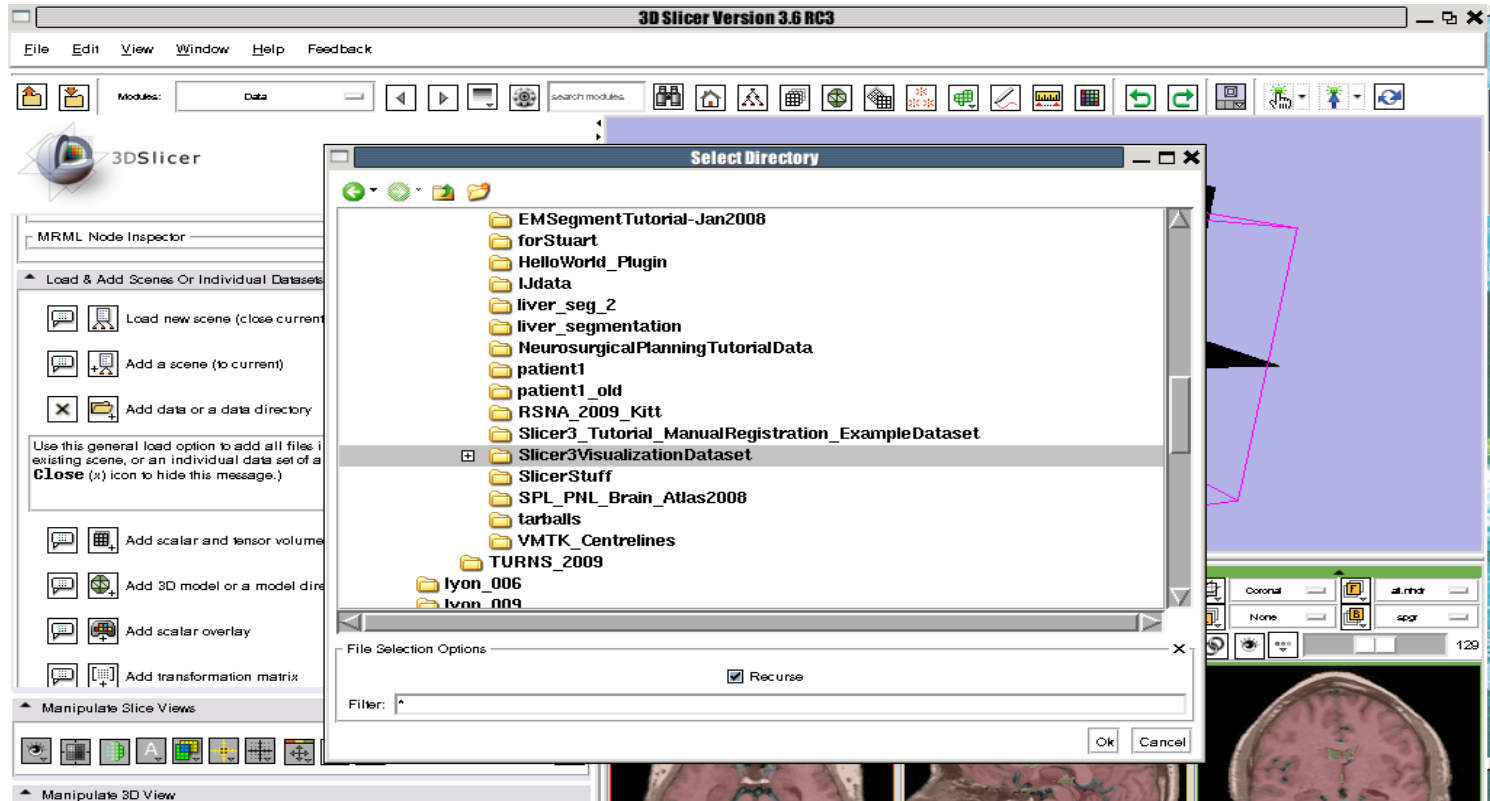
100%

A small window displays information on how to use the function **Add data or data directory**

Click on the  icon

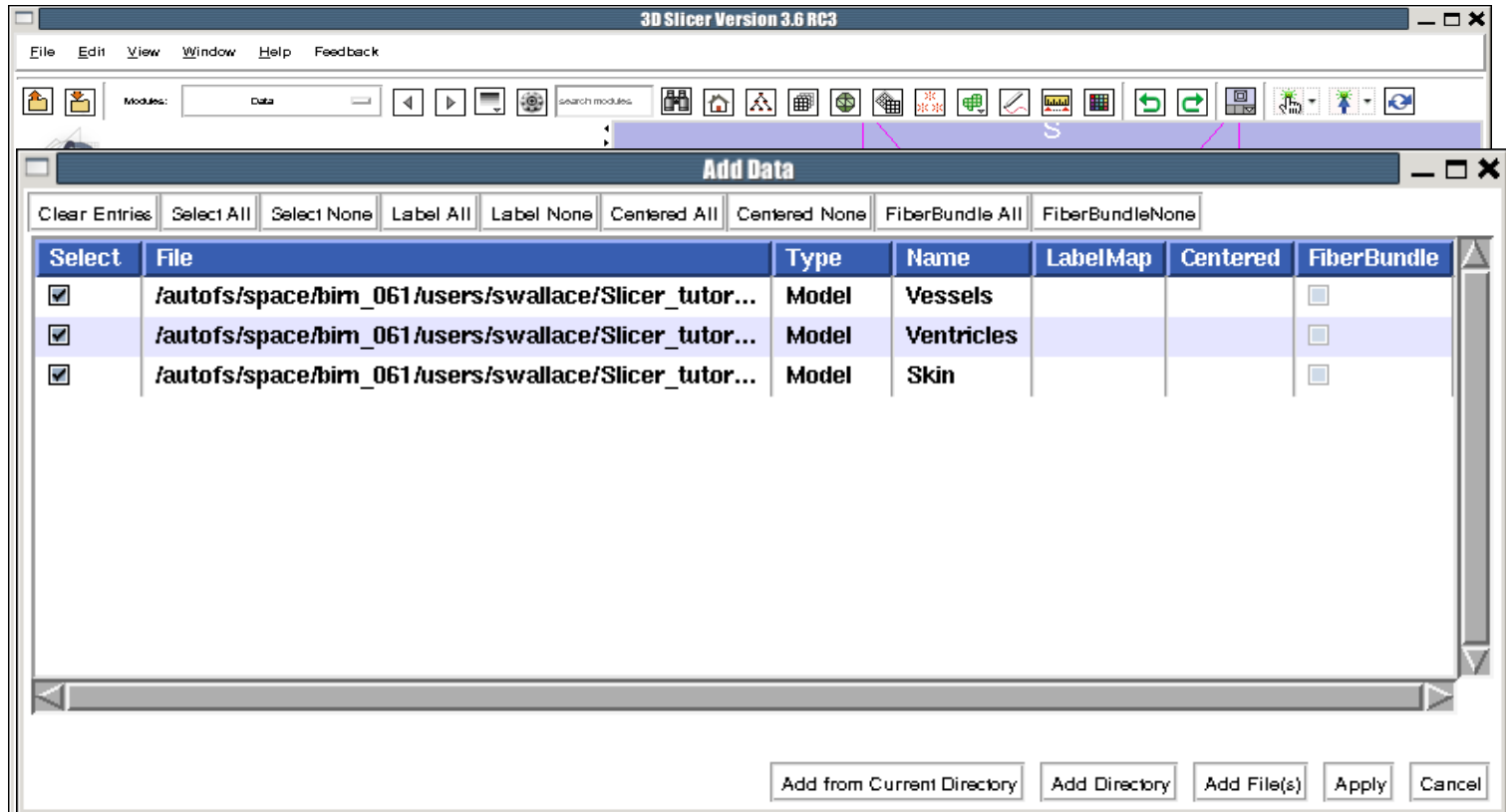


Loading 3D models



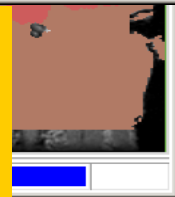
Select the directory **Slicer3VisualizationDataset/models** and click on OK

Loading 3D models

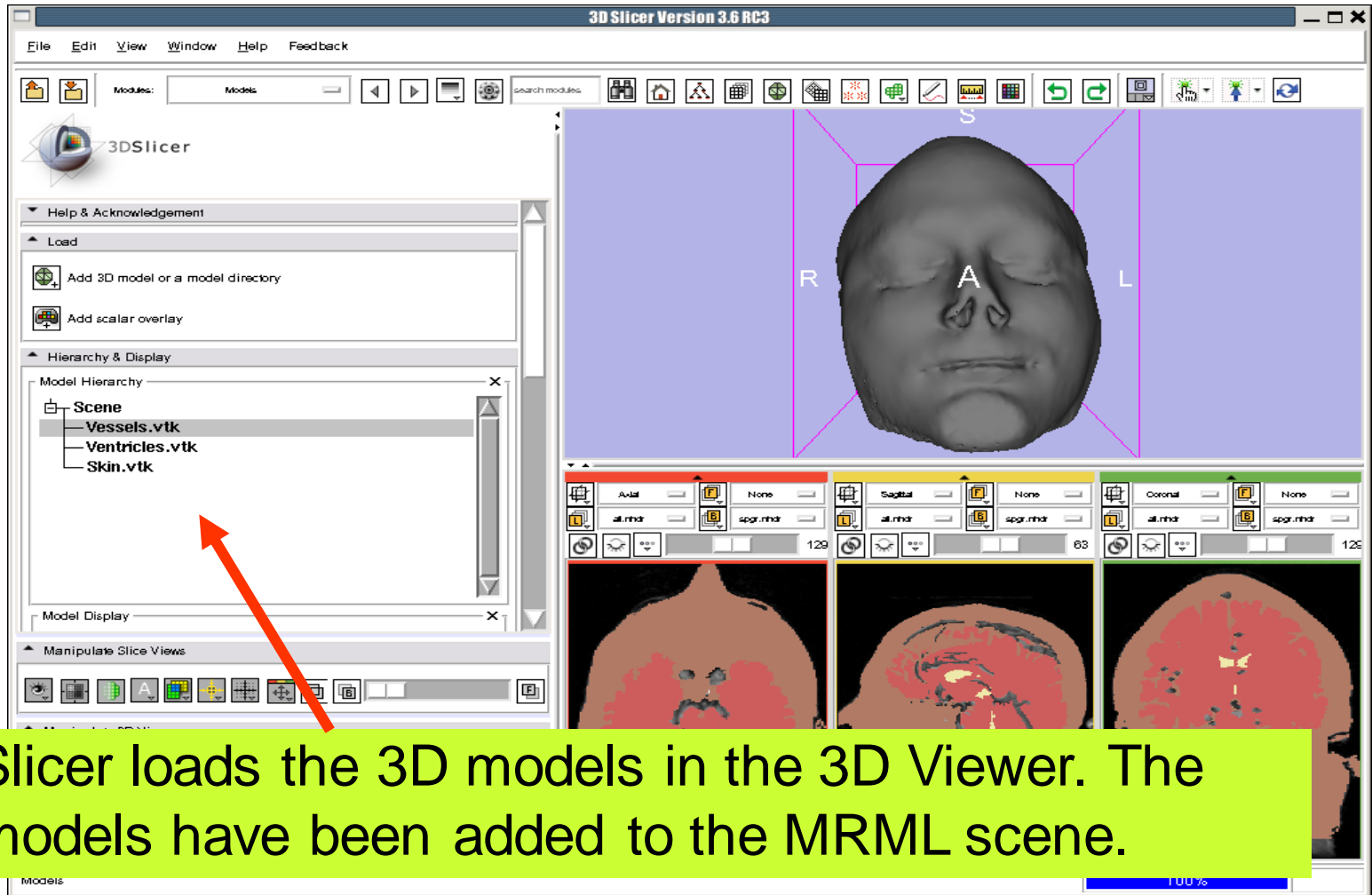


The list of elements present in the models directory appears in the Add Data window.

Click on **Apply** to load all the **3D models**.

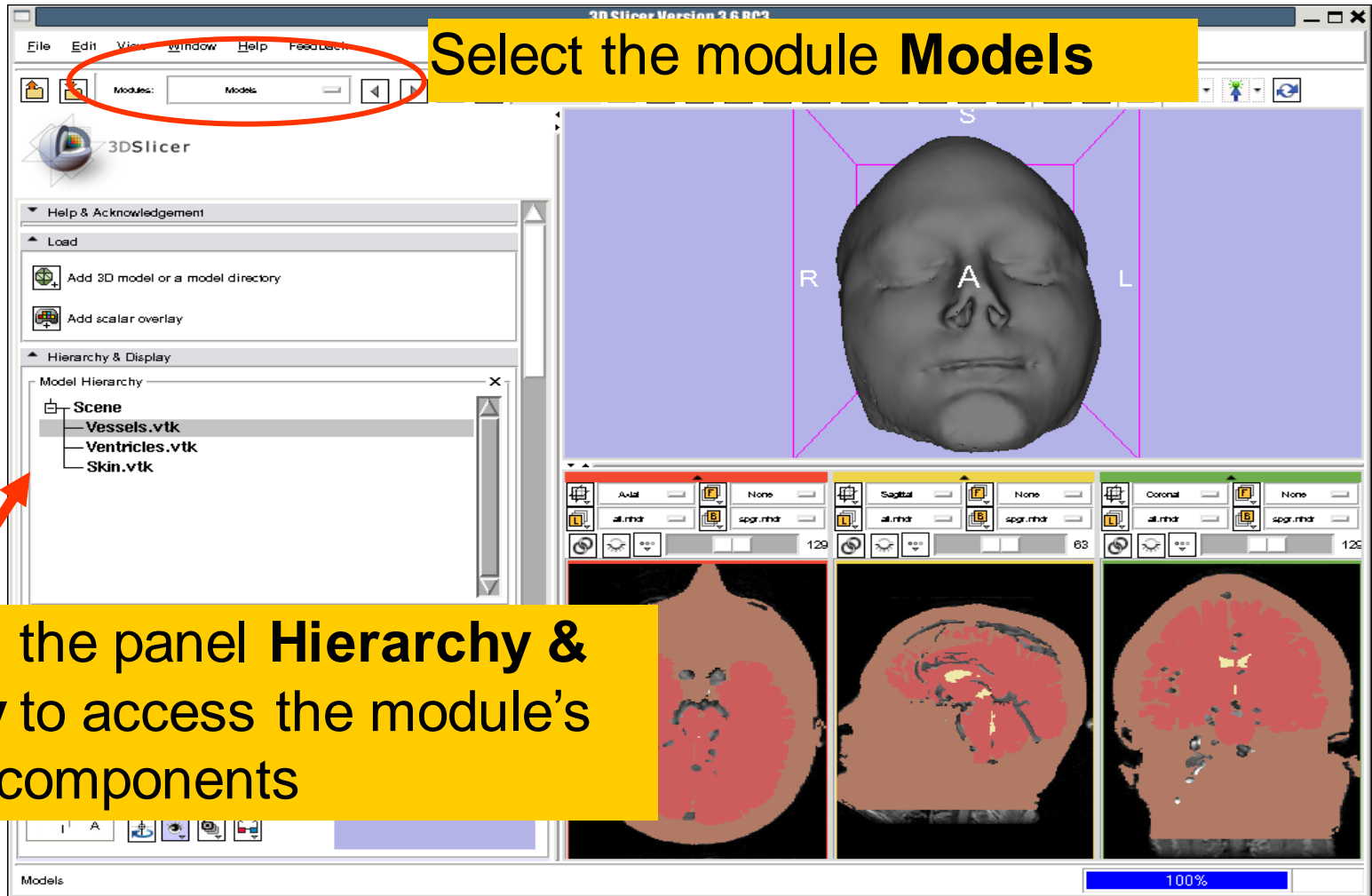


Loading 3D models



Slicer loads the 3D models in the 3D Viewer. The models have been added to the MRML scene.

Loading a 3D model



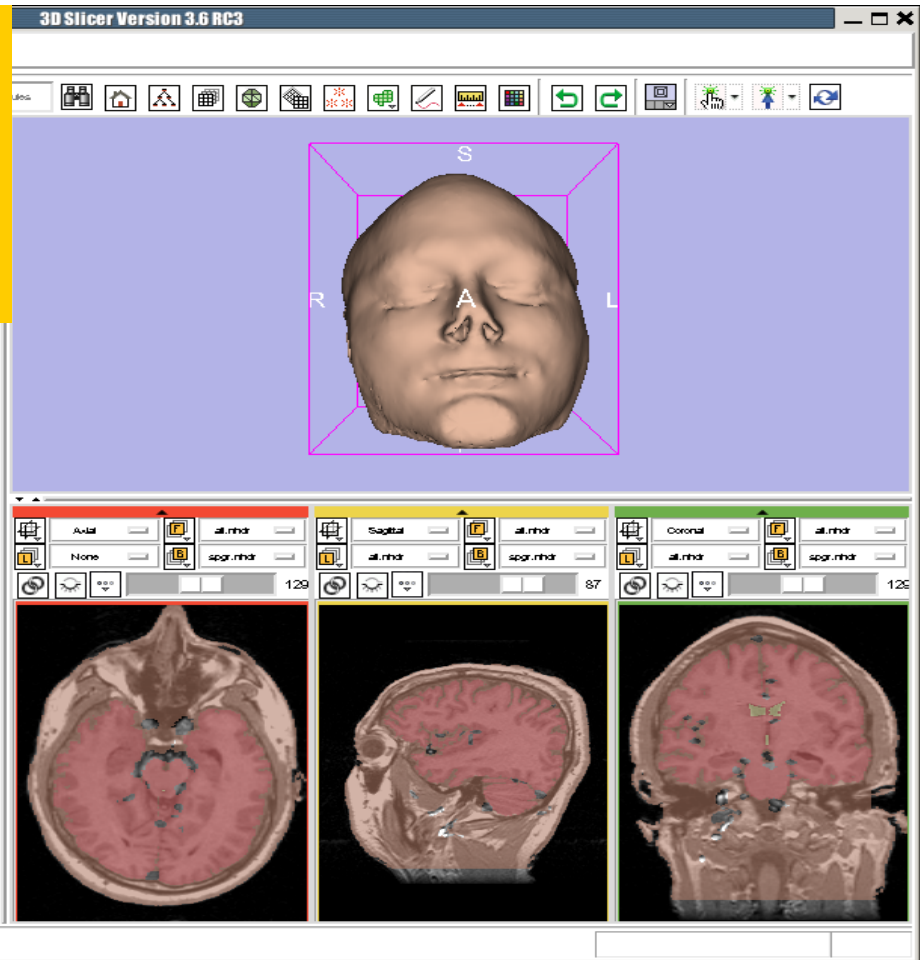
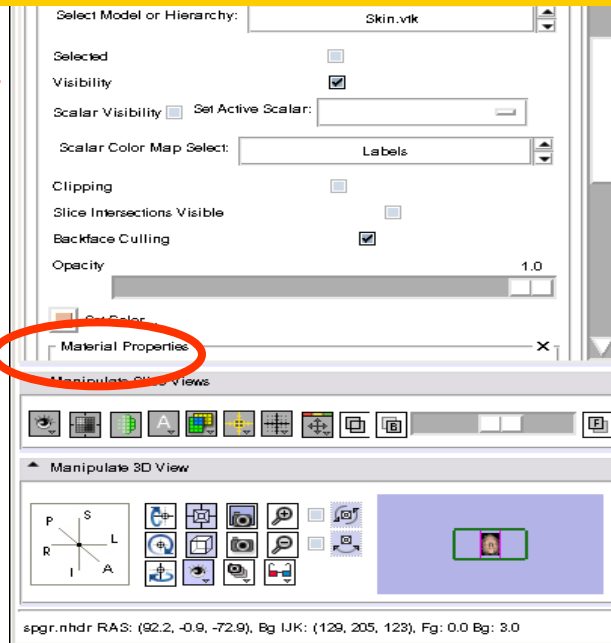
The screenshot shows the 3DSlicer interface. At the top, the menu bar includes File, Edit, View, Window, Help, and Feedback. Below the menu bar is a toolbar with a 'Modules' dropdown menu set to 'Models', which is circled in red. A yellow callout box with the text 'Select the module Models' points to this dropdown. On the left side, there is a 'Hierarchy & Display' panel with a tree view showing 'Scene' expanded to include 'Vessels.vtk', 'Ventricles.vtk', and 'Skin.vtk'. A red arrow points from a yellow callout box to this panel. The main 3D view shows a grayscale 3D model of a human face with anatomical labels 'R' (Right), 'A' (Anterior), and 'L' (Left). Below the 3D view are three orthogonal viewports (Axial, Sagittal, Coronal) showing the face model overlaid on a red-tinted medical scan. At the bottom, there is a 'Models' panel with a '100%' zoom indicator.

Select the module **Models**

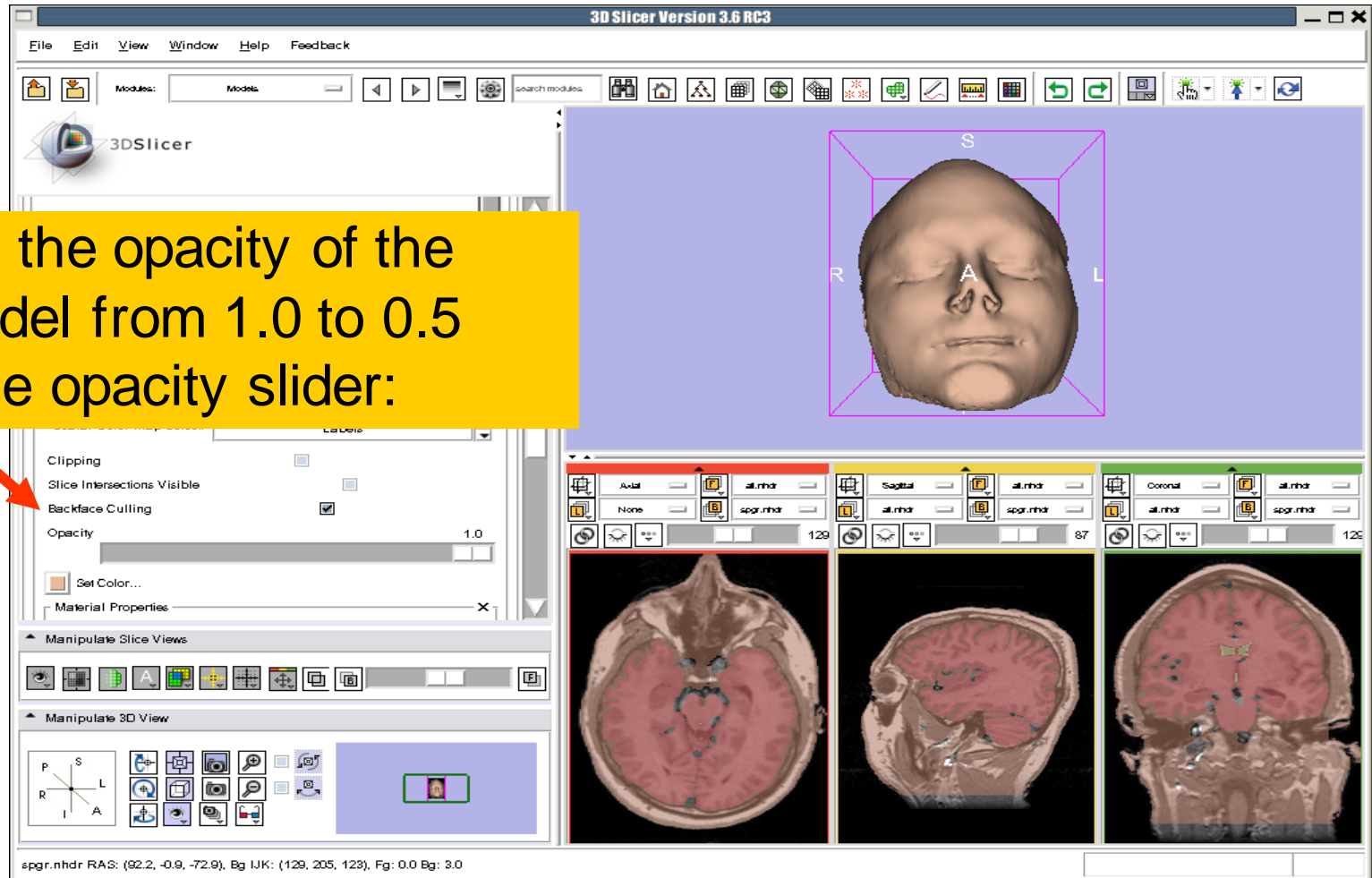
Click on the panel **Hierarchy & Display** to access the module's display components

Visualizing a 3D model

Select the model **Skin.vtk**
Click on the icon **Set Color**
and choose a new color for
the 3D model of the head.

