



NAC



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

# Data Loading & 3D Visualization

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- An **end-user application** for image analysis
- An **open-source environment** for software development
- A software platform that is both **easy to use** for clinical researchers and **easy to extend** for programmers

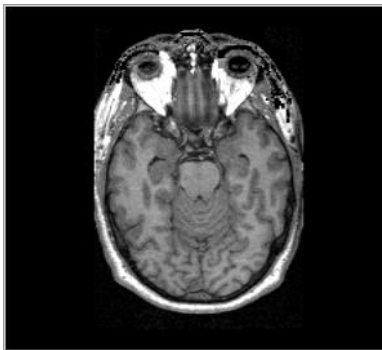


- Slicer3 is a **multi-platform** software that is developed and maintained on:
  - Windows XP
  - Linux x86\_64
  - Linux x86
  - Mac OSX – Darwin x86-Intel

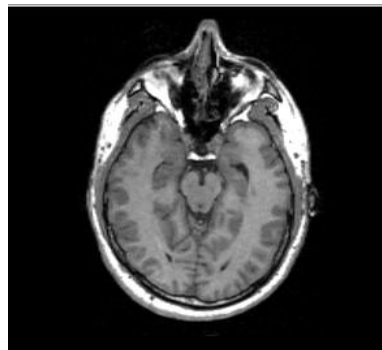
# 3D Visualization dataset

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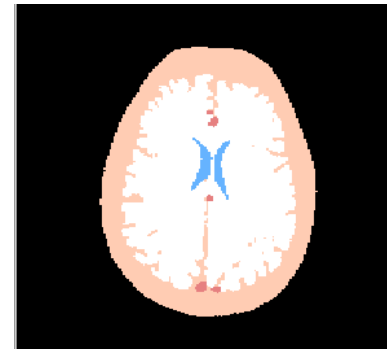
- This course is built upon three datasets of a single healthy subject brain:



MR DICOM  
GRASS



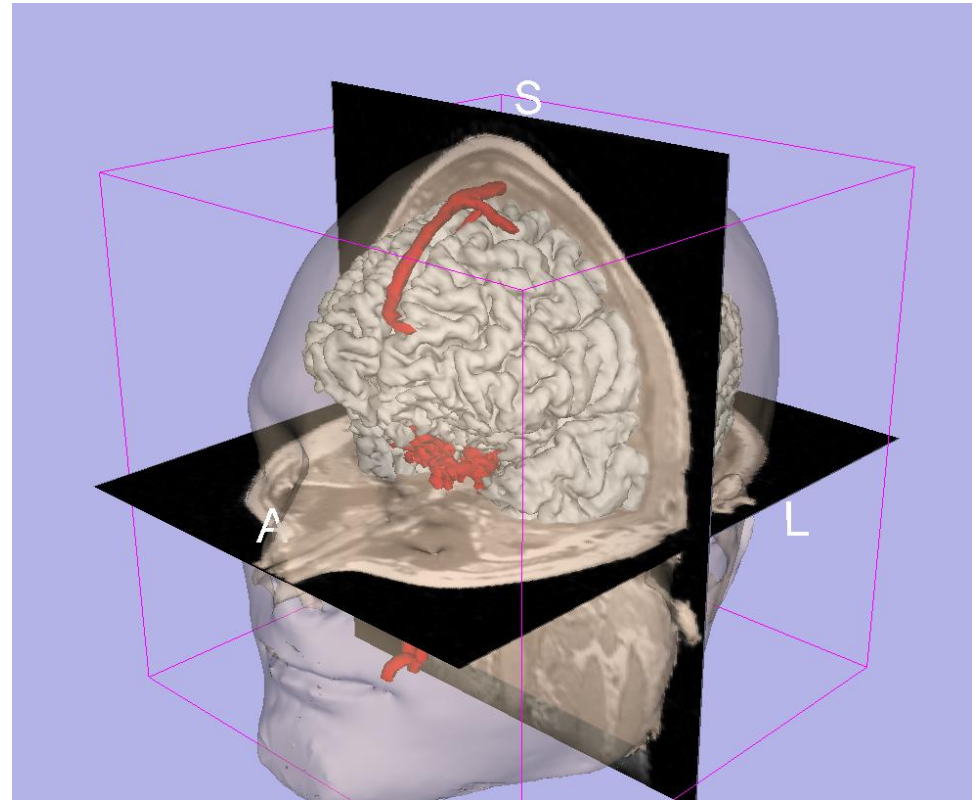
MR Nrrd  
SPGR



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.

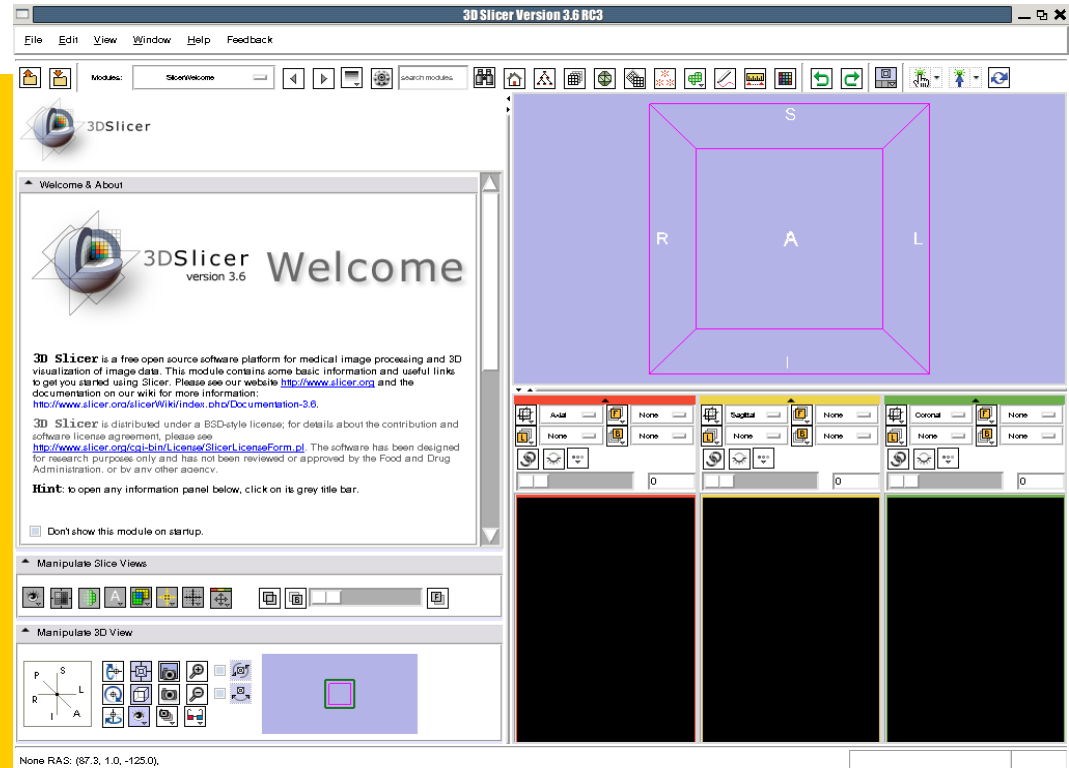




# Start Slicer3

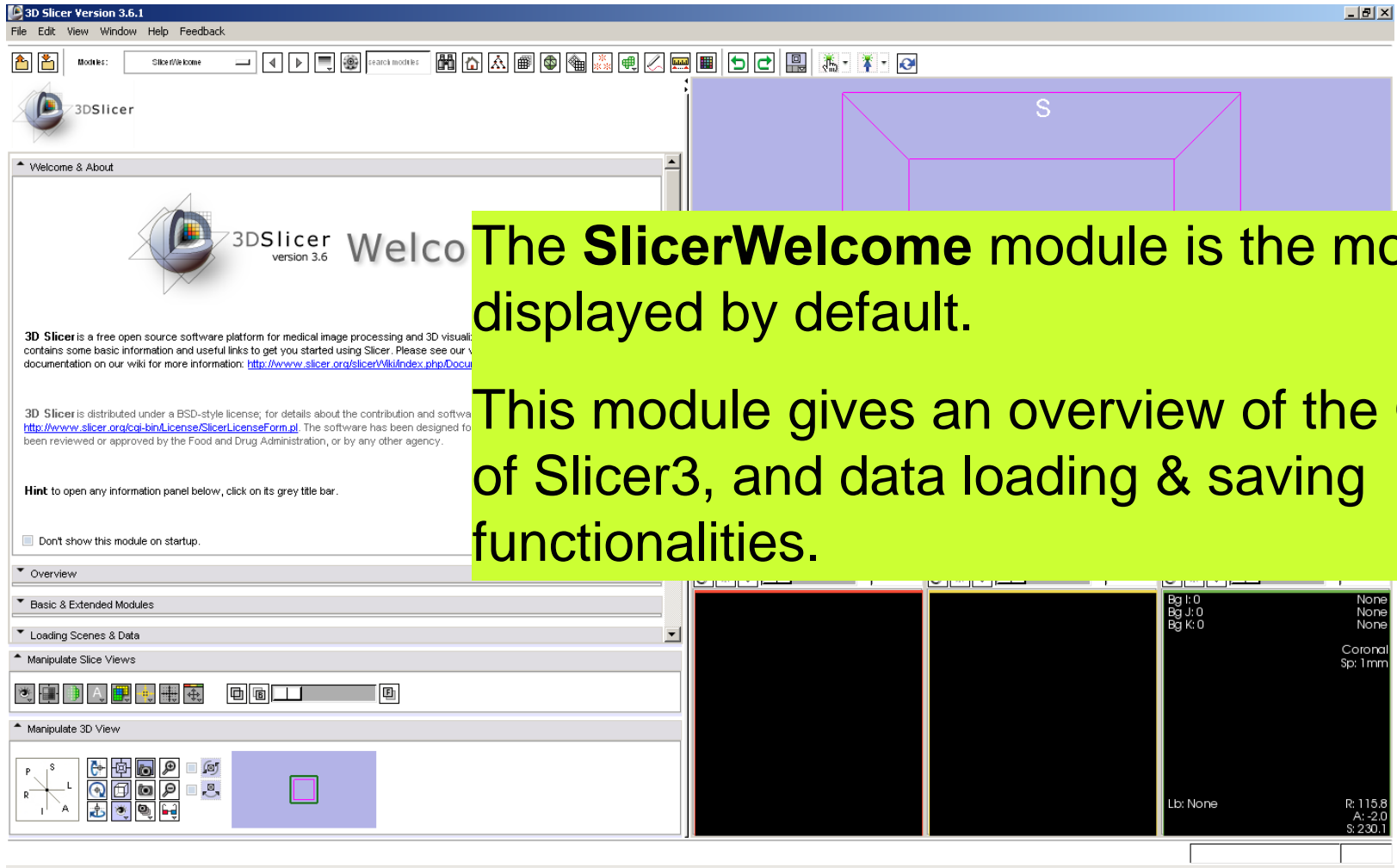
**Linux/Mac users**  
Launch the Slicer3  
executable located in  
the Slicer3.6 directory

**Windows users**  
Select  
Start → All Programs  
→ Slicer3-3.6-2011-06-07 → Slicer3





# Slicer Welcome

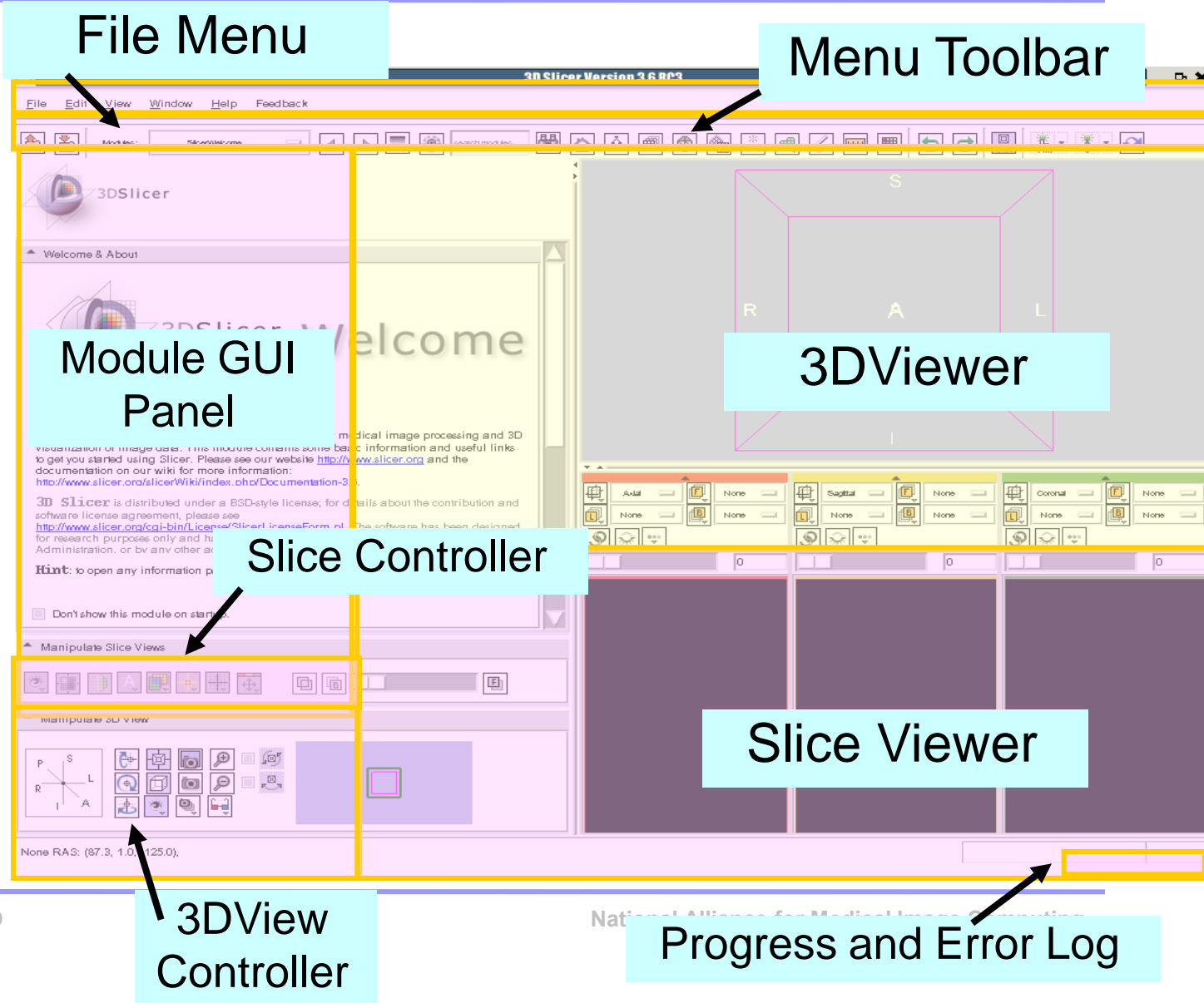


The **SlicerWelcome** module is the module displayed by default.

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

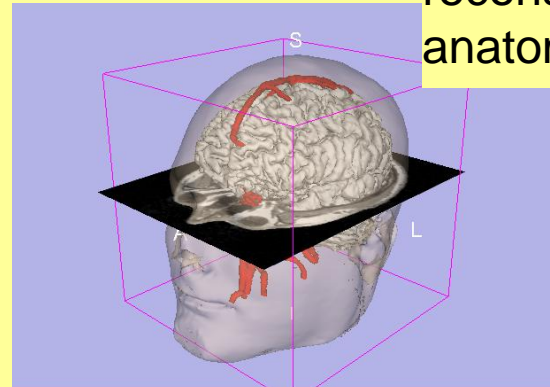




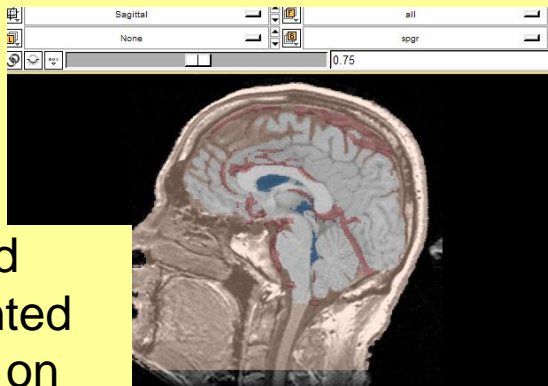
**Part 1.** Loading and visualizing multiple volumes simultaneously



**Part 3.** Visualizing 3D reconstructions of anatomical surfaces



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

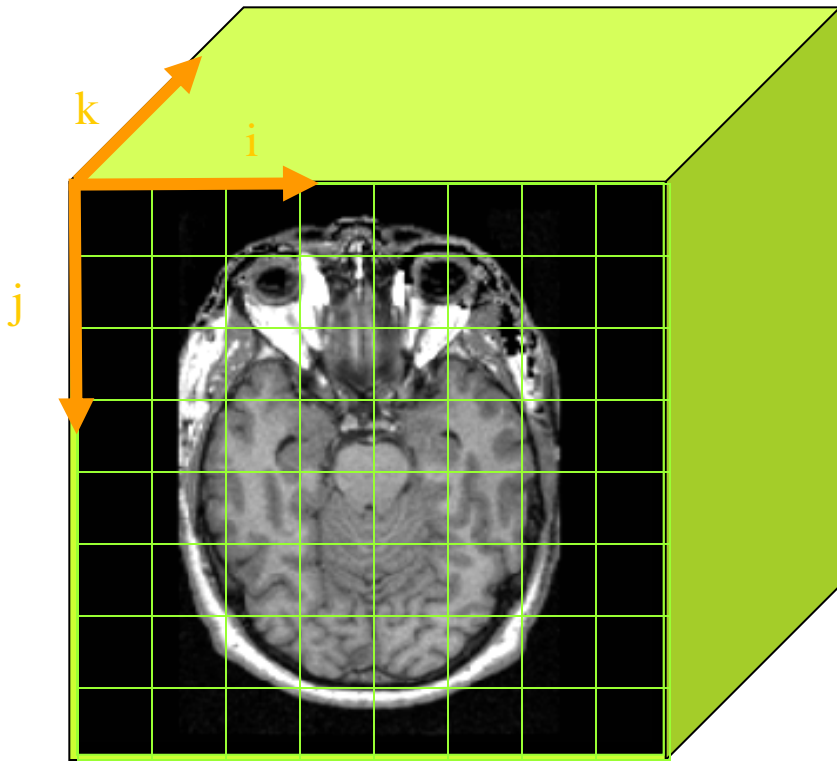


**Part 4.** The lightbox viewer

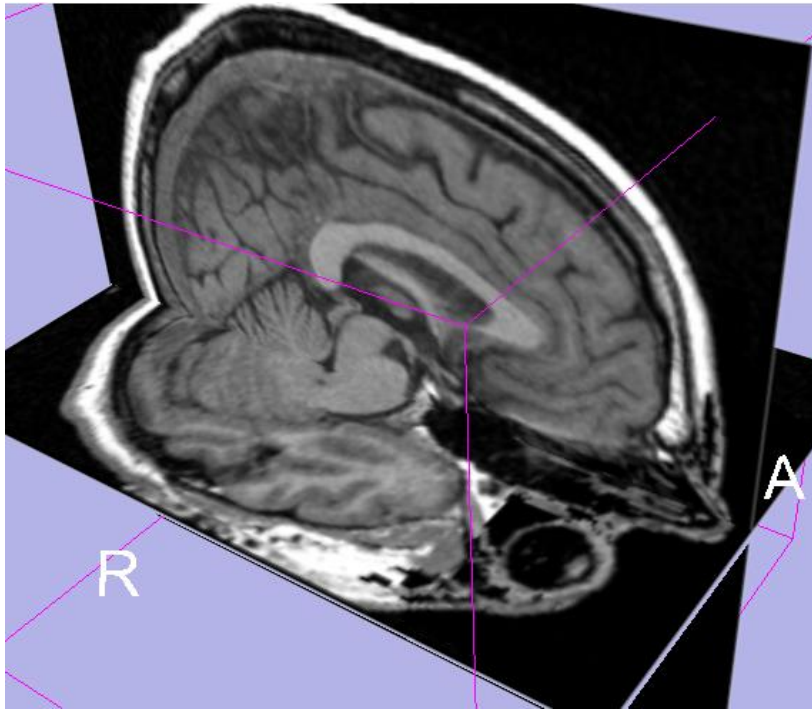
**Part 5.** Saving data

# Data Representation

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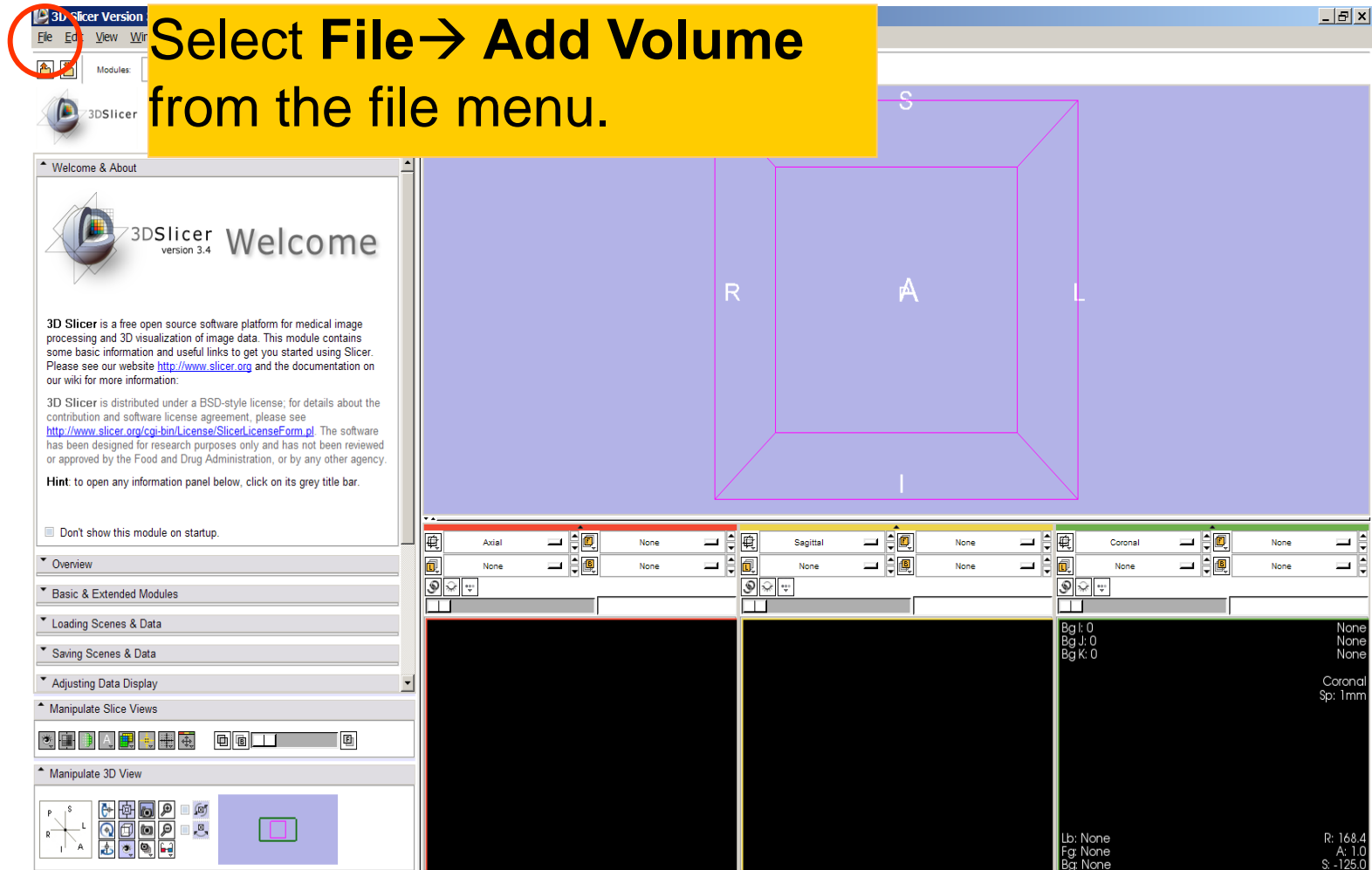


- The result of a volumetric acquisition is a **3D volume of data** related to the patient.
- The 3D raster dataset is sampled on a discrete grid with elements called **voxels** which contain the **signal intensity**.