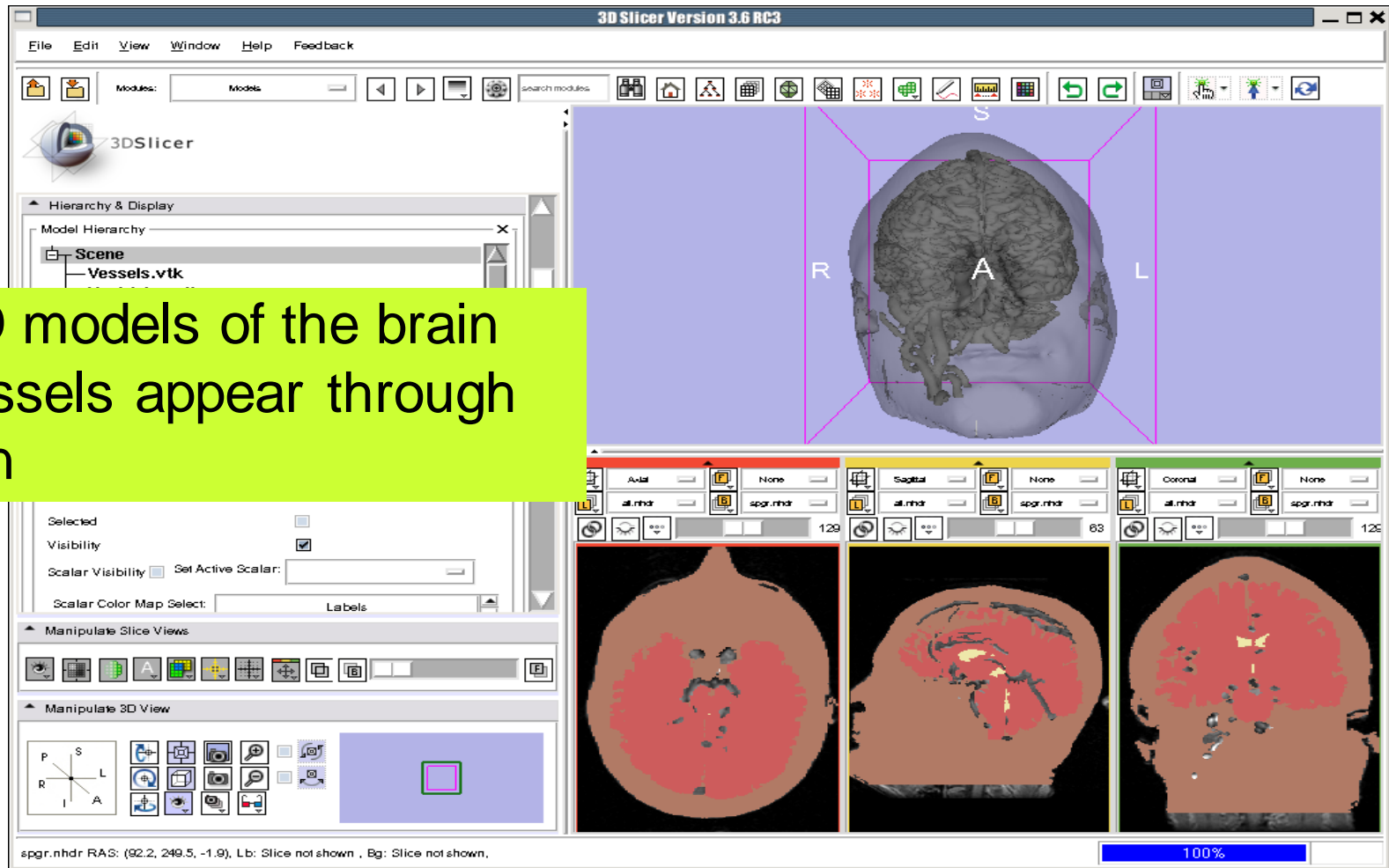


Visualizing a 3D model



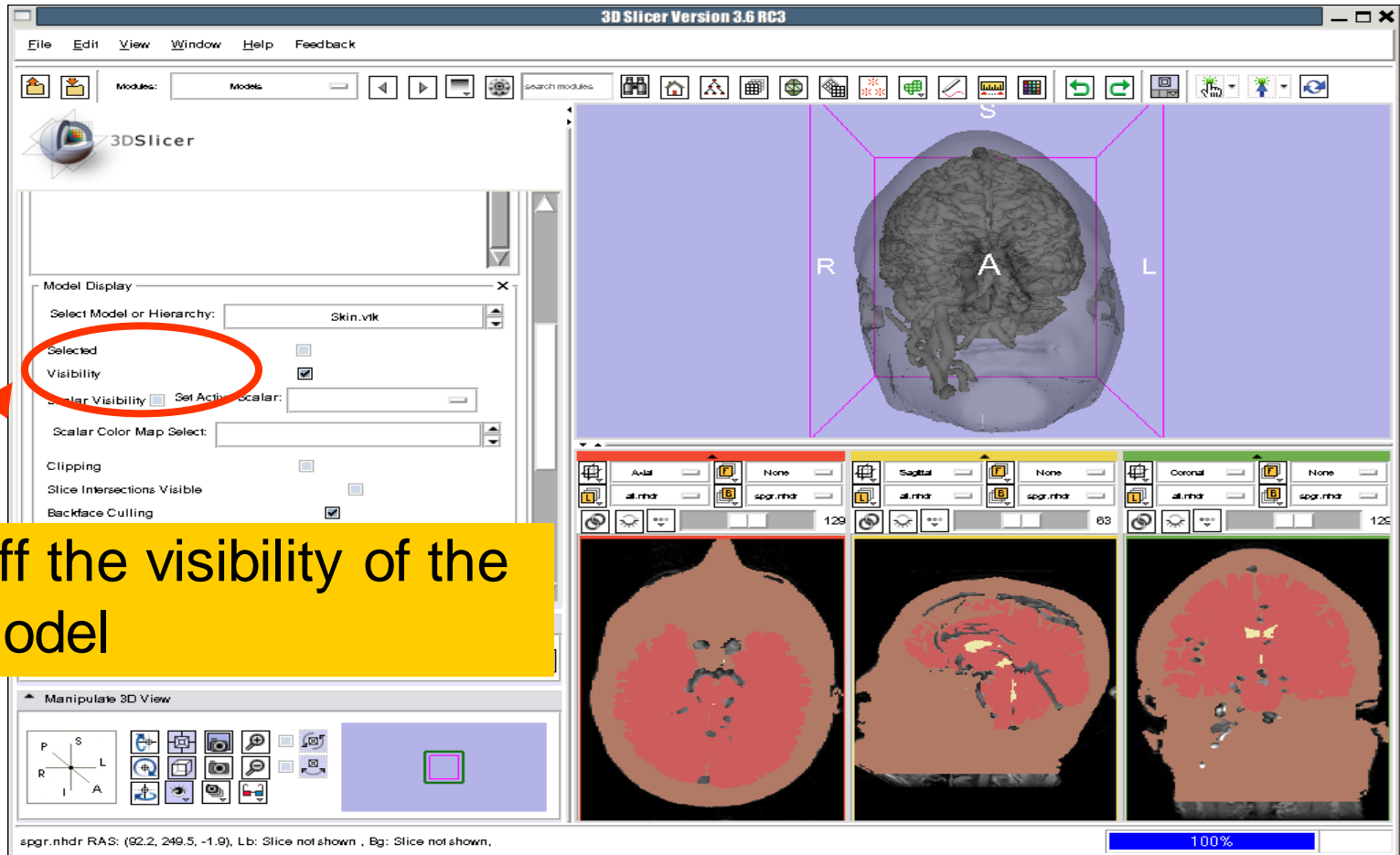
Change the opacity of the skin model from 1.0 to 0.5 using the opacity slider:

Visualizing a 3D model



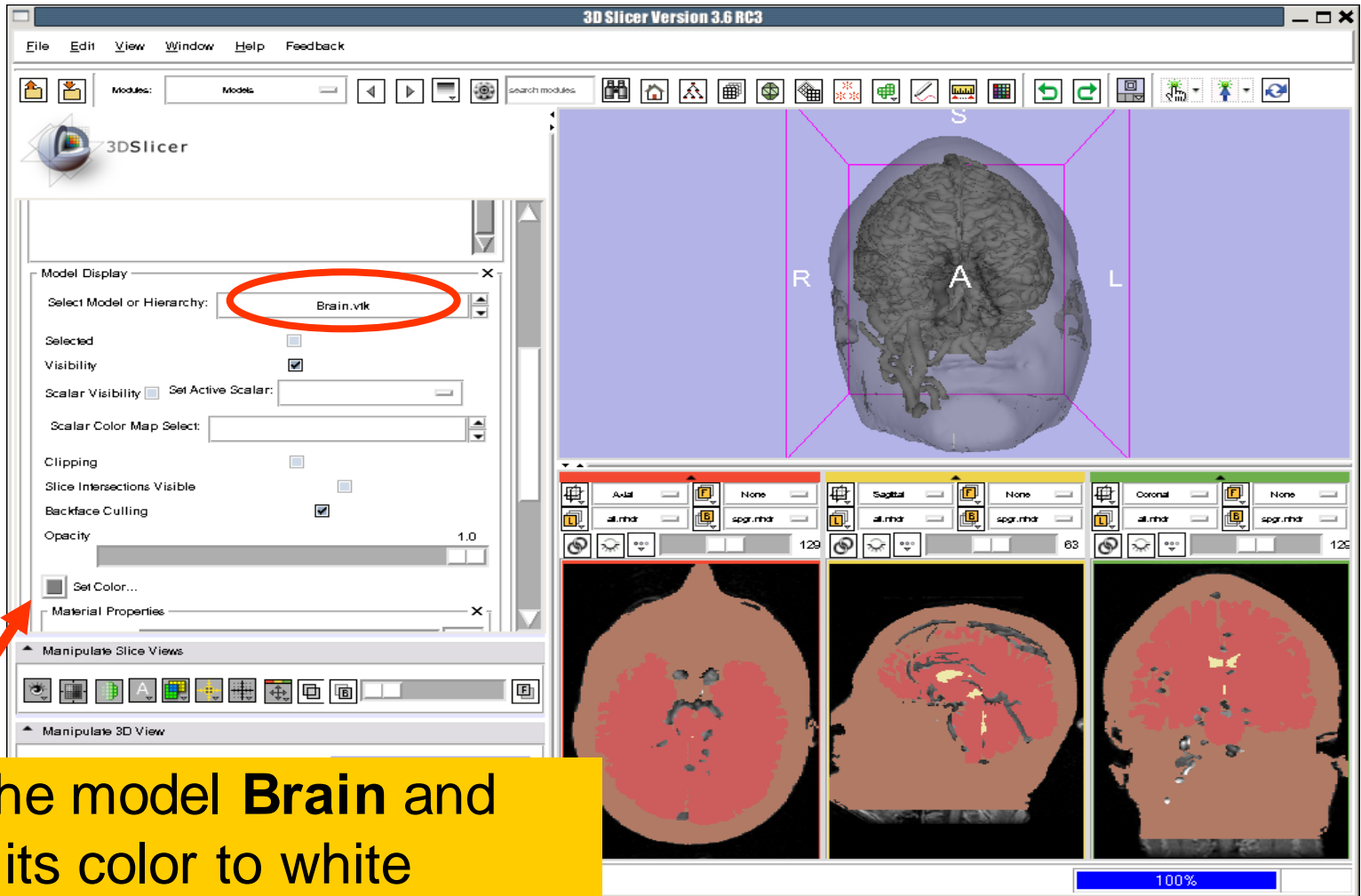
The 3D models of the brain and vessels appear through the skin

Visualizing a 3D model



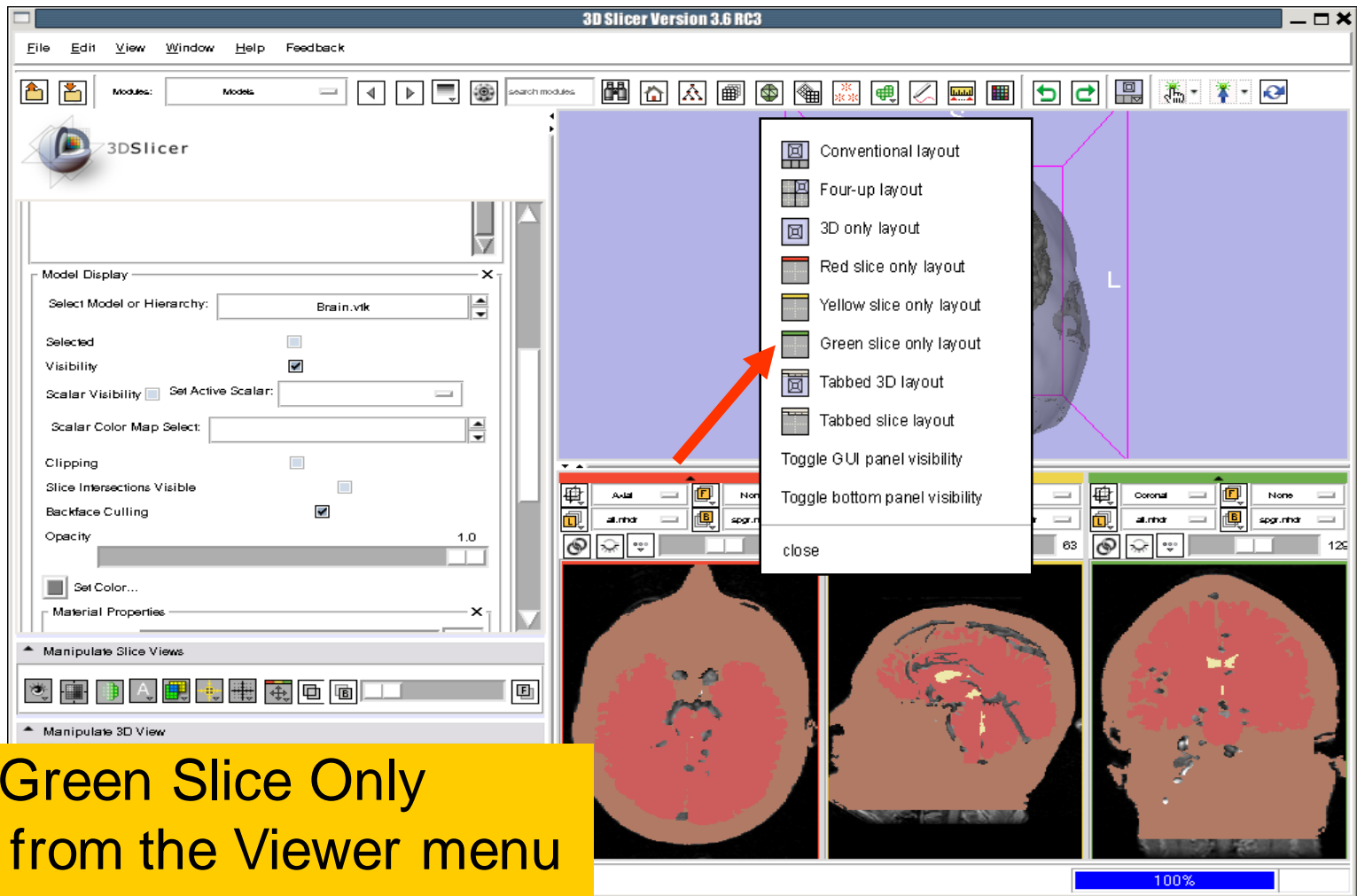
Turn off the visibility of the skin model

Visualizing a 3D model



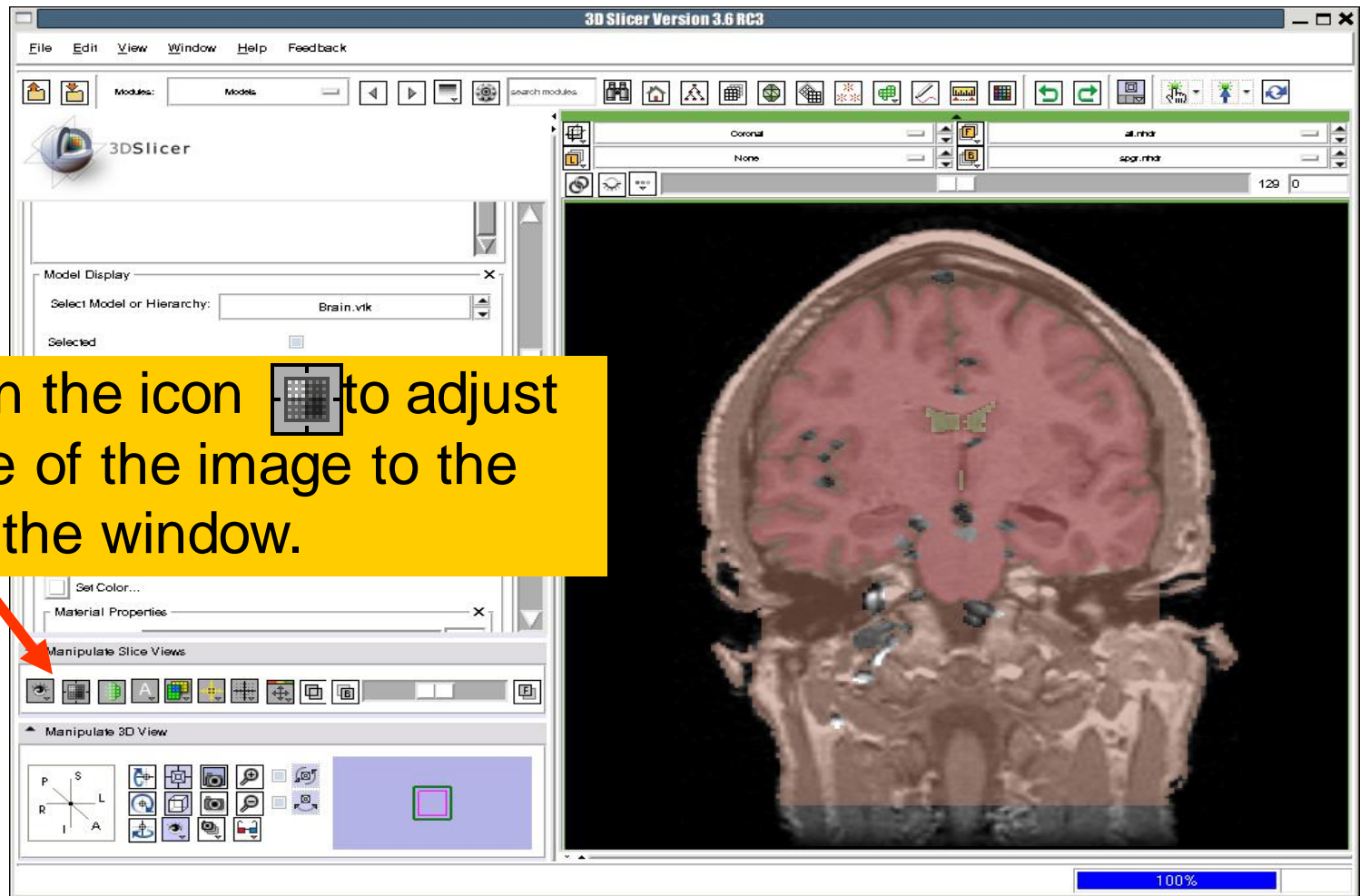
Select the model **Brain** and change its color to white