# Part 1: Loading and visualizing multiple volumes simultaneously

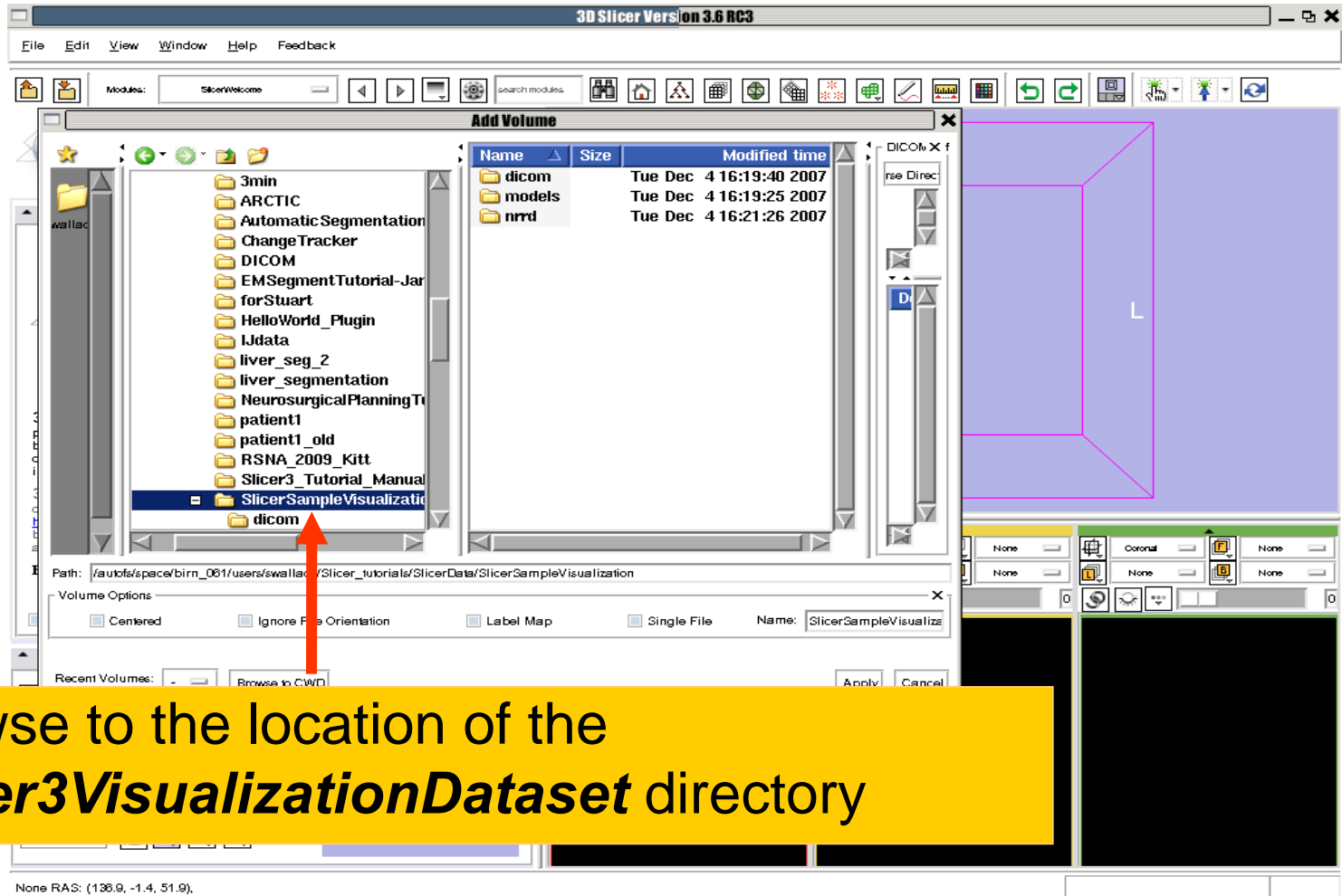
# Loading Volumes



**Select File → Add Volume**  
from the file menu.

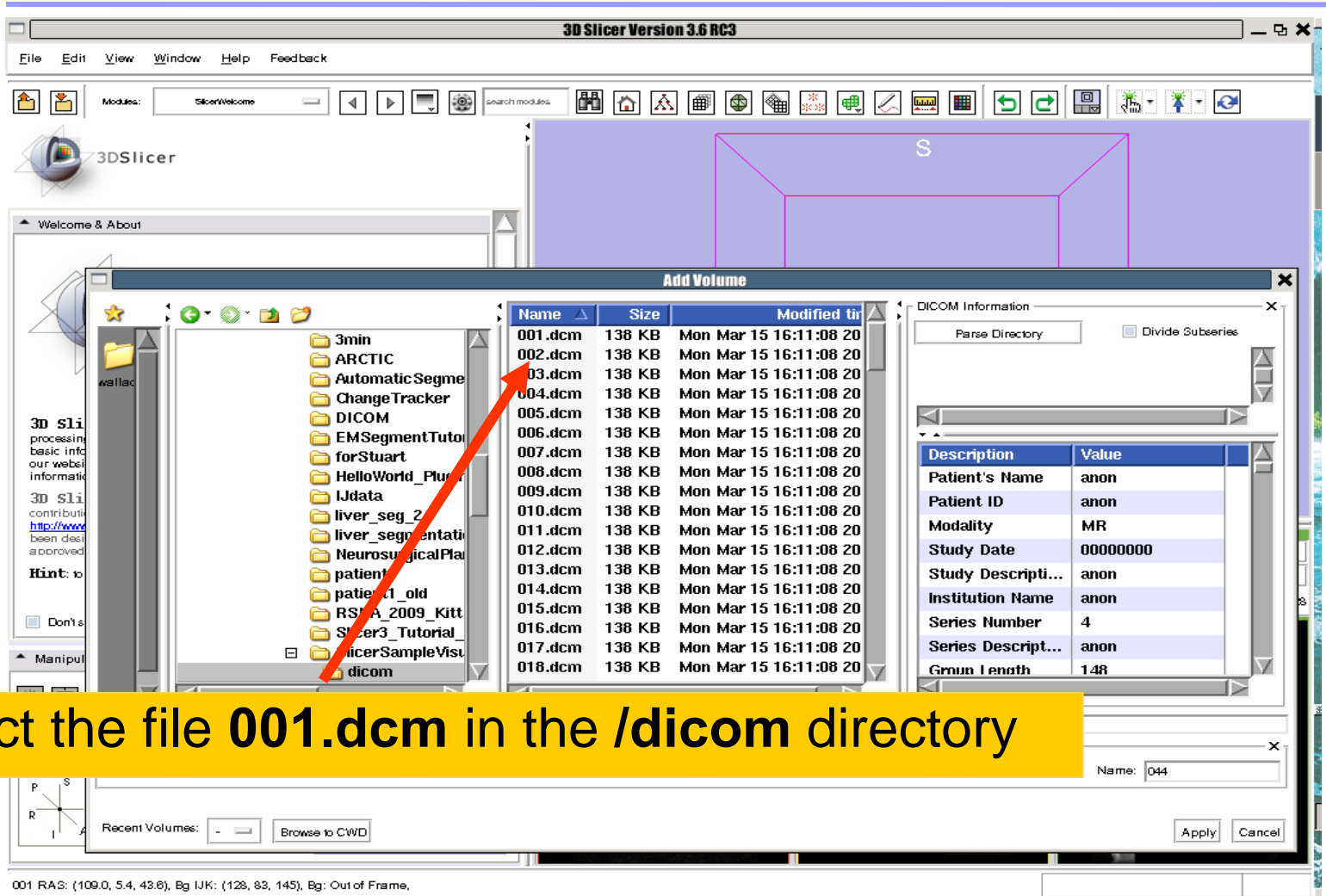
The screenshot shows the 3DSlicer software interface. A yellow callout box highlights the 'File' menu and the 'Add Volume' option. The main window displays a 3D view of a volume with a purple bounding box and axes labeled R (Right), L (Left), A (Anterior), and P (Posterior). The interface includes a 'Welcome & About' panel on the left, a 'Manipulate 3D View' panel at the bottom left, and a 'Manipulate Slice Views' panel at the bottom right. The 'Manipulate Slice Views' panel shows three slice views: Axial, Sagittal, and Coronal. The Coronal slice view is active, showing a black background with white text indicating slice parameters: Bg I: 0, Bg J: 0, Bg K: 0, None, None, None, Coronal Sp: 1mm, Lb: None, Fg: None, Bg: None, R: 168.4, A: 1.0, S: -125.0.

# Loading Volumes



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

# Loading Volumes



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: SlicerWelcome

Welcome & About

**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

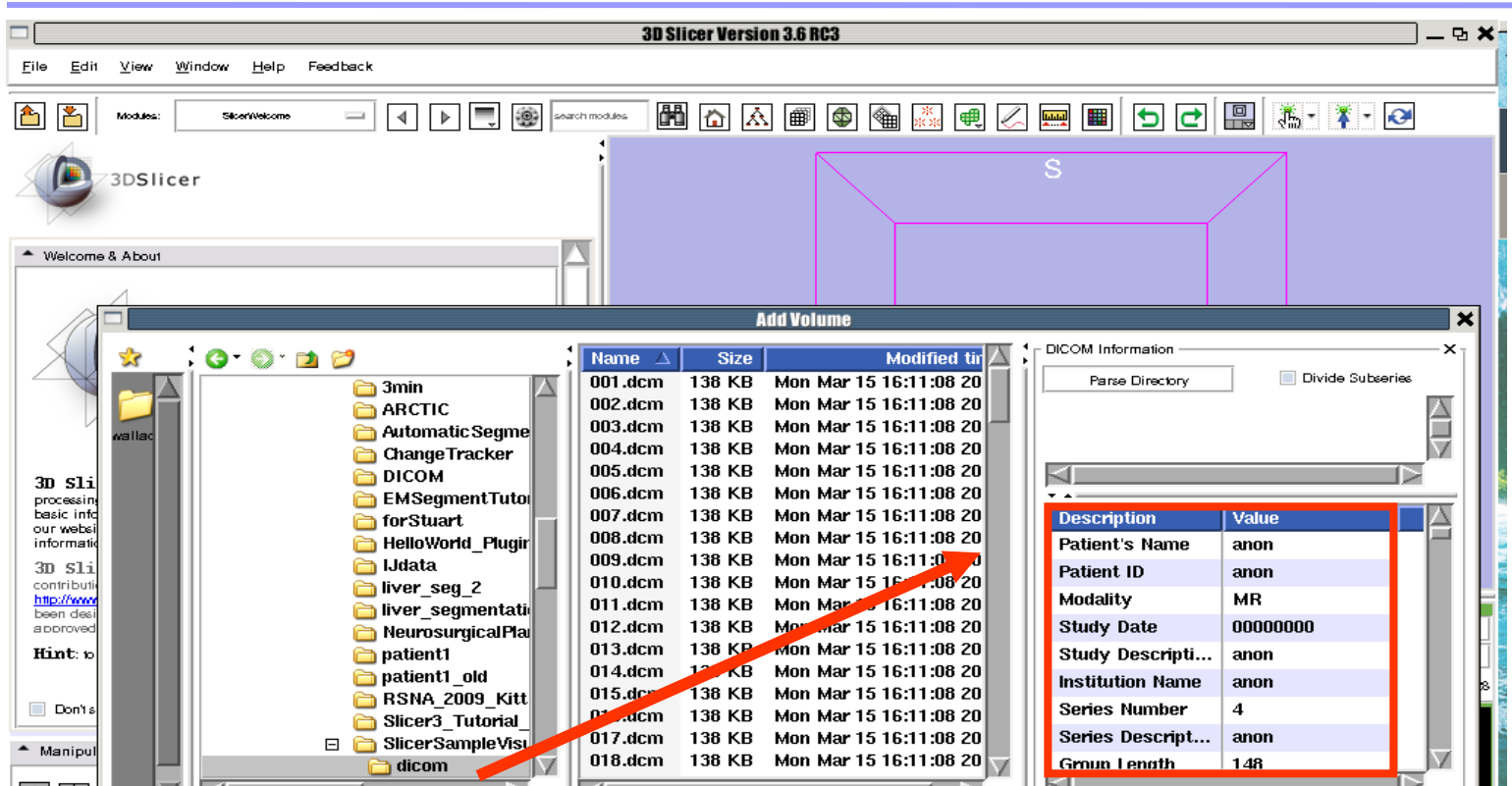
Description	Value
Patient's Name	anon
Patient ID	anon
Modality	MR
Study Date	00000000
Study Descripti...	anon
Institution Name	anon
Series Number	4
Series Descript...	anon
Group Length	148

Recent Volumes: - Browse to CWD

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

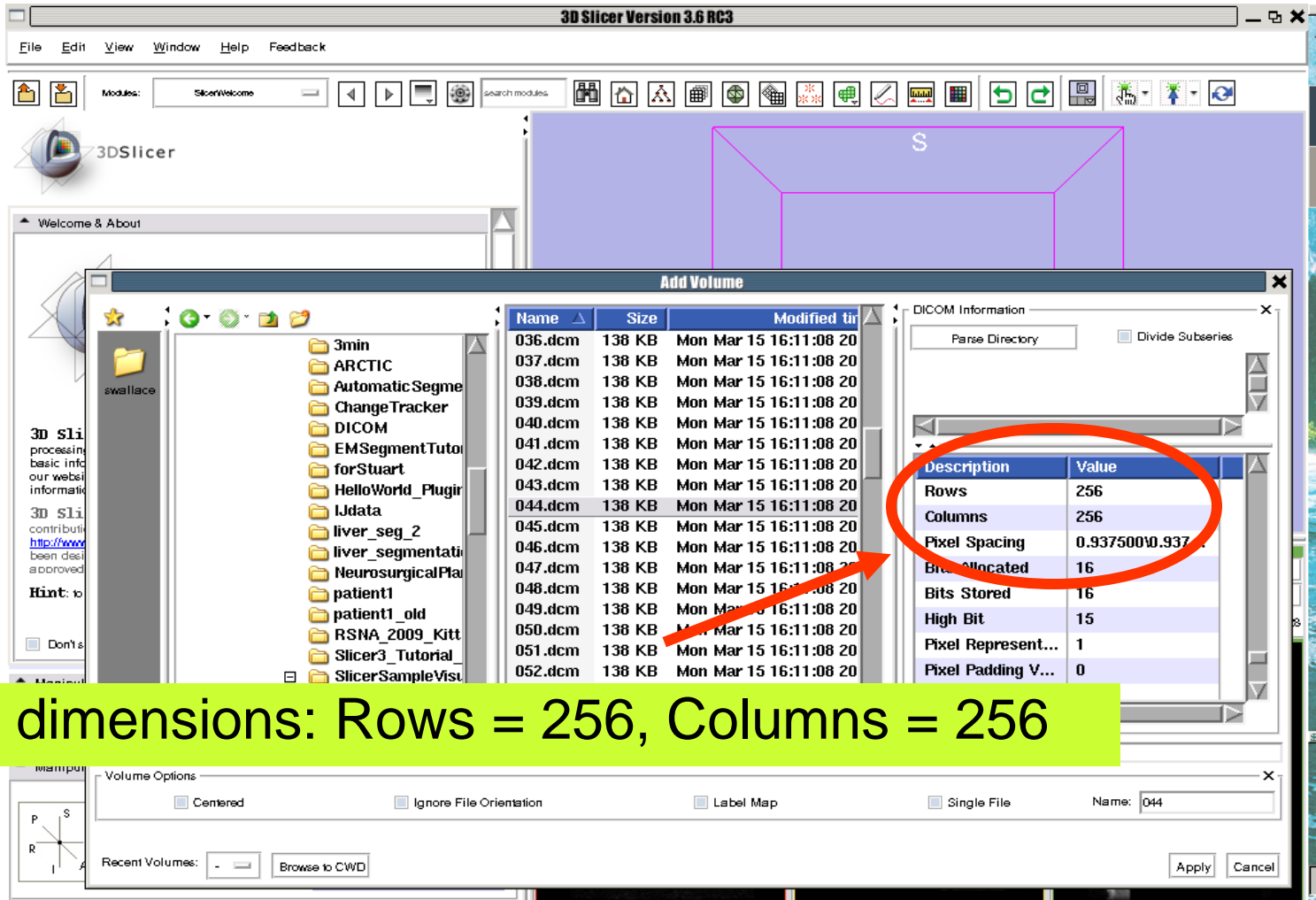
Select the file **001.dcm** in the **/dicom** directory

# 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

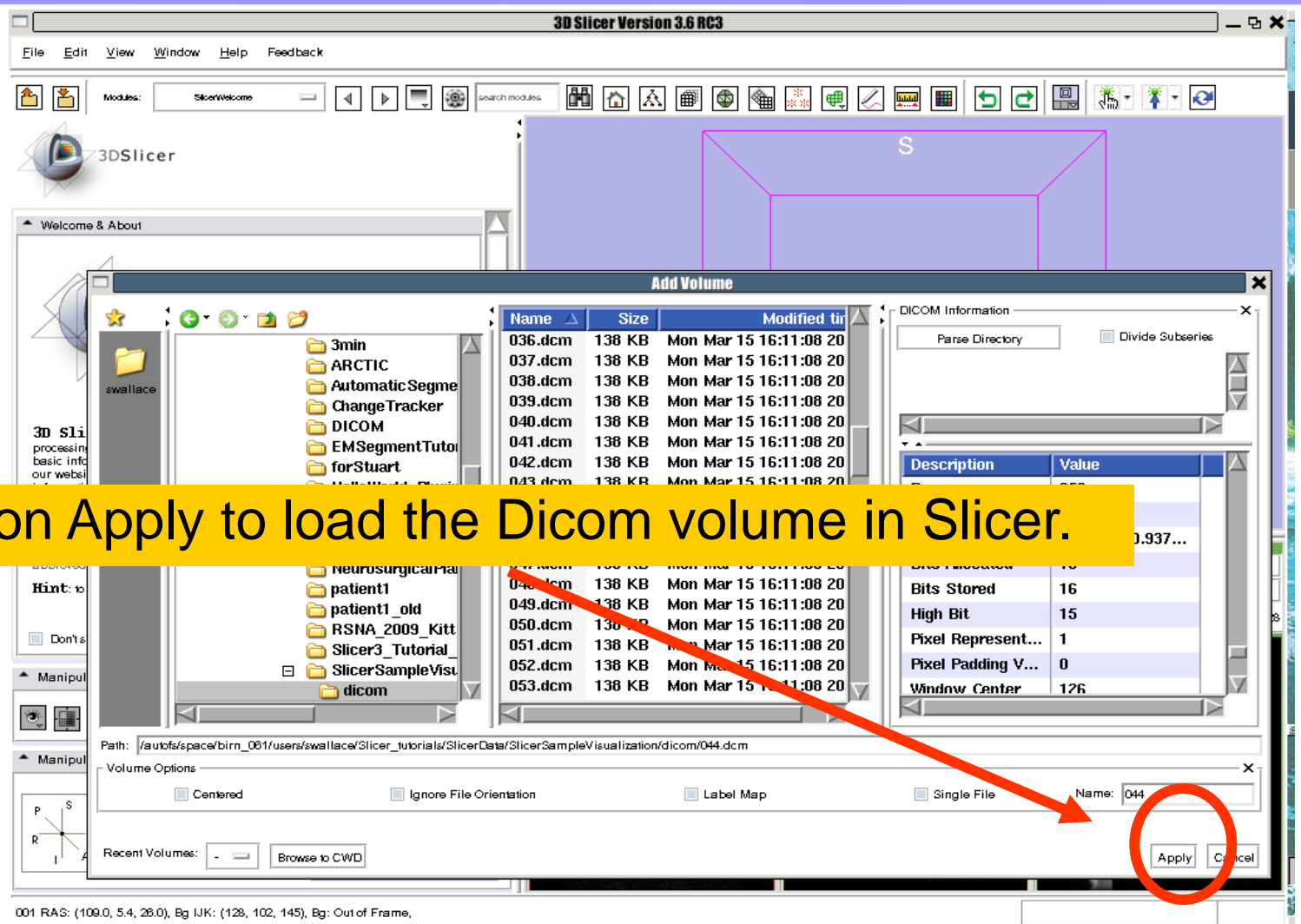
Centered  Ignore File Orientation  Label Map  Single File Name: 044

Recent Volumes:

Image dimensions: Rows = 256, Columns = 256



# Loading Volumes



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: SlicerWelcome

Welcome & About

3DSlicer

**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	
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

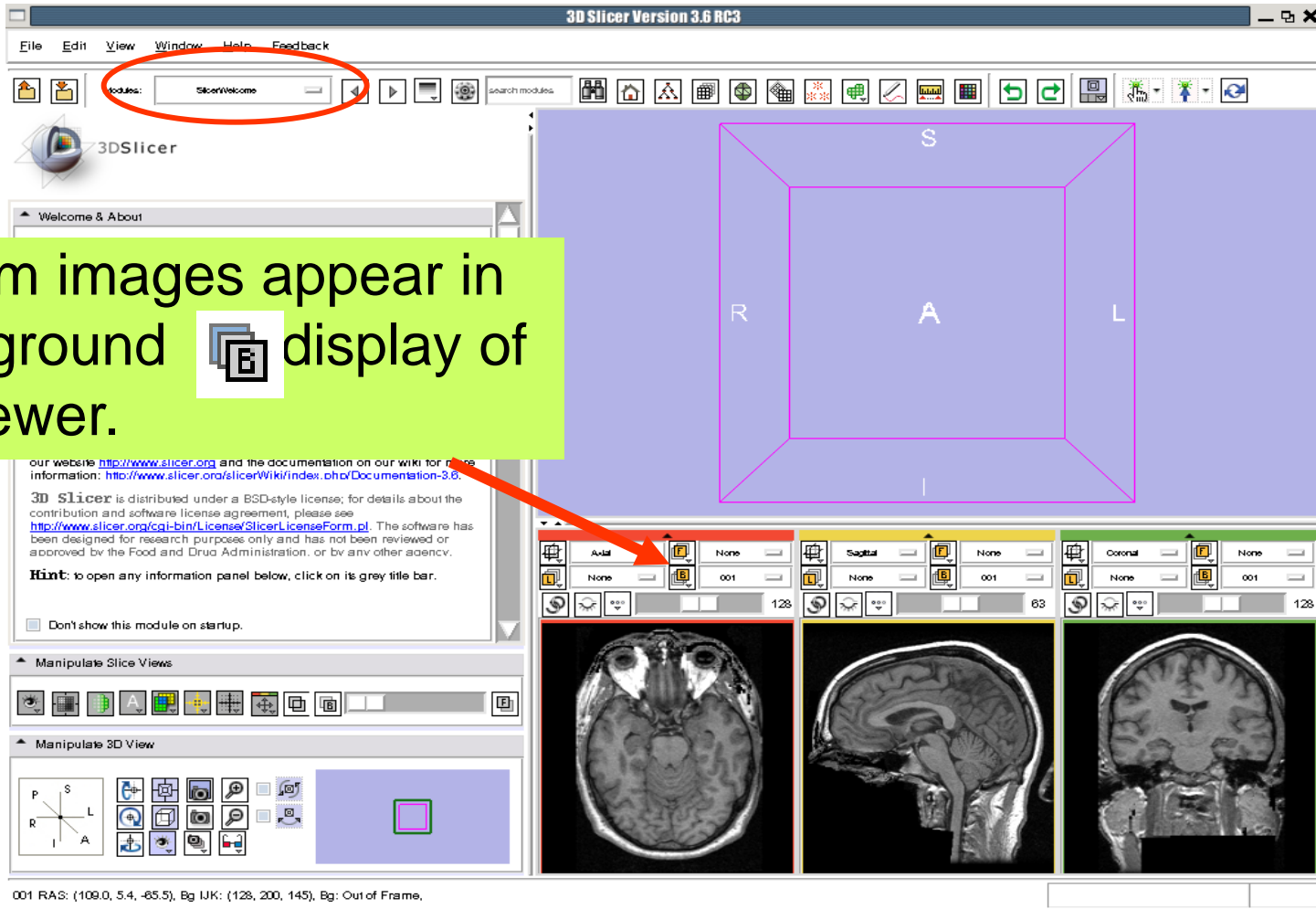
Apply Cancel

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

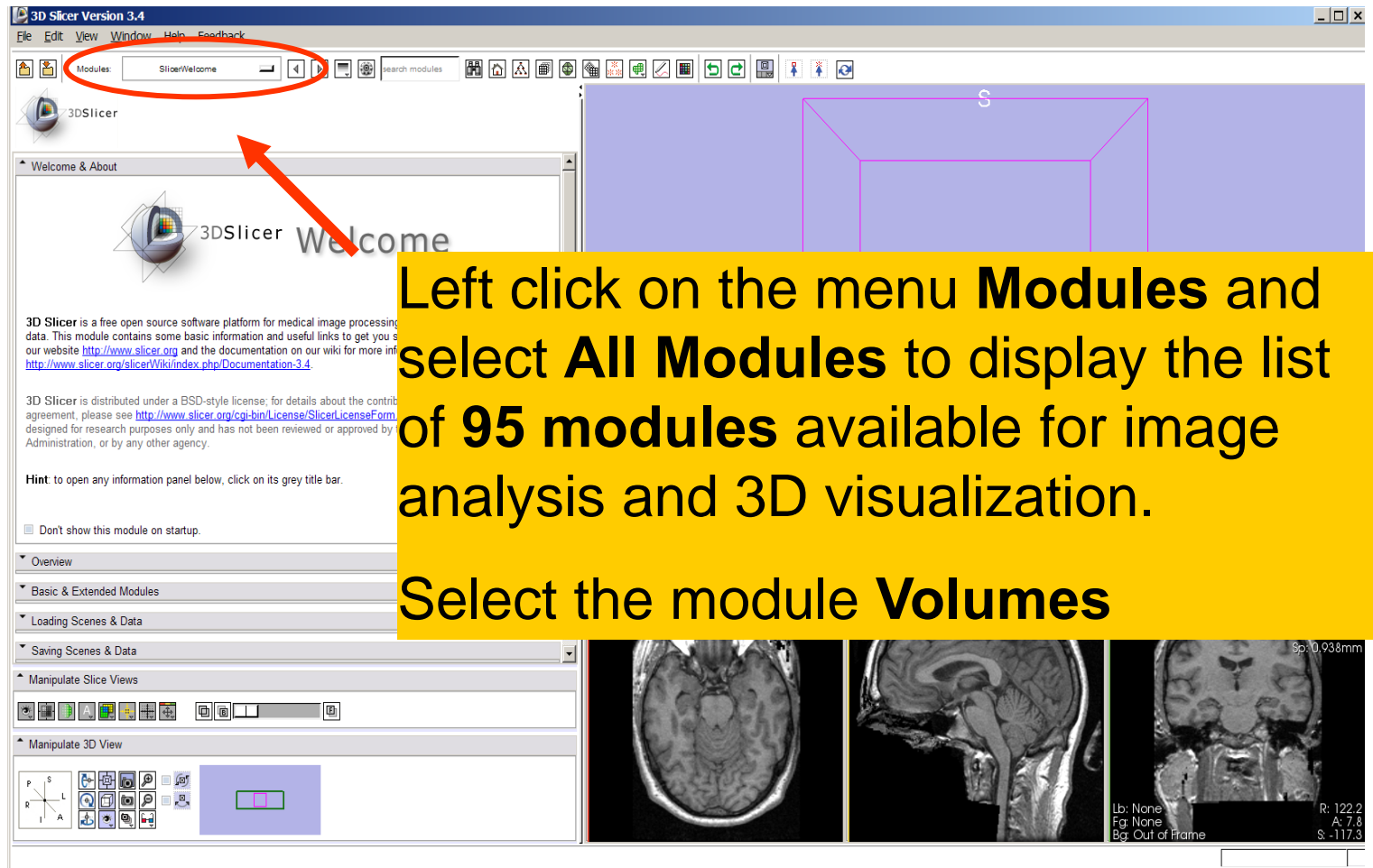
Click on Apply to load the Dicom volume in Slicer.

# Loading Volumes

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



# Loading Volumes



3D Slicer Version 3.4

File Edit View Window Help Feedback

Modules: SlicerWelcome

3DSlicer

Welcome & About

3DSlicer Welcome

3D Slicer is a free open source software platform for medical image processing data. This module contains some basic information and useful links to get you started. Our website <http://www.slicer.org> and the documentation on our wiki for more information <http://www.slicer.org/slicerWiki/index.php/Documentation-3.4>.

3D Slicer is distributed under a BSD-style license; for details about the contribution agreement, please see <http://www.slicer.org/cgi-bin/License/SlicerLicenseForm> designed for research purposes only and has not been reviewed or approved by the Administration, or by any other agency.

Hint: to open any information panel below, click on its grey title bar.

Don't show this module on startup.

Overview

Basic & Extended Modules

Loading Scenes & Data

Saving Scenes & Data

Manipulate Slice Views

Manipulate 3D View

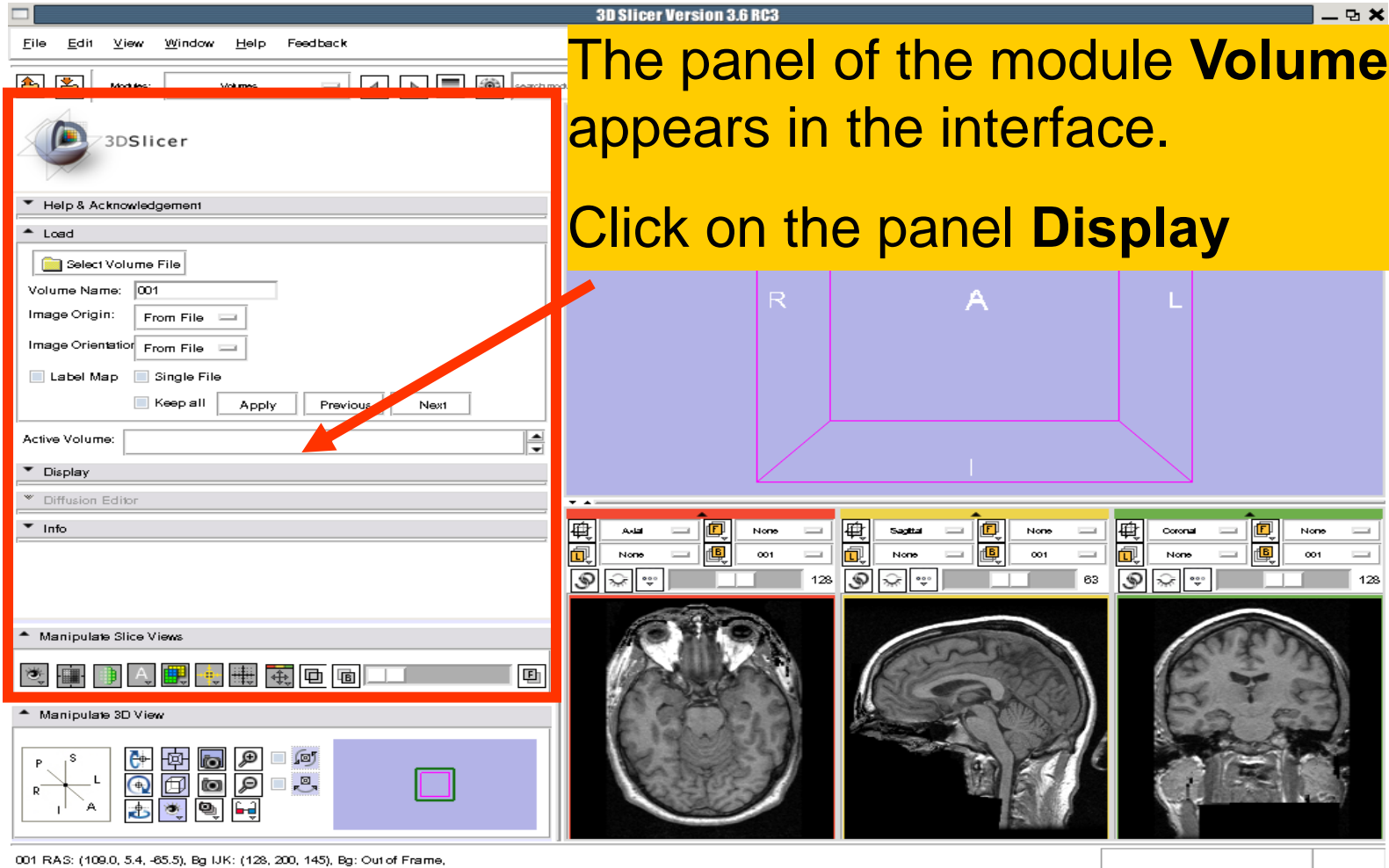
Left click on the menu **Modules** and select **All Modules** to display the list of **95 modules** available for image analysis and 3D visualization.

Select the module **Volumes**

Sp: 0.938mm

Lb: None R: 122.2  
Fg: None A: 7.8  
Bg: Out of Frame S: -117.3

# Loading Volumes



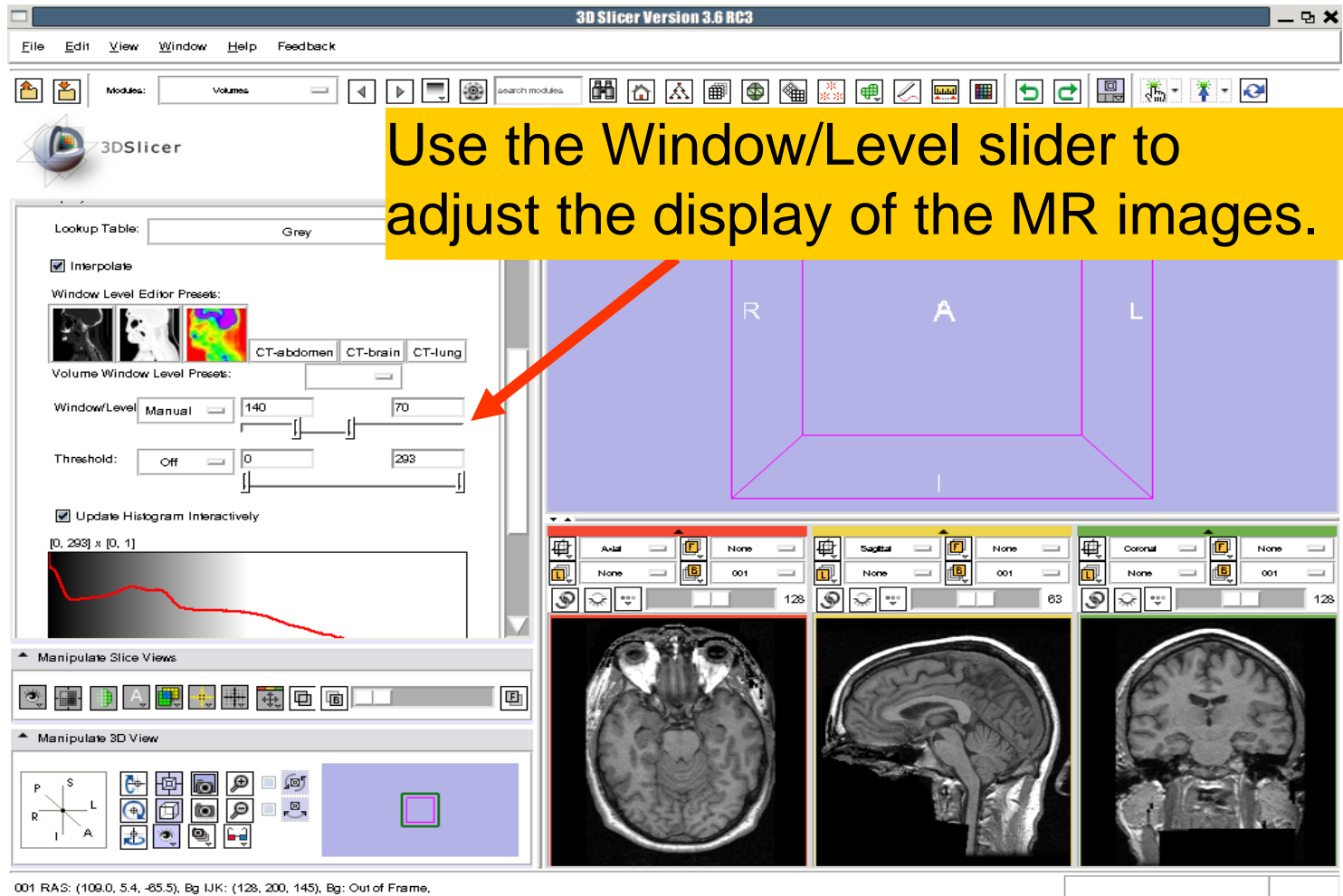
The panel of the module **Volumes** appears in the interface.

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 Version 3.6 RC3 interface. The Volumes module panel is highlighted with a red border. The panel includes sections for 'Load' (with 'Select Volume File', 'Volume Name', 'Image Origin', 'Image Orientation', 'Label Map', 'Single File', 'Keep all', 'Apply', 'Previous', 'Next'), 'Display', 'Diffusion Editor', 'Info', 'Manipulate Slice Views', and 'Manipulate 3D View'. A red arrow points to the 'Display' section. 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, each with a corresponding MRI slice image.

# Loading Volumes



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Volumes

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

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]

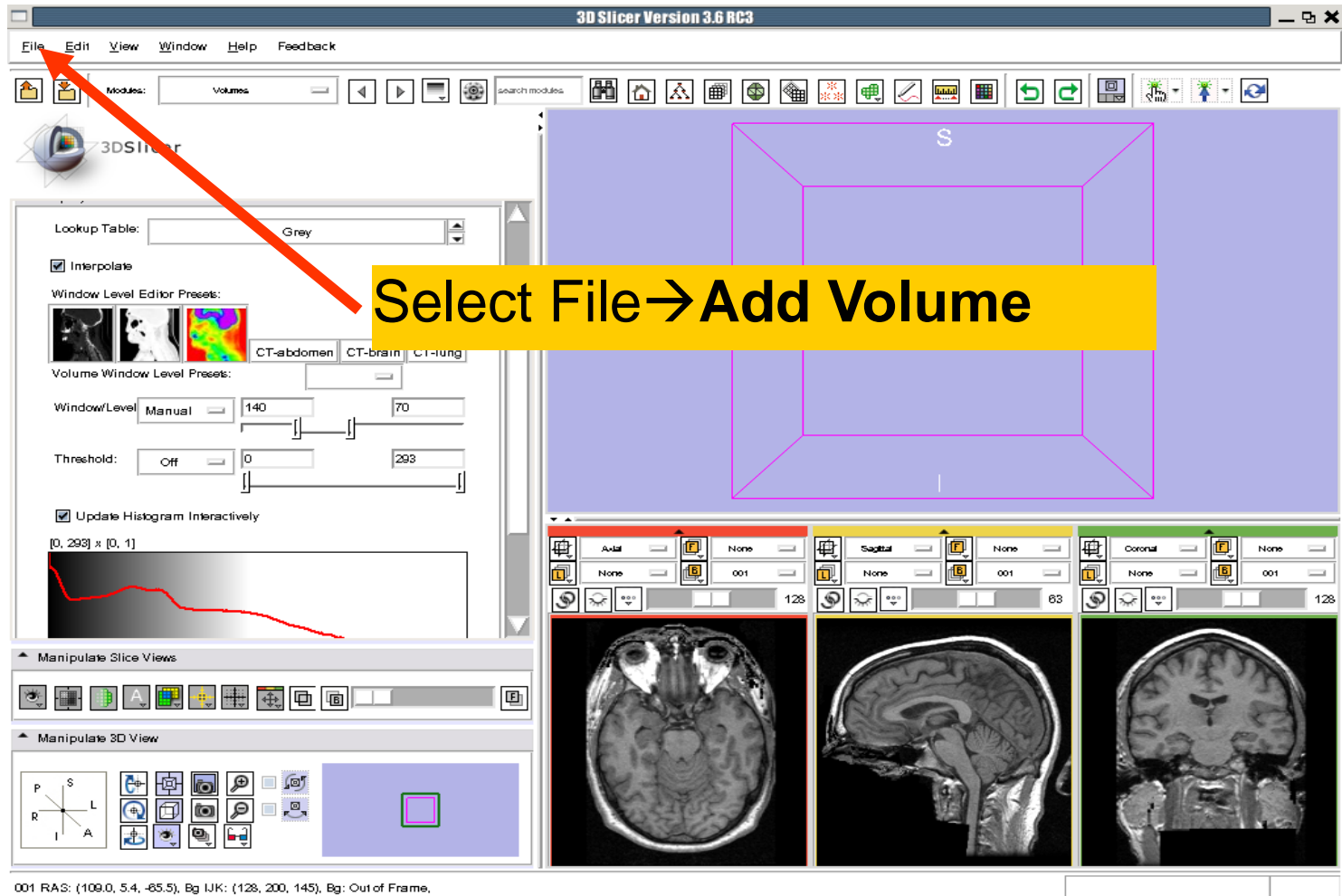
Manipulate Slice Views

Manipulate 3D View

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

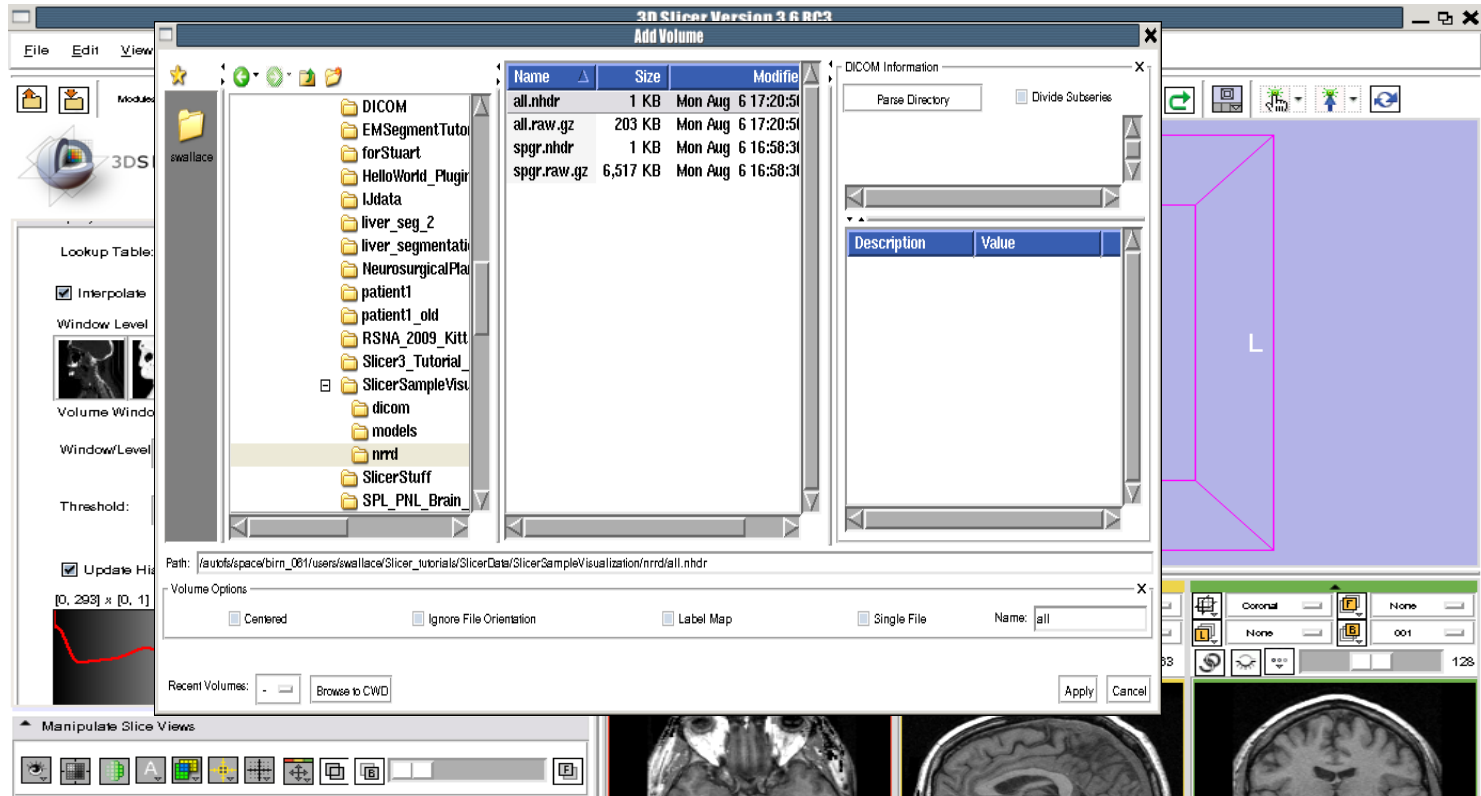
The screenshot displays the 3D Slicer interface. A yellow callout box with a red arrow points to the 'Window/Level' slider in the 'Volume Window Level Presets' section. The slider is set to 'Manual' with values of 140 and 70. Below the slider is a histogram showing the intensity distribution of the MR image. The main 3D view shows three orthogonal slice views: Axial, Sagittal, and Coronal. The Axial view is selected and shows a brain slice with 'R', 'A', and 'L' markers. The Sagittal and Coronal views show the same slice from different perspectives. The status bar at the bottom indicates the current RAS coordinates and background settings.

# Loading Volumes



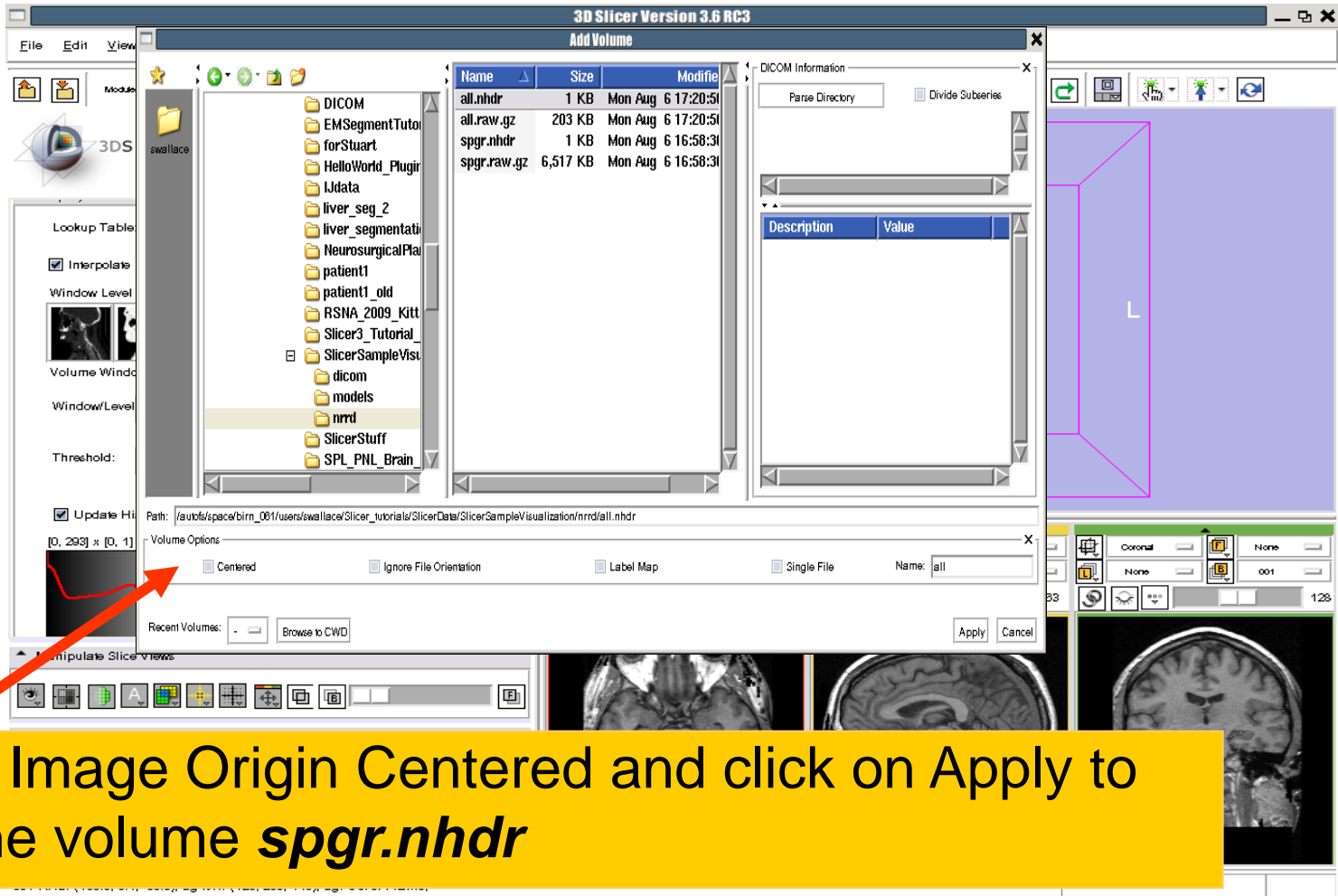
The screenshot displays the 3D Slicer software interface. The title bar reads "3D Slicer Version 3.6 RC3". The menu bar includes "File", "Edit", "View", "Window", "Help", and "Feedback". A red arrow points from the "File" menu to a yellow callout box that says "Select File → Add Volume". The main 3D view area shows a purple volume with a white wireframe box labeled 'S'. Below the 3D view are three slice view panels: Axial, Sagittal, and Coronal. The Axial panel shows a brain slice with a red line indicating the window level. The Sagittal and Coronal panels show corresponding brain slices. The bottom status bar displays coordinates: "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

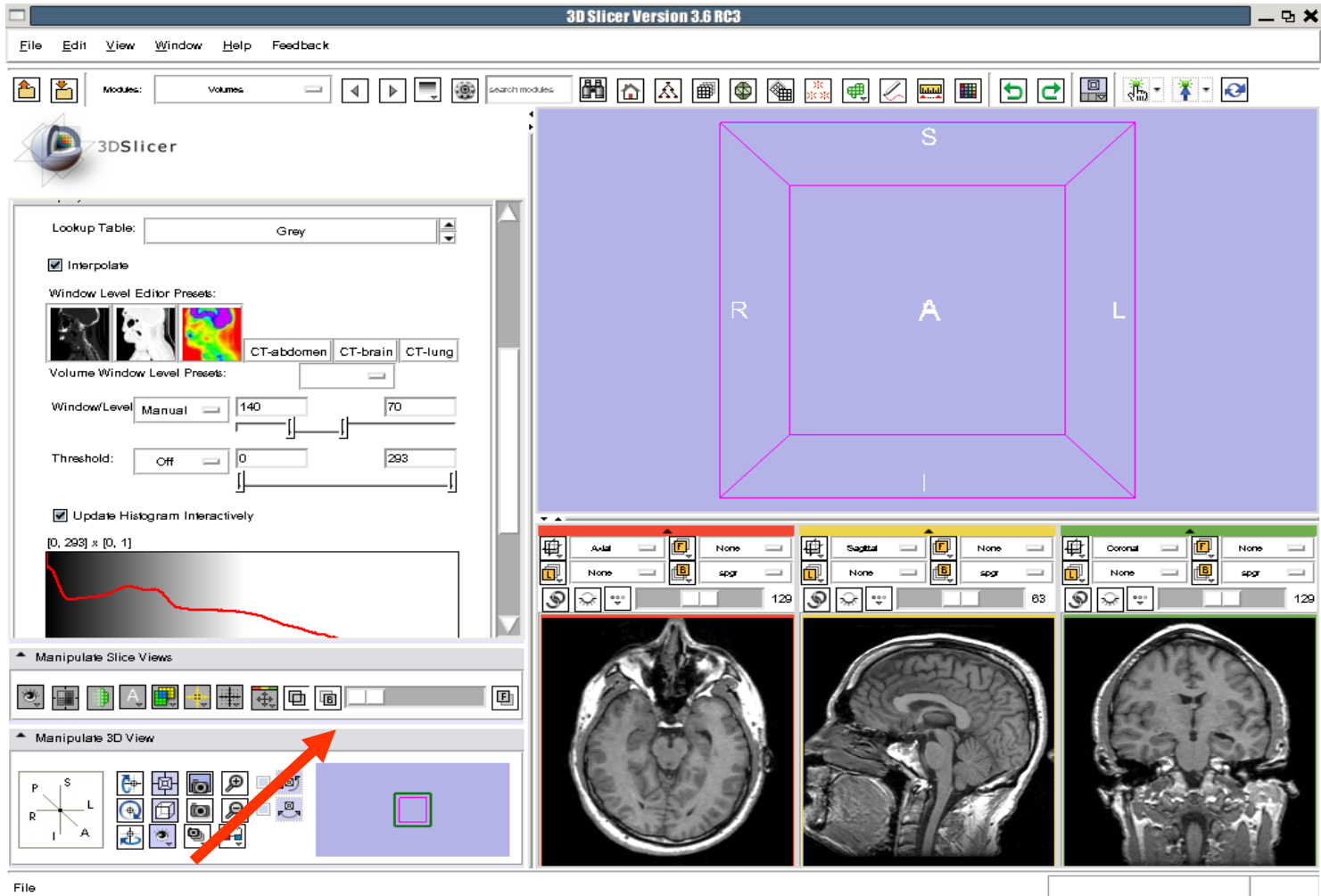
Centered     Ignore File Orientation     Label Map     Single File    Name: all

Recent Volumes:    Browse to CWD    Apply    Cancel

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



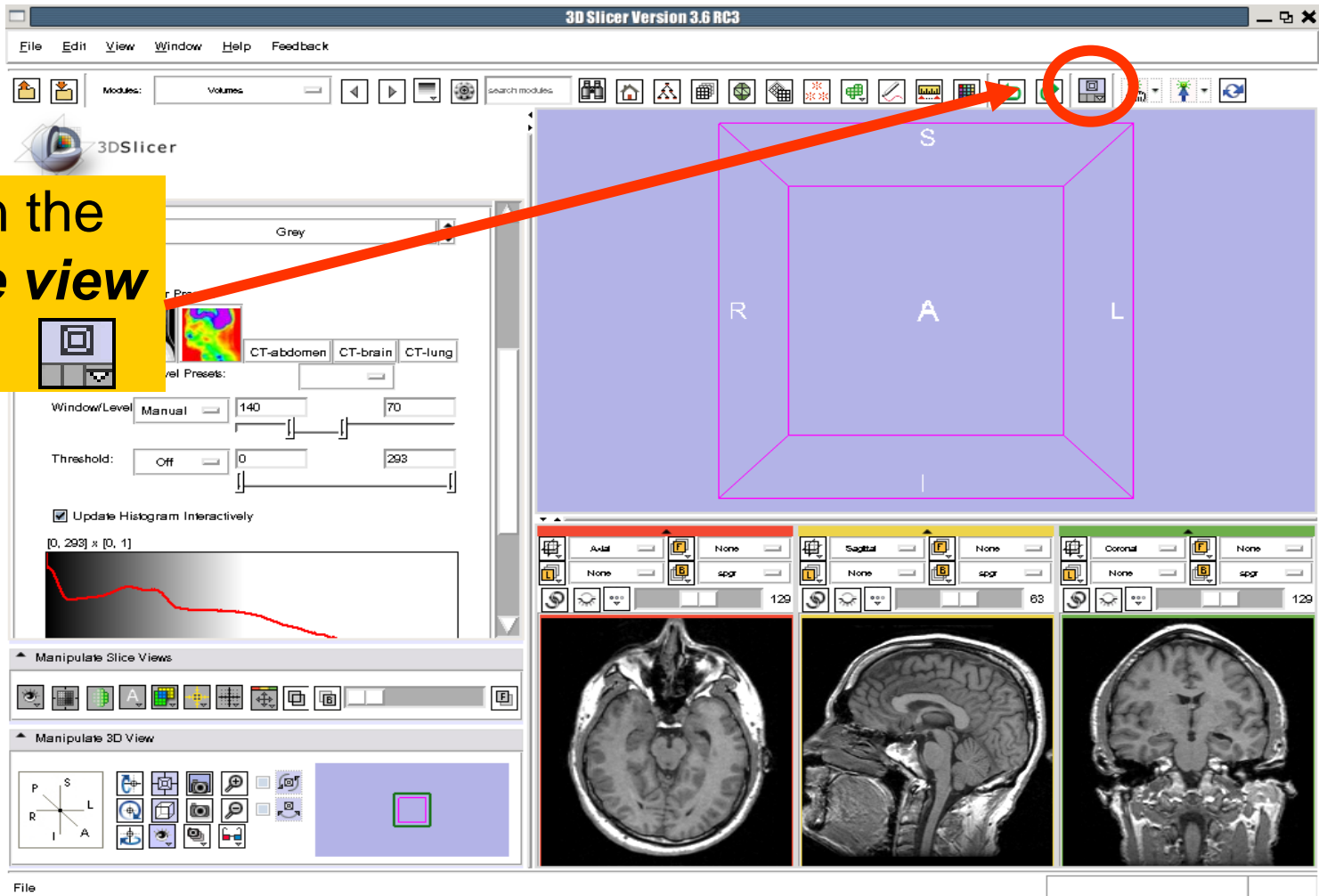
# Loading Volumes



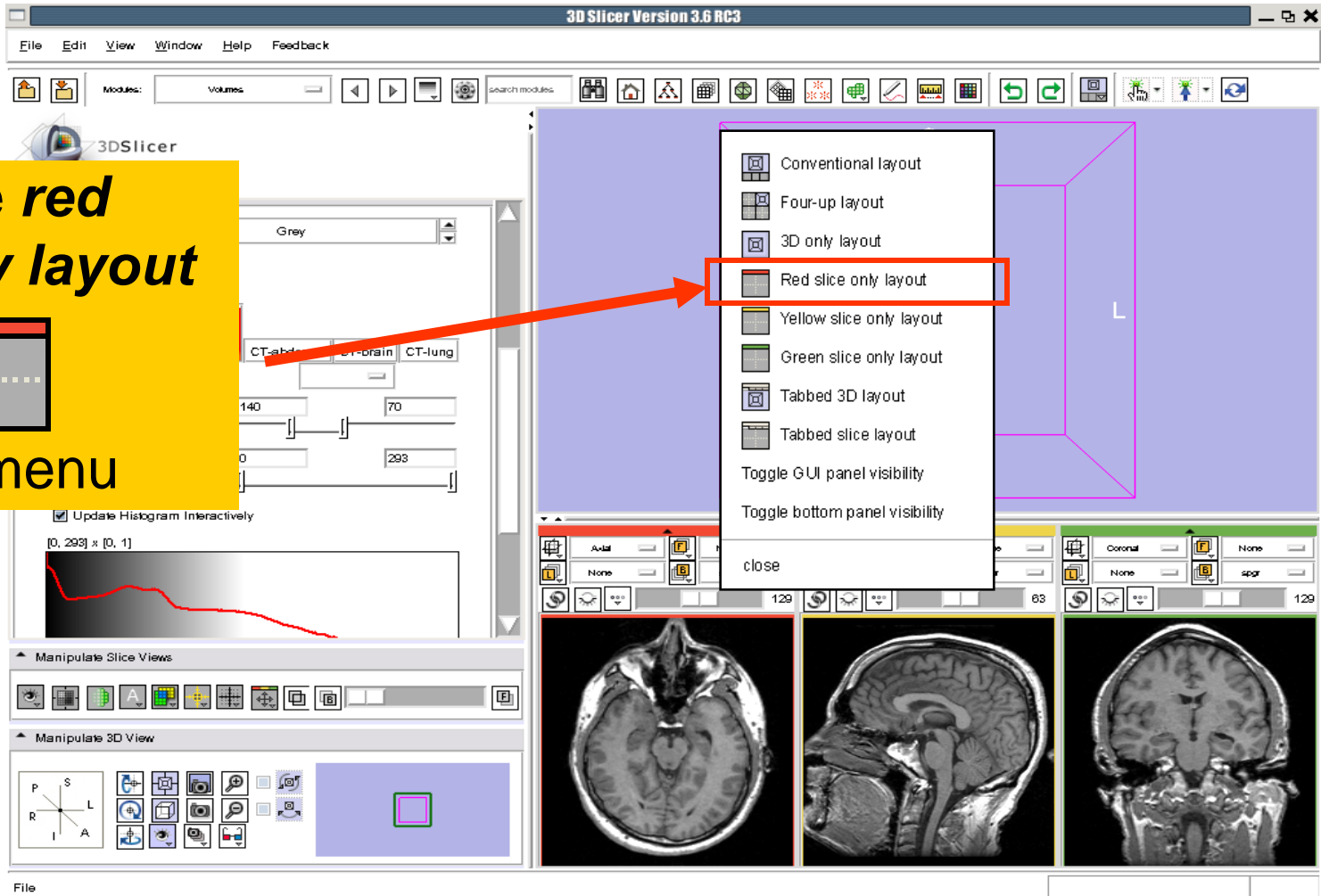
The spgr volume appears in the Background display of the 2D Viewer.