Visualizing a 3D model

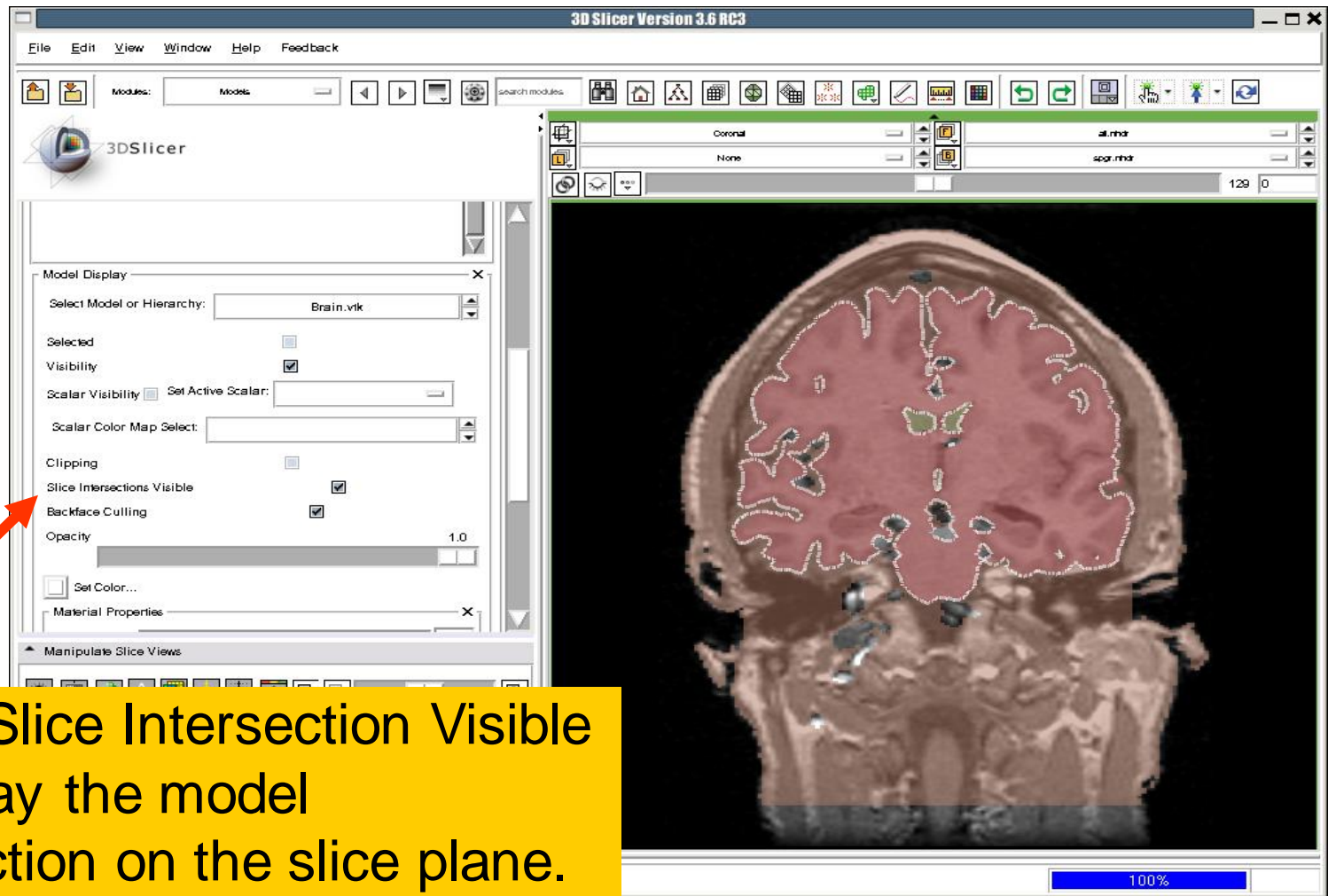


Select Green Slice Only
Layout from the Viewer menu

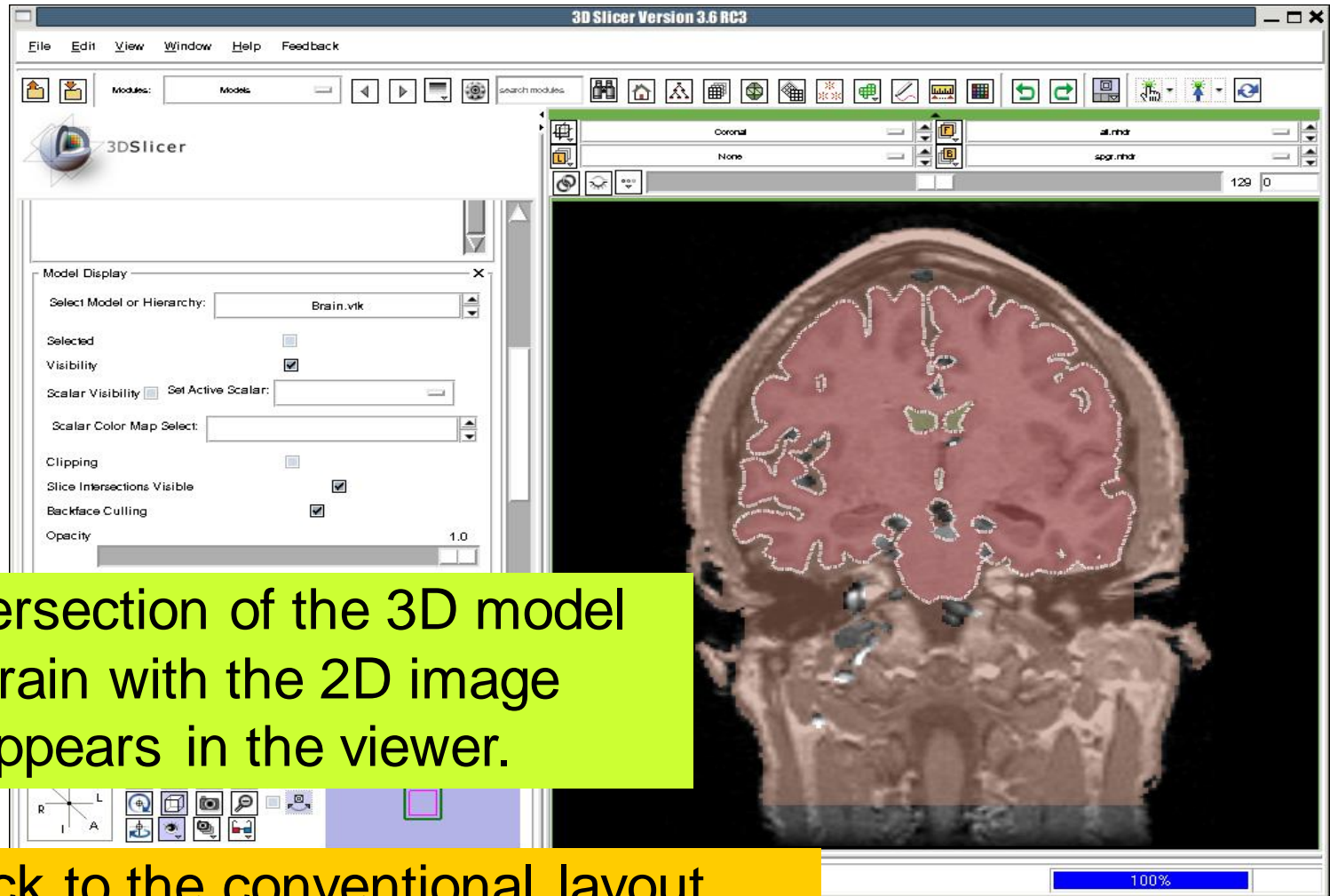
Visualizing a 3D model



Visualizing a 3D model



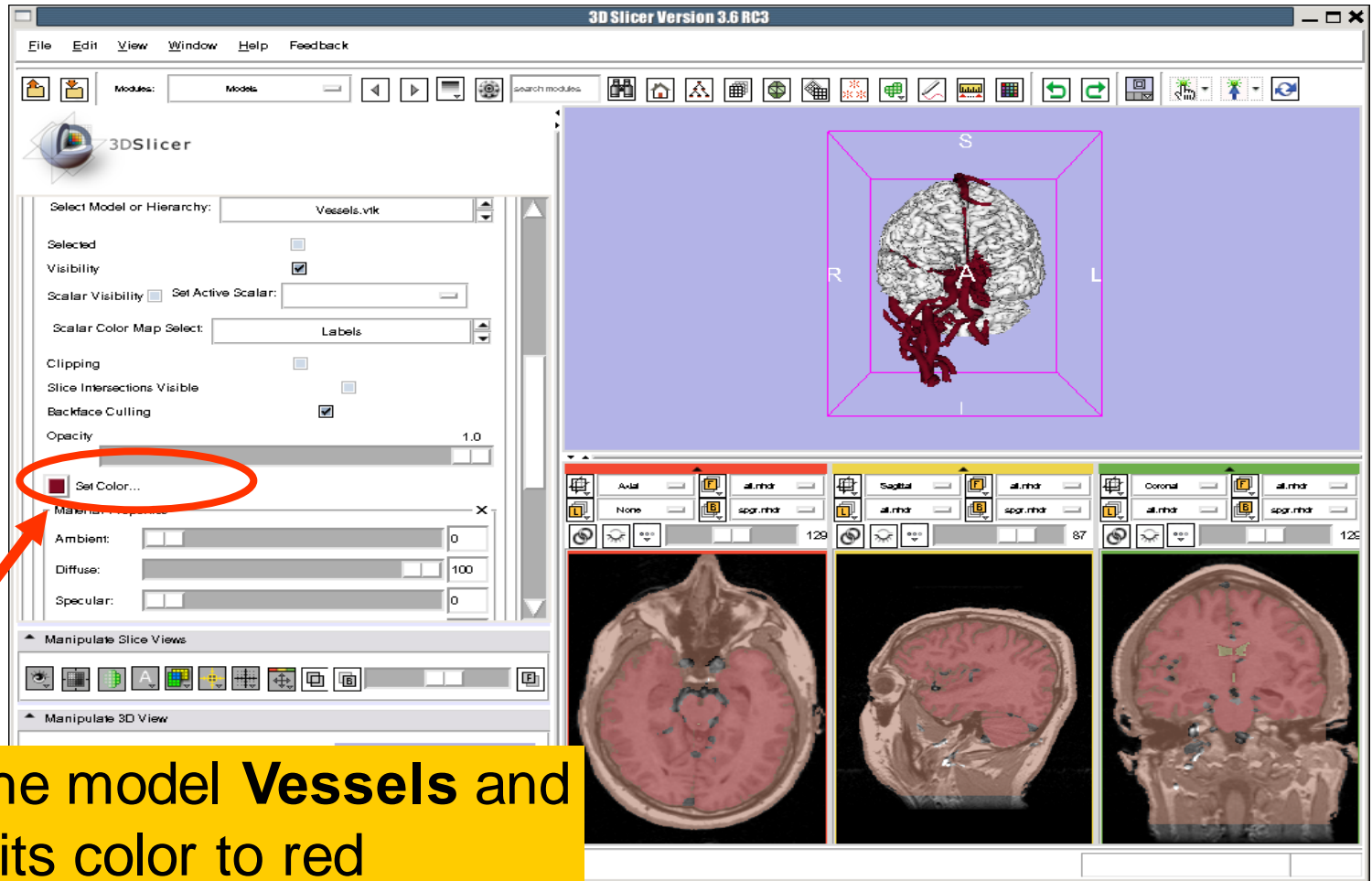
Visualizing a 3D model



The intersection of the 3D model of the brain with the 2D image plane appears in the viewer.

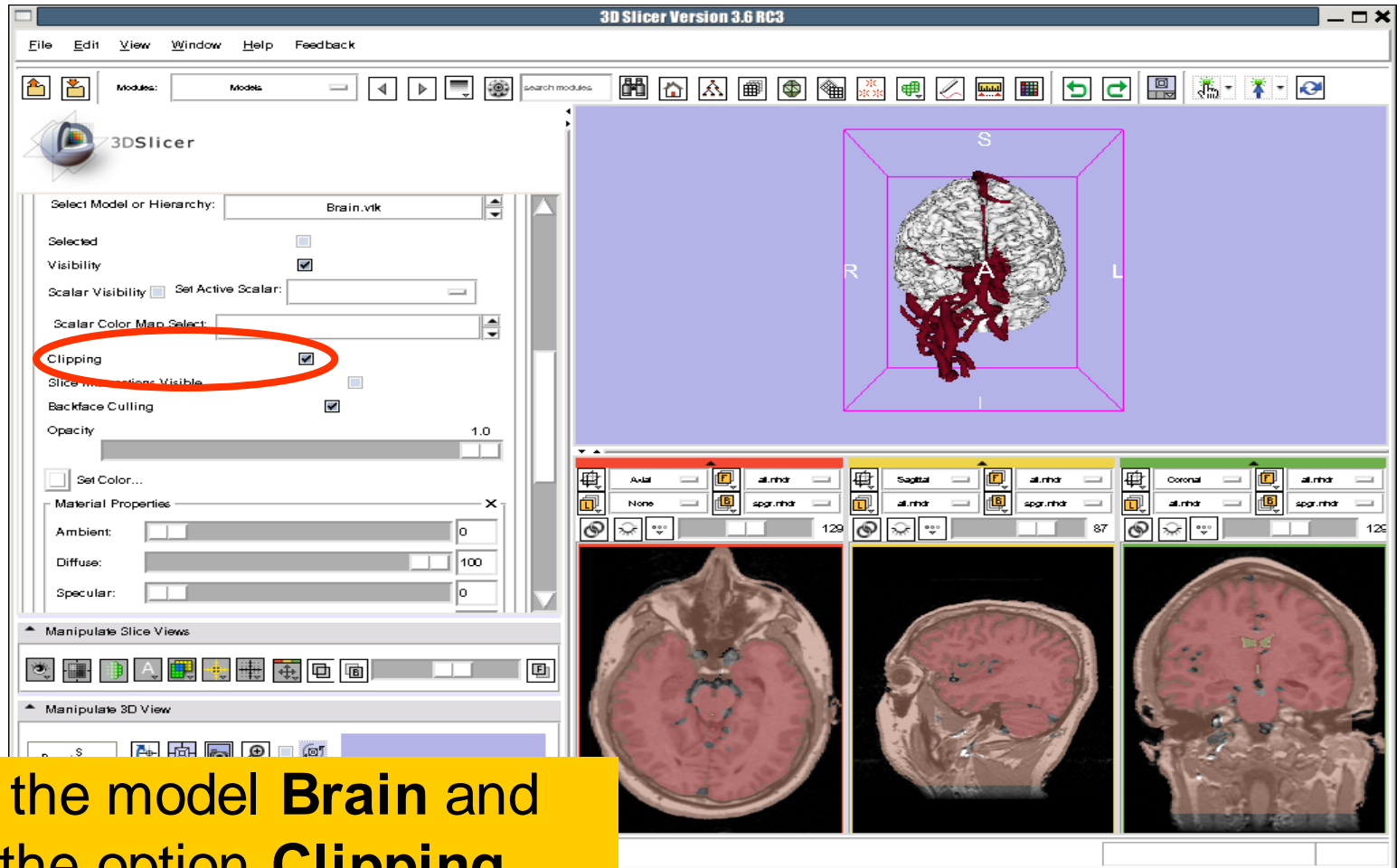
Go back to the conventional layout

Visualizing a 3D model

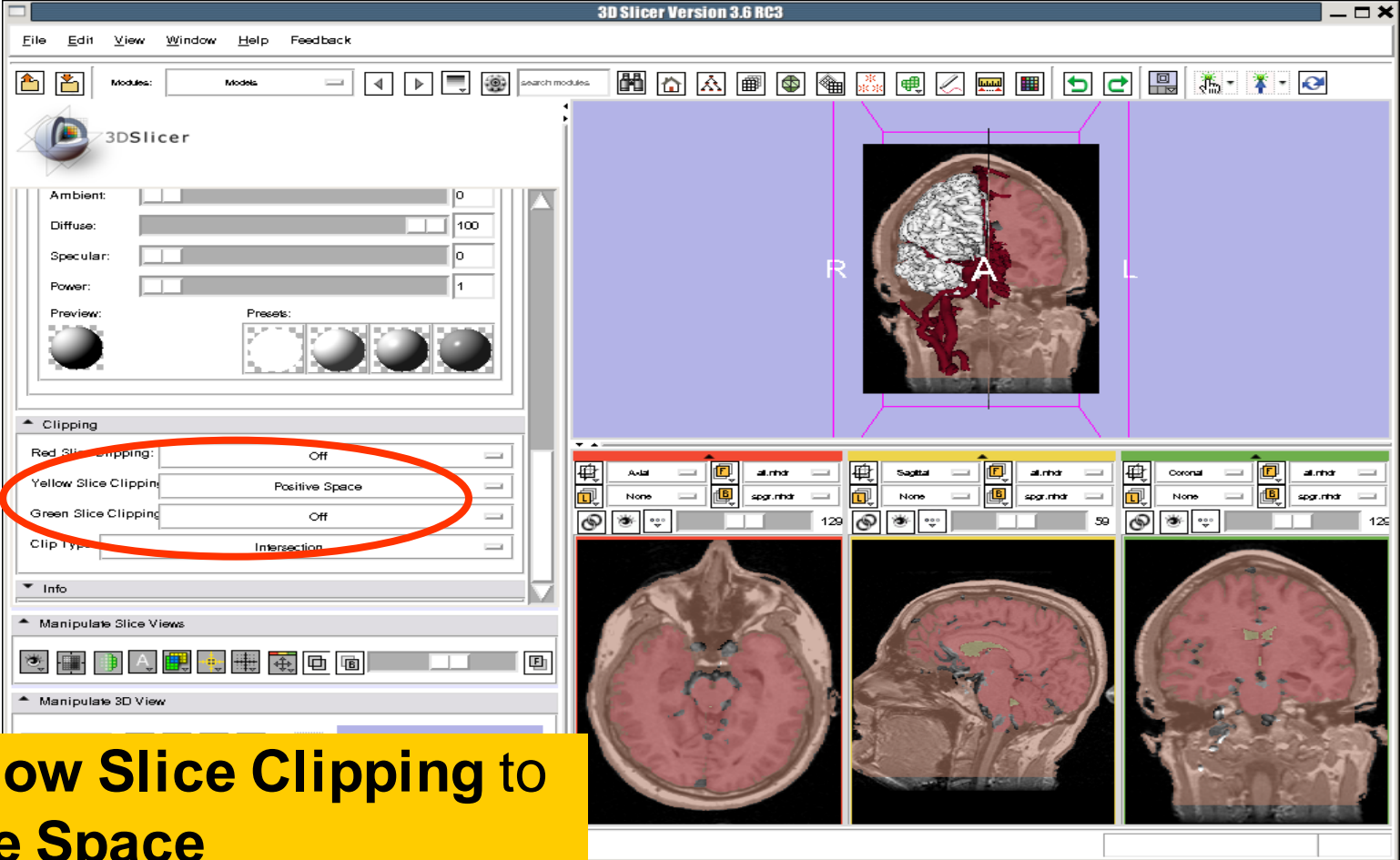


Select the model **Vessels** and change its color to red

Visualizing a 3D model



Visualizing a 3D model



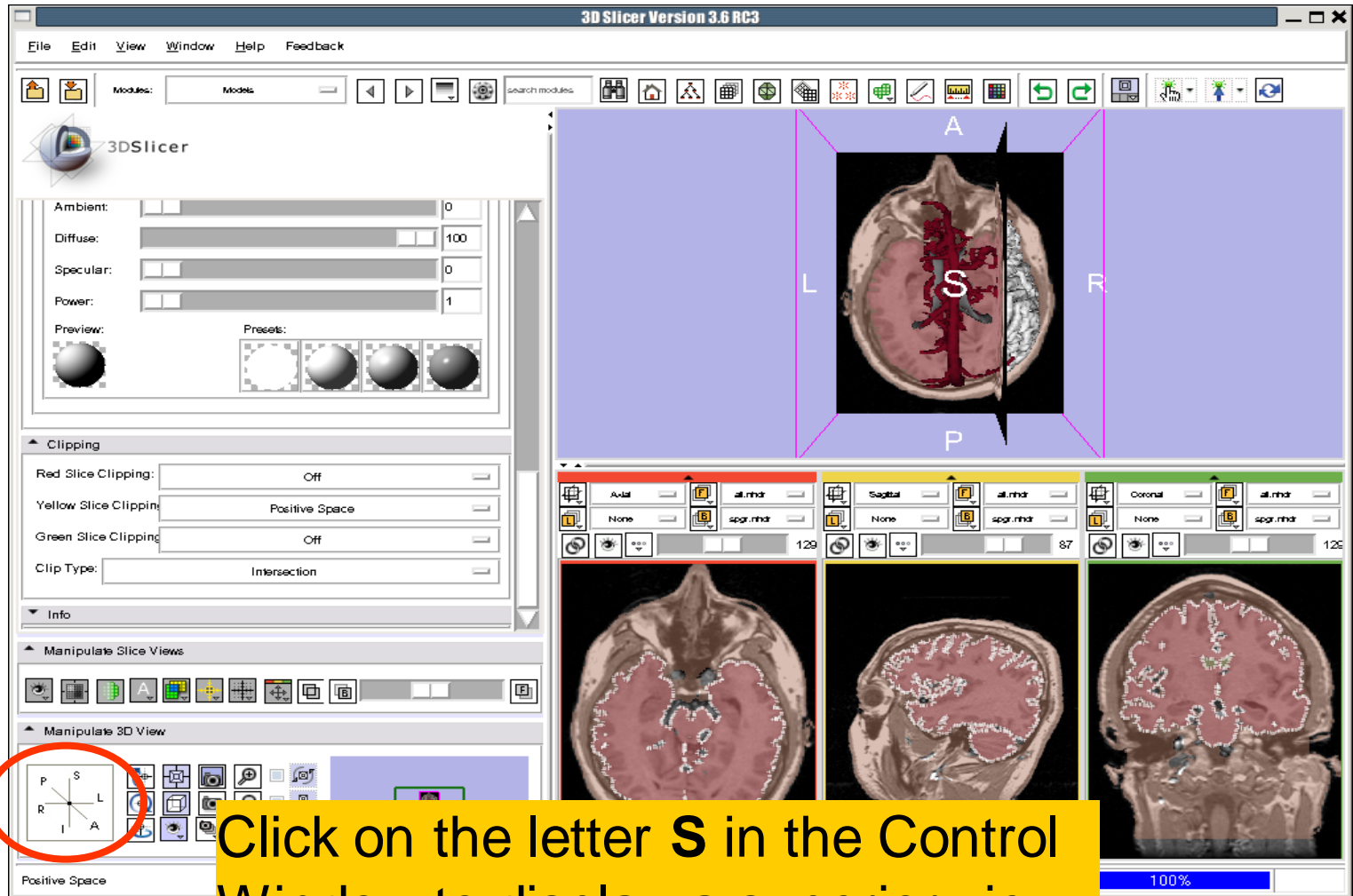
The screenshot shows the 3D Slicer software interface. The main window displays a 3D model of a brain with red vessels. The interface includes a menu bar (File, Edit, View, Window, Help, Feedback), a toolbar, and a sidebar with various settings. The 'Clipping' section is highlighted with a red circle, showing the following settings:

Clipping Type	Setting
Red Slice Clipping	Off
Yellow Slice Clipping	Positive Space
Green Slice Clipping	Off
Clip Type	Intersection

The bottom of the interface shows three slice views: Axial, Sagittal, and Coronal. The 'Yellow Slice Clipping' setting is highlighted in a yellow box.

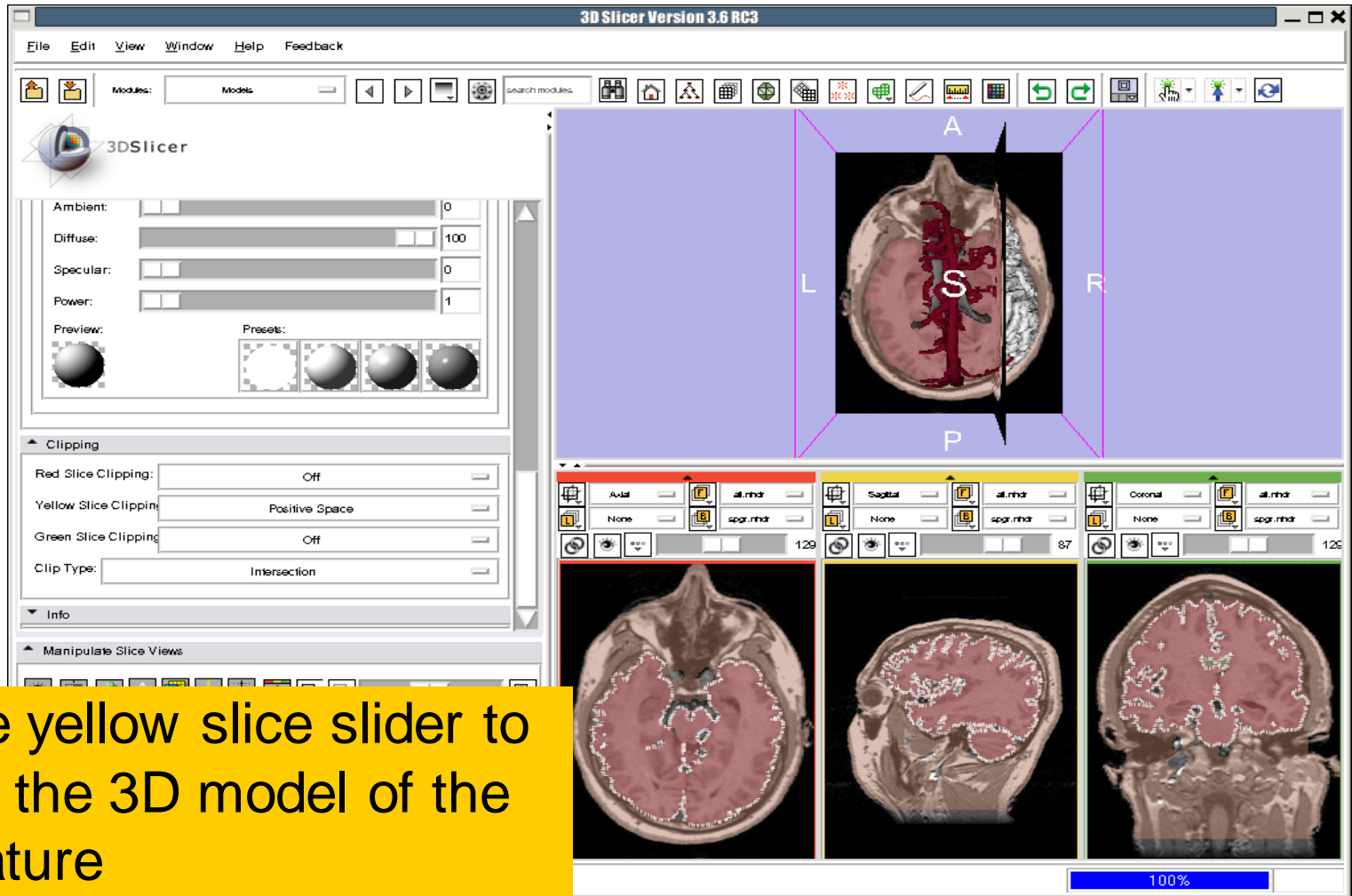
Set Yellow Slice Clipping to Positive Space

Visualizing a 3D model

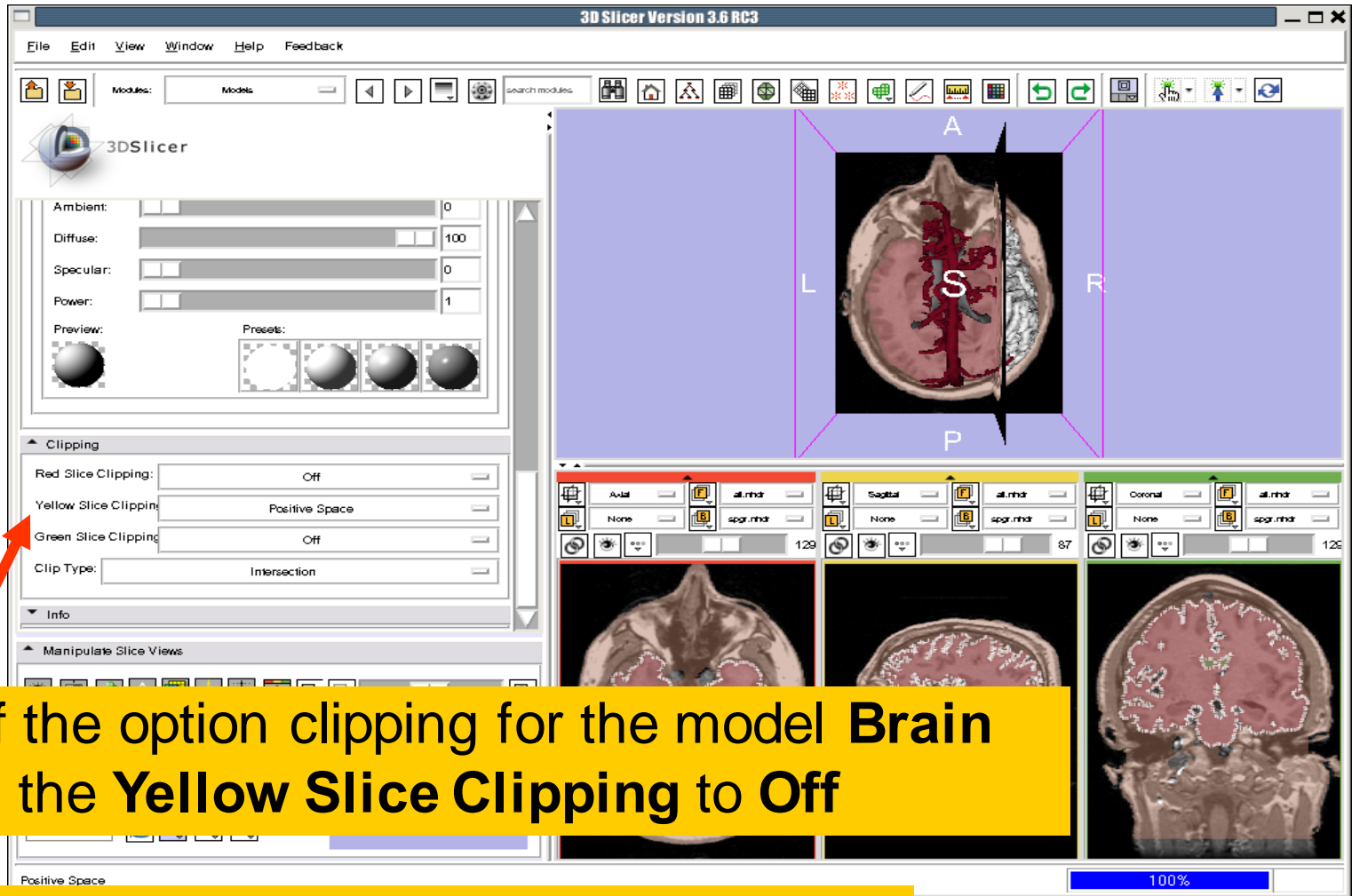


Click on the letter **S** in the Control Window to display a superior view of the 3D models

Visualizing a 3D model



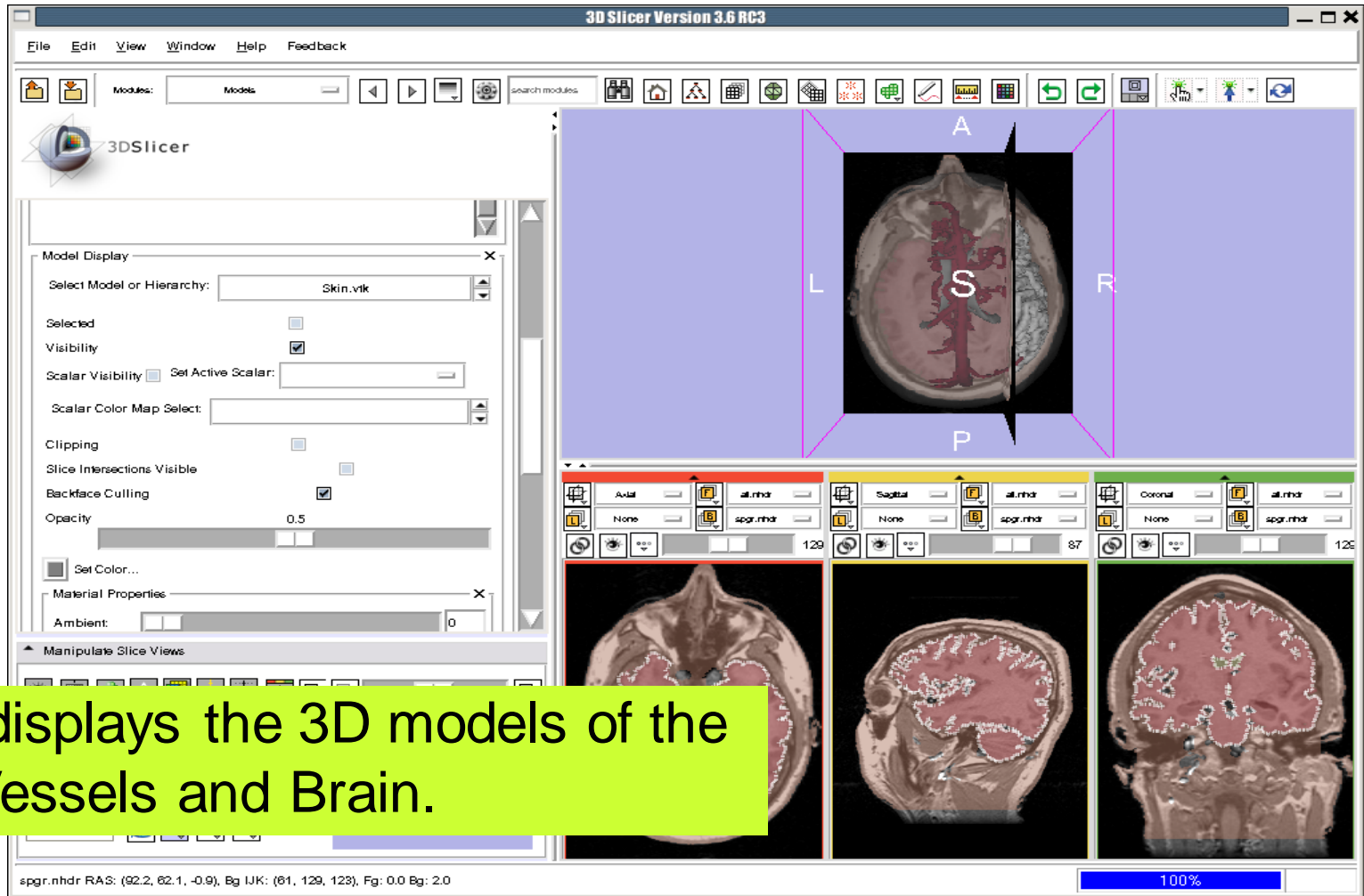
Visualizing a 3D model



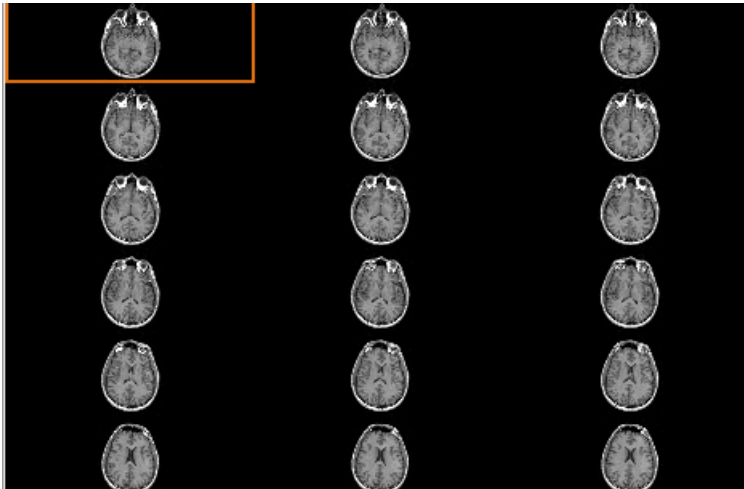
Turn off the option clipping for the model **Brain** and set the **Yellow Slice Clipping** to **Off**

Turn on the visibility of the model **Skin**

Visualizing a 3D model

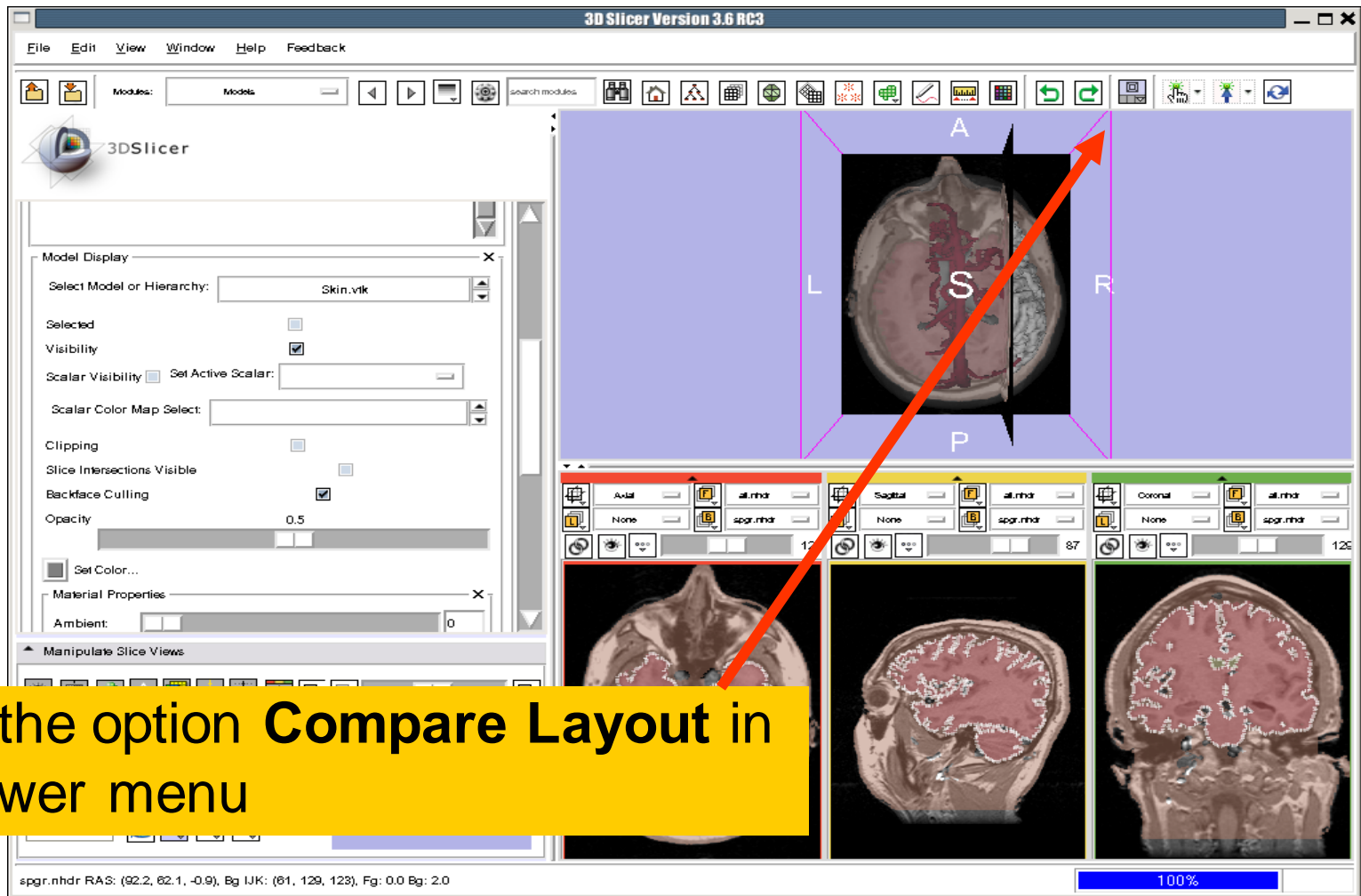


Slicer displays the 3D models of the Skin, Vessels and Brain.

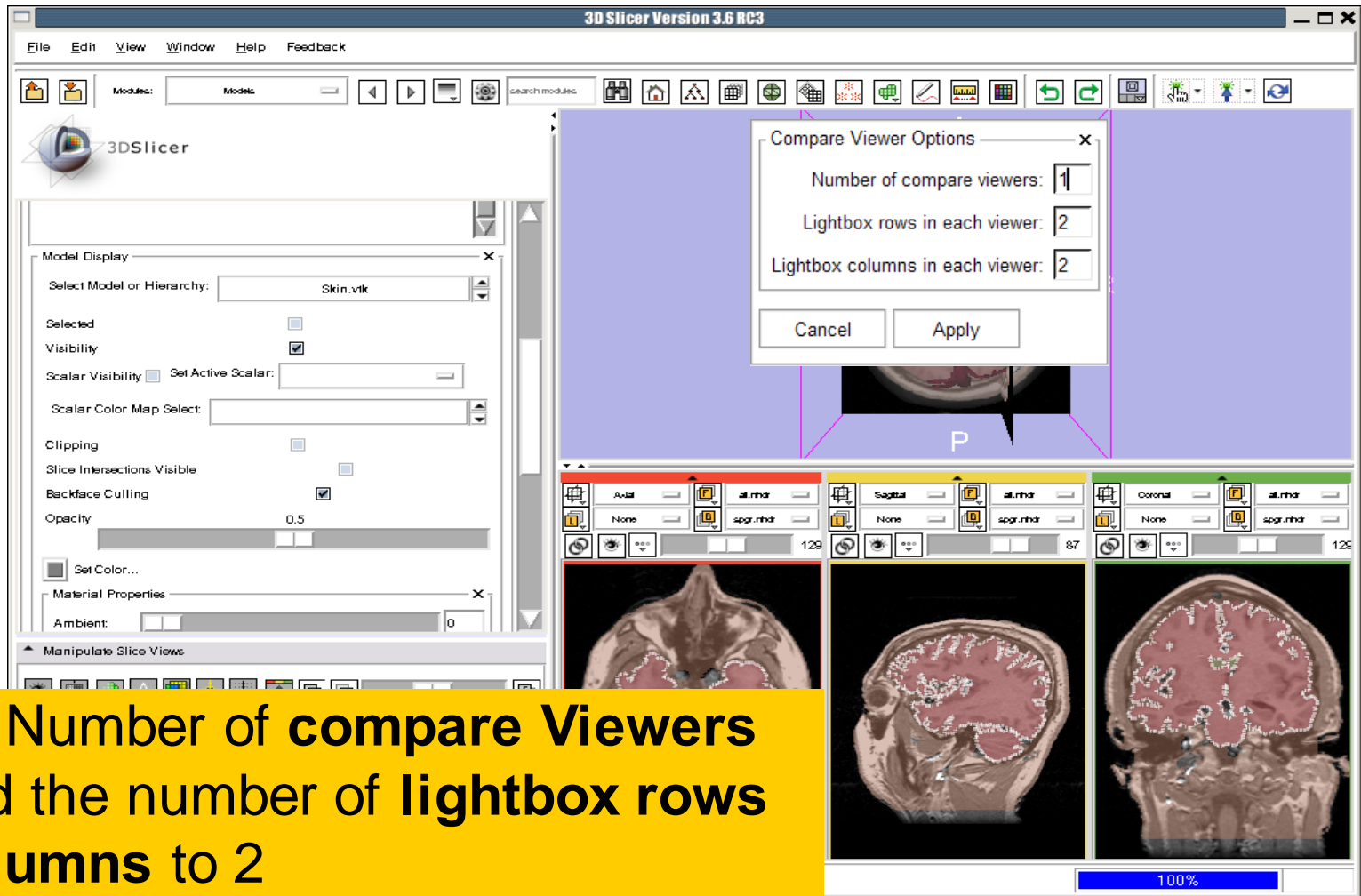


Part 4: Lightbox viewer

Visualizing a 3D model



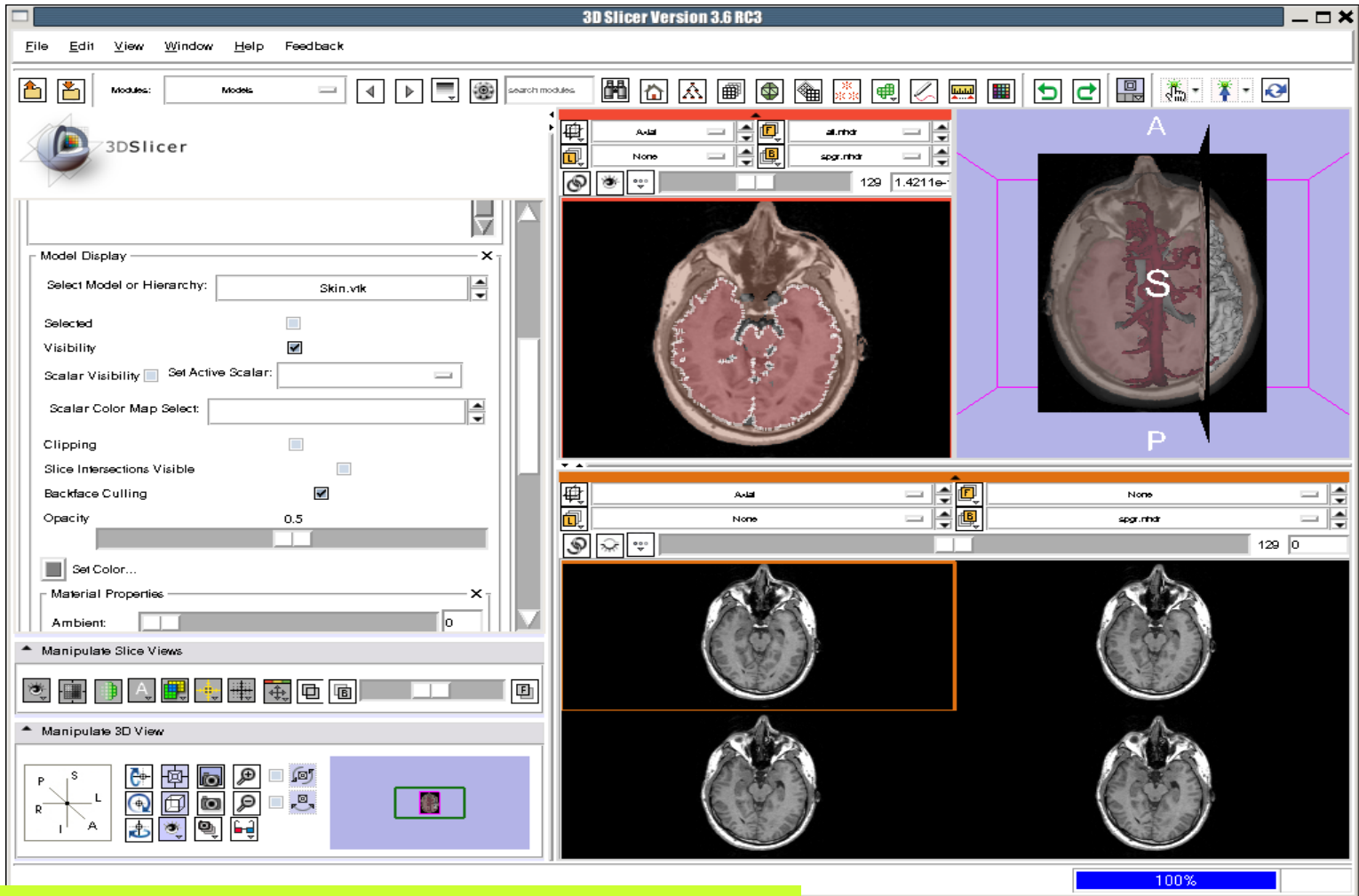
Visualizing a 3D model



Set the Number of **compare Viewers** to 1 and the number of **lightbox rows** and **columns** to 2

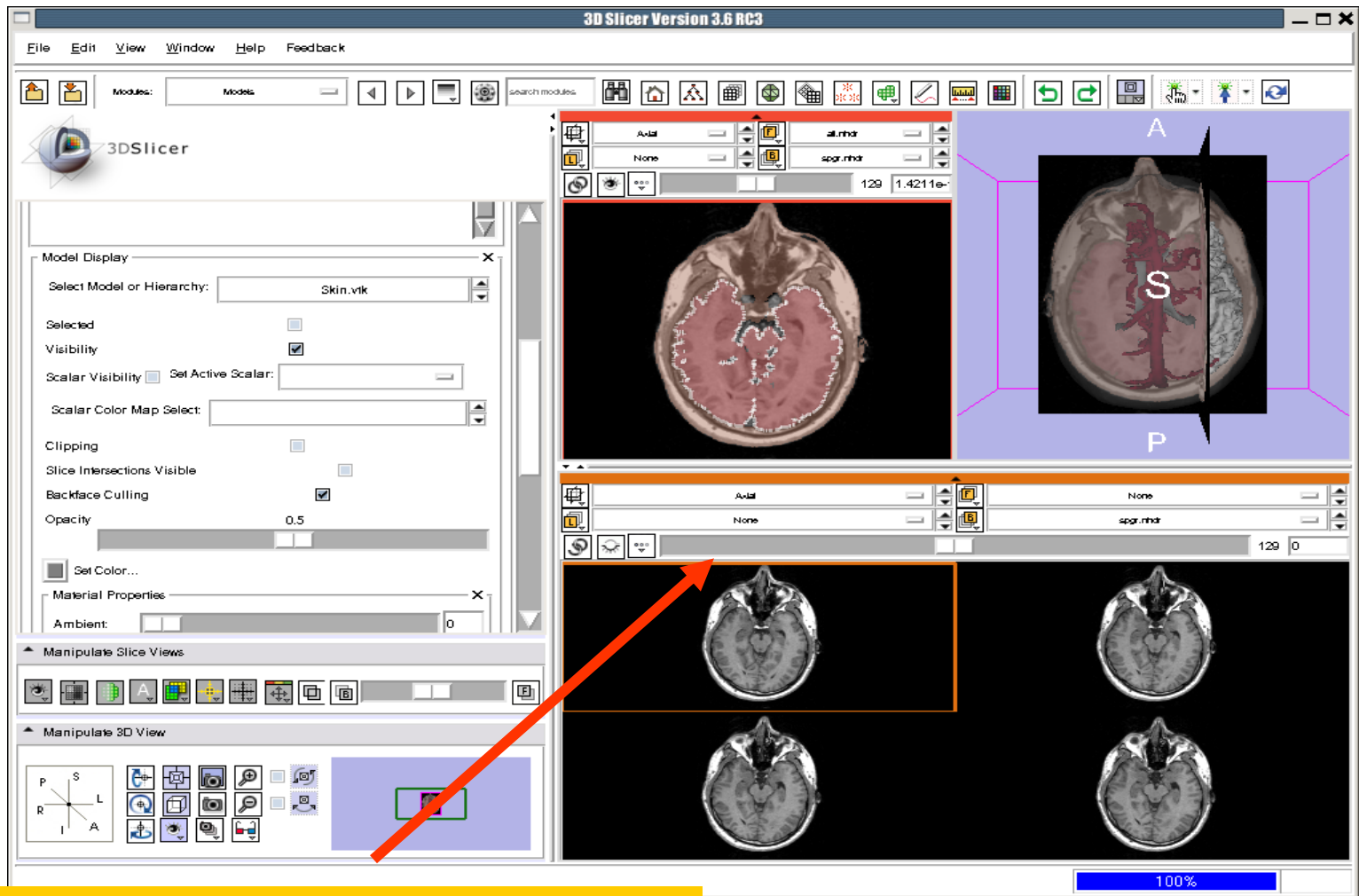
Click on **Apply**

Lightbox viewer



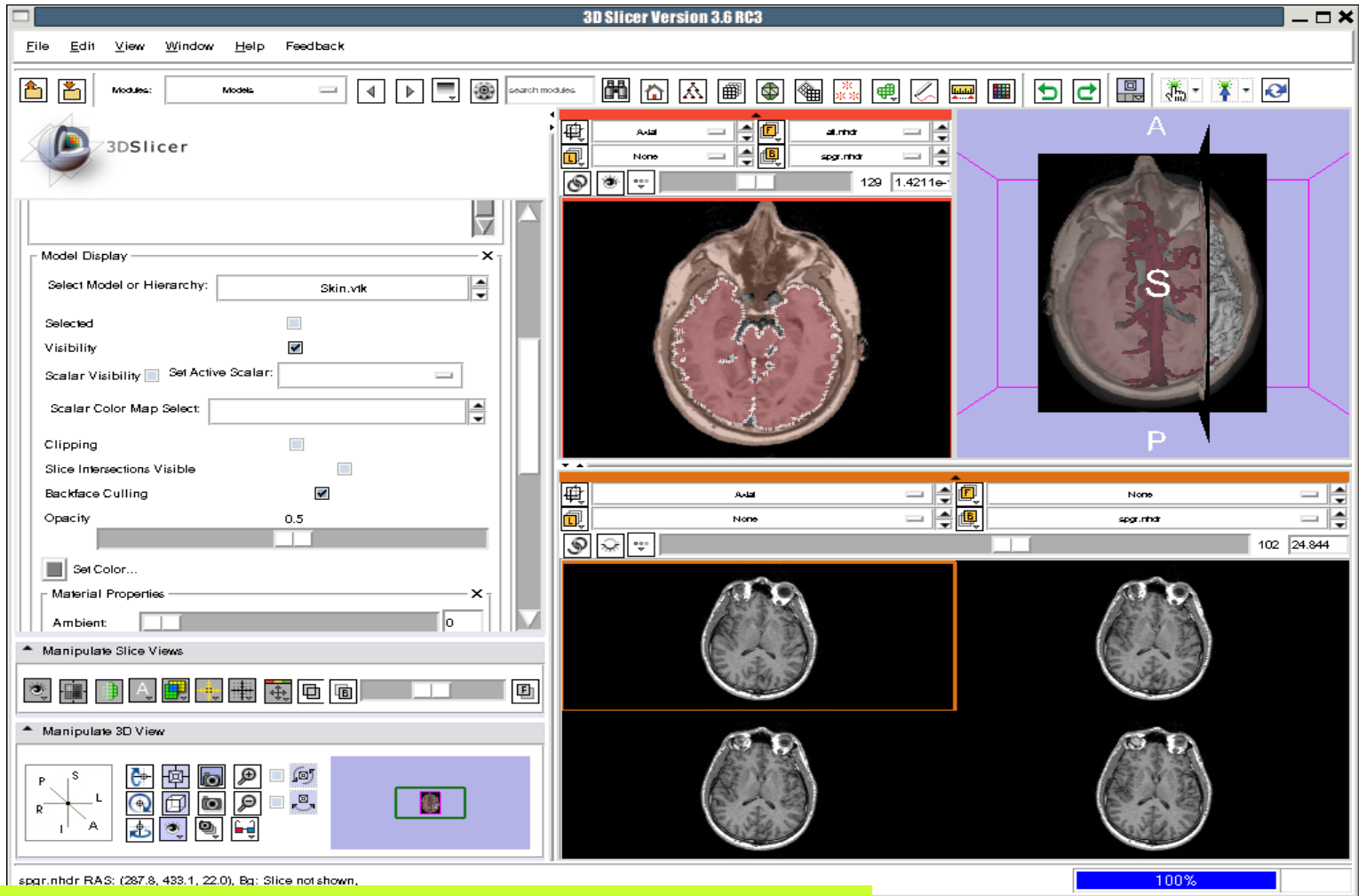
Slicer displays a lightbox view of the Background dataset.