# Exploring the data

Click on the  
**choose view**  
icon

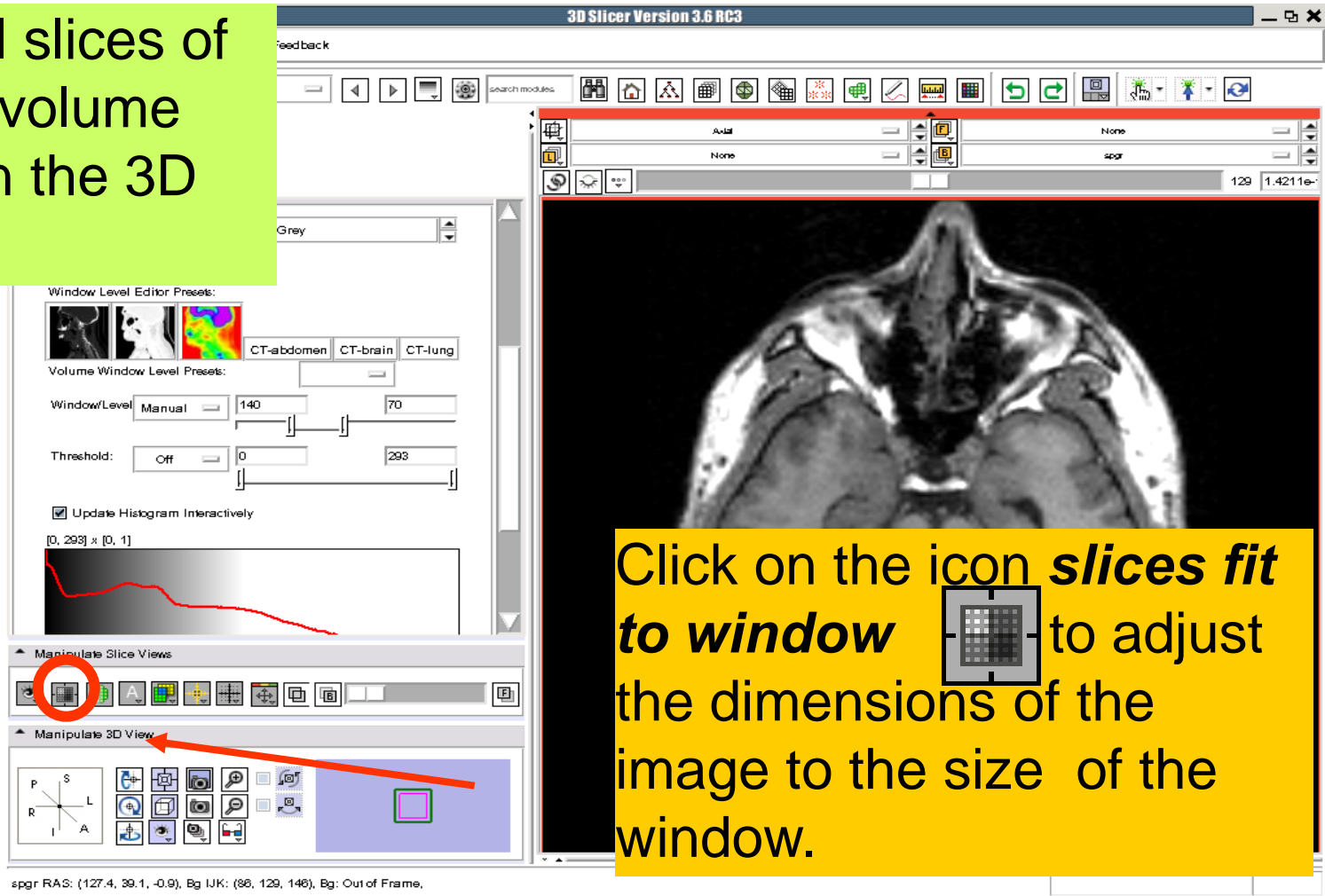


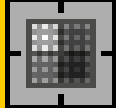
# Exploring the data




# Exploring the data

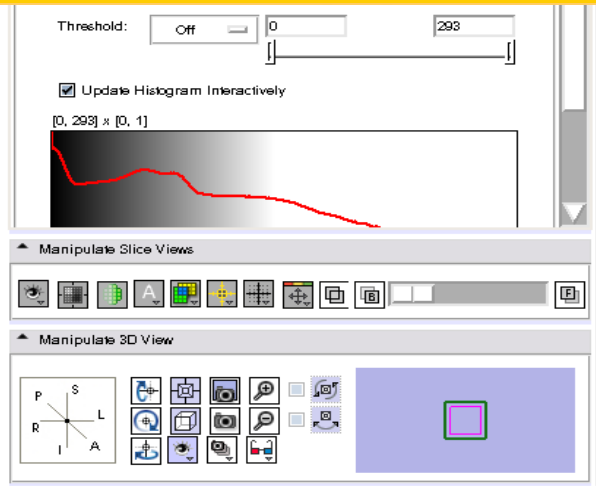
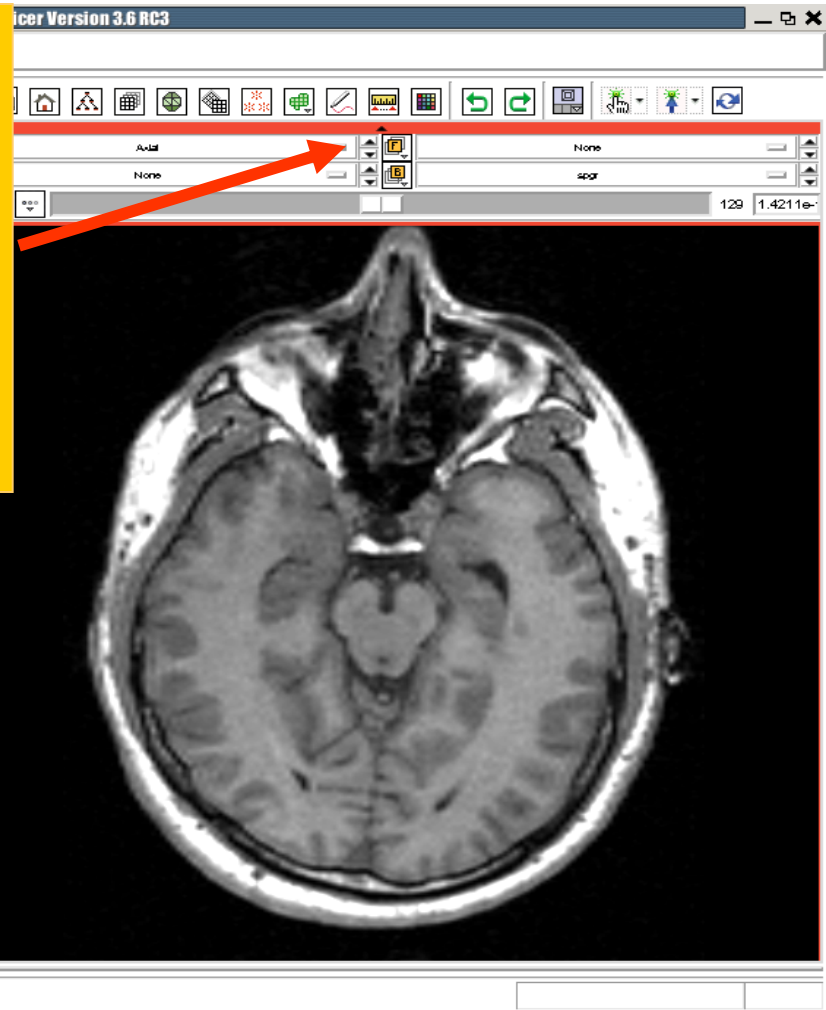
The axial slices of the spgr volume appear in the 3D viewer.





The screenshot shows the 3D Slicer interface. On the left, the 'Window Level Editor' panel is visible, showing 'Window/Level' set to 'Manual' with values 140 and 70, and a 'Threshold' of 0 to 293. Below this is a histogram. The 'Manipulate Slice Views' panel has a red circle around the 'slices fit to window' icon. A red arrow points from this icon to the 3D viewer. The 3D viewer displays an axial MRI slice of a head. A yellow callout box is overlaid on the 3D viewer, containing the text: 'Click on the icon *slices fit to window*  to adjust the dimensions of the image to the size of the window.'

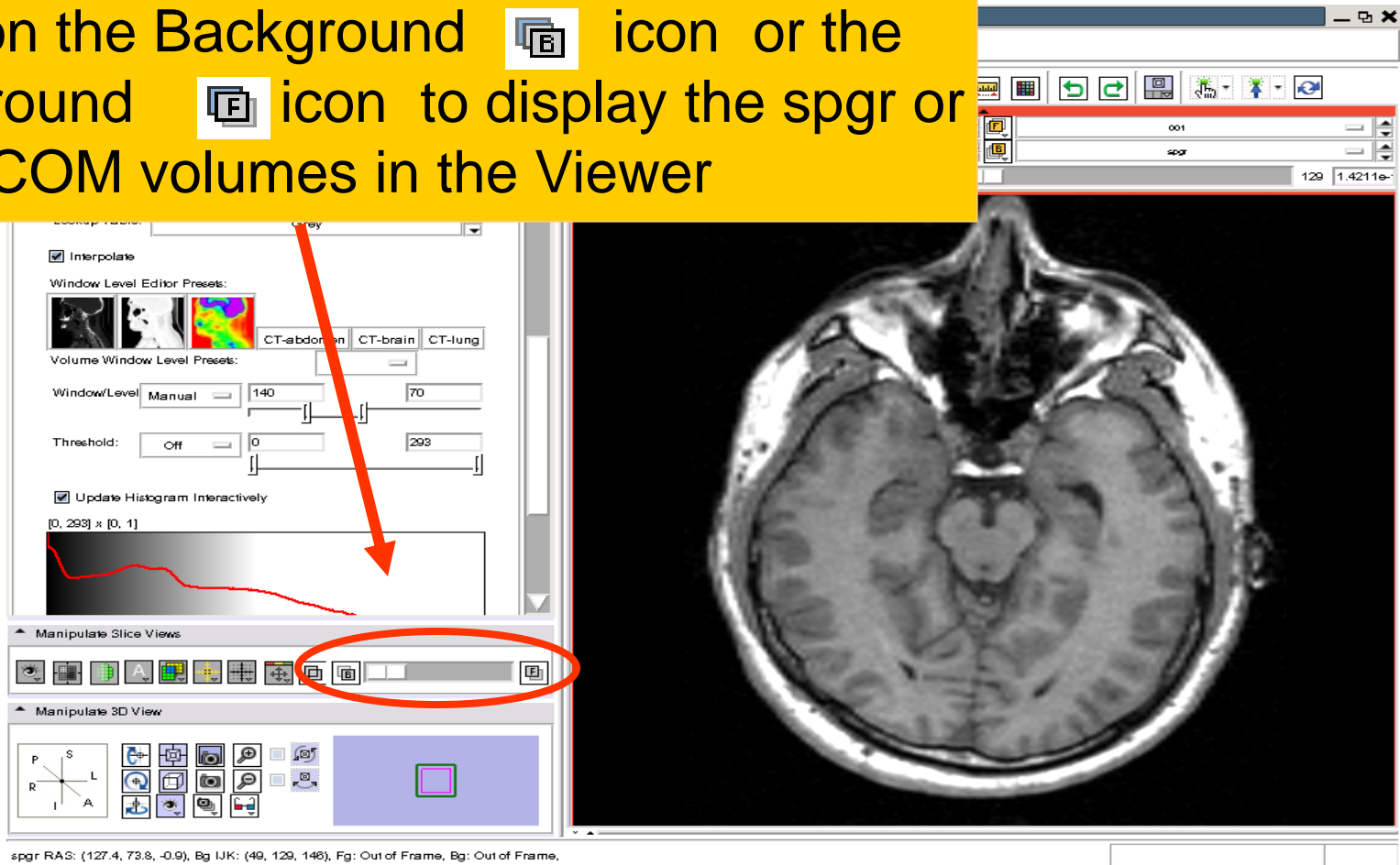
# Exploring the data

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



# Exploring the data

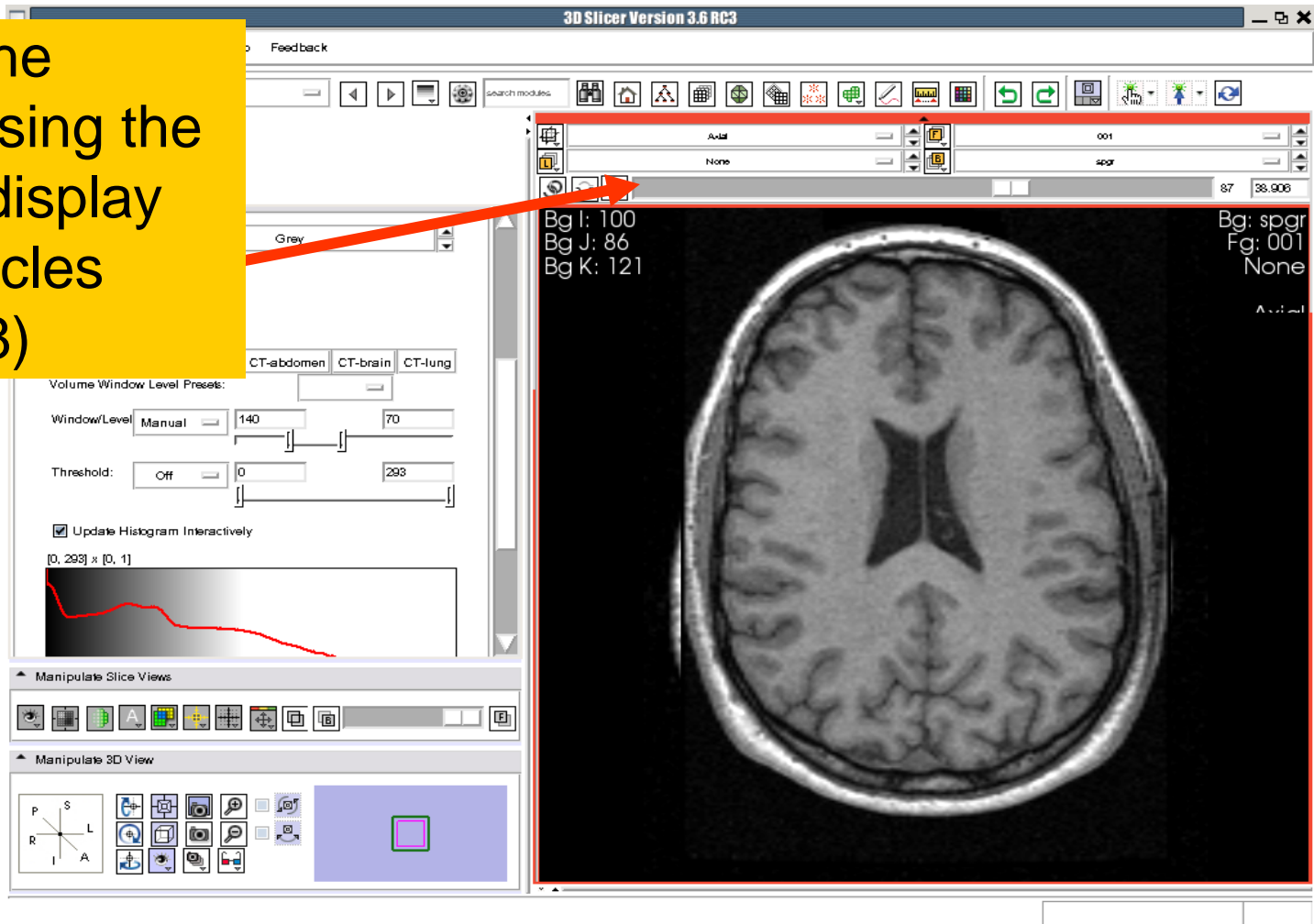
Click on the Background  icon or the Foreground  icon to display the spgr or the DICOM volumes in the Viewer




The screenshot displays the 3DSlicer software interface. On the right, a large window shows an axial MRI slice of a brain. On the left, there are several control panels. The 'Volume Window Level Editor' panel includes a 'Volume Window Level Presets' dropdown menu with options for 'CT-abdomen', 'CT-brain', and 'CT-lung'. Below this, there are 'Window/Level' and 'Threshold' sliders. The 'Manipulate Slice Views' panel at the bottom left contains a toolbar with icons for various slice manipulation actions; the 'Background' and 'Foreground' icons are circled in red. A red arrow points from the text above to the 'Background' icon. At the bottom of the interface, a status bar displays coordinates: 'spgr RAS: (127.4, 73.8, -0.9), Bg IJK: (49, 129, 146), Fg: Out of Frame, Bg: Out of Frame.'

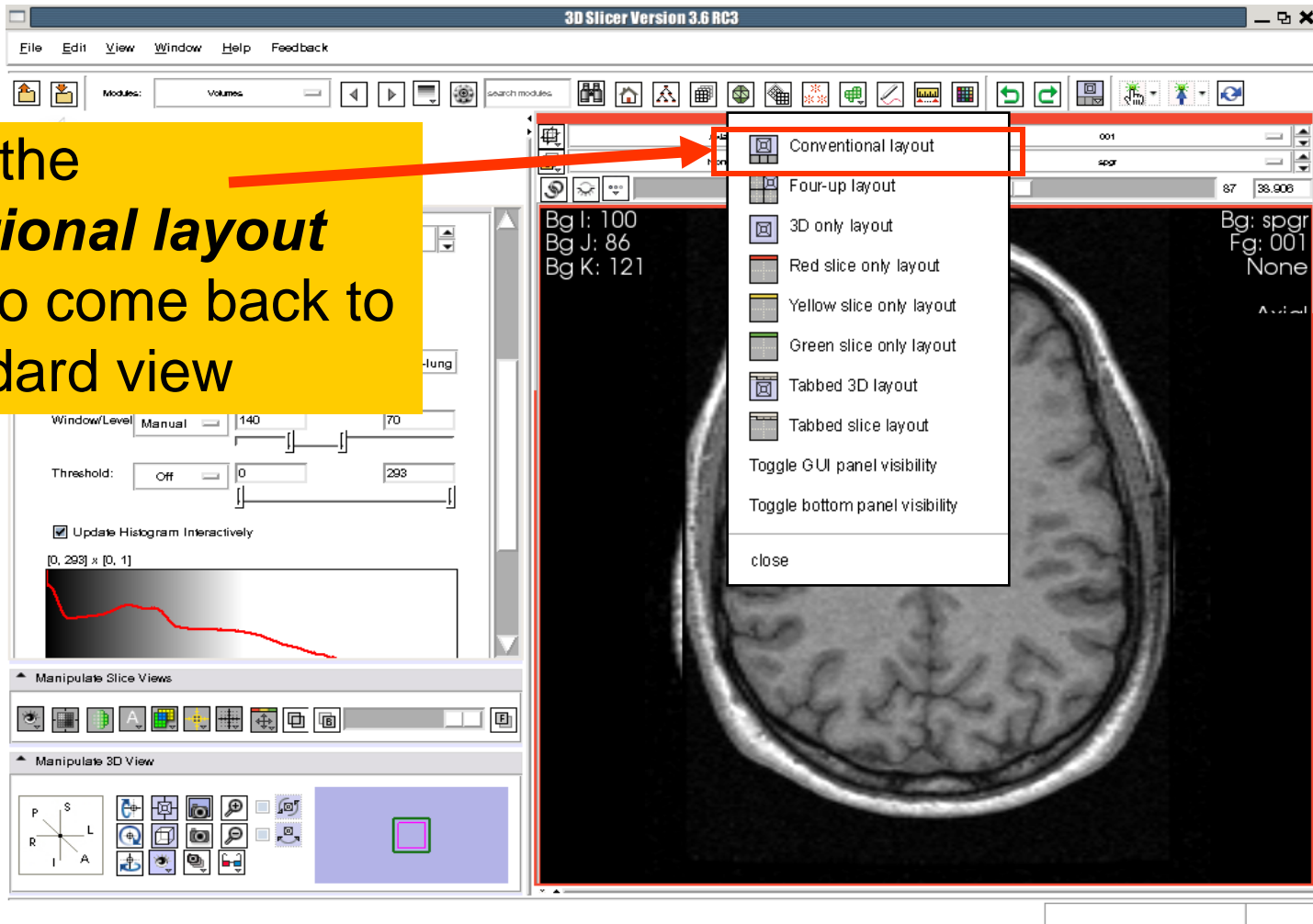
# Exploring the data

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




# Exploring the data

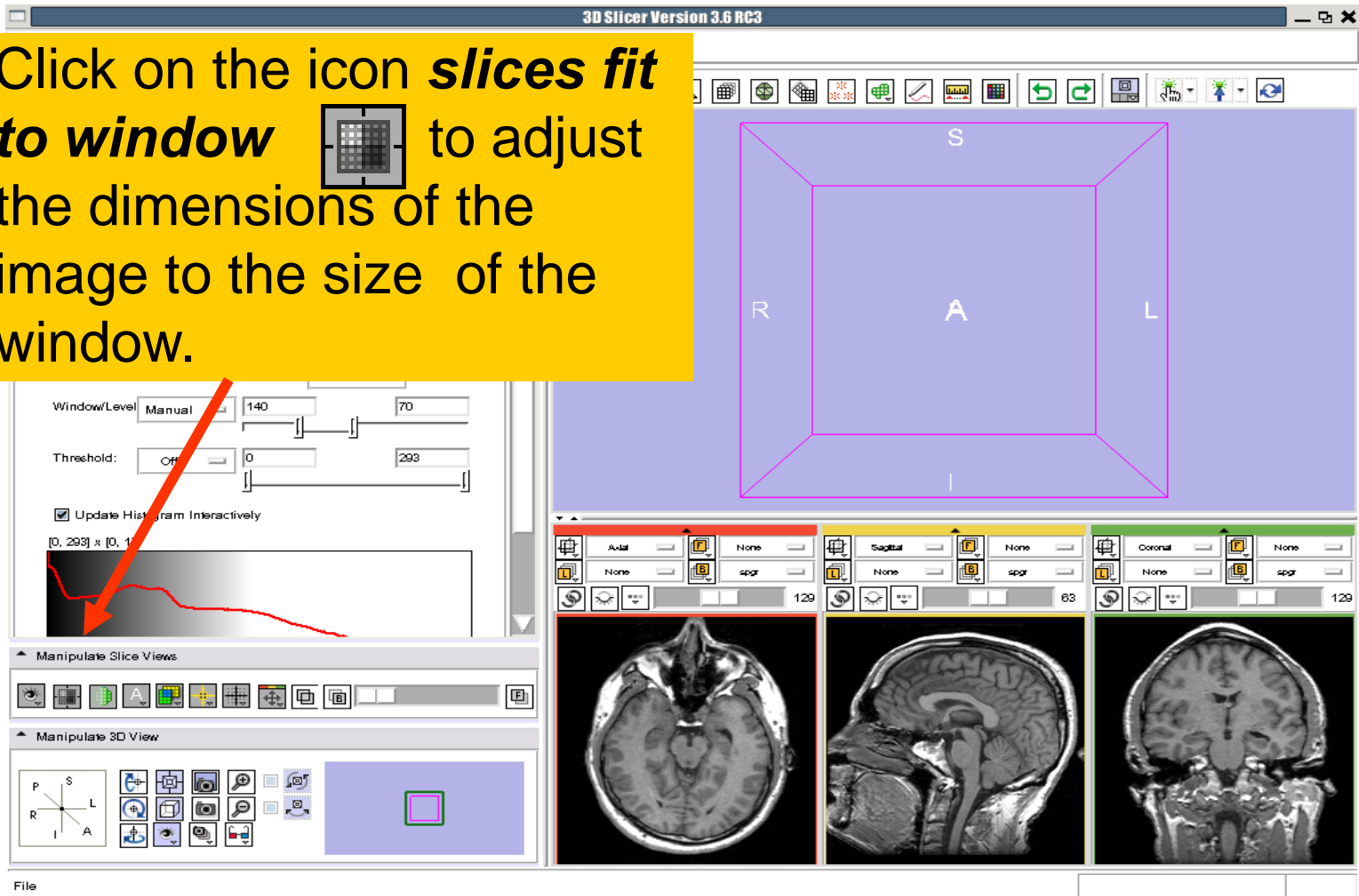
Click on the **conventional layout icon**  to come back to the standard view

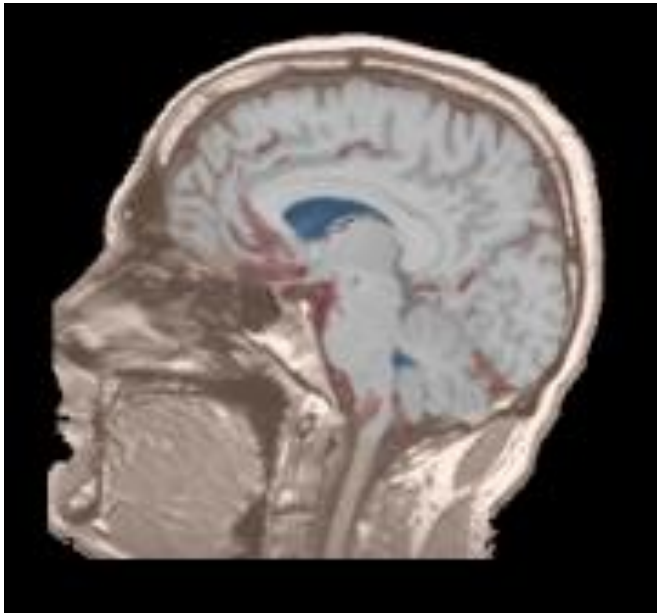




# Loading Volumes

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



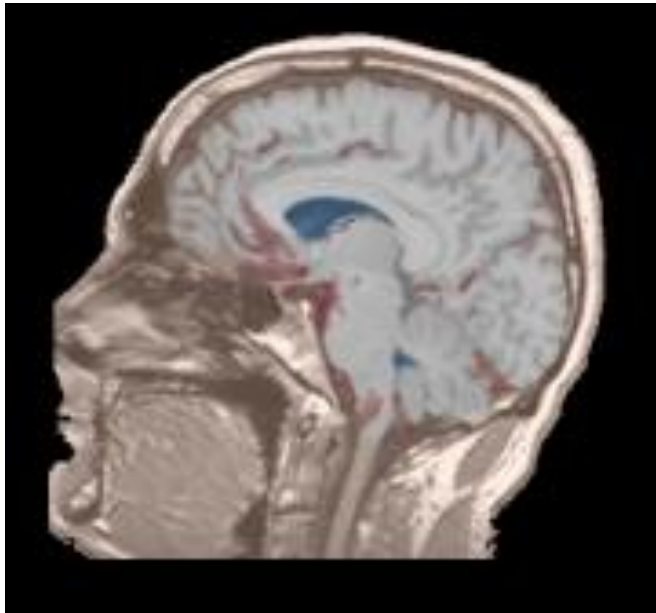


## Part 2: Loading and visualizing segmented structures overlaid on grayscale images

# Label map

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

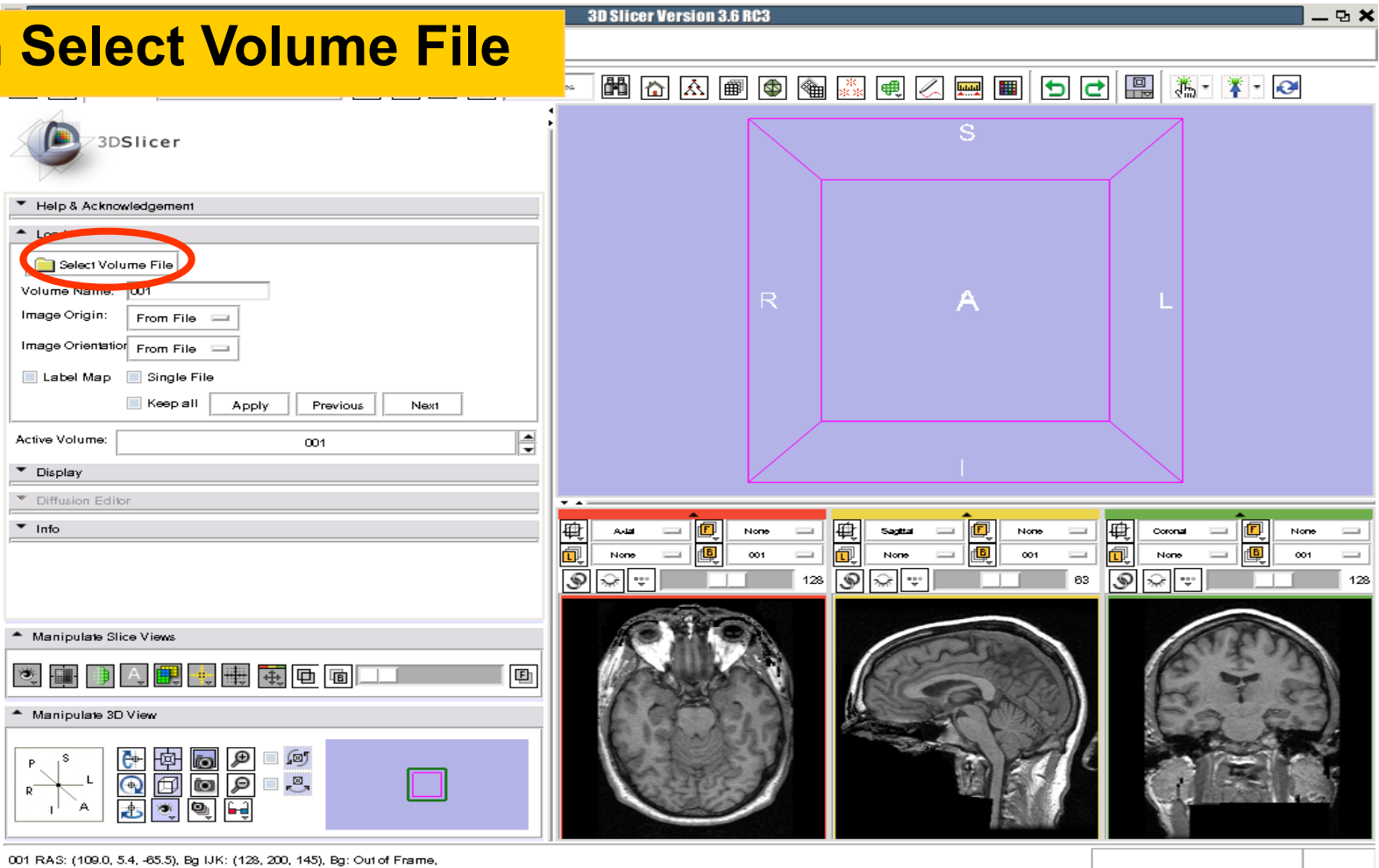


Each pixel is assigned a specific **label value** which corresponds to the anatomical structure that it belongs to.