Lightbox viewer



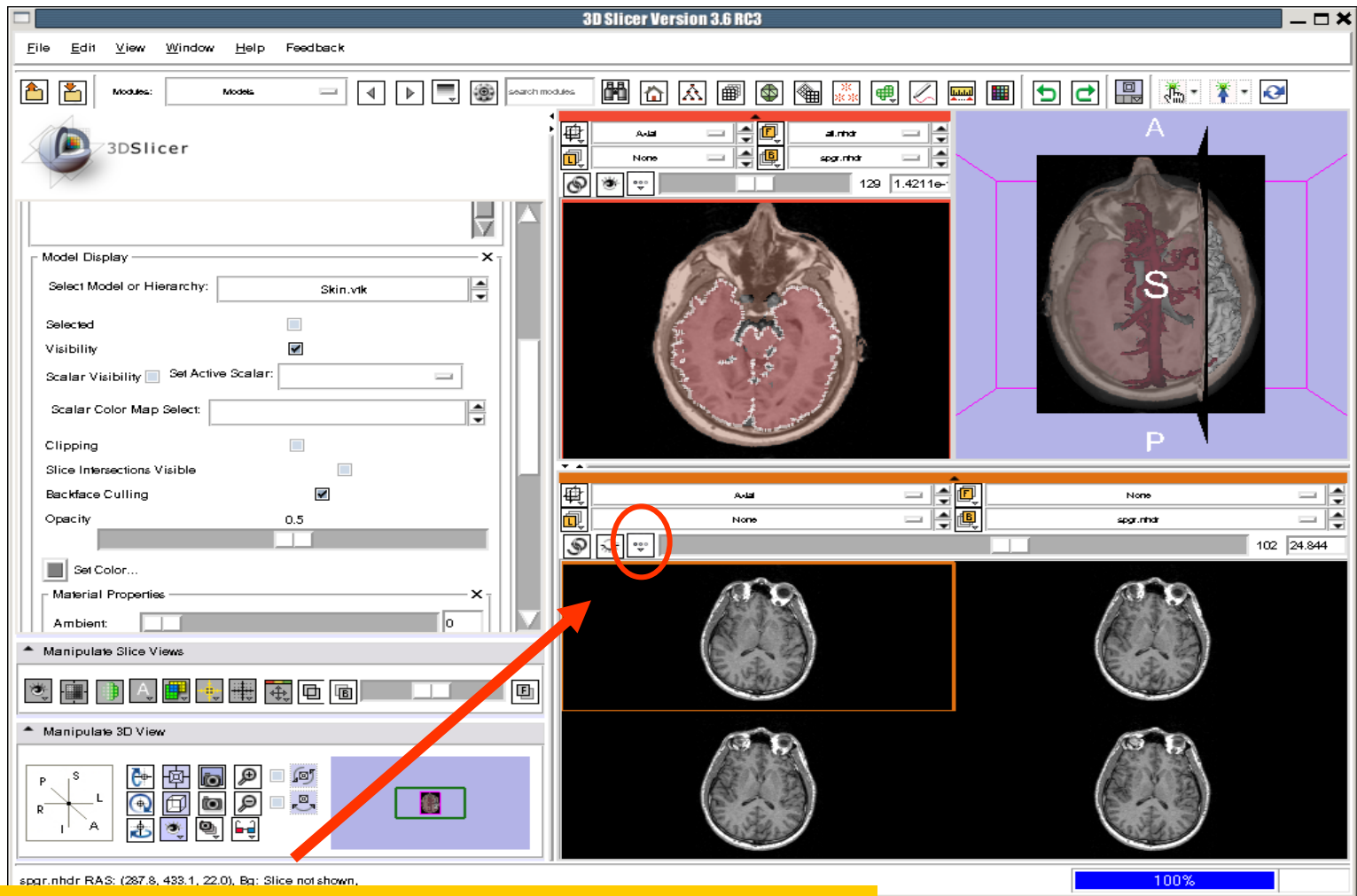
Browse through the spgr volume using the lightbox slider

Lightbox viewer



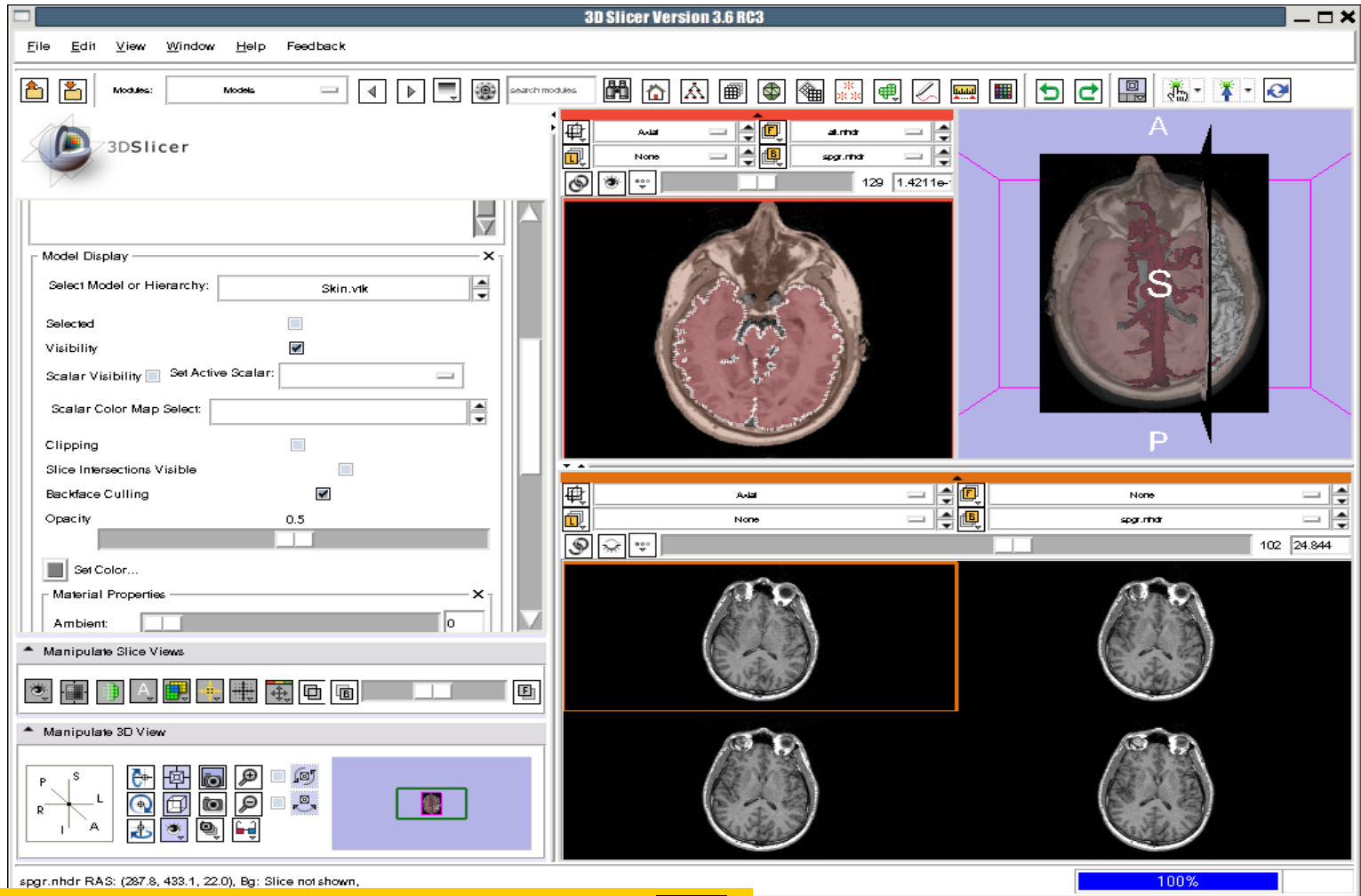
Slicer displays 4 adjacent axial slices of the spgr volume simultaneously

Lightbox viewer



Left click on the Slice Viewer menu of the Compare Layout viewer

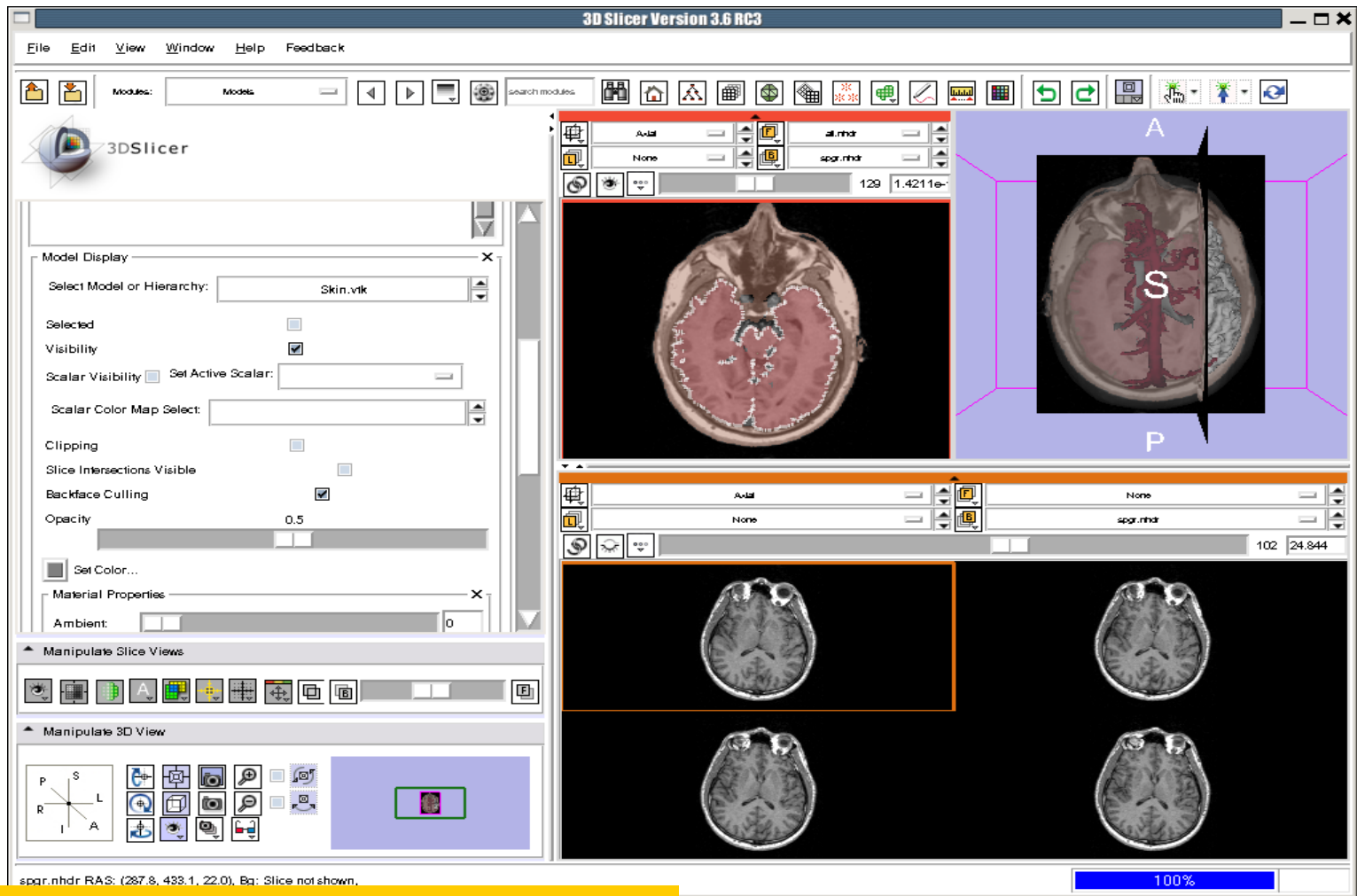
Lightbox viewer



Select the **lightbox view** option

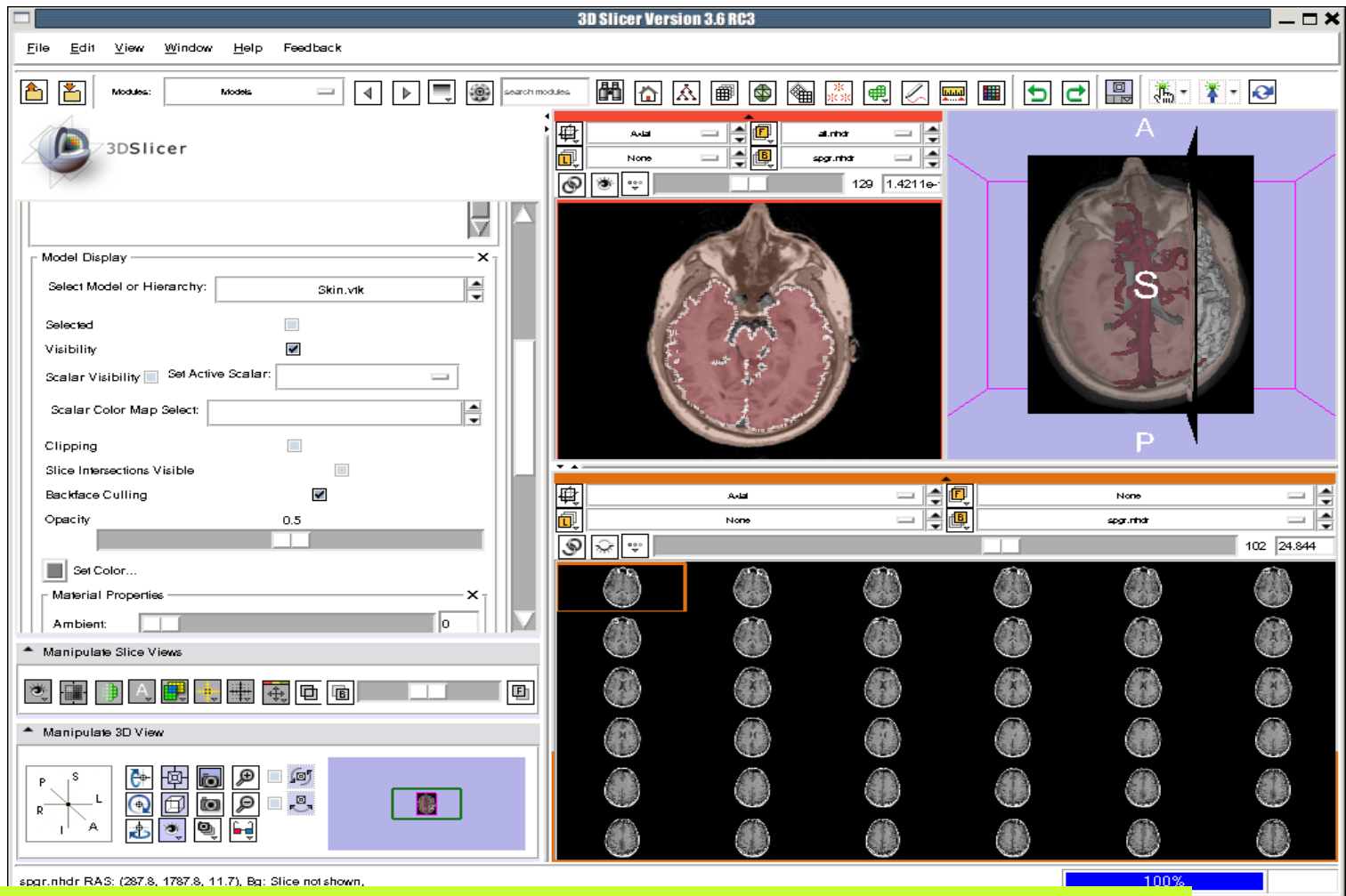


Lightbox viewer



Set the configuration of the light box view to **6x6**

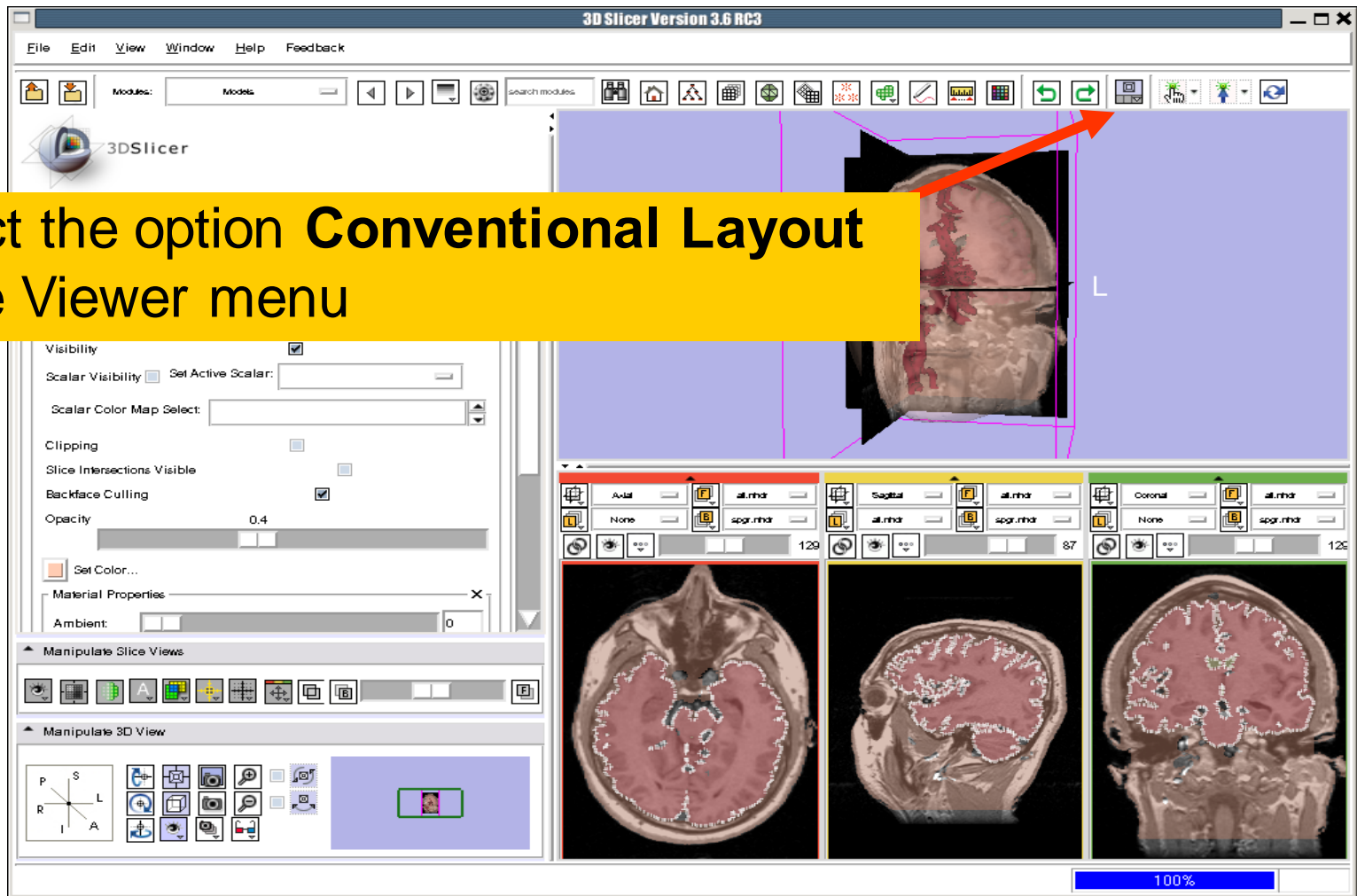
Lightbox viewer

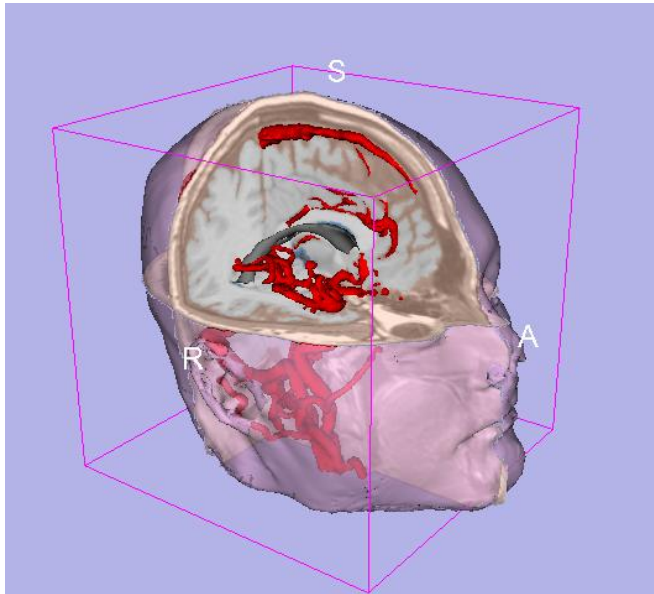


Slicer displays a matrix of 36 adjacent axial slices of the spgr volume.

Lightbox viewer

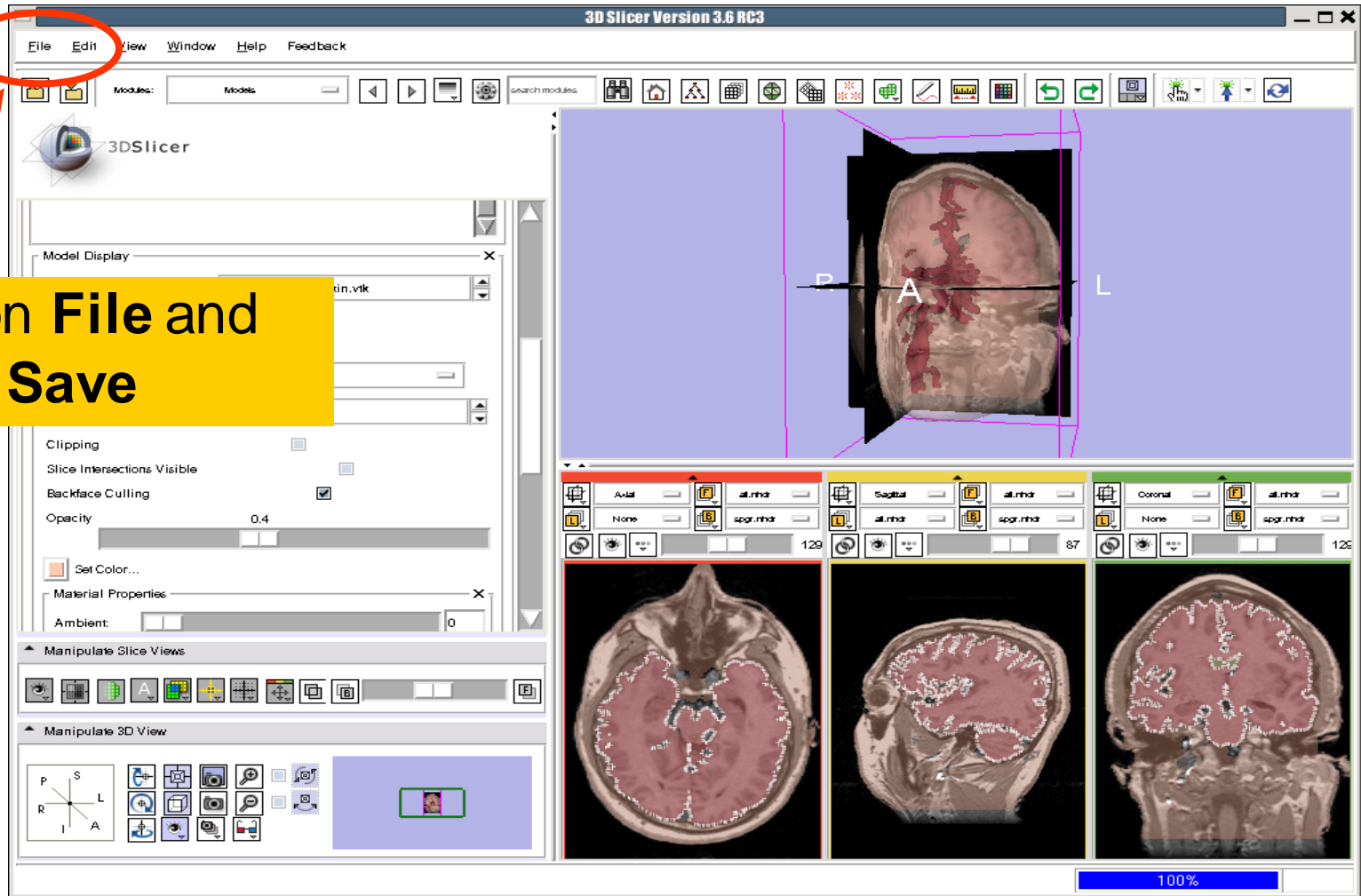
Select the option **Conventional Layout** in the Viewer menu





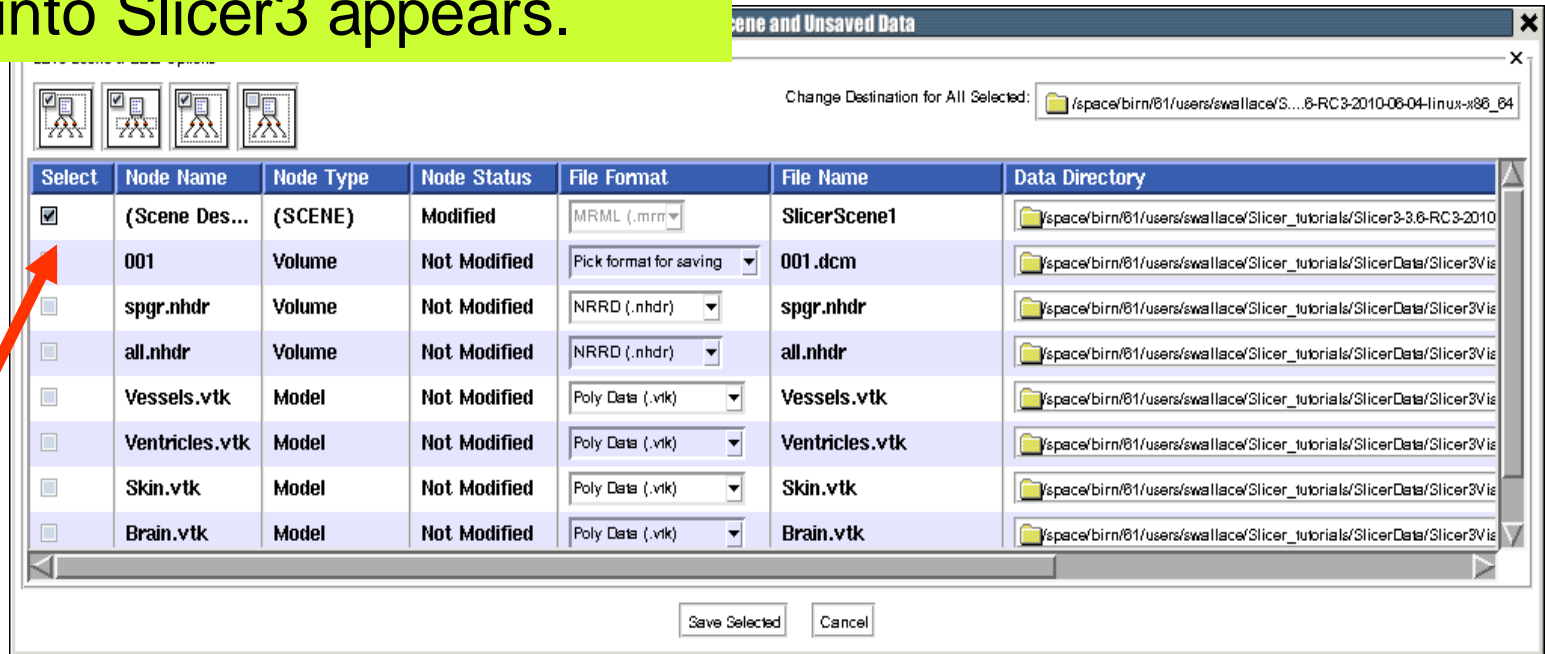
Part 5: Loading and saving a Scene

Saving Data



Saving Data

The list of elements currently loaded into Slicer3 appears.

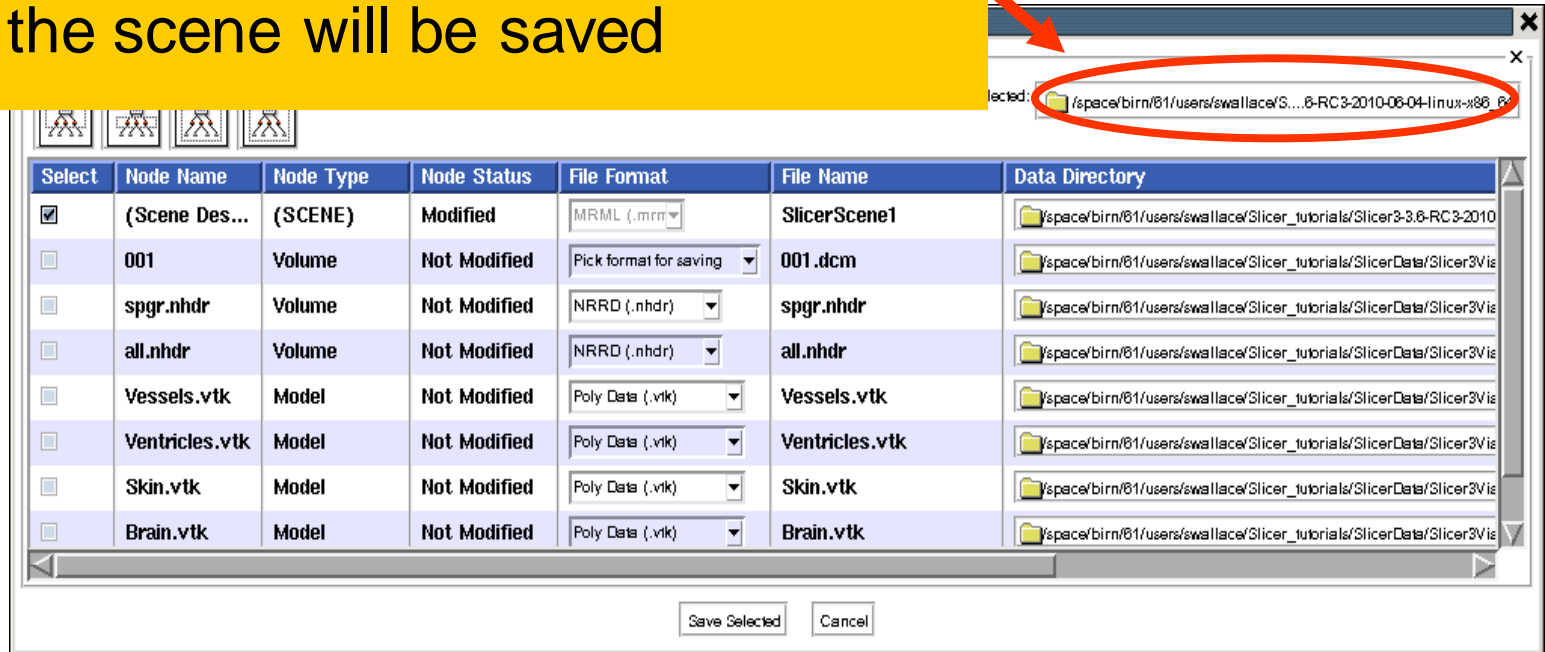


Select	Node Name	Node Type	Node Status	File Format	File Name	Data Directory
<input checked="" type="checkbox"/>	(Scene Des...	(SCENE)	Modified	MRML (.mrm)	SlicerScene1	/space/birn/81/users/swallace/Slicer_tutorials/Slicer3-3.8-RC3-2010
<input type="checkbox"/>	001	Volume	Not Modified	Pick format for saving	001.dcm	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	spgr.nhdr	Volume	Not Modified	NRRD (.nhdr)	spgr.nhdr	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	all.nhdr	Volume	Not Modified	NRRD (.nhdr)	all.nhdr	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Vessels.vtk	Model	Not Modified	Poly Data (.vtk)	Vessels.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Ventricles.vtk	Model	Not Modified	Poly Data (.vtk)	Ventricles.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Skin.vtk	Model	Not Modified	Poly Data (.vtk)	Skin.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Brain.vtk	Model	Not Modified	Poly Data (.vtk)	Brain.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis

Make sure only the first check box is selected

Saving Data

Click on **Change Destination for All Selected** and browse to the location where the scene will be saved

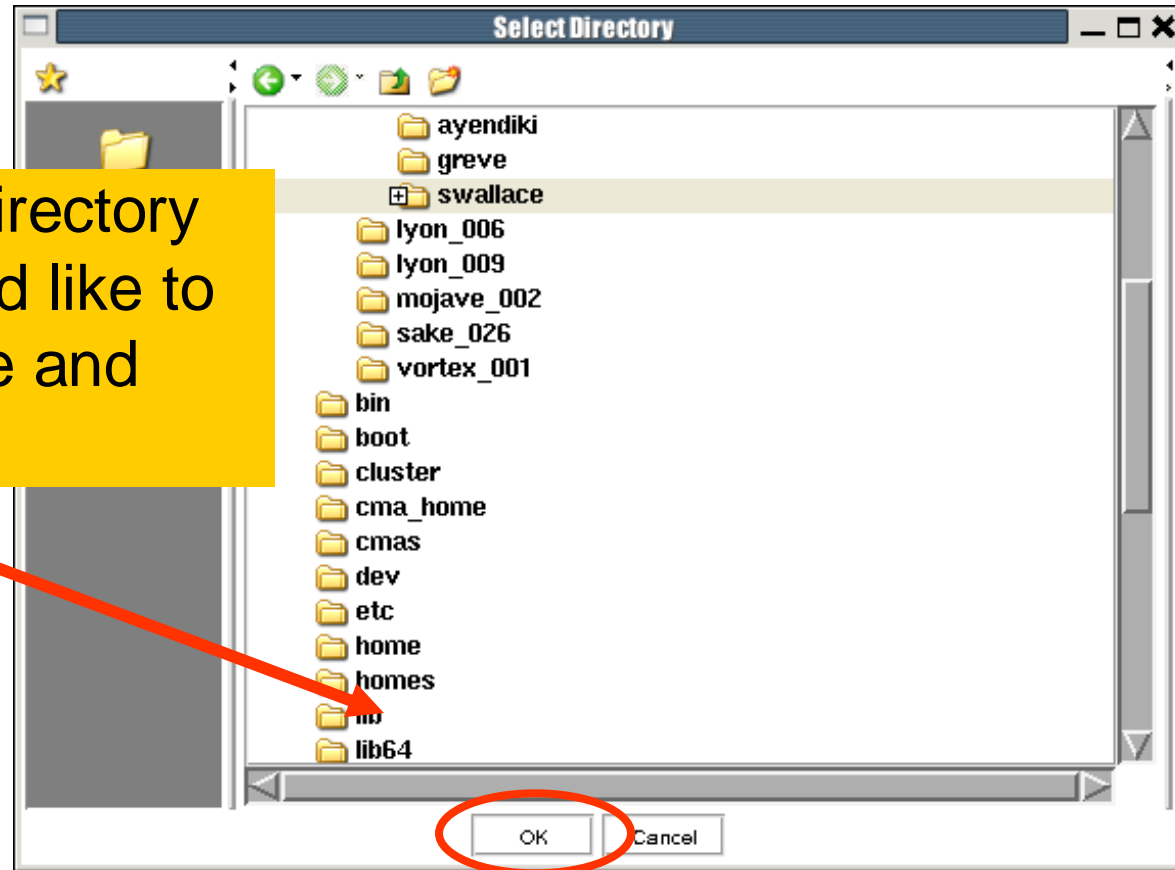


The screenshot shows the 'Save Data' dialog box in 3DSlicer. A red arrow points from the yellow text box to the 'Change Destination for All Selected' button. The dialog displays a table of nodes to be saved, with columns for Select, Node Name, Node Type, Node Status, File Format, File Name, and Data Directory. The 'Data Directory' column shows the path for each node, which is currently set to a default location. At the bottom of the dialog, there are 'Save Selected' and 'Cancel' buttons.

Select	Node Name	Node Type	Node Status	File Format	File Name	Data Directory
<input checked="" type="checkbox"/>	(Scene Des...)	(SCENE)	Modified	MRML (.mrm)	SlicerScene1	/space/birn/81/users/swallace/Slicer_tutorials/Slicer3-3.8-RC3-2010
<input type="checkbox"/>	001	Volume	Not Modified	Pick format for saving	001.dcm	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	spgr.nhdr	Volume	Not Modified	NRRD (.nhdr)	spgr.nhdr	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	all.nhdr	Volume	Not Modified	NRRD (.nhdr)	all.nhdr	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Vessels.vtk	Model	Not Modified	Poly Data (.vtk)	Vessels.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Ventricles.vtk	Model	Not Modified	Poly Data (.vtk)	Ventricles.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Skin.vtk	Model	Not Modified	Poly Data (.vtk)	Skin.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis
<input type="checkbox"/>	Brain.vtk	Model	Not Modified	Poly Data (.vtk)	Brain.vtk	/space/birn/81/users/swallace/Slicer_tutorials/SlicerData/Slicer3Vis

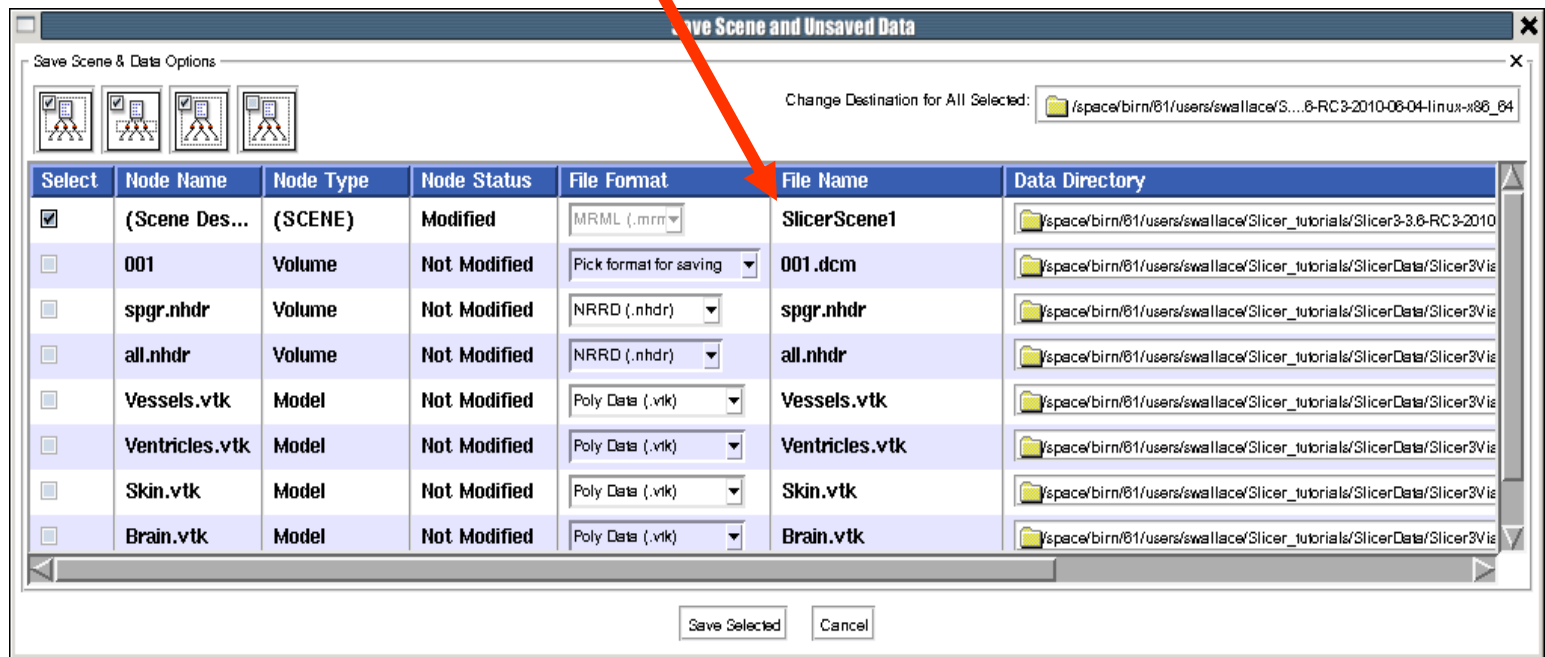
Saving Data

Browse to the directory where you would like to save your scene and click OK

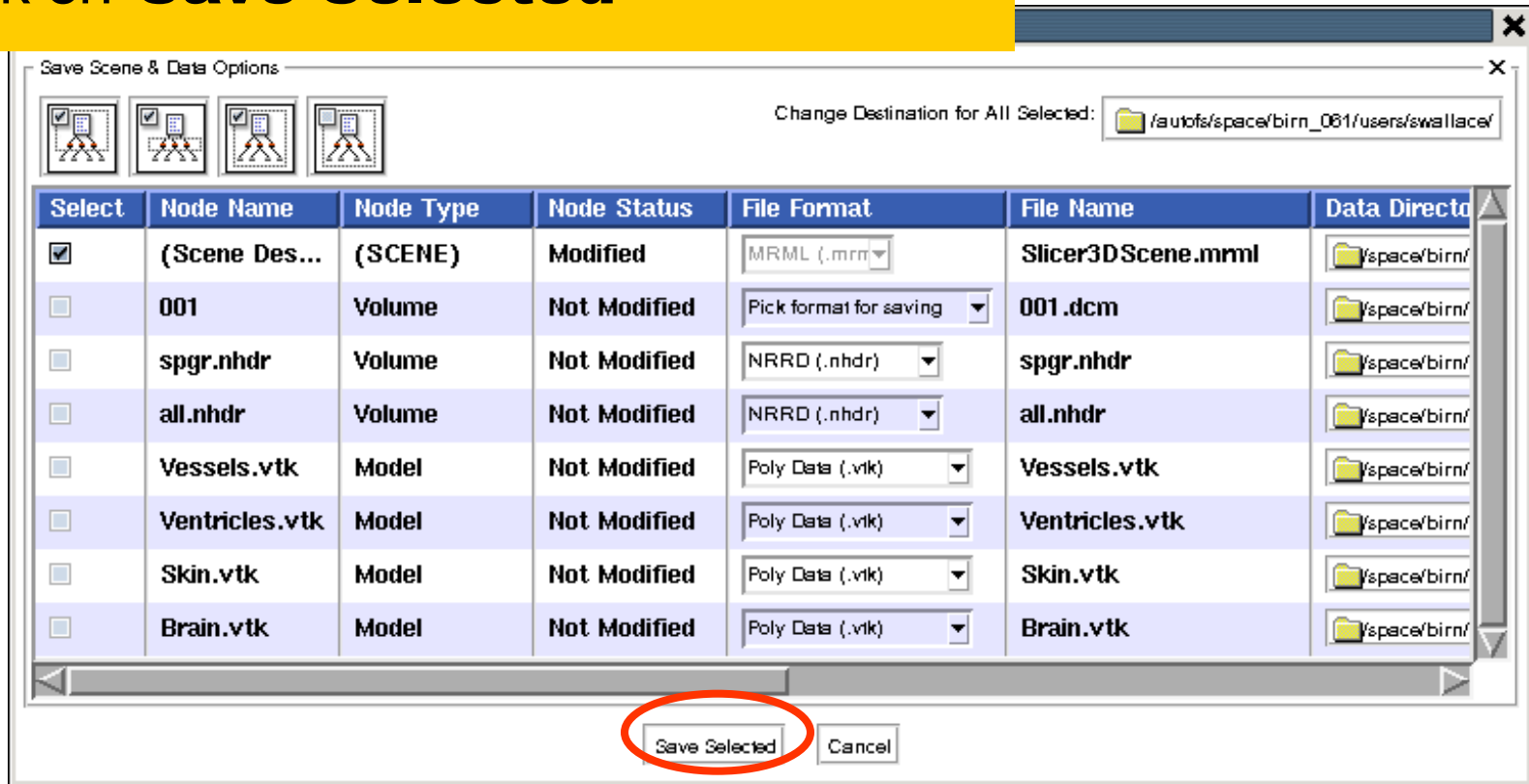


Saving Data

Double click on the file name **SlicerScene1** and change it to **Slicer3DScene**



Click on **Save Selected**



Save Scene & Data Options

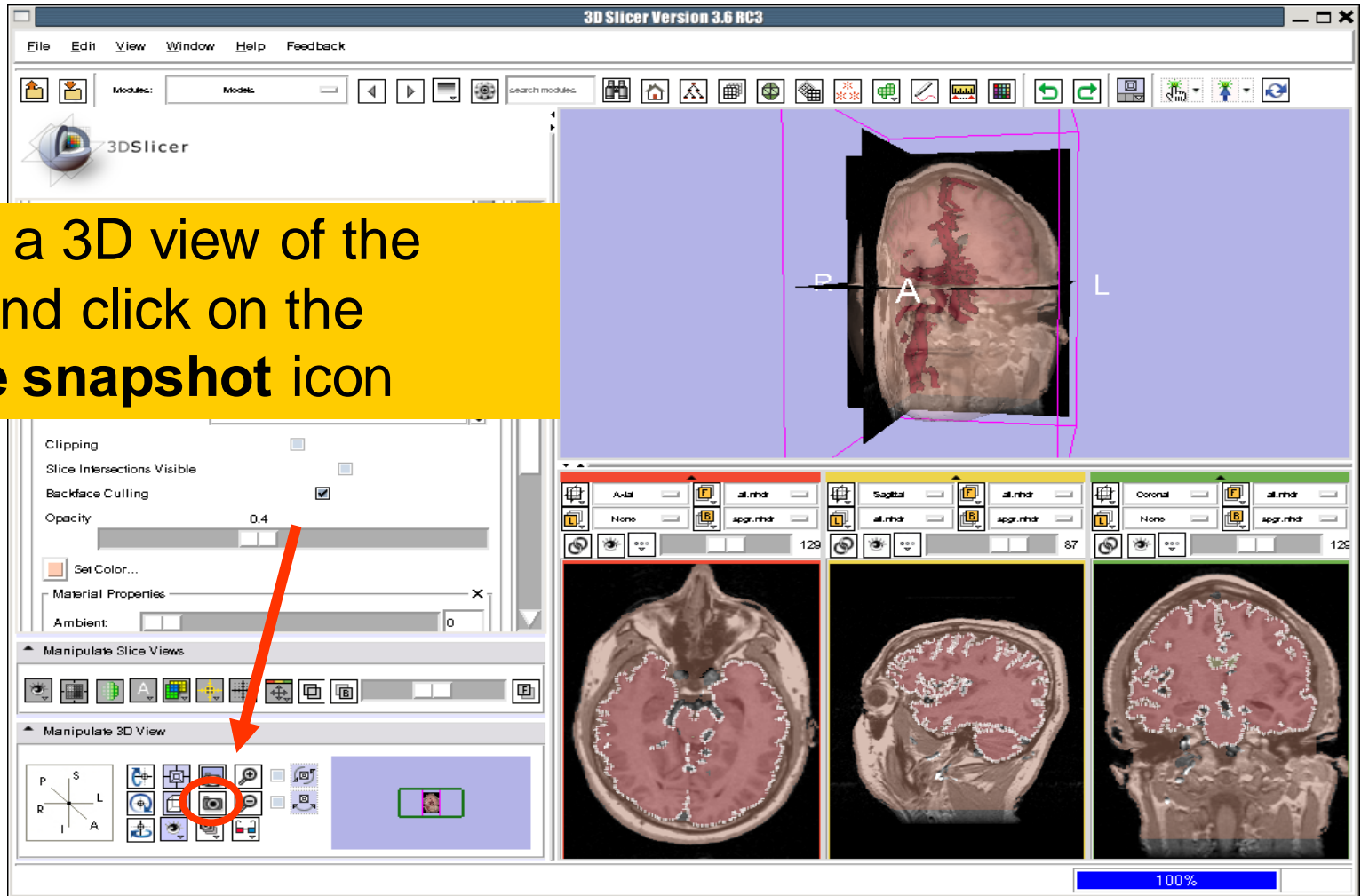
Change Destination for All Selected:

Select	Node Name	Node Type	Node Status	File Format	File Name	Data Directory
<input checked="" type="checkbox"/>	(Scene Des...	(SCENE)	Modified	MRML (.mrm)	Slicer3DScene.mrm	/space/birn/
<input type="checkbox"/>	001	Volume	Not Modified	Pick format for saving	001.dcm	/space/birn/
<input type="checkbox"/>	spgr.nhdr	Volume	Not Modified	NRRD (.nhdr)	spgr.nhdr	/space/birn/
<input type="checkbox"/>	all.nhdr	Volume	Not Modified	NRRD (.nhdr)	all.nhdr	/space/birn/
<input type="checkbox"/>	Vessels.vtk	Model	Not Modified	Poly Data (.vtk)	Vessels.vtk	/space/birn/
<input type="checkbox"/>	Ventricles.vtk	Model	Not Modified	Poly Data (.vtk)	Ventricles.vtk	/space/birn/
<input type="checkbox"/>	Skin.vtk	Model	Not Modified	Poly Data (.vtk)	Skin.vtk	/space/birn/
<input type="checkbox"/>	Brain.vtk	Model	Not Modified	Poly Data (.vtk)	Brain.vtk	/space/birn/