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

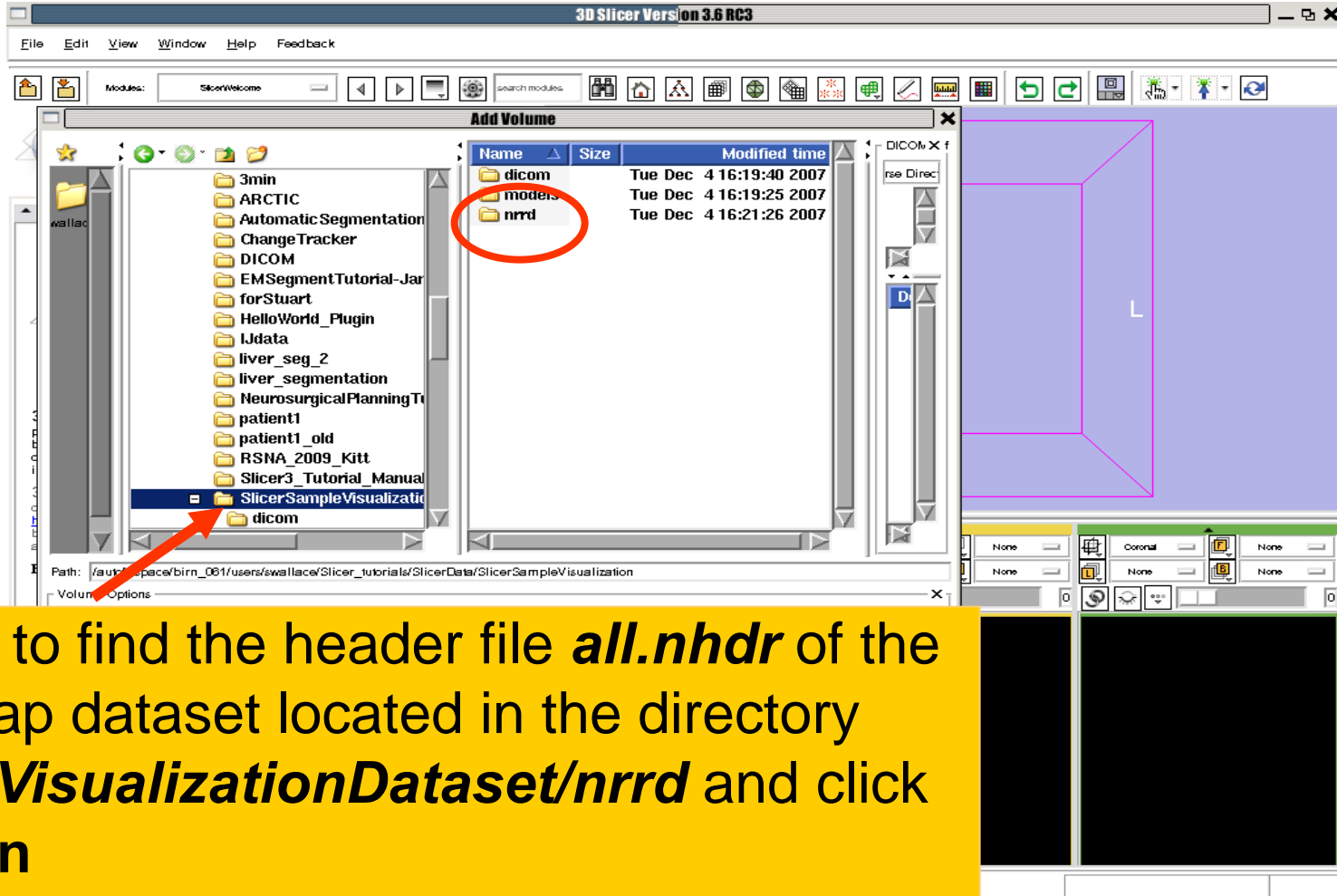
Manipulate 3D View

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 3.6 RC3 interface. The 'Add Volume' dialog box is open, displaying a list of files and folders. The 'nrrd' folder is circled in red. A red arrow points to the 'SlicerSampleVisualization' folder in the left pane. The main view shows a purple 3D volume with a white 'L' label.

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

Path: /aunt...space/birn\_061/users/swallace/Slicer\_tutorials/SlicerData/SlicerSampleVisualization

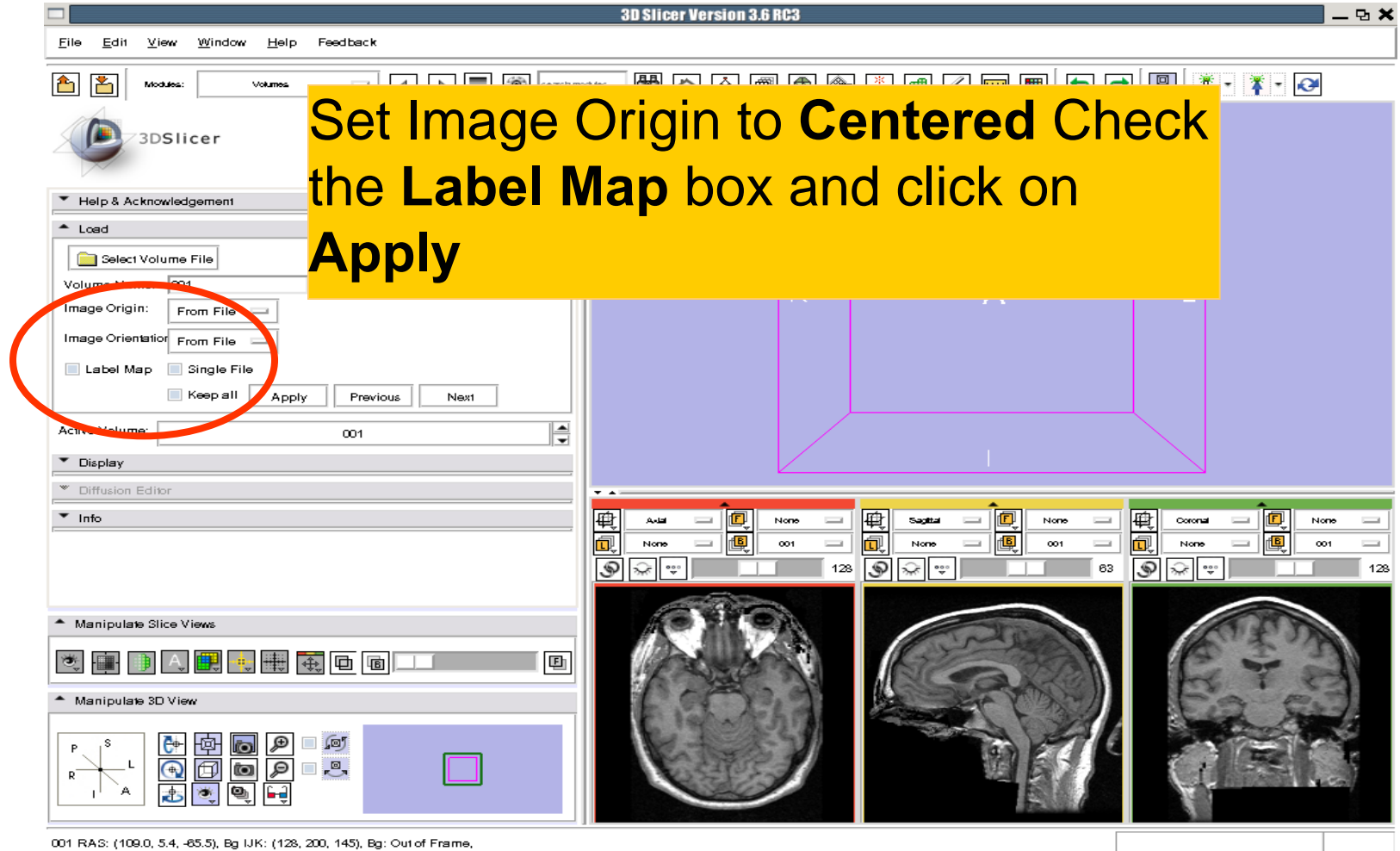
Volume Options

None | Coronal | None

None | None | None

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



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Volumes

3DSlicer

Help & Acknowledgement

Load

Select Volume File

Volume Name: 001

Image Origin: From File

Image Orientation: From File

Label Map  Single File

Keep all Apply Previous Next

Active Volume: 001

Display

Diffusion Editor

Info

Manipulate Slice Views

Manipulate 3D View

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

001

001

001

128 63 128

Axial Sagittal Coronal

None None None

None 001 None

None 001 None

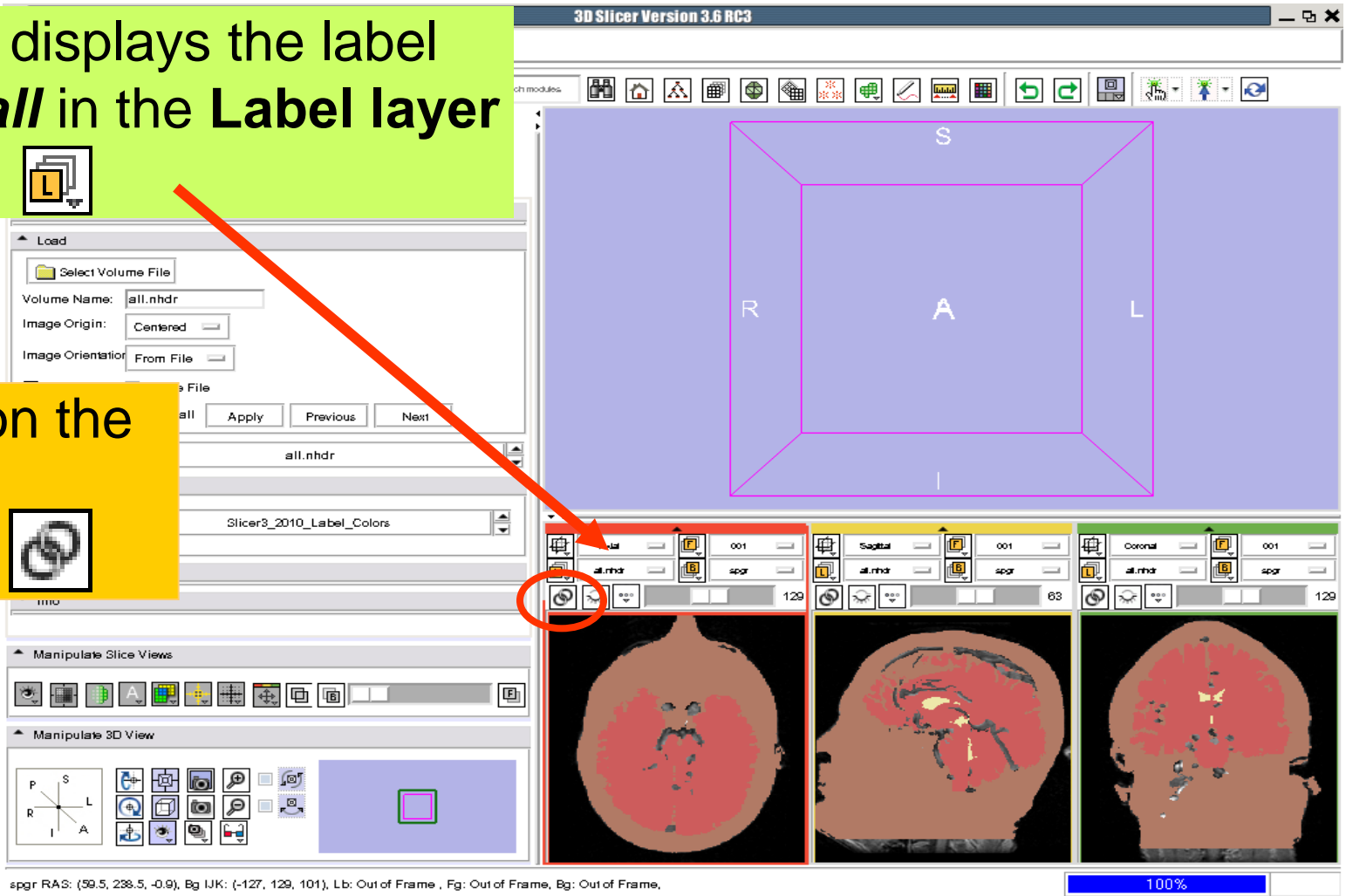
None 001 None

# Visualizing a label map

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



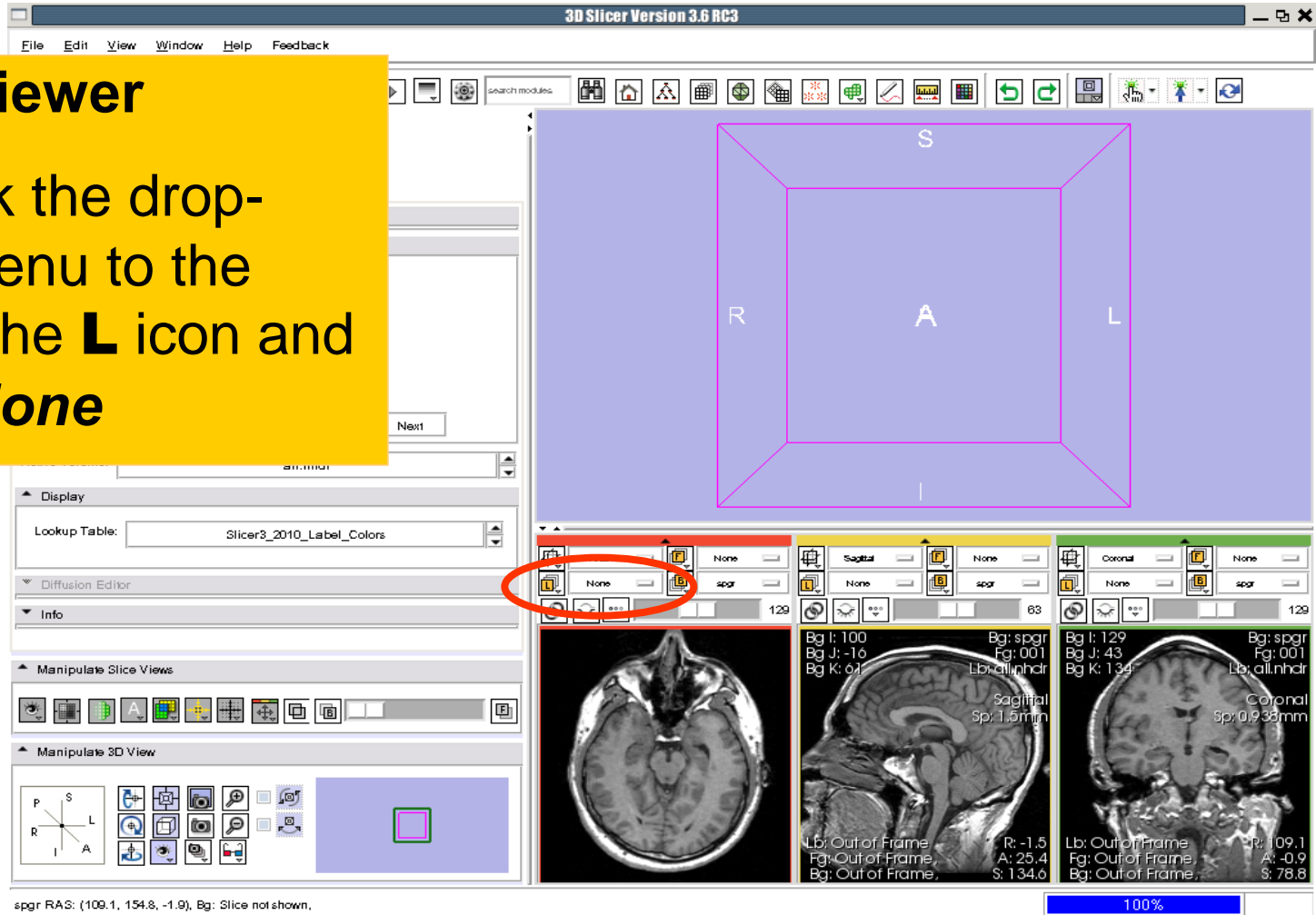
Click on the *links* icon.



# Visualizing Multiple Volumes

## Label Viewer

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

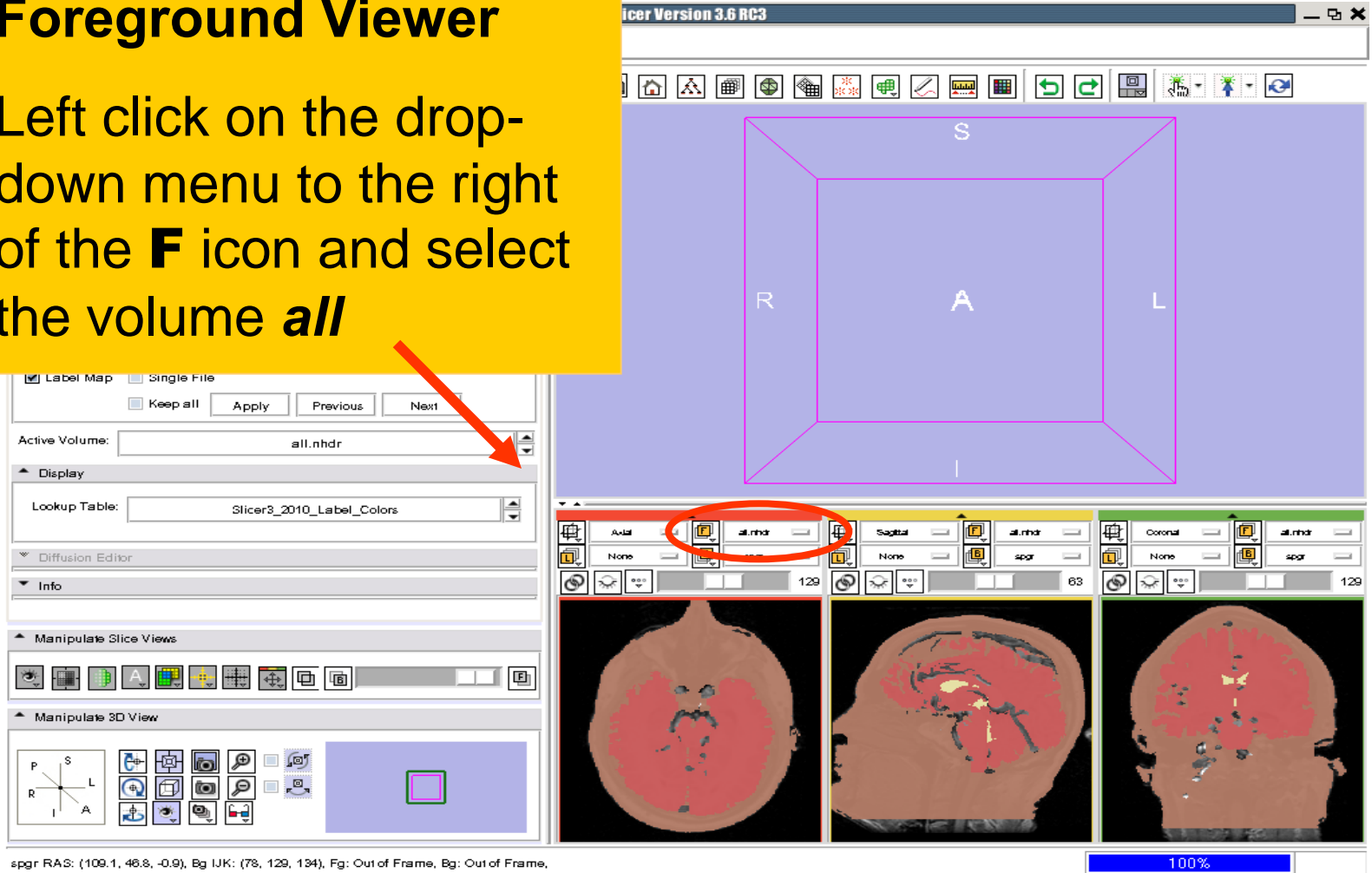




# Visualizing Multiple Volumes

## Foreground Viewer

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



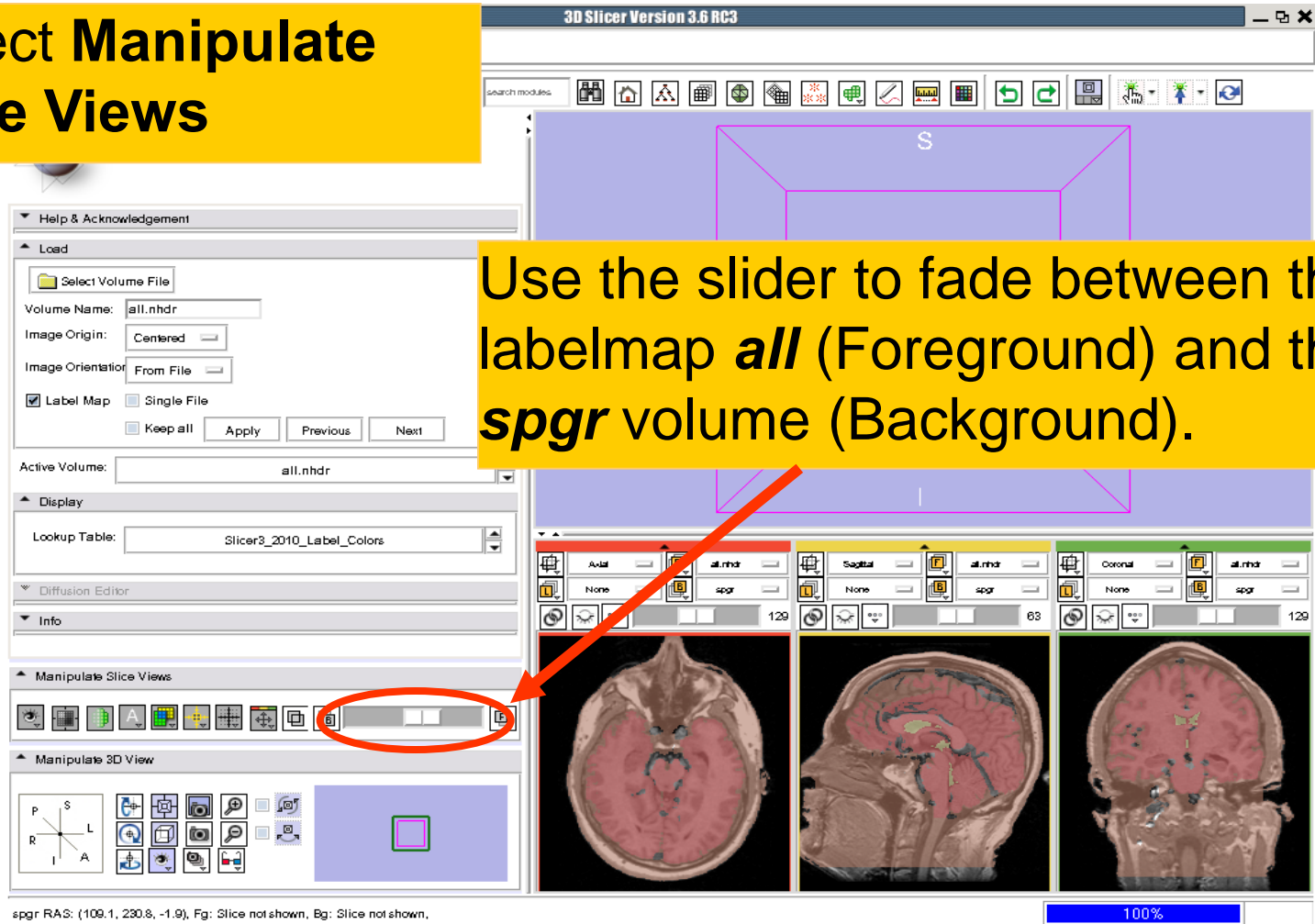
The screenshot displays the 3DSlicer interface. The main window shows a 3D view of a brain volume with a purple wireframe bounding box. The foreground viewer at the bottom shows three slice views: Axial, Sagittal, and Coronal. The Axial view is currently selected and shows a cross-section of the brain with red and blue regions. The slice view controls at the bottom of the foreground viewer show the 'all.nhdr' volume selected for the Axial view, which is circled in red. The background viewer shows the 'sgr' volume selected for the Sagittal view. The interface includes a toolbar at the top, a sidebar on the left with various tool panels, and a status bar at the bottom.