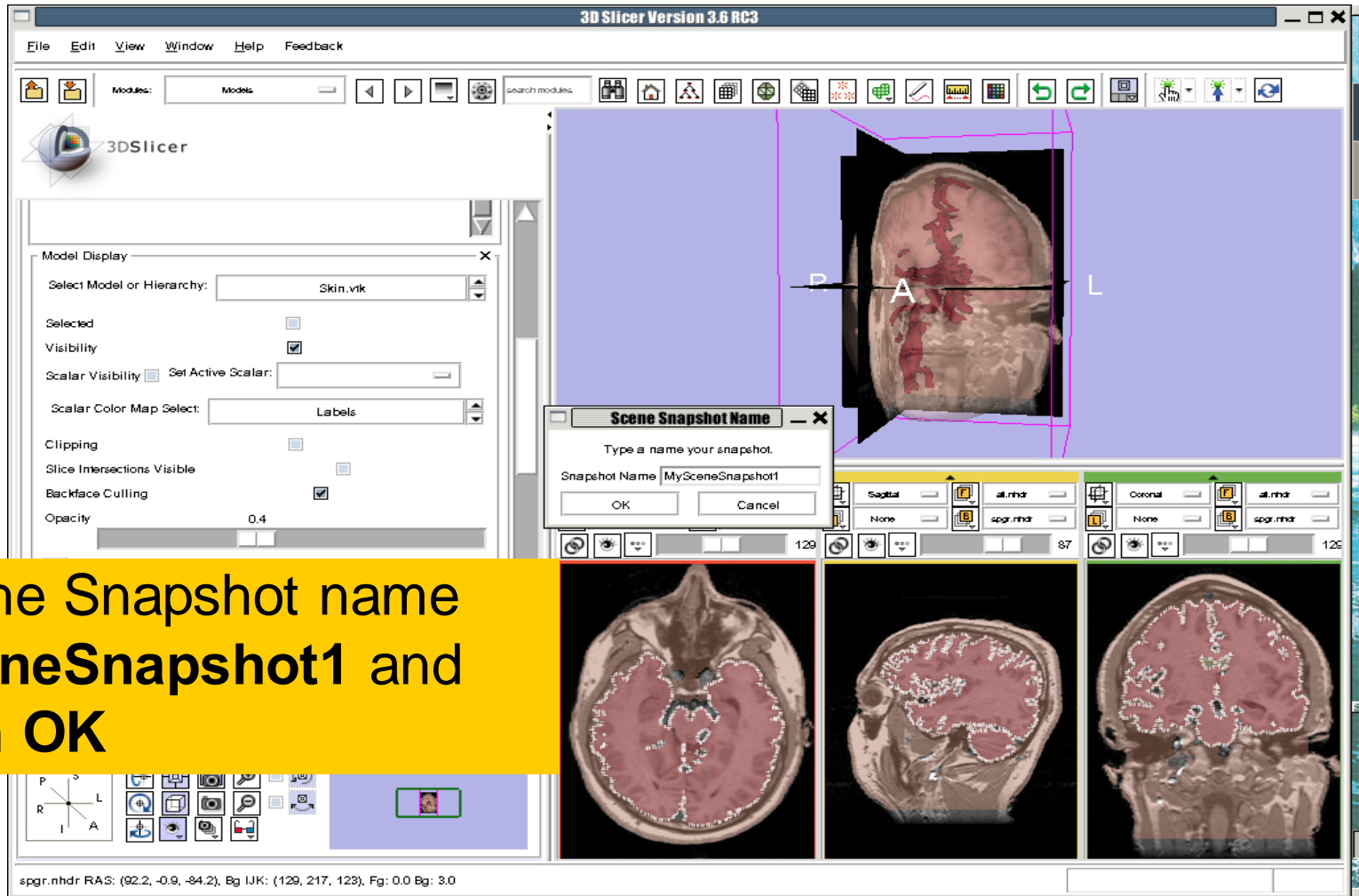
Save Selected Cancel

Creating Scene Snapshots

Choose a 3D view of the scene and click on the capture snapshot icon



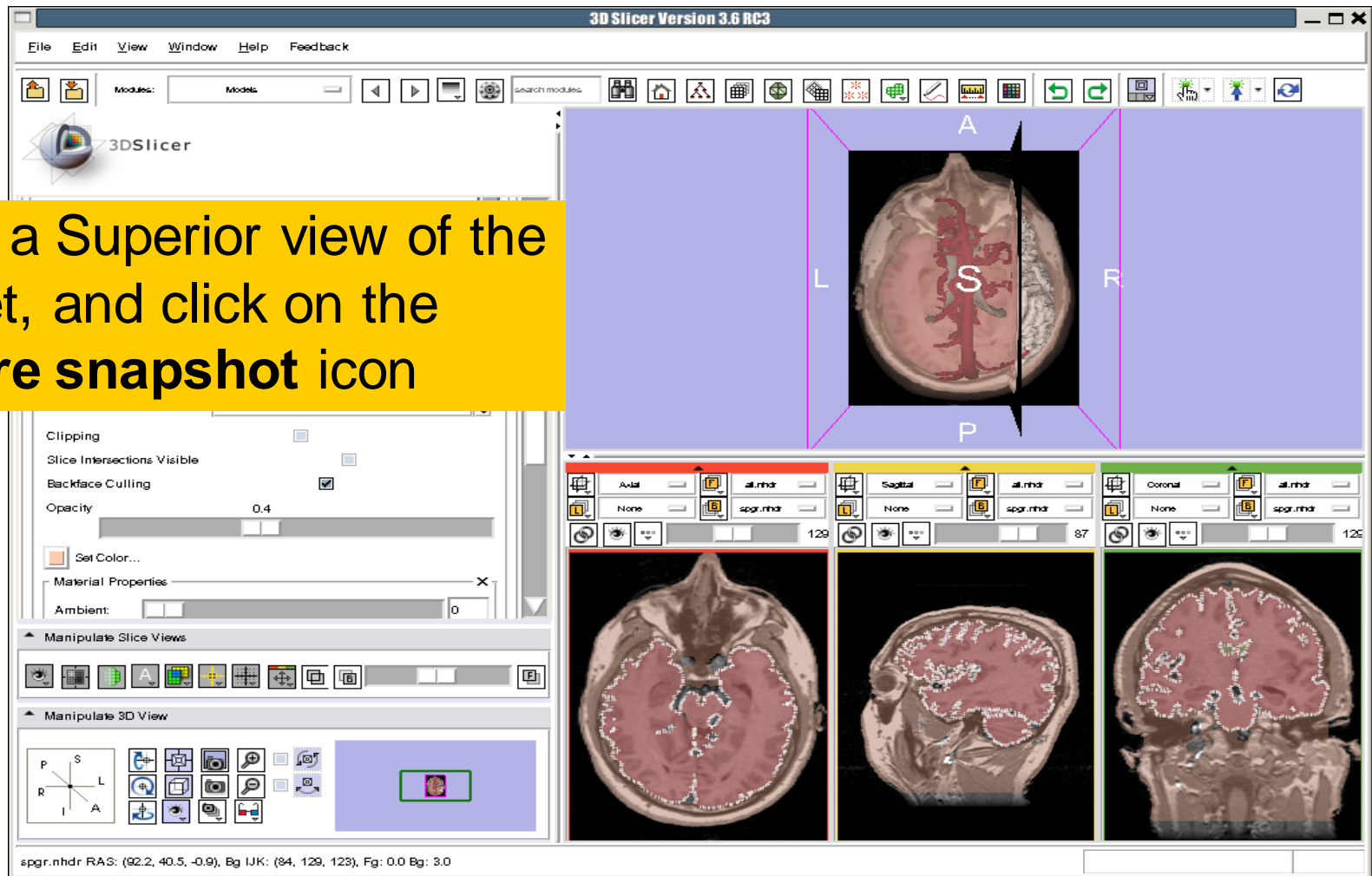
Creating Scene Snapshots



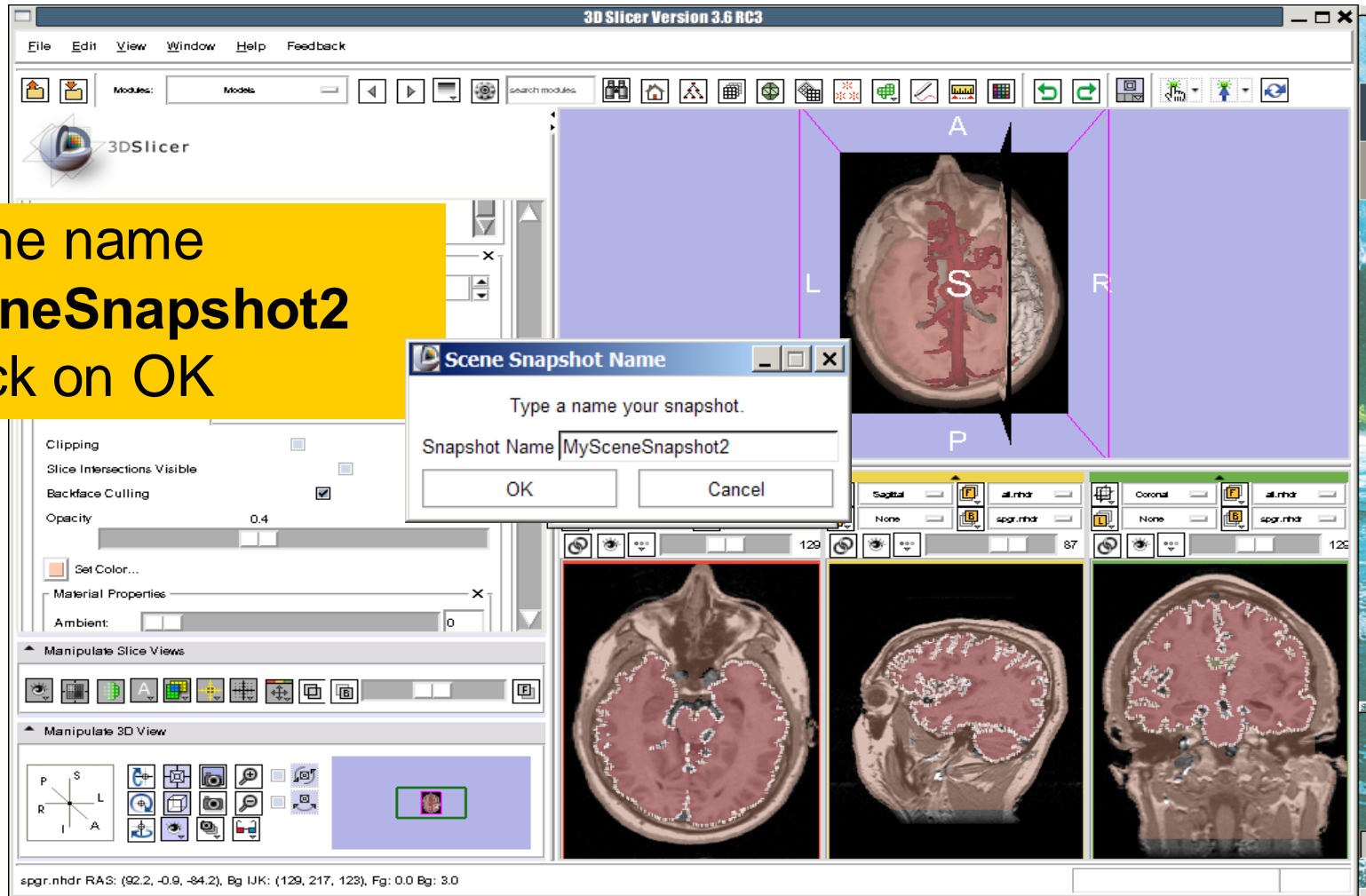
Enter the Snapshot name
MySceneSnapshot1 and
click on **OK**

Creating Scene Snapshots

Select a Superior view of the dataset, and click on the capture snapshot icon

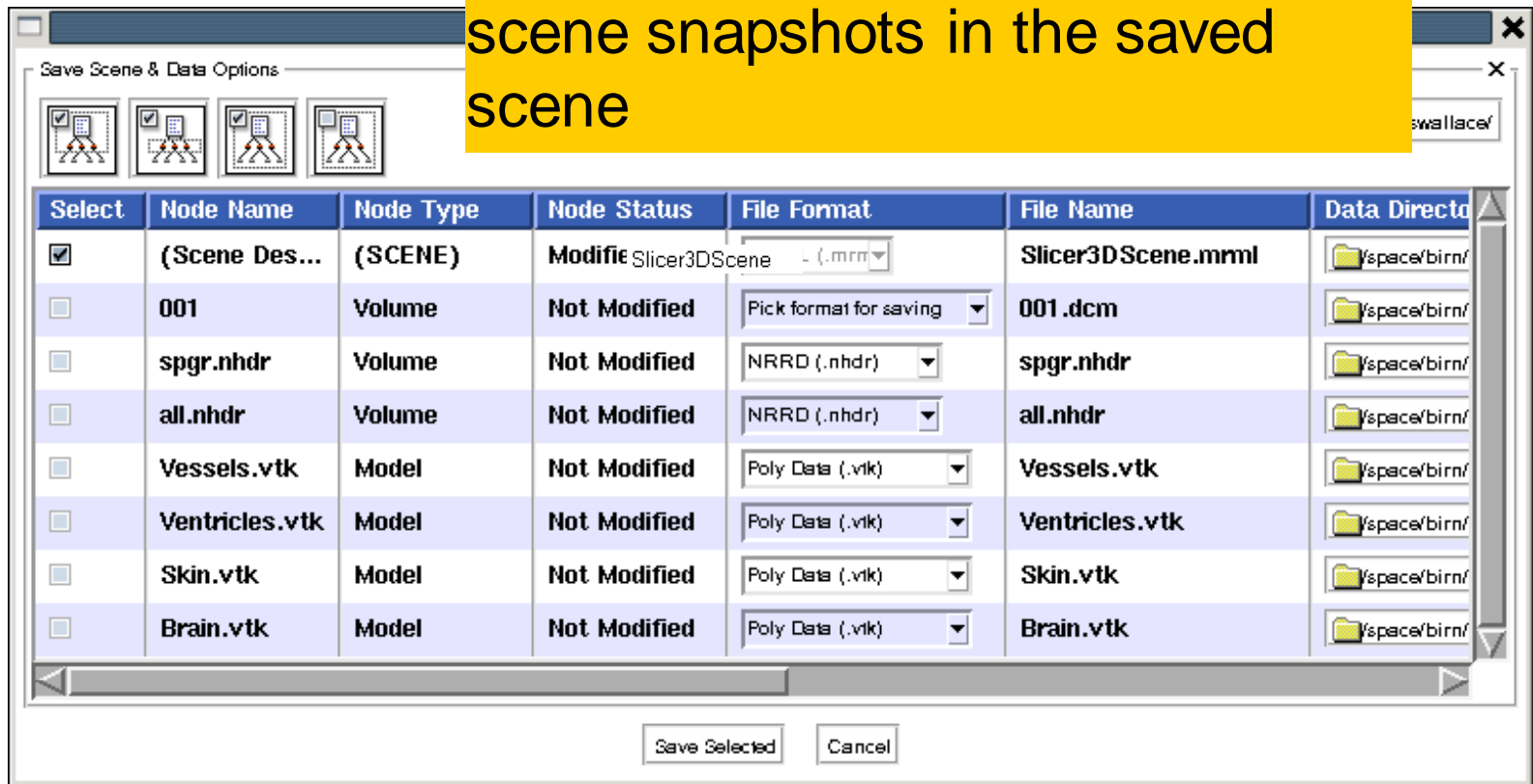


Creating Scene Snapshots



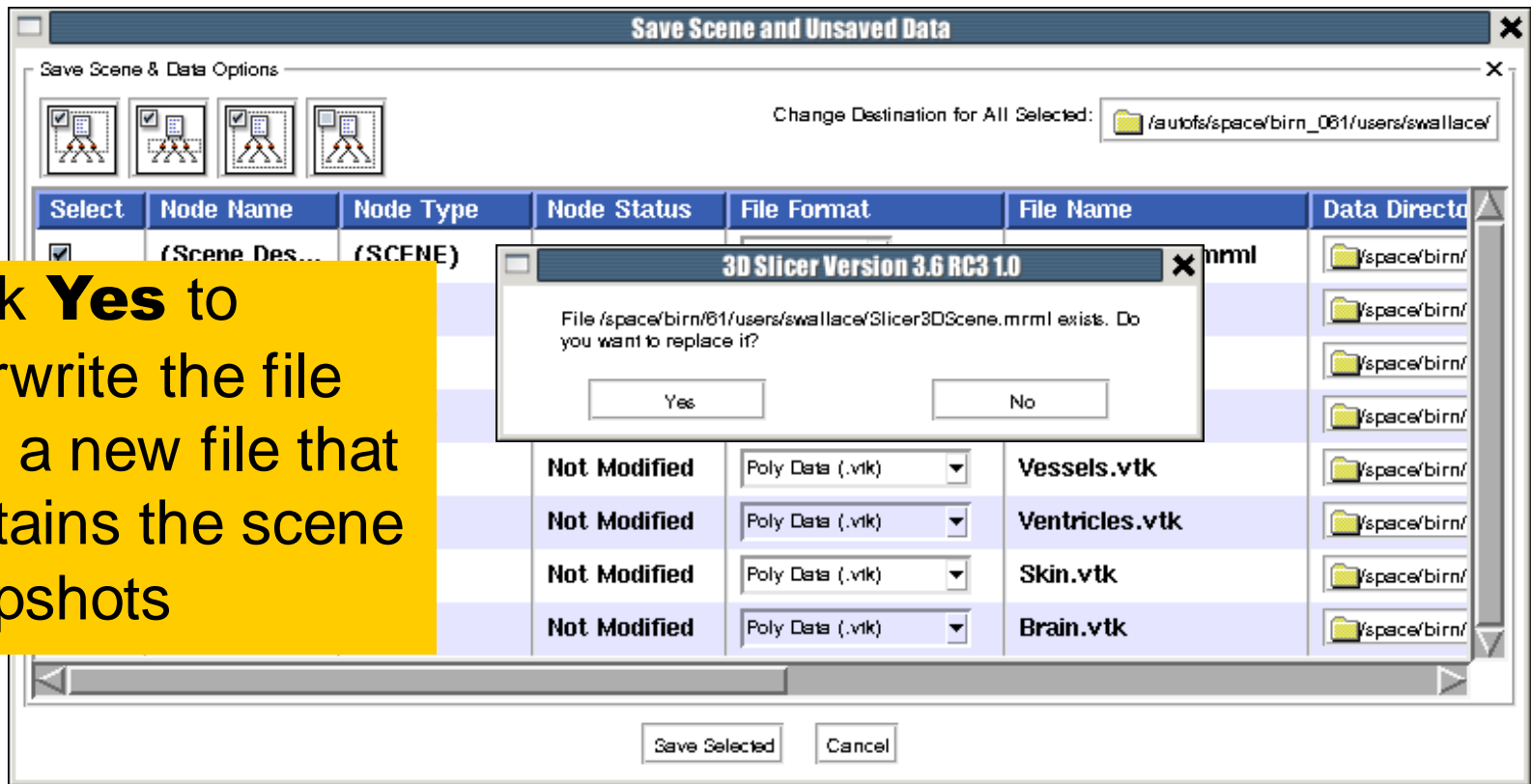
Creating Scene Snapshots

Select **File** → **Save** and click on **Save Selected** to include the two scene snapshots in the saved scene



Creating Scene Snapshots

Click **Yes** to overwrite the file with a new file that contains the scene snapshots



Save Scene and Unsaved Data

Save Scene & Data Options

Change Destination for All Selected: /autofs/space/birn_081/users/swallace/

Select	Node Name	Node Type	Node Status	File Format	File Name	Data Directory
<input checked="" type="checkbox"/>	(Scene Des...	(SCENE)				/space/birn/
			Not Modified	Poly Data (.vtk)	Vessels.vtk	/space/birn/
			Not Modified	Poly Data (.vtk)	Ventricles.vtk	/space/birn/
			Not Modified	Poly Data (.vtk)	Skin.vtk	/space/birn/
			Not Modified	Poly Data (.vtk)	Brain.vtk	/space/birn/

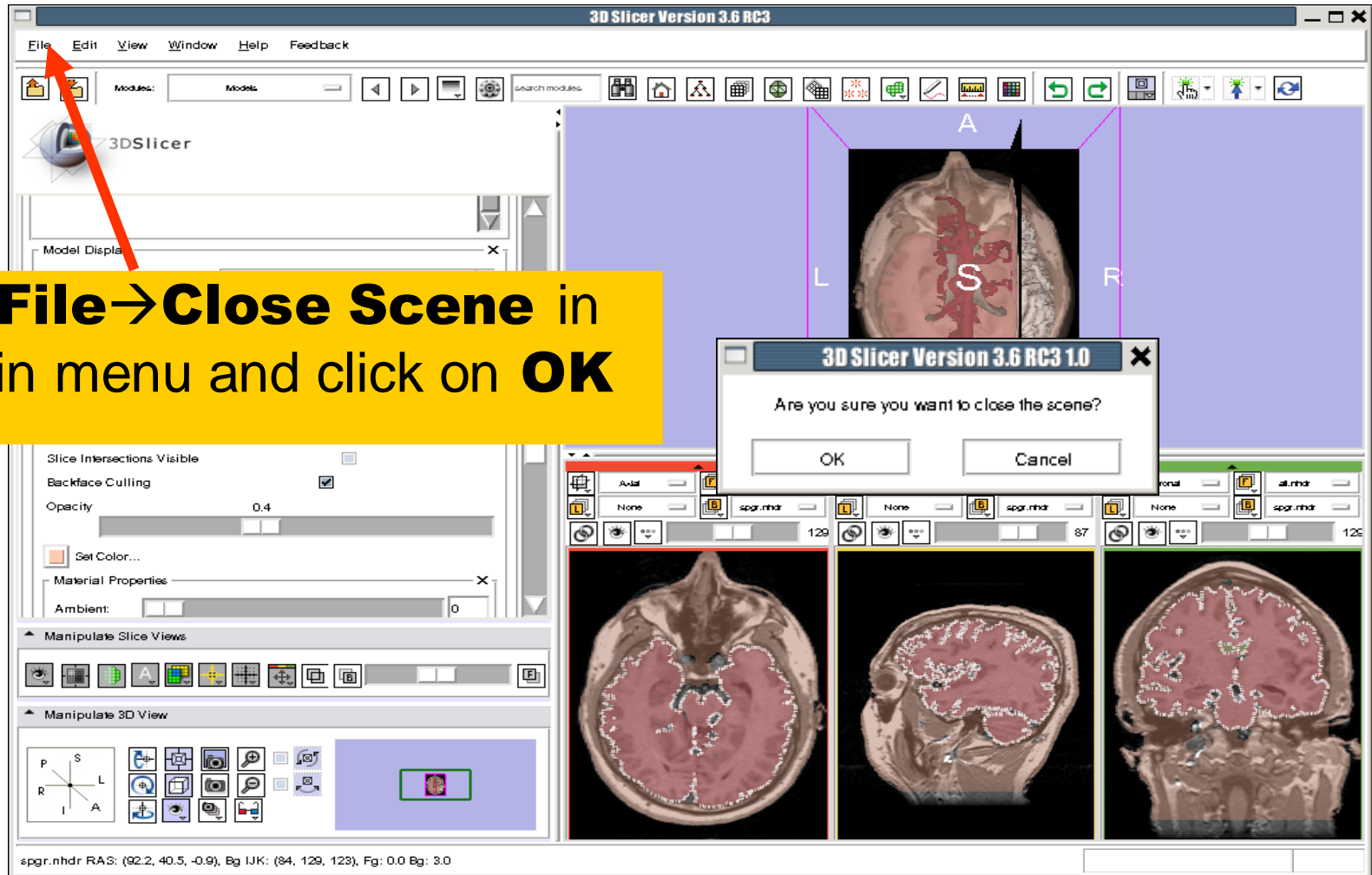
3D Slicer Version 3.6 RC3 1.0

File /space/birn/81/users/swallace/Slicer3DScene.mrml exists. Do you want to replace it?