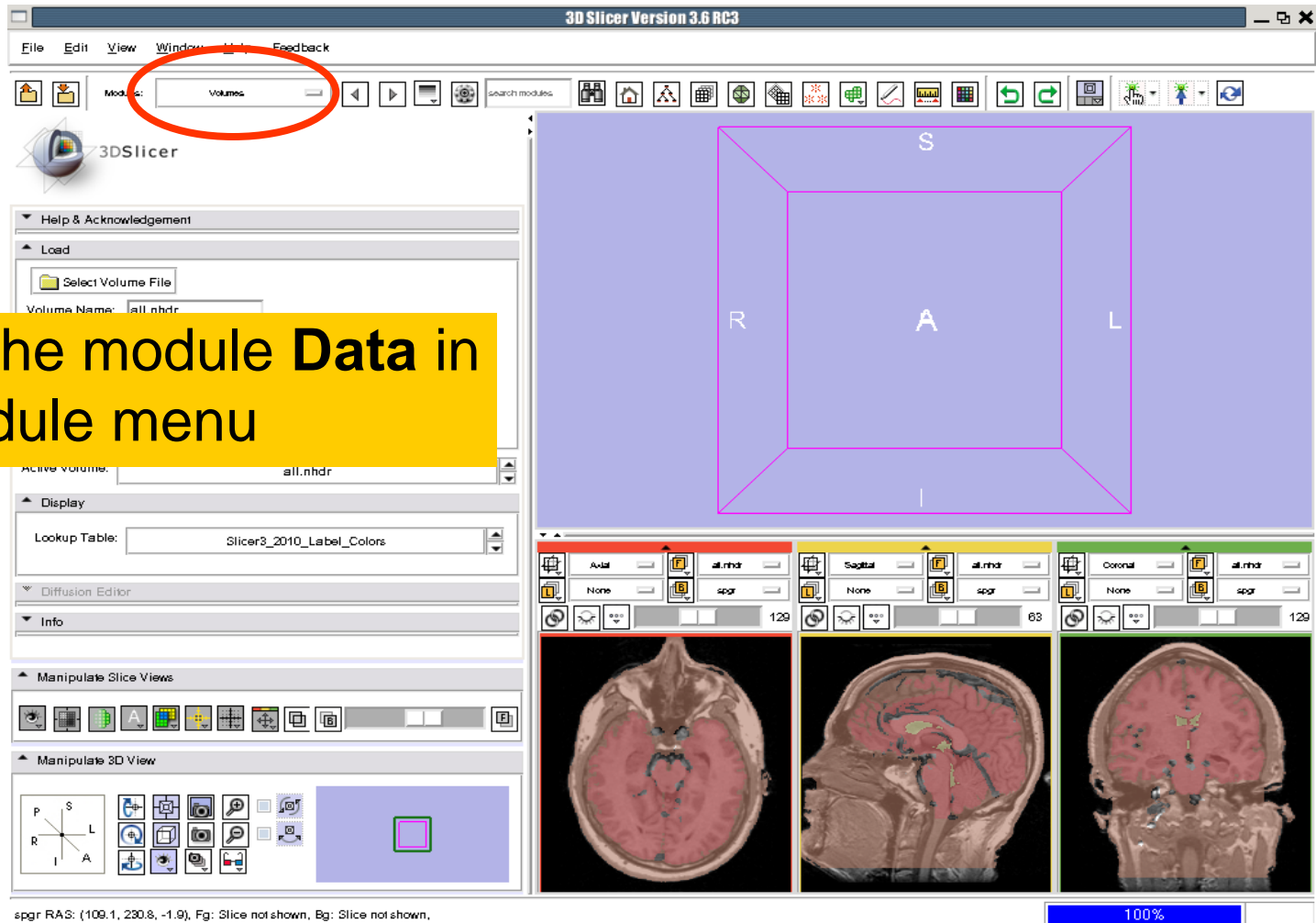
# Visualizing Multiple Volumes

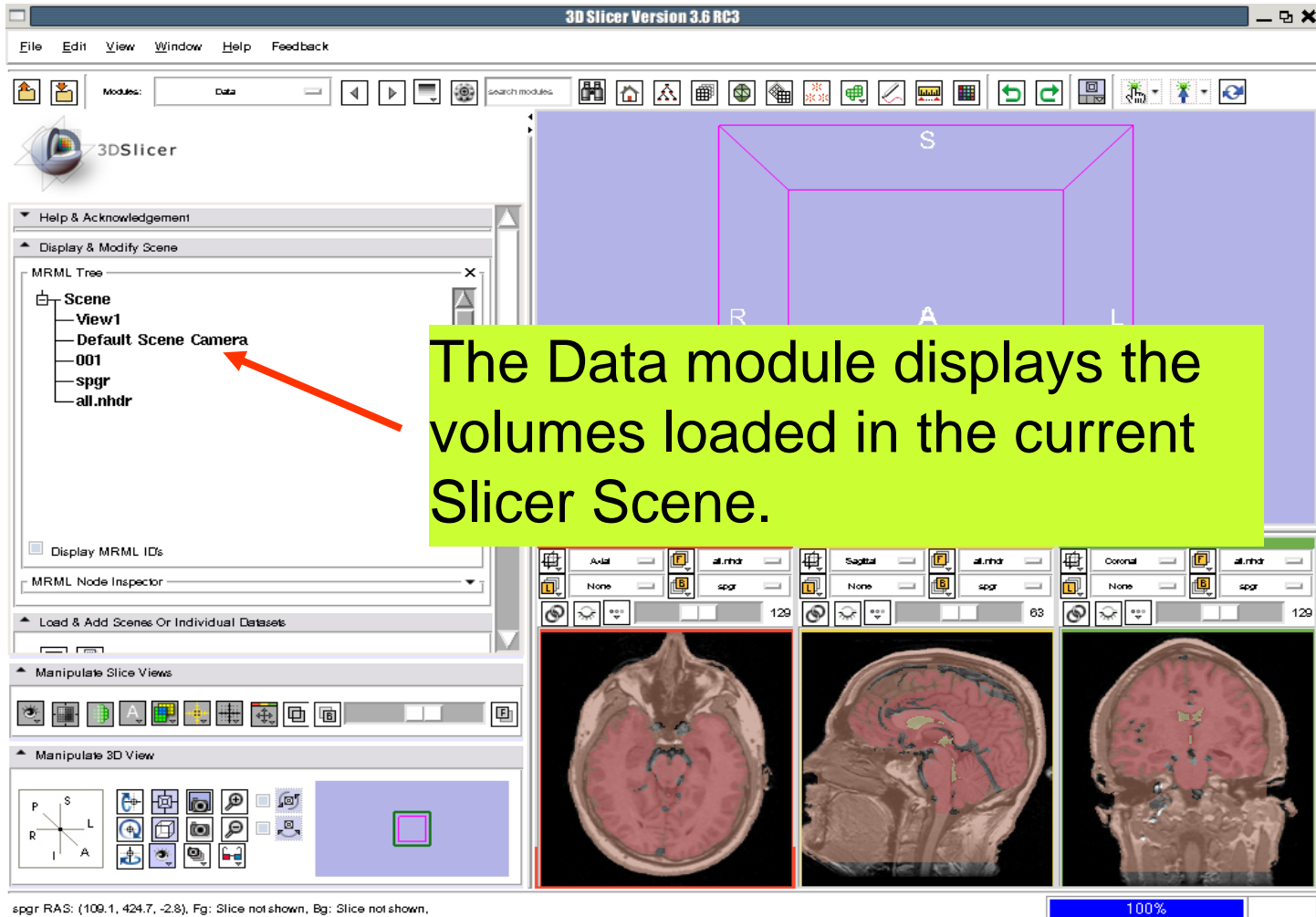
Select Manipulate  
Slice Views

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



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

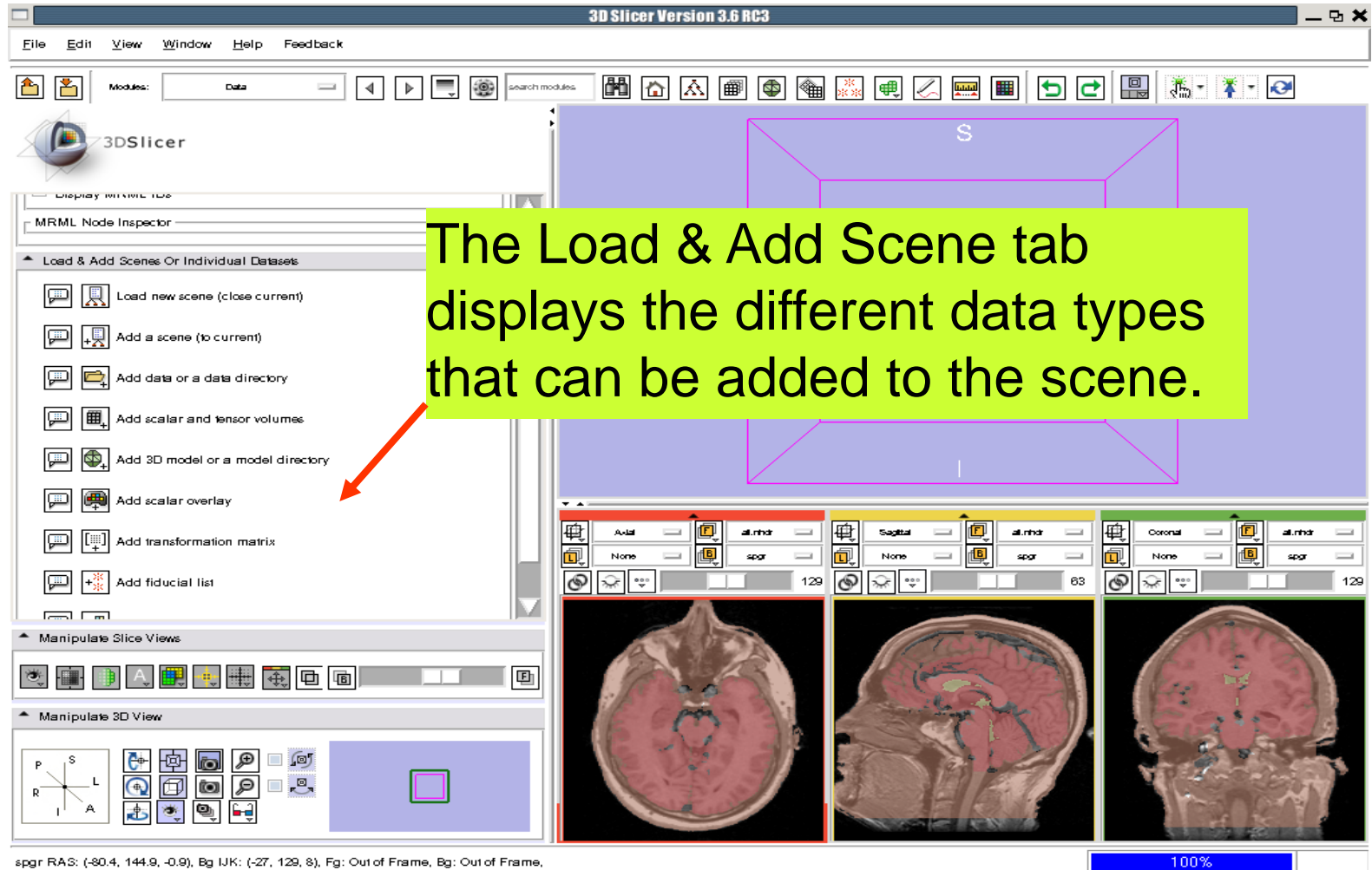




The screenshot displays the 3D Slicer software interface. The main window shows a 3D volume with a purple bounding box and labels 'S', 'R', 'A', and 'L'. The left sidebar contains the MRML Tree, where 'Default Scene Camera' is highlighted with a red arrow. The bottom right shows three slice views: Axial, Sagittal, and Coronal. A yellow text box is overlaid on the 3D view.

**The Data module displays the volumes loaded in the current Slicer Scene.**

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



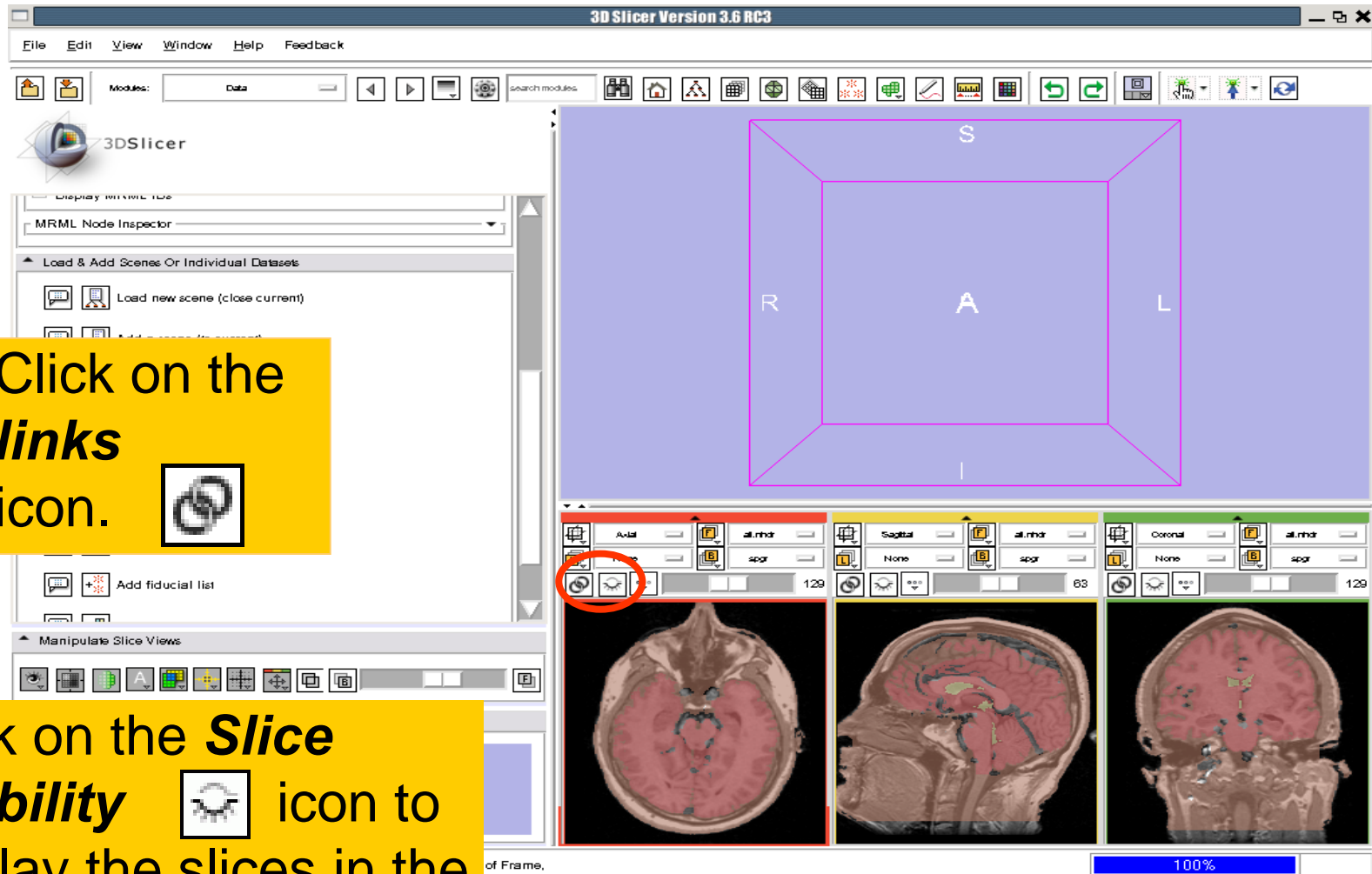
The screenshot displays the 3D Slicer Version 3.6 RC3 interface. The 'Load & Add Scene Or Individual Datasets' panel is active, showing various options for adding data to the scene. A red arrow points from a text box to this panel. The 3D visualization area shows a brain scan with a purple bounding box labeled 'S'. Below the 3D view are three slice views: Axial, Sagittal, and Coronal. The status bar at the bottom shows the current slice position and zoom level (100%).

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

- 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

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

# 3D Visualization

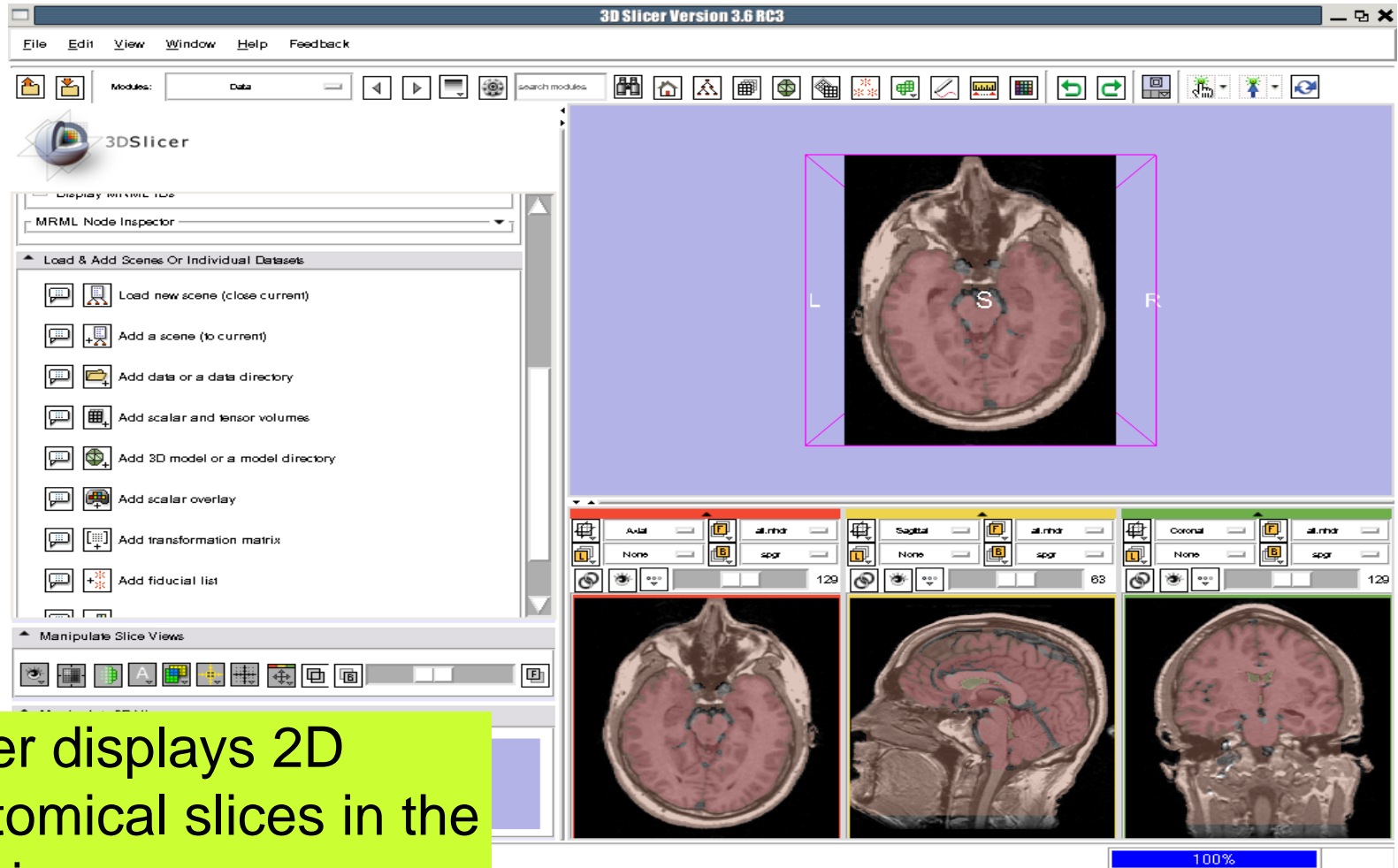


Click on the **links** icon.



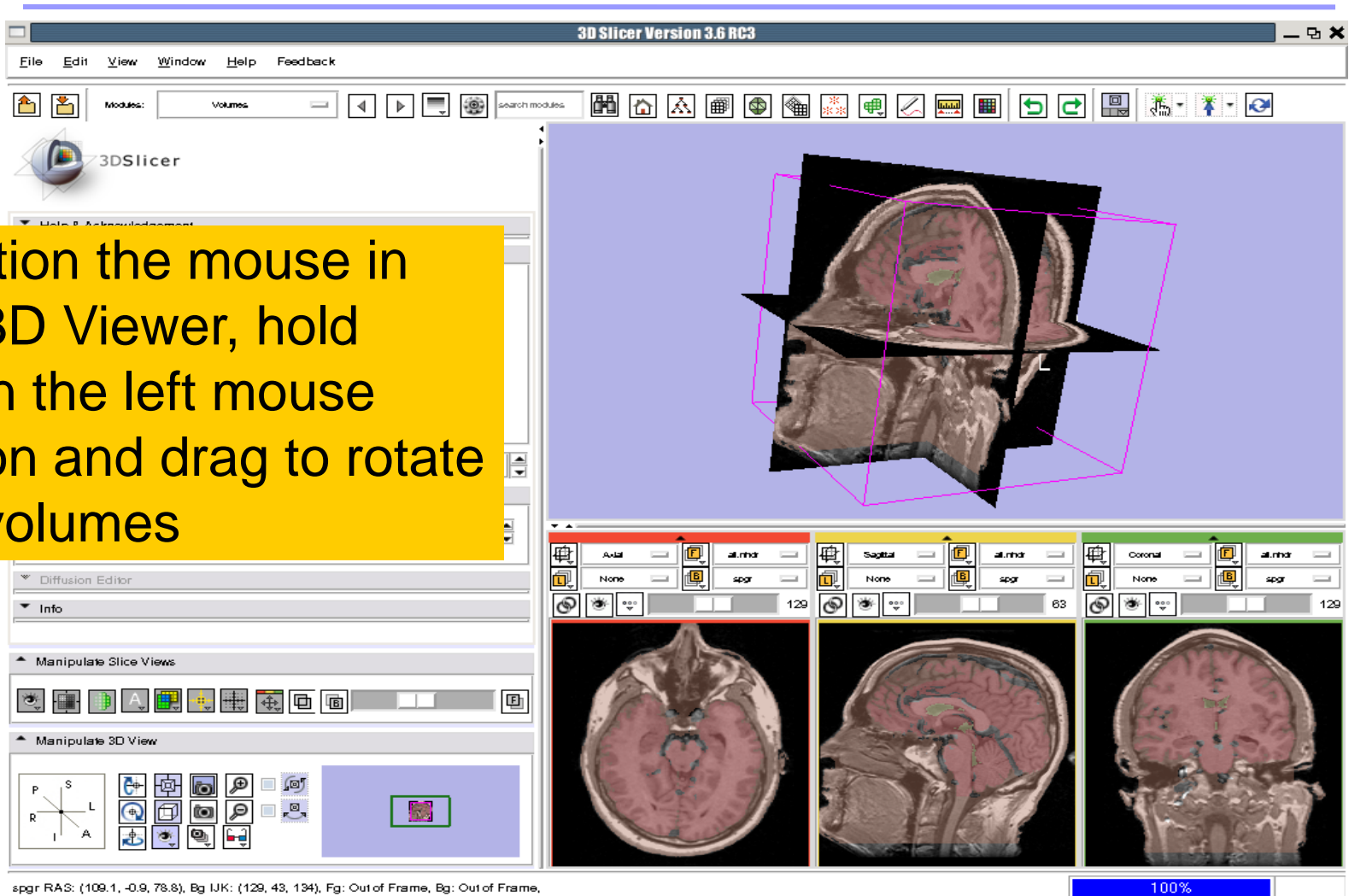
Click on the **Slice Visibility** icon to display the slices in the 3D Viewer



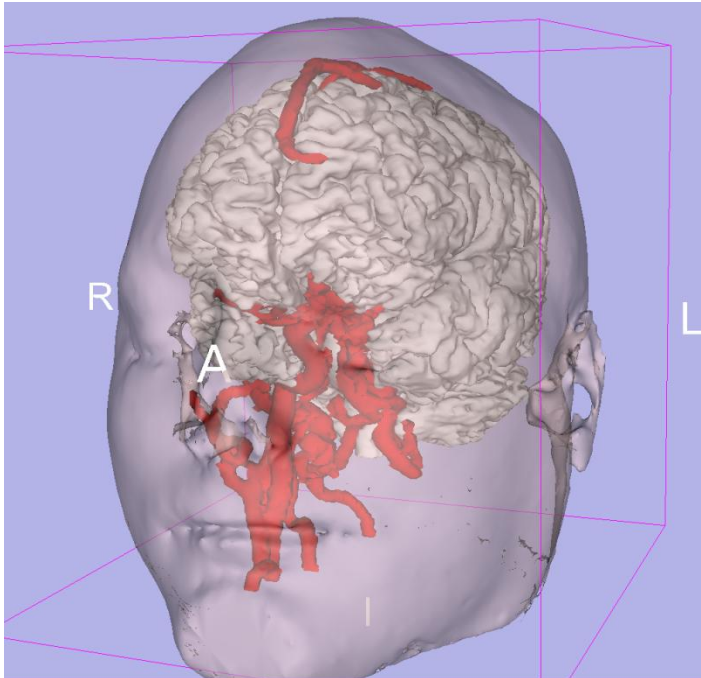


Slicer displays 2D anatomical slices in the 3D viewer

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

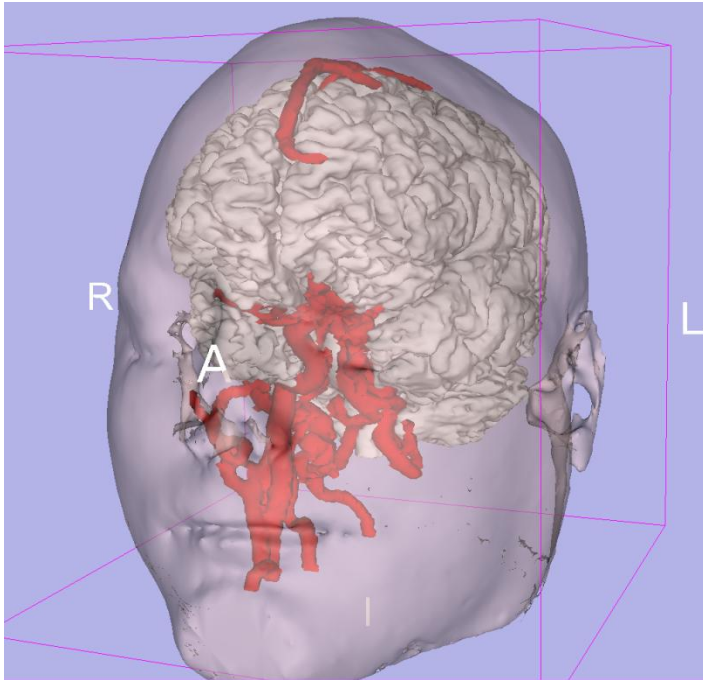






## Part 3: Loading and visualizing 3D models of the anatomy

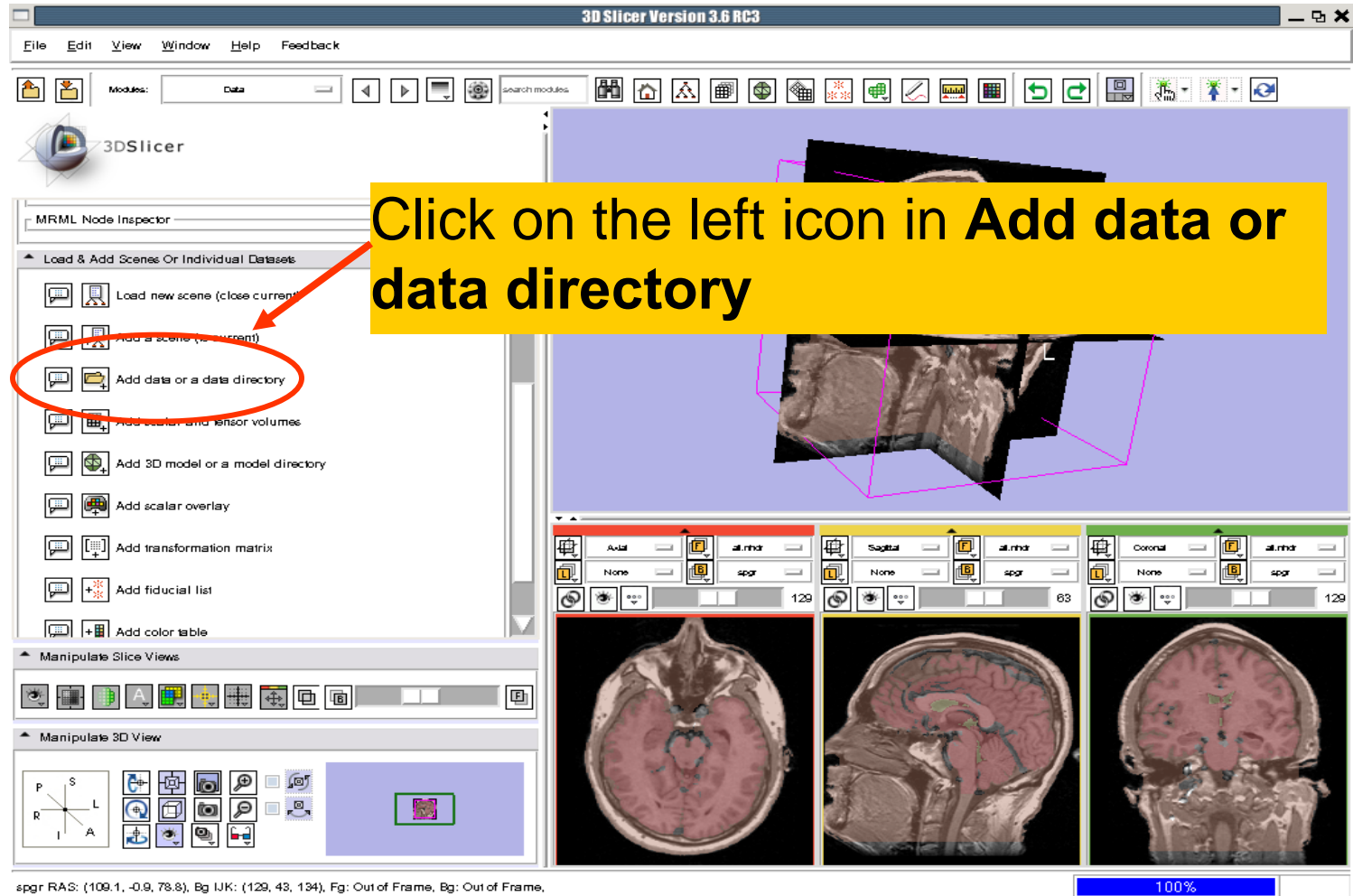
# 3D models



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

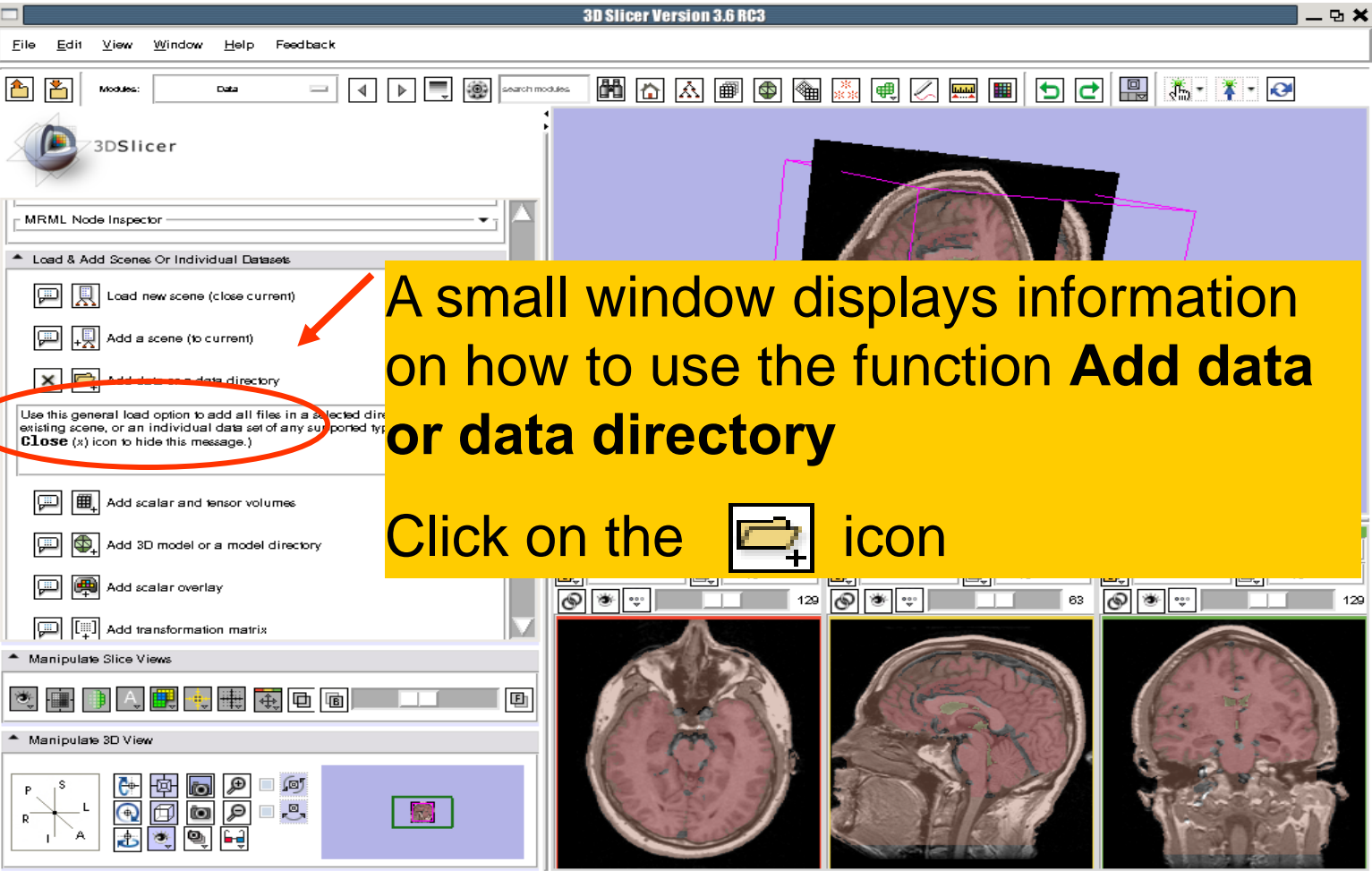
MRML Node Inspector

- 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

Click on the left icon in **Add data or data directory**

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

100%



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 to 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

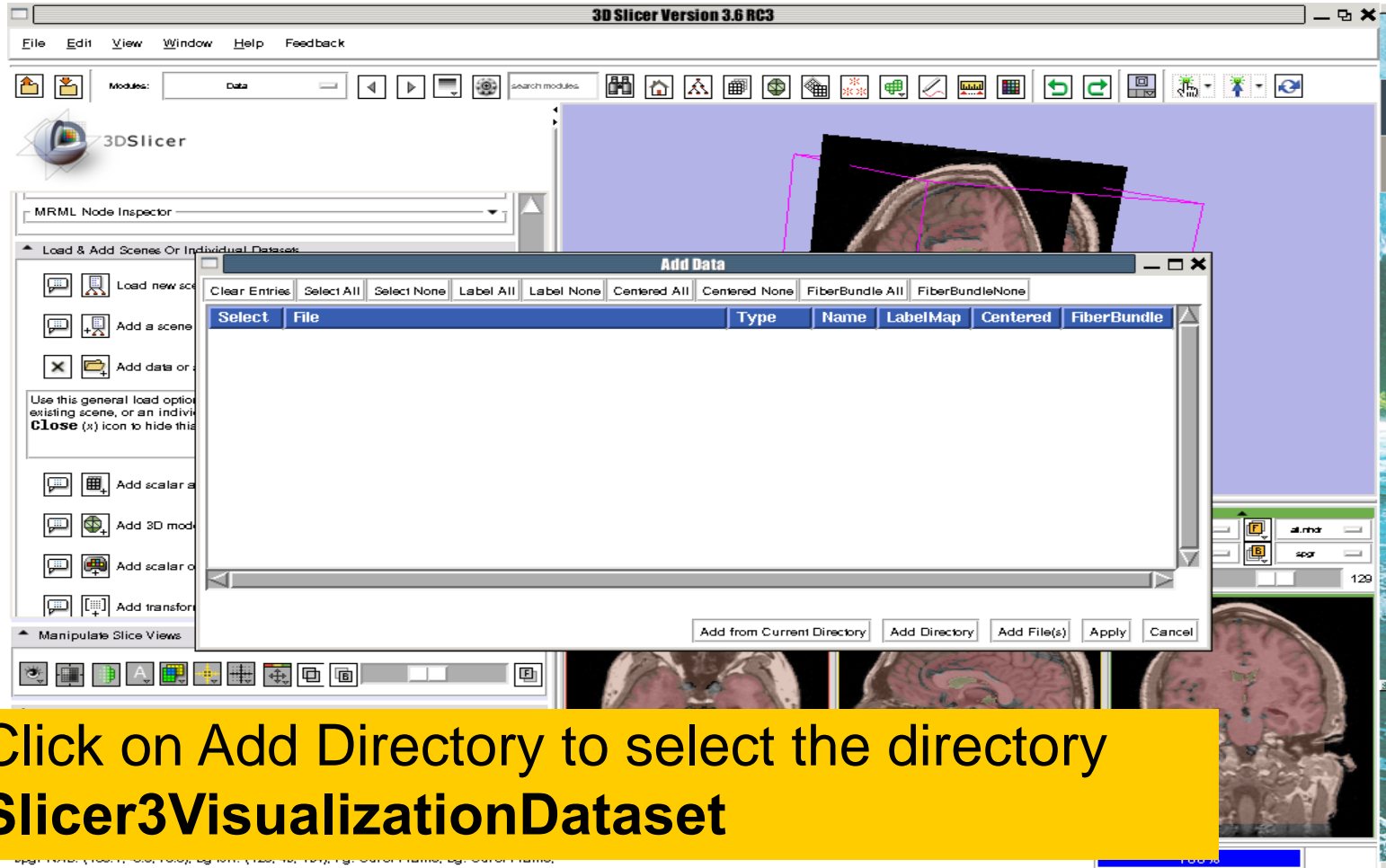
Add transformation matrix

Manipulate Slice Views

Manipulate 3D View

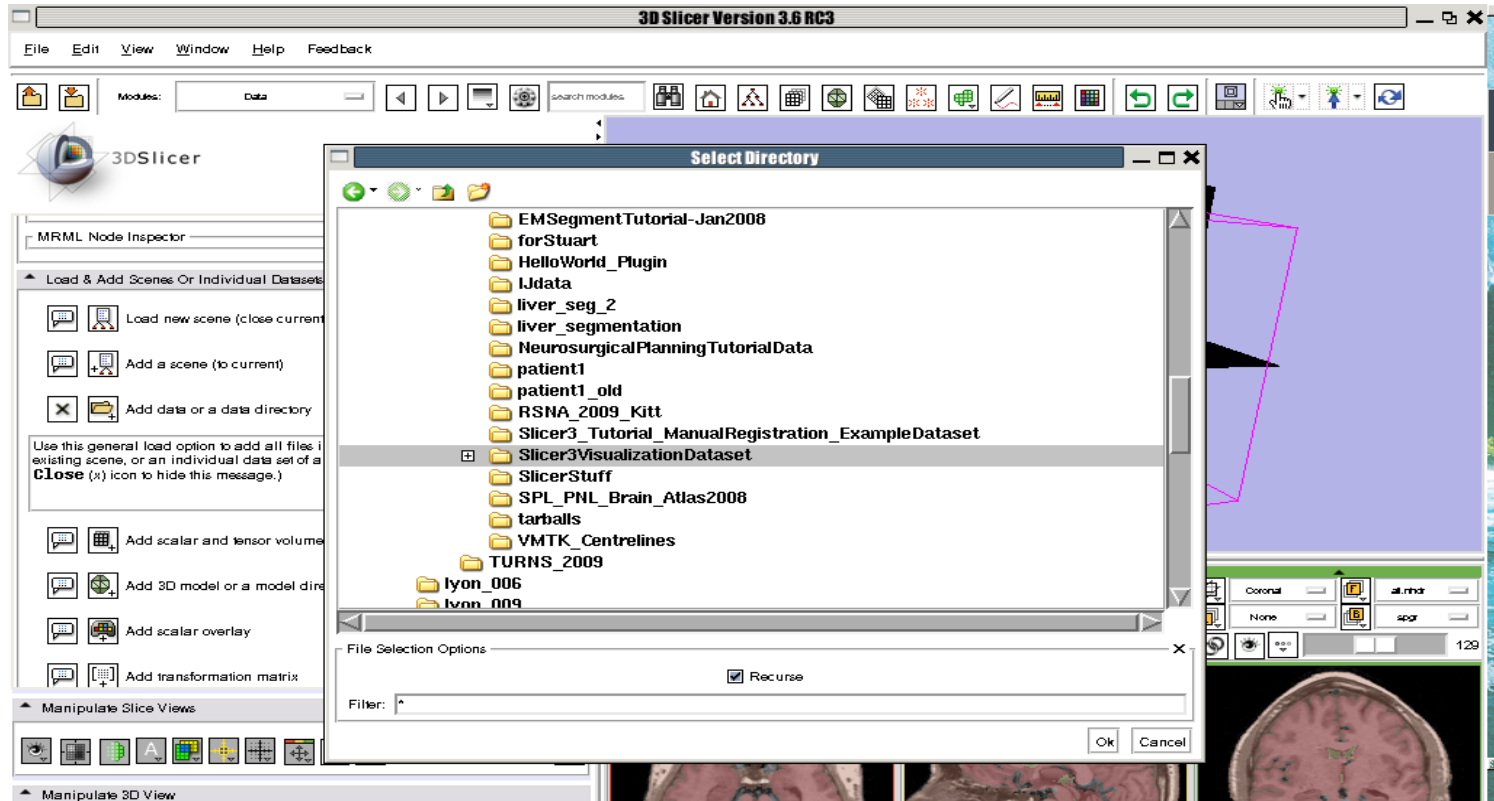
spgr RAS: (109.1, -0.9, 78.8), Bg IJK: (129, 43, 134), Fg: Out of Frame, Bg: Out of Frame.

100%



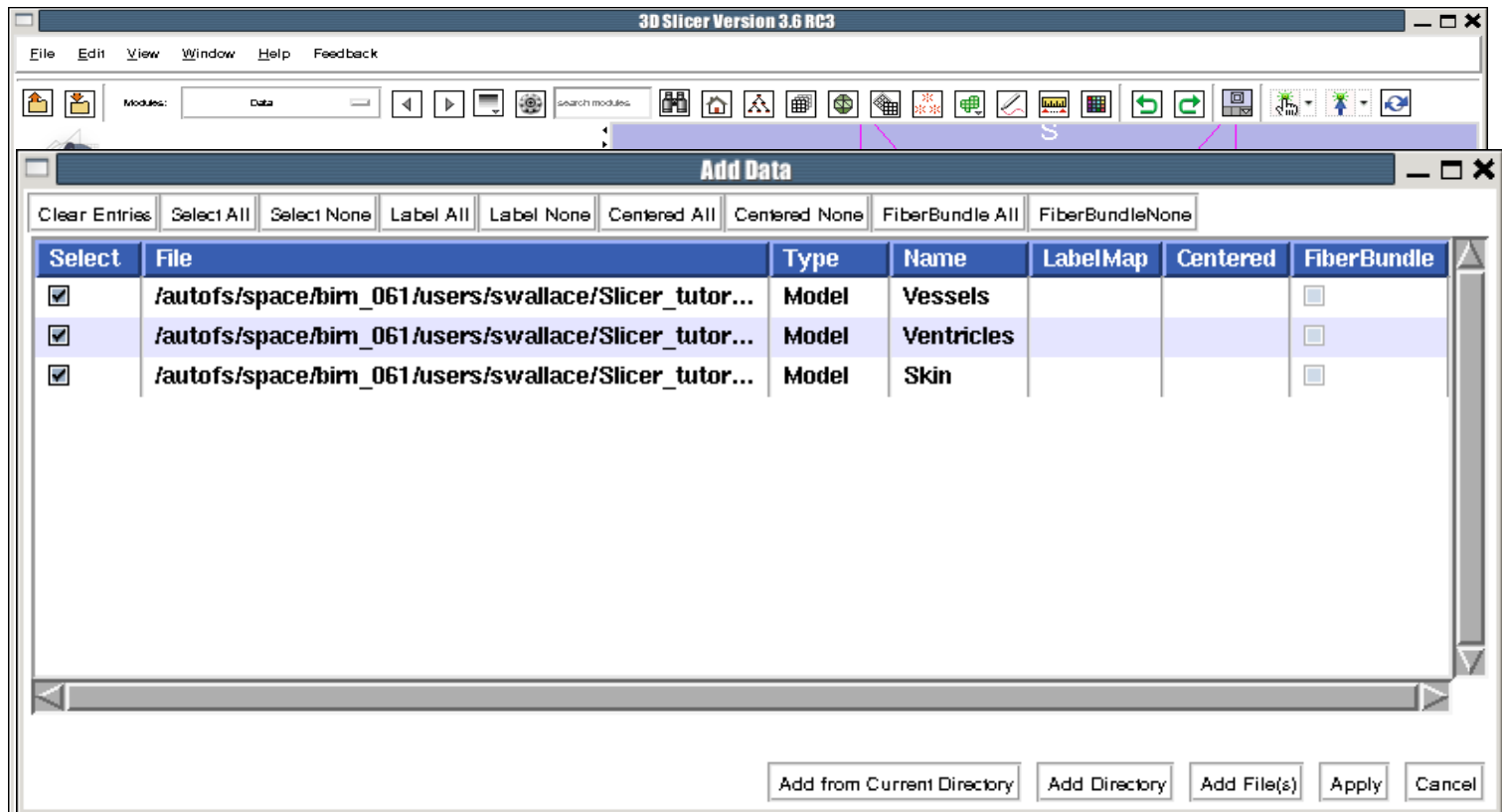
Click on Add Directory to select the directory  
**Slicer3VisualizationDataset**

# Loading 3D models



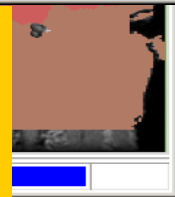
Select the directory **Slicer3VisualizationDataset/models** and click on OK

# Loading 3D models

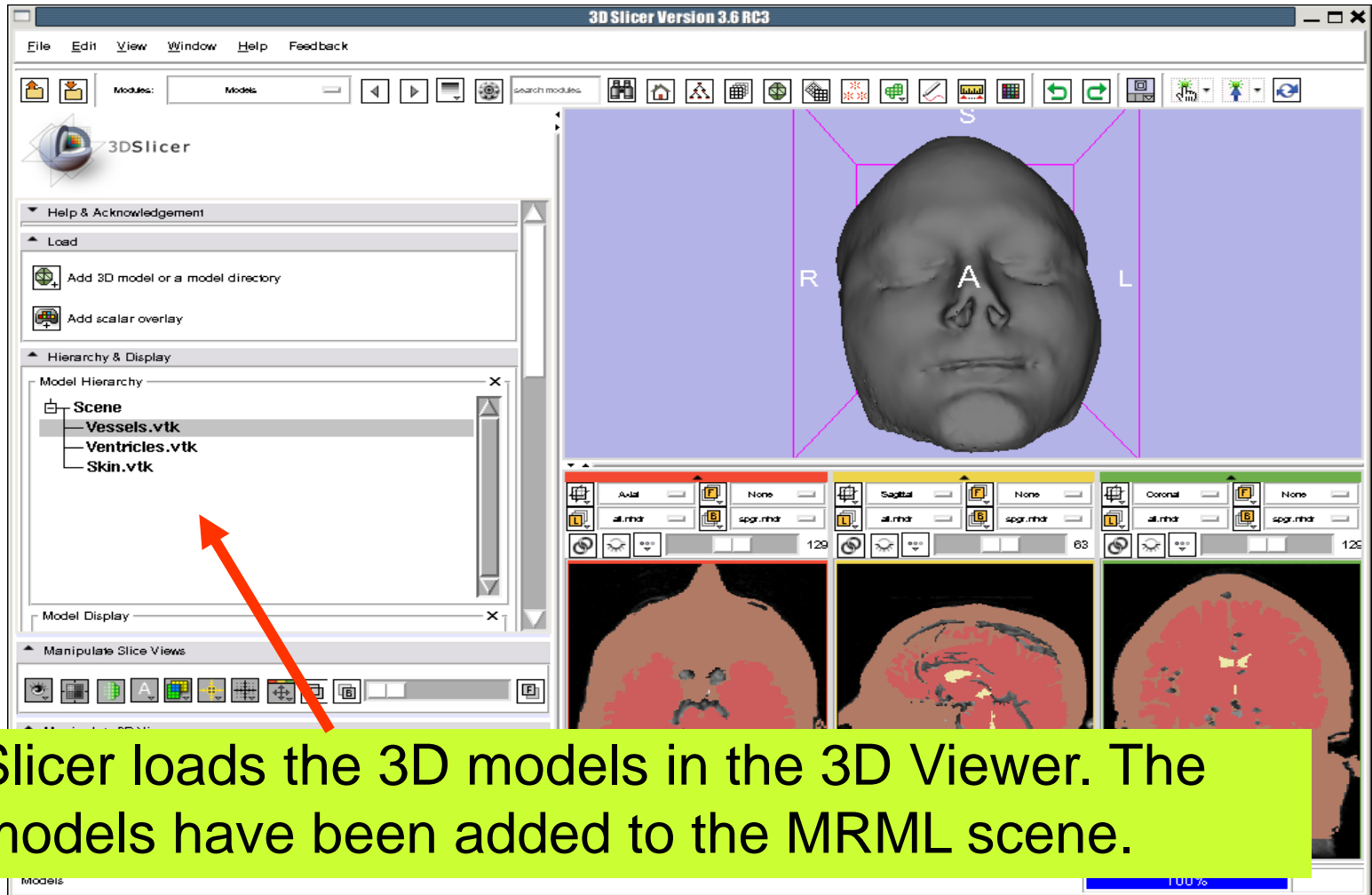


The list of elements present in the models directory appears in the Add Data window.