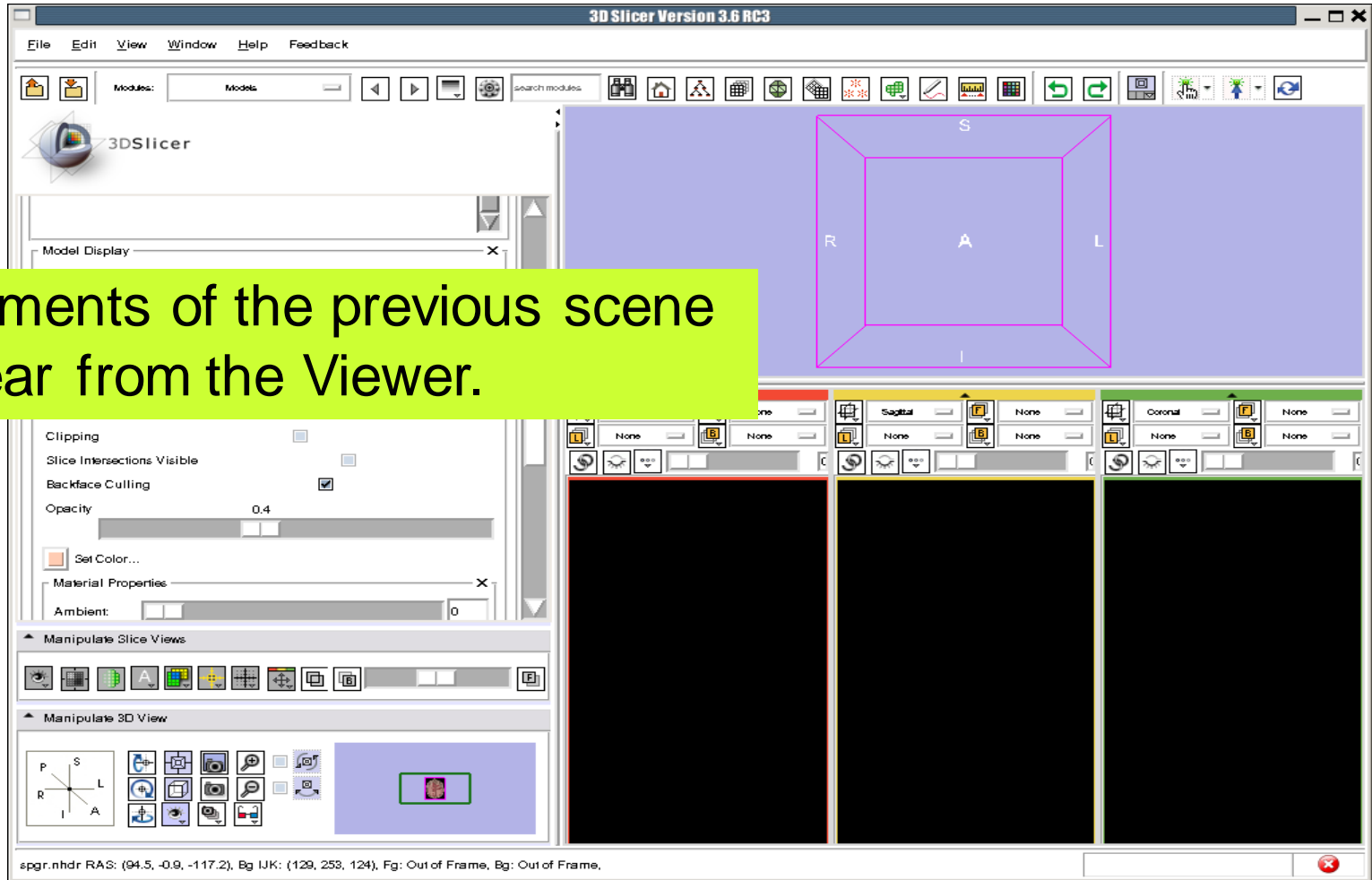
Yes No

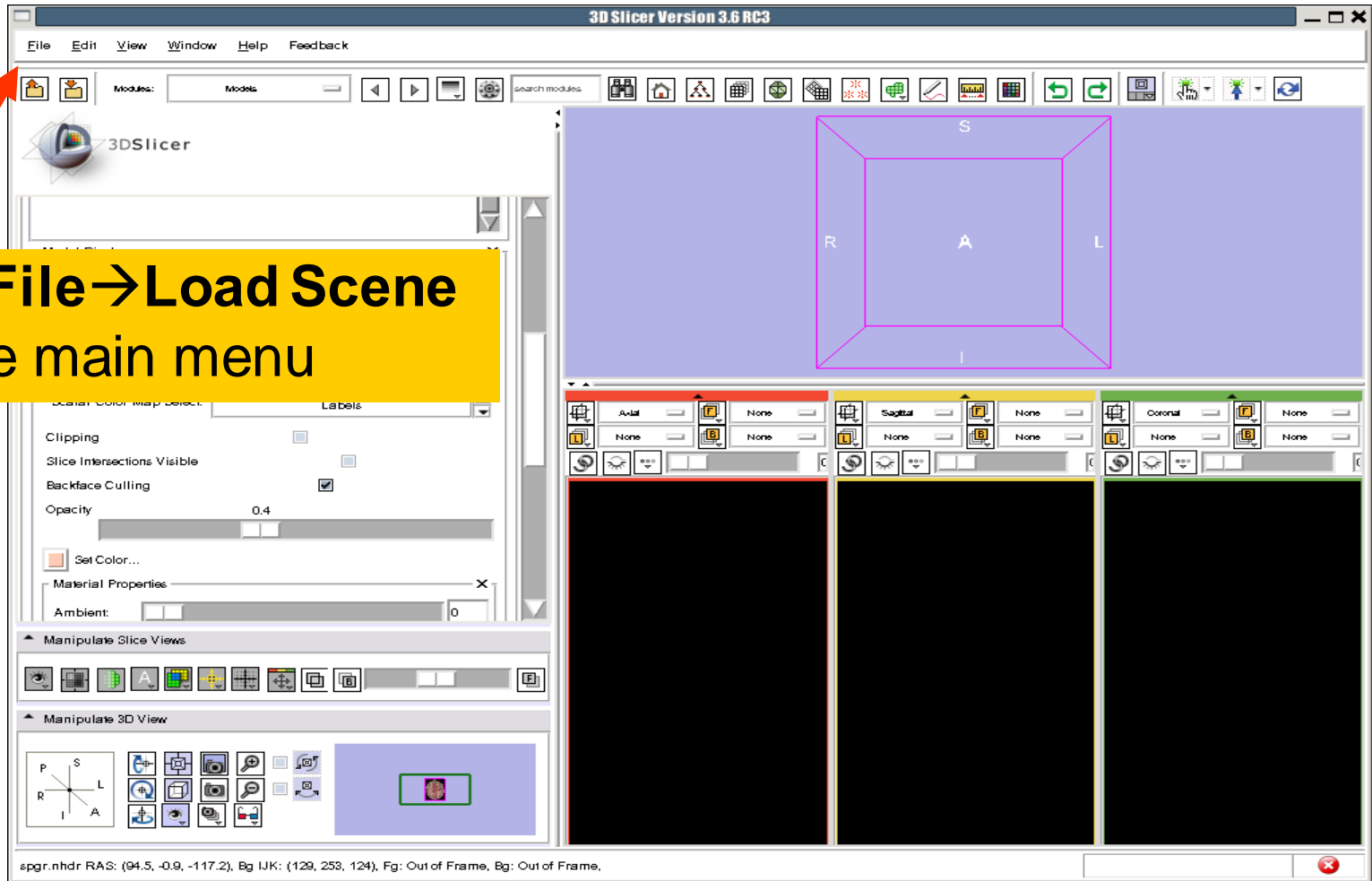
Save Selected Cancel

Saving Data



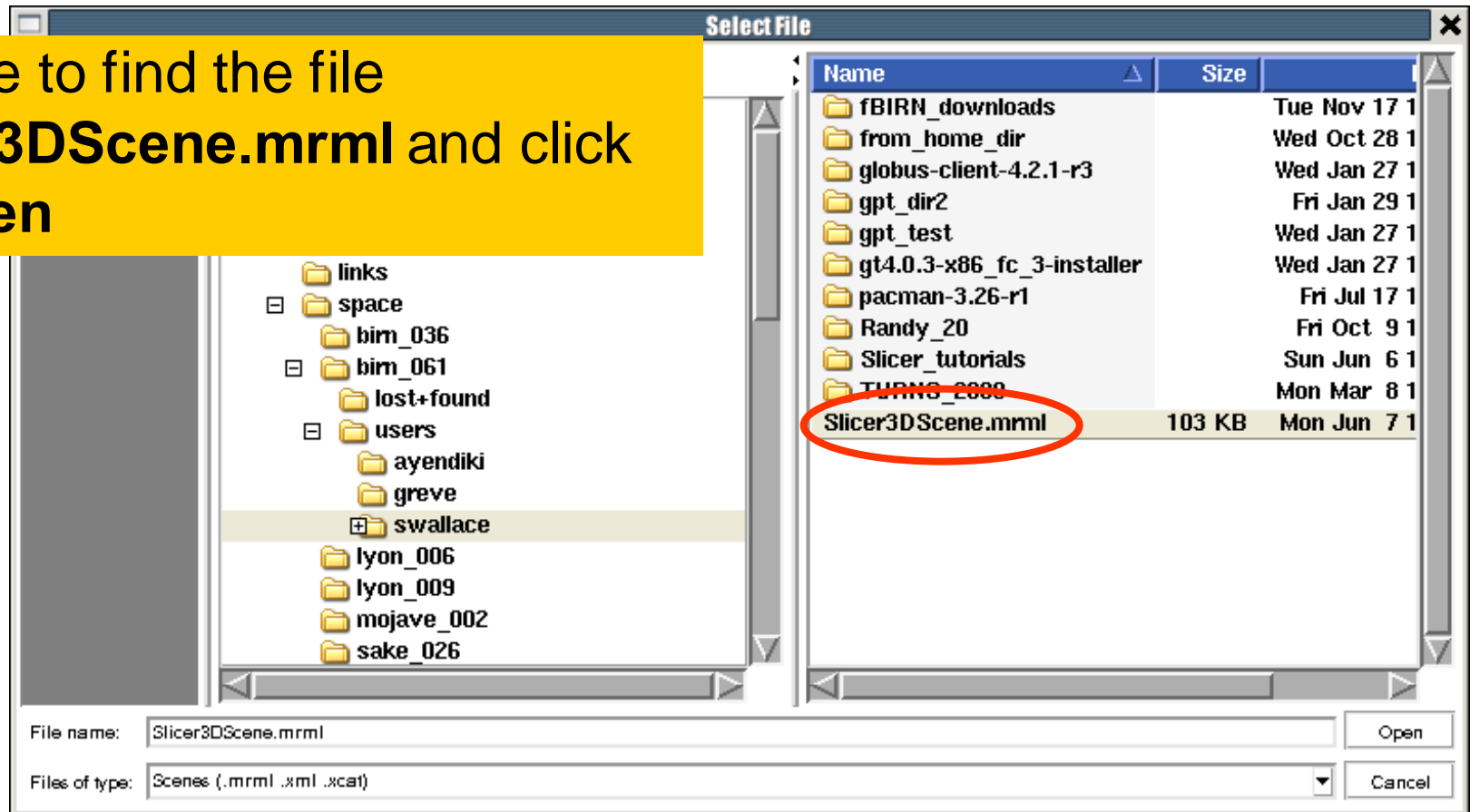
Saving Data



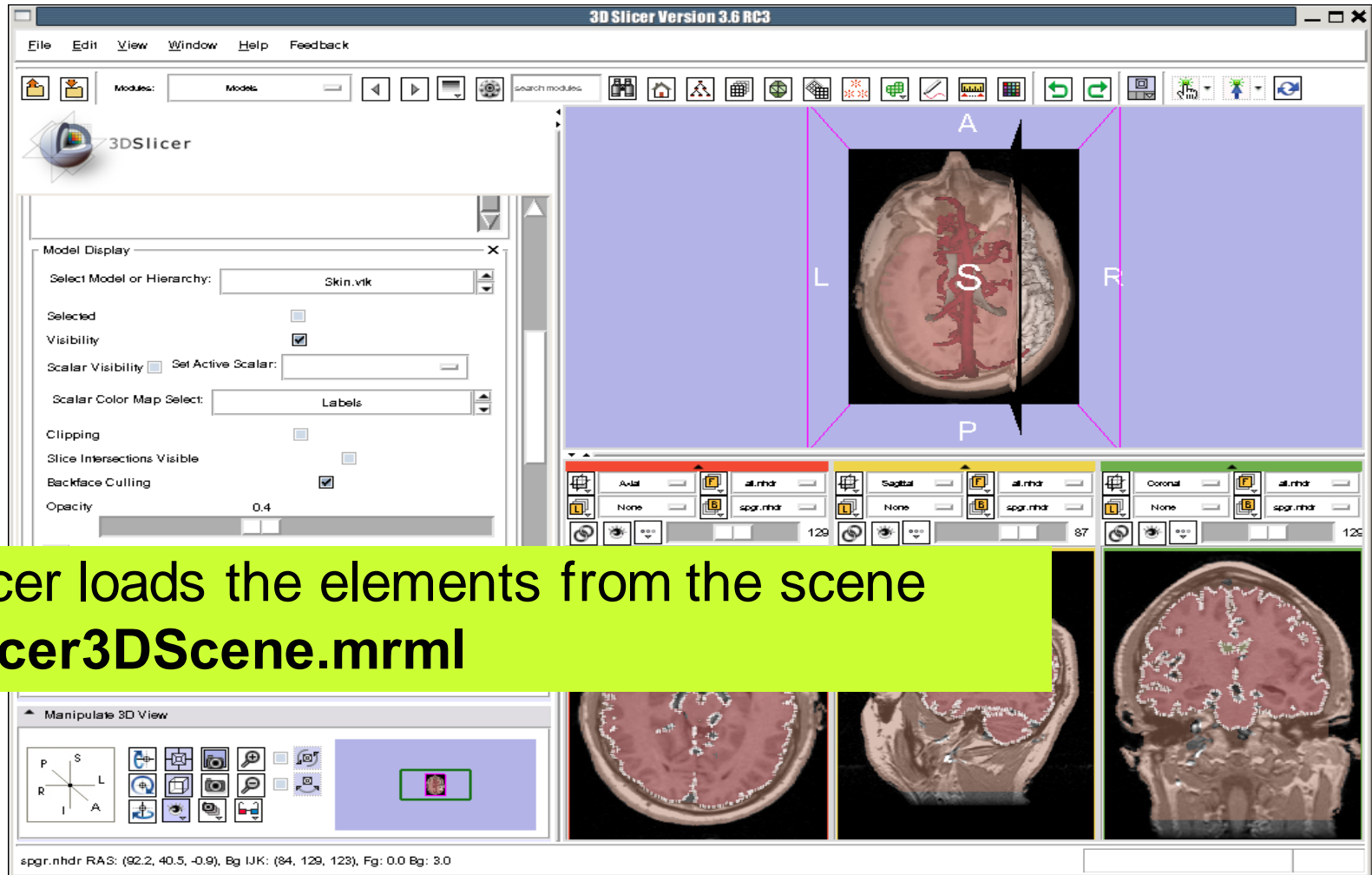


Saving Data

Browse to find the file
Slicer3DScene.mrml and click
on **Open**



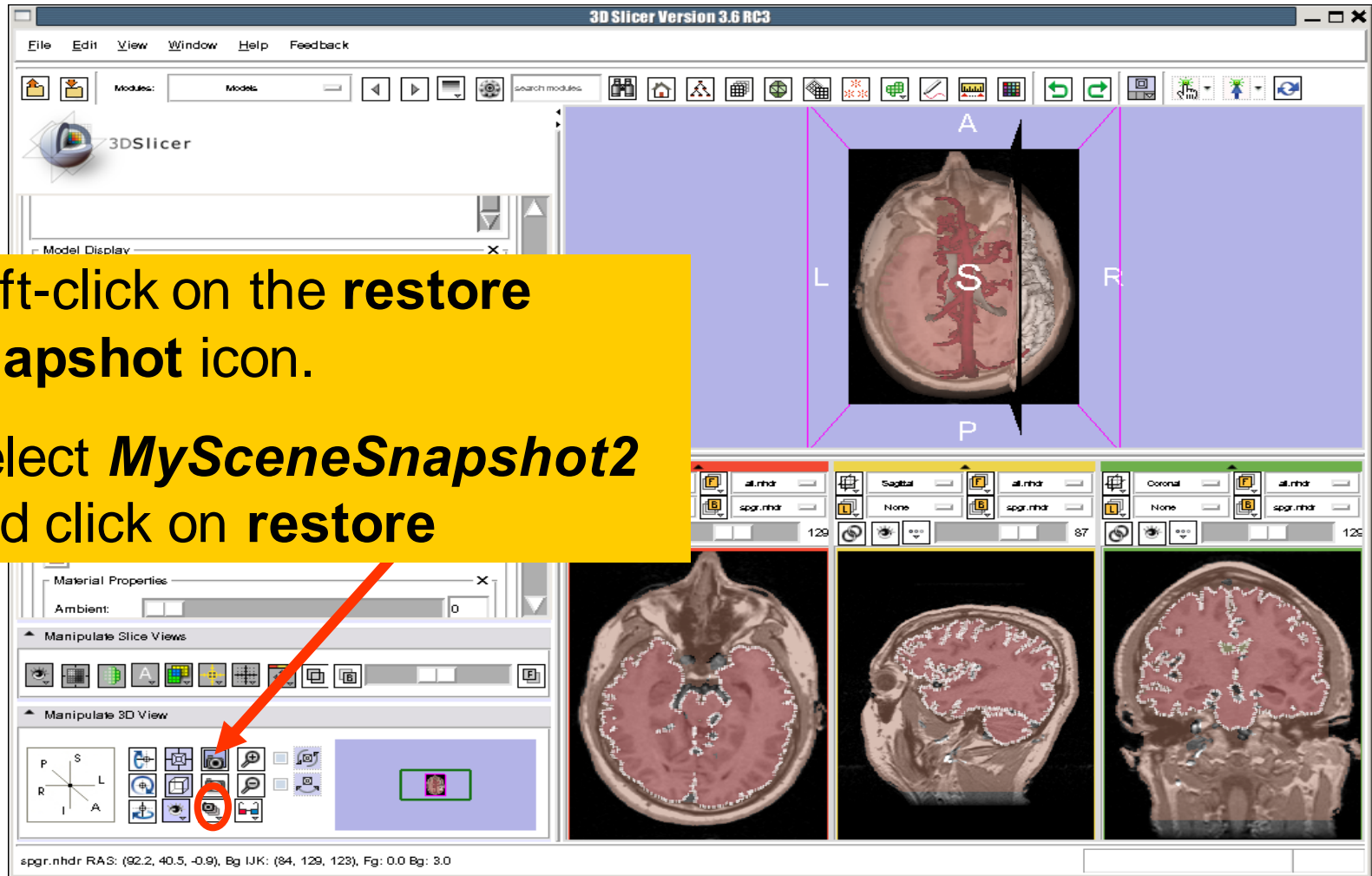
Loading a Scene



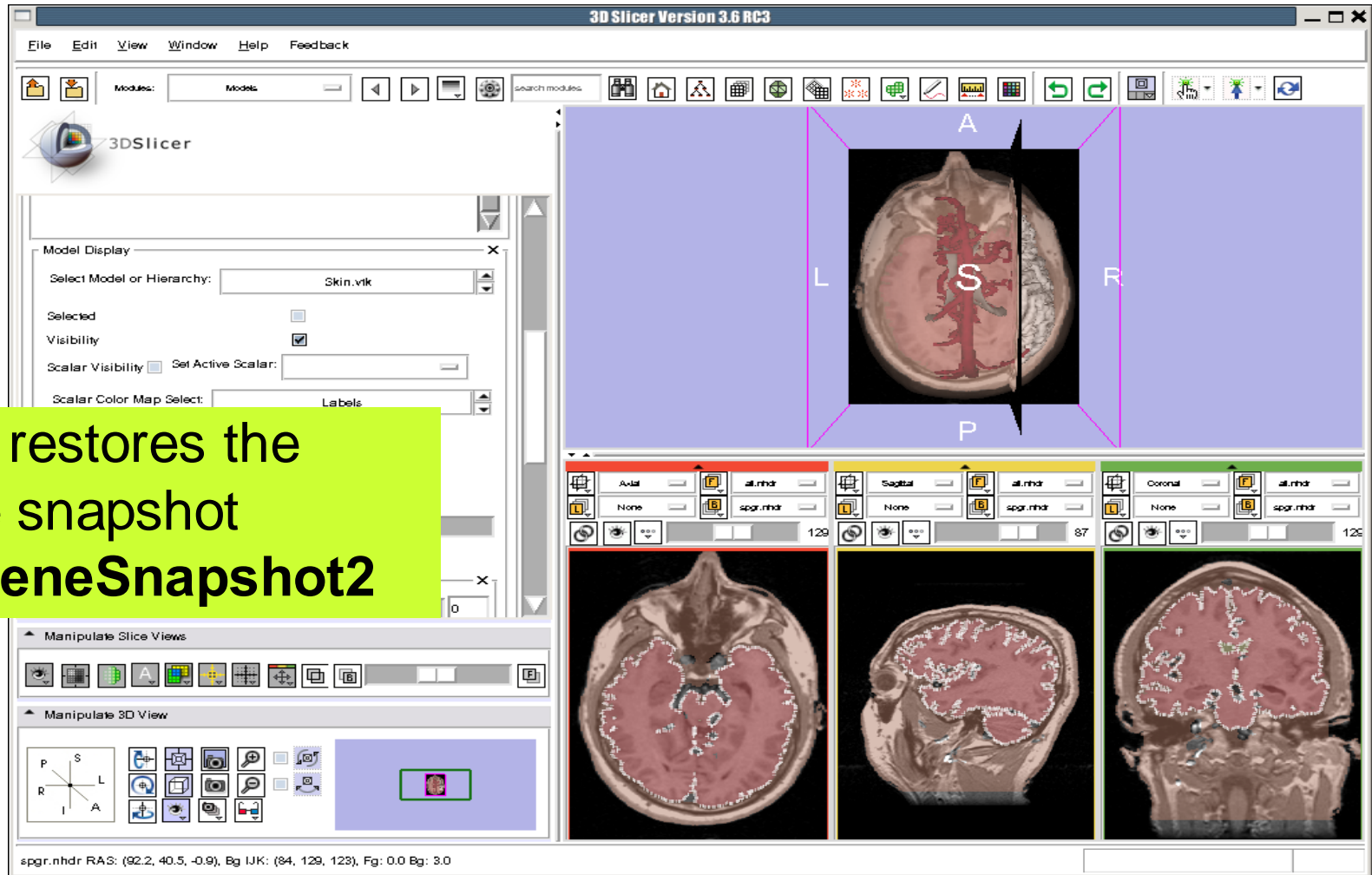
Loading a Scene

Left-click on the **restore snapshot** icon.

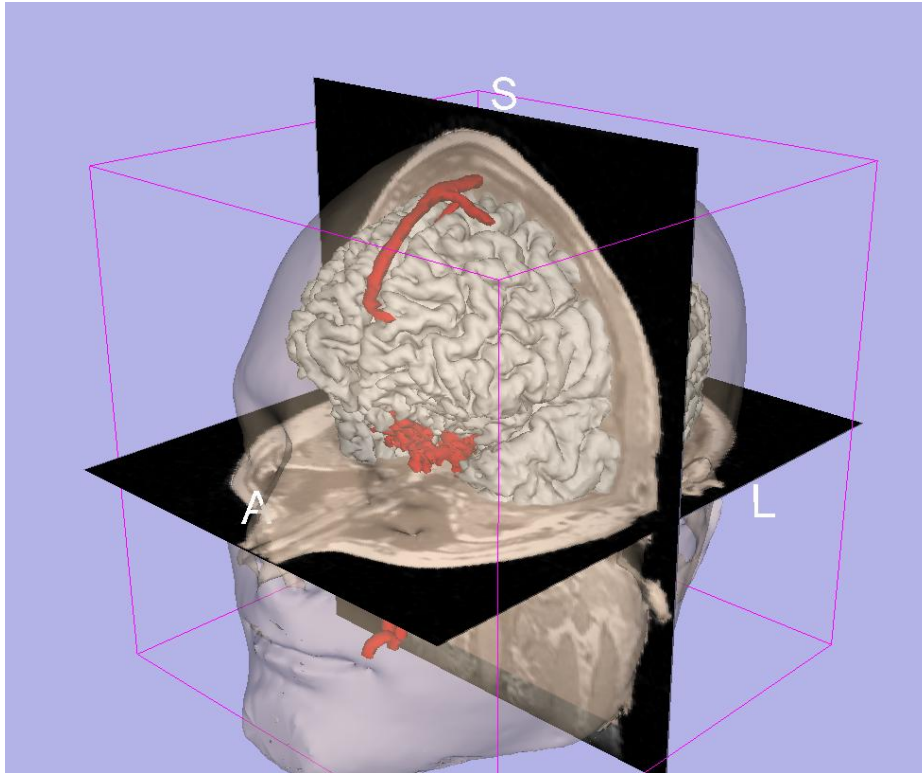
Select ***MySceneSnapshot2*** and click on **restore**



Loading a Scene



Conclusion



- 3D visualization of anatomical surface reconstructions
- 3D interaction with volumes and models
- Open-source platform



Acknowledgments



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Neuroimage Analysis Center

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