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



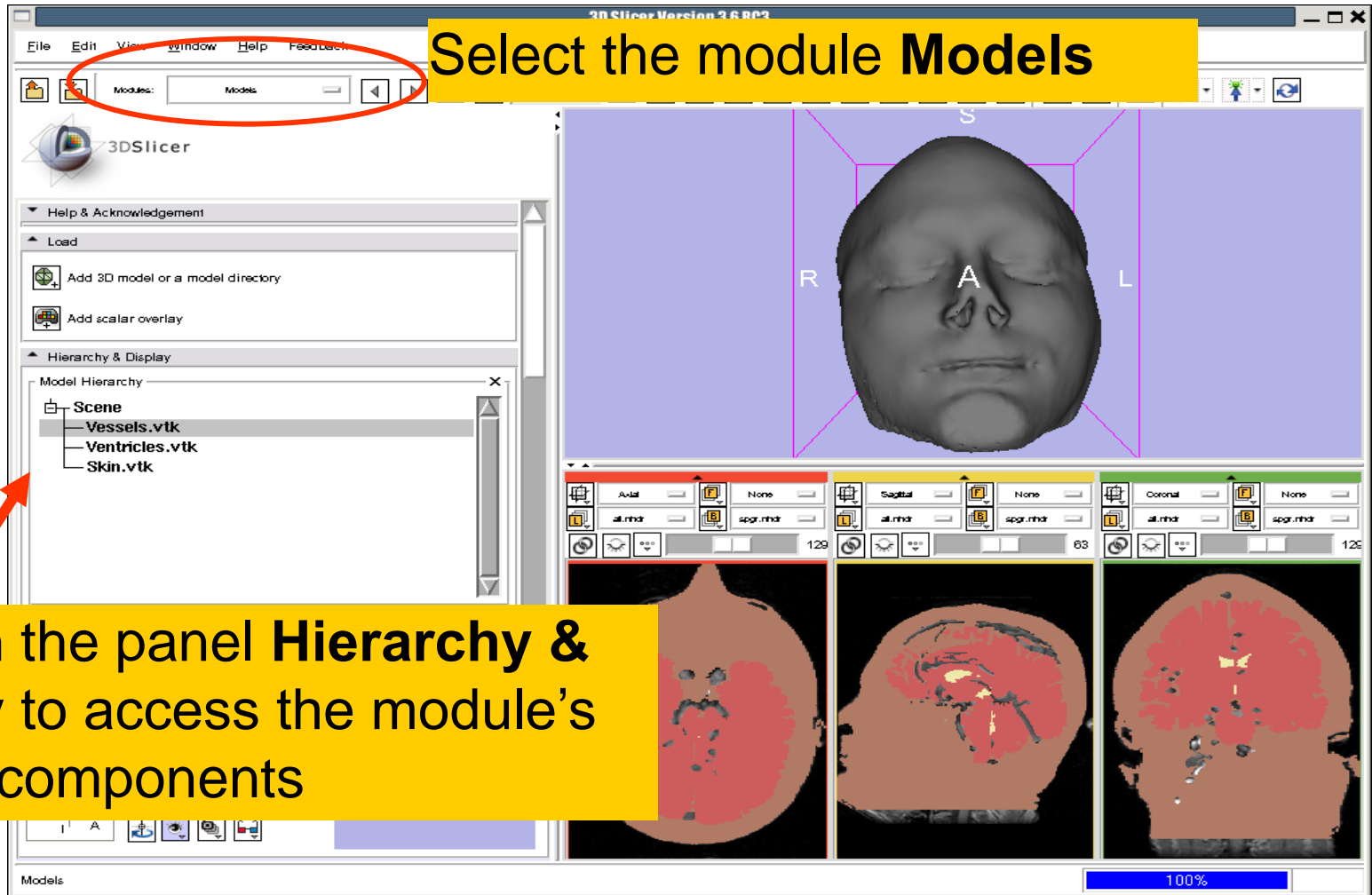
# Loading 3D models



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



# Loading a 3D model



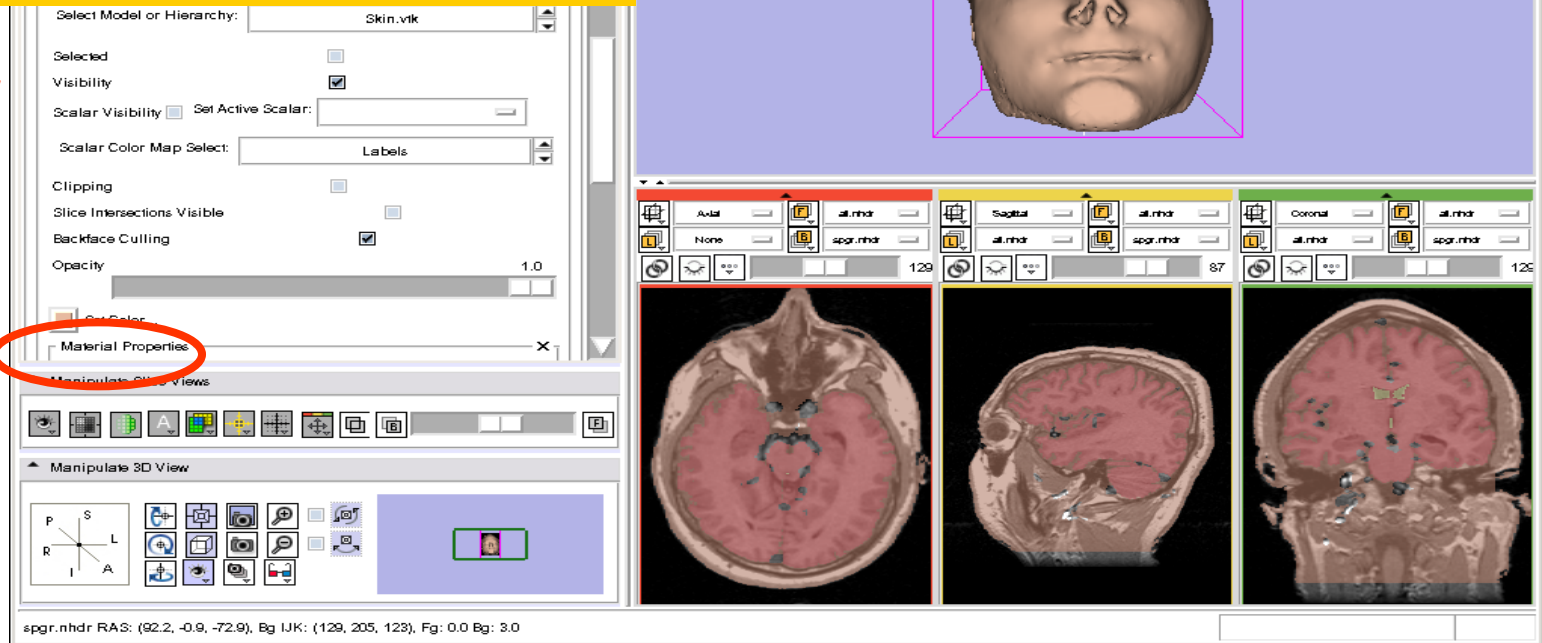
**Select the module Models**

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

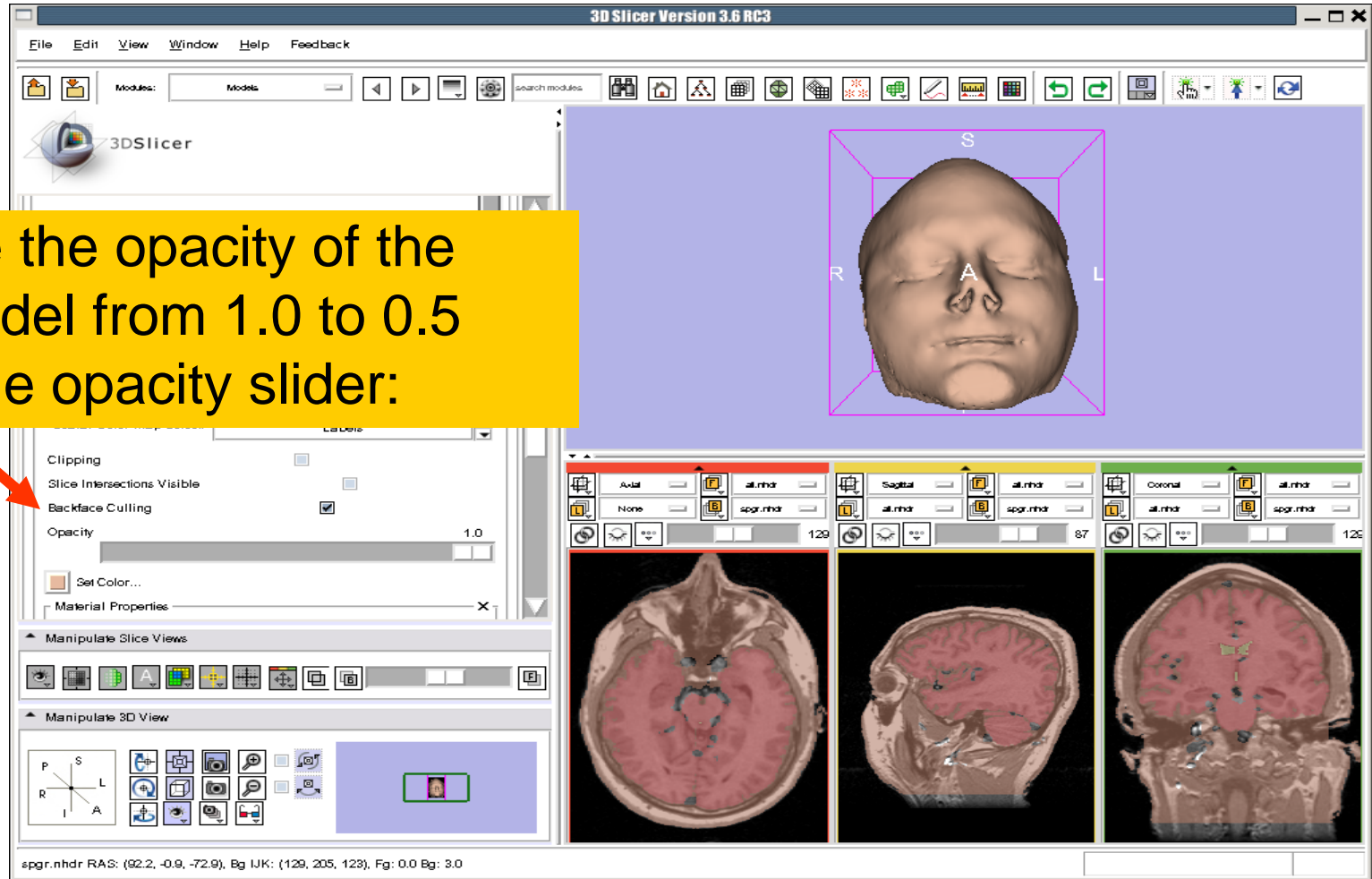
The screenshot shows the 3DSlicer interface with a 3D model of a face in the center. The 'Modules' dropdown menu is set to 'Models'. The 'Hierarchy & Display' panel on the left shows a tree view with 'Scene' expanded, containing 'Vessels.vtk', 'Ventricles.vtk', and 'Skin.vtk'. The bottom right shows three orthogonal views (Axial, Sagittal, Coronal) of the face model.

# Visualizing a 3D model

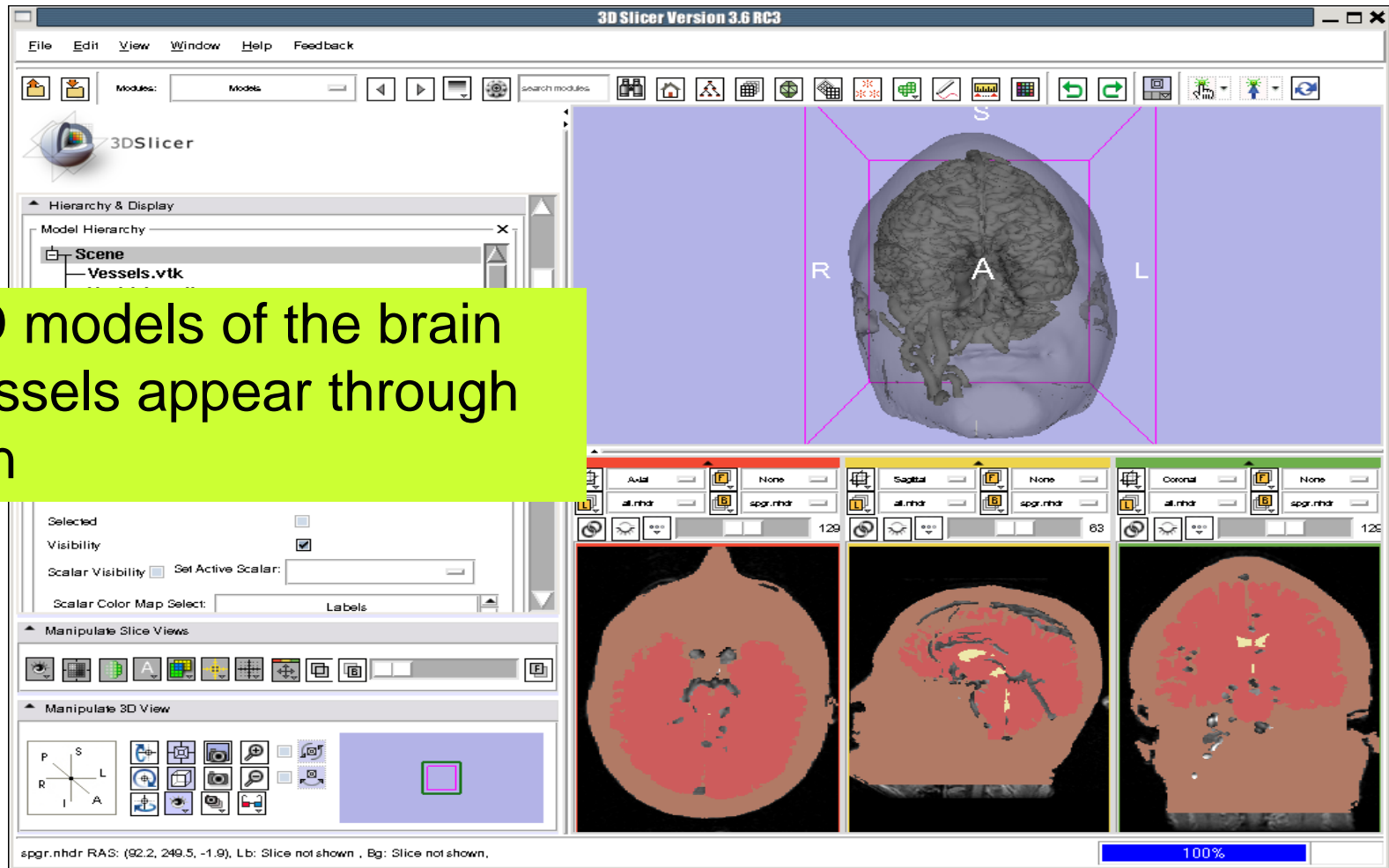
Select the model **Skin.vtk**  
Click on the icon **Set Color**  
and choose a new color for  
the 3D model of the head.



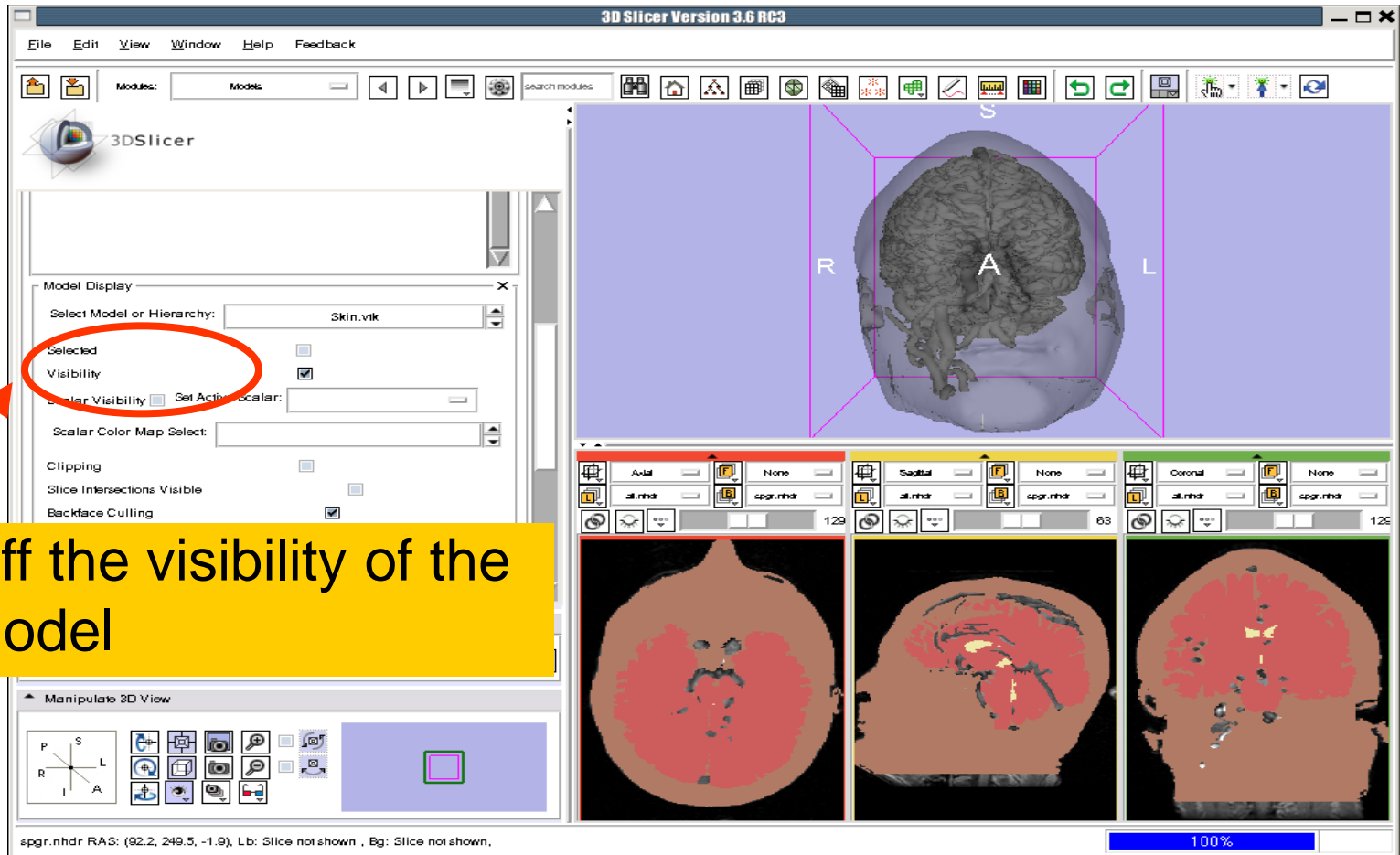
# Visualizing a 3D model



# Visualizing a 3D model

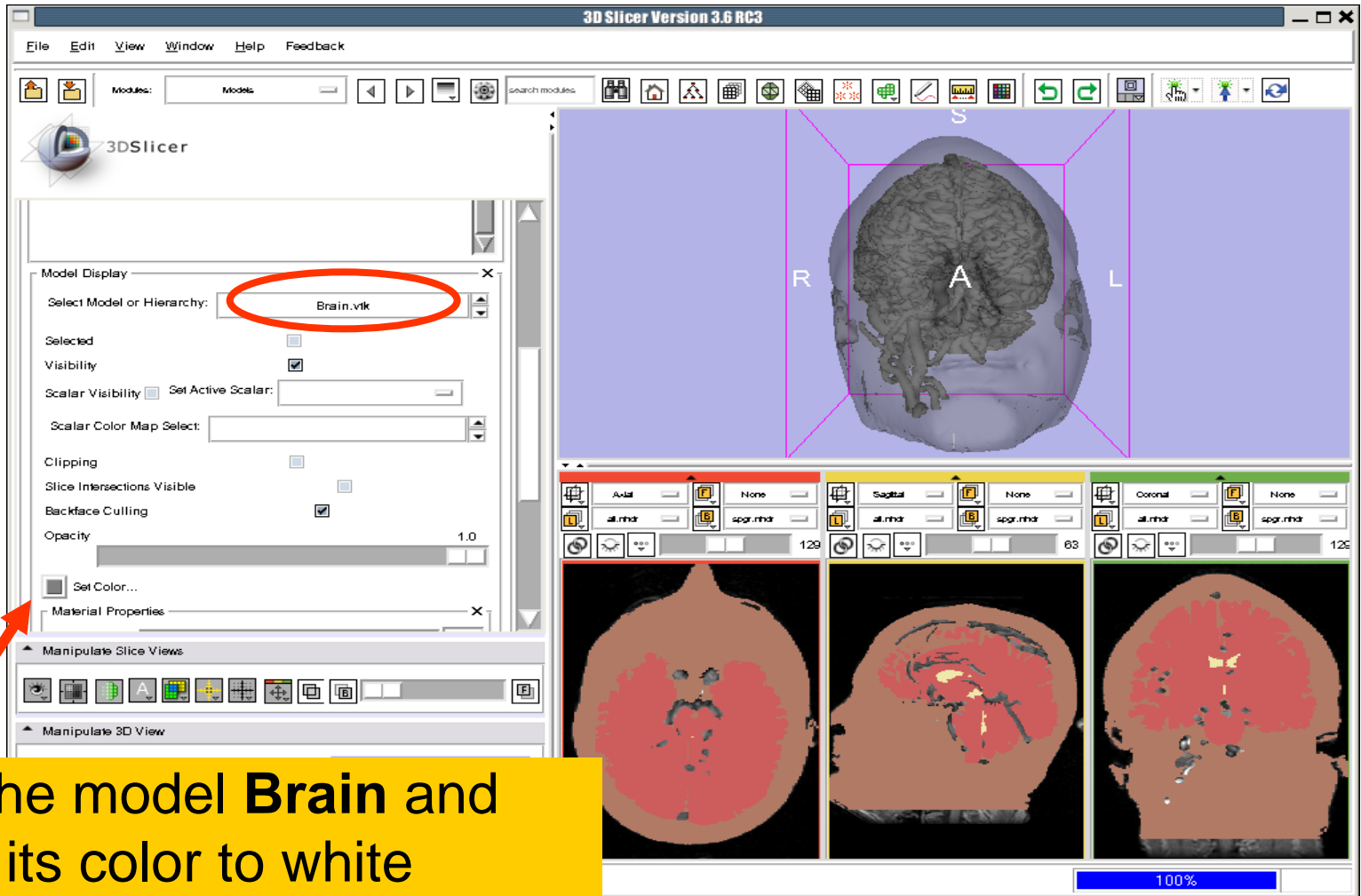


# Visualizing a 3D model



Turn off the visibility of the skin model

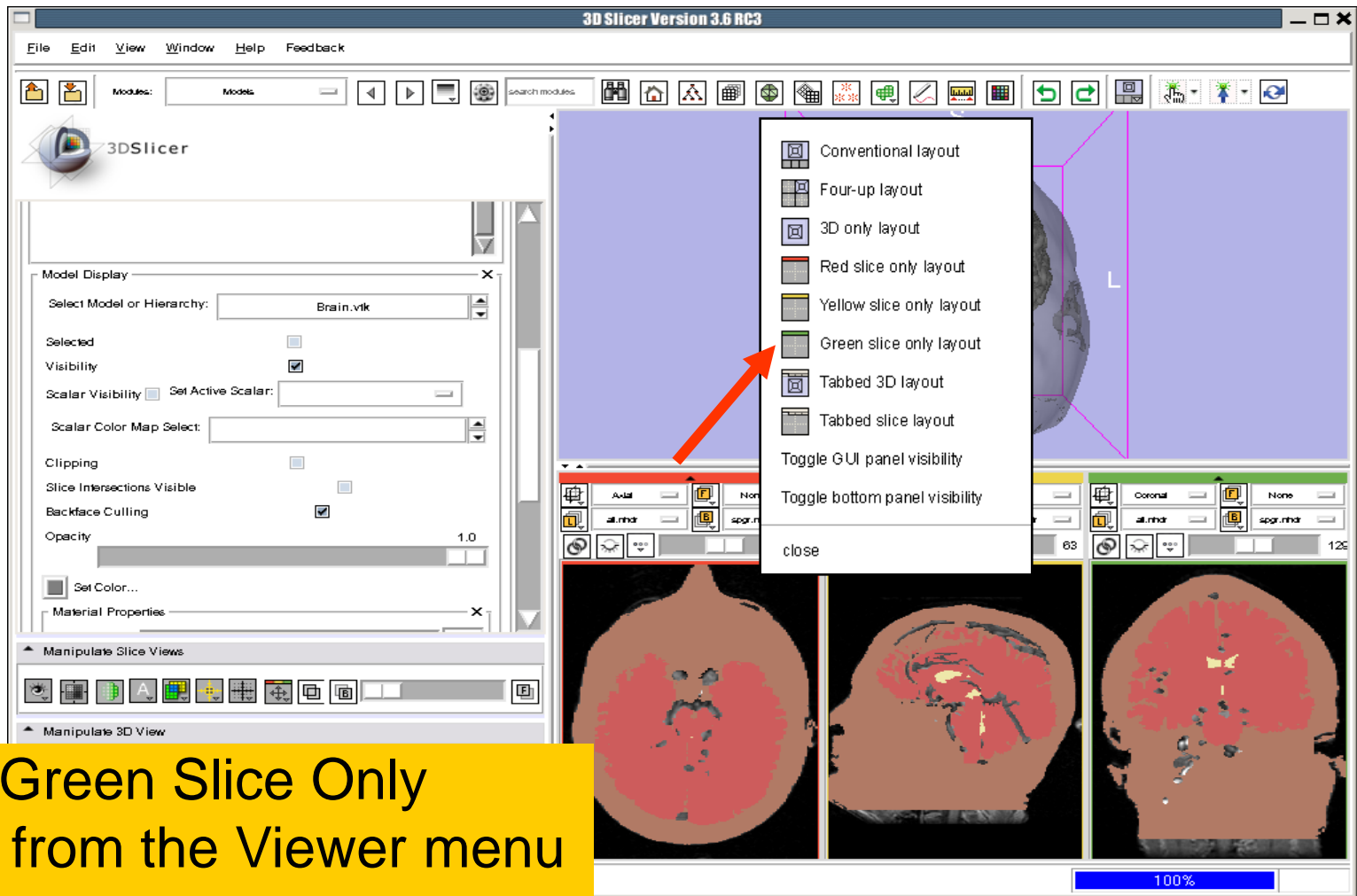
# Visualizing a 3D model



The screenshot displays the 3D Slicer software interface. The main window shows a 3D model of a brain with axes labeled R (Right), A (Anterior), and L (Left). The left sidebar contains the 'Model Display' panel, where the model 'Brain.vtk' is selected and circled in red. Below this, there are checkboxes for 'Selected', 'Visibility', and 'Scalar Visibility', along with a 'Set Active Scalar' dropdown. The 'Clipping' section includes 'Slice Intersections Visible', 'Backface Culling', and an 'Opacity' slider set to 1.0. A red arrow points from the 'Set Color...' button in the 'Material Properties' section to a yellow text box. The bottom right of the interface shows three slice views: Axial, Sagittal, and Coronal, each with its own set of controls and a zoom slider at the bottom right set to 100%.

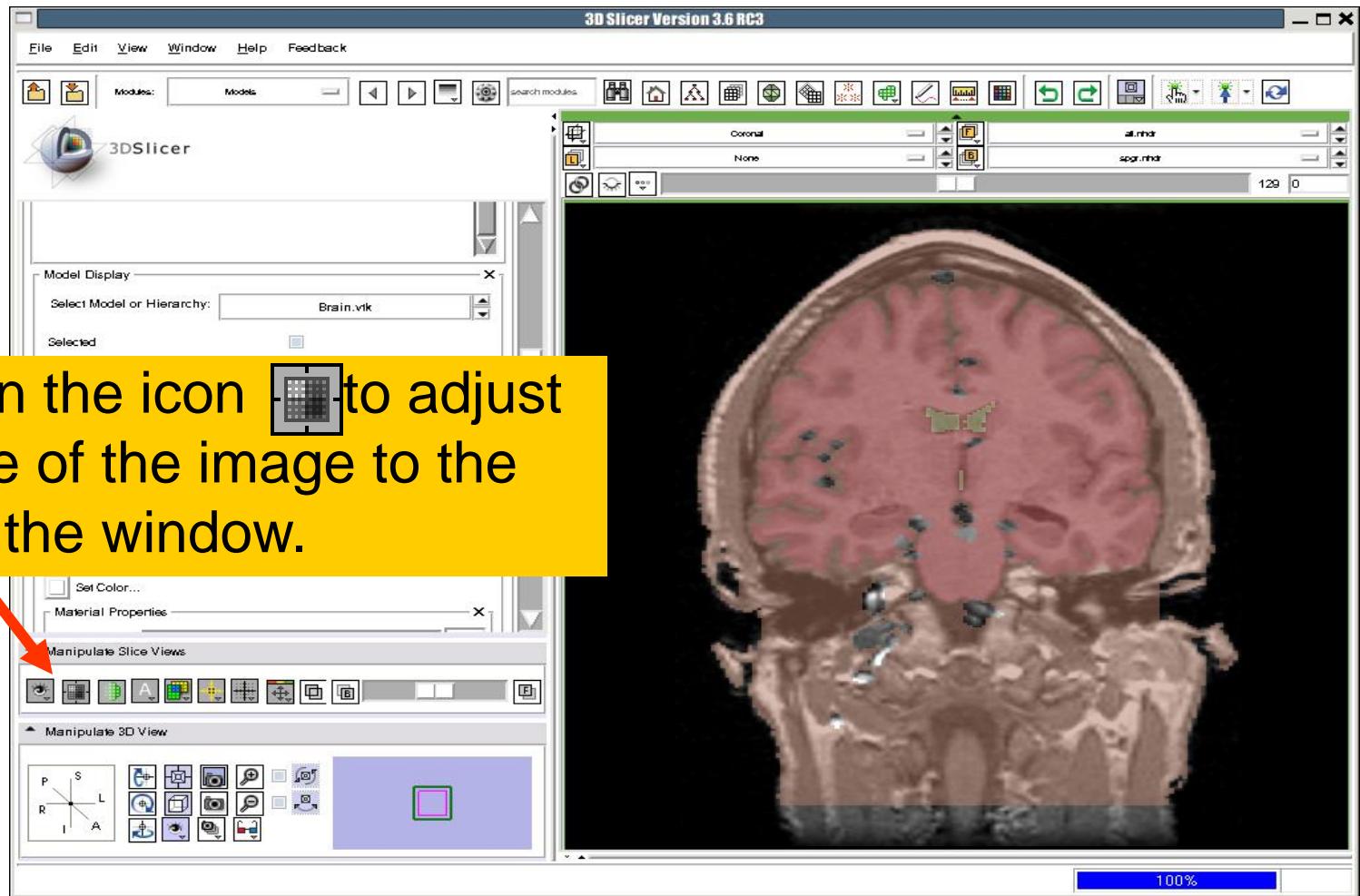
Select the model **Brain** and change its color to white

# Visualizing a 3D model



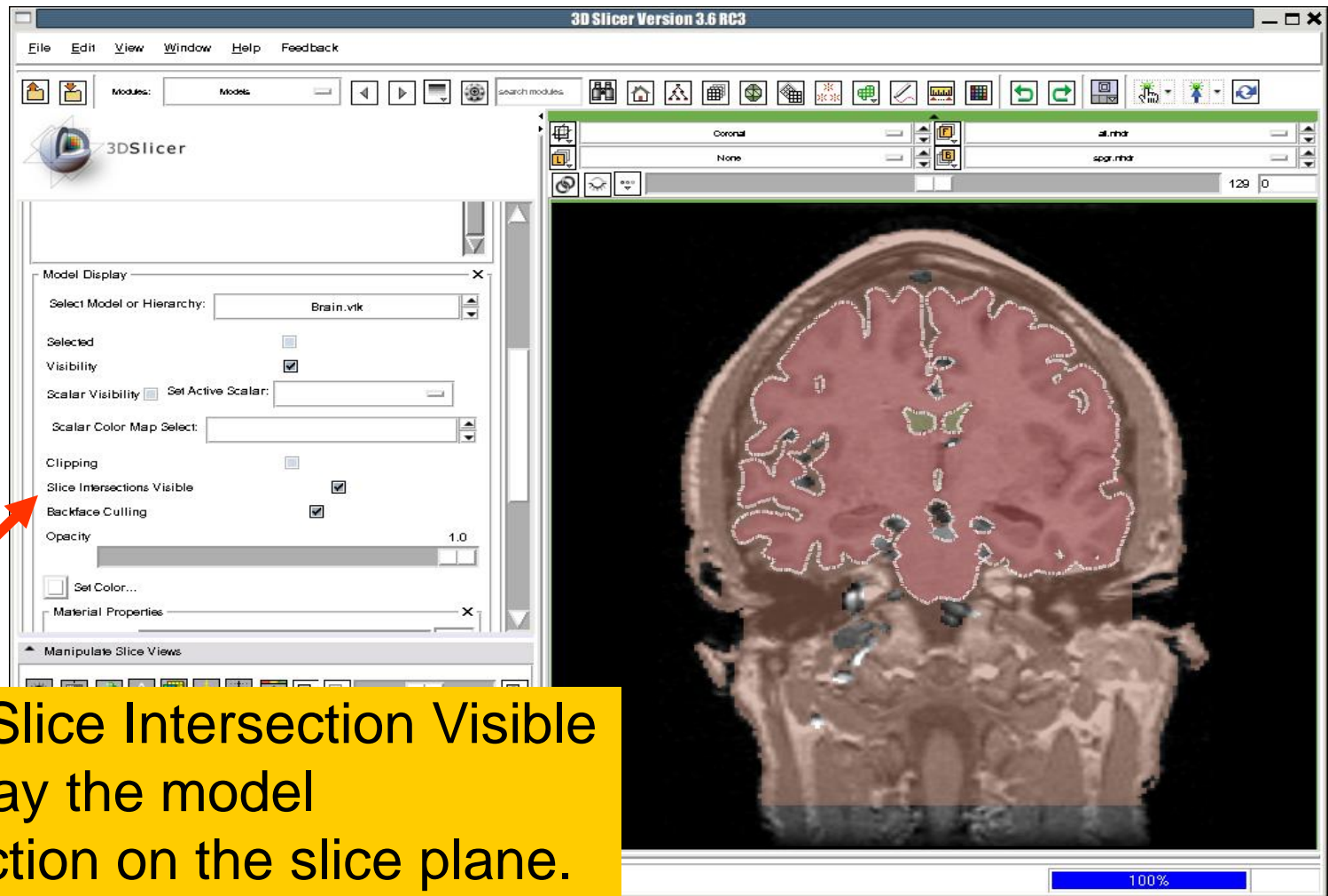
Select Green Slice Only  
Layout from the Viewer menu

# Visualizing a 3D model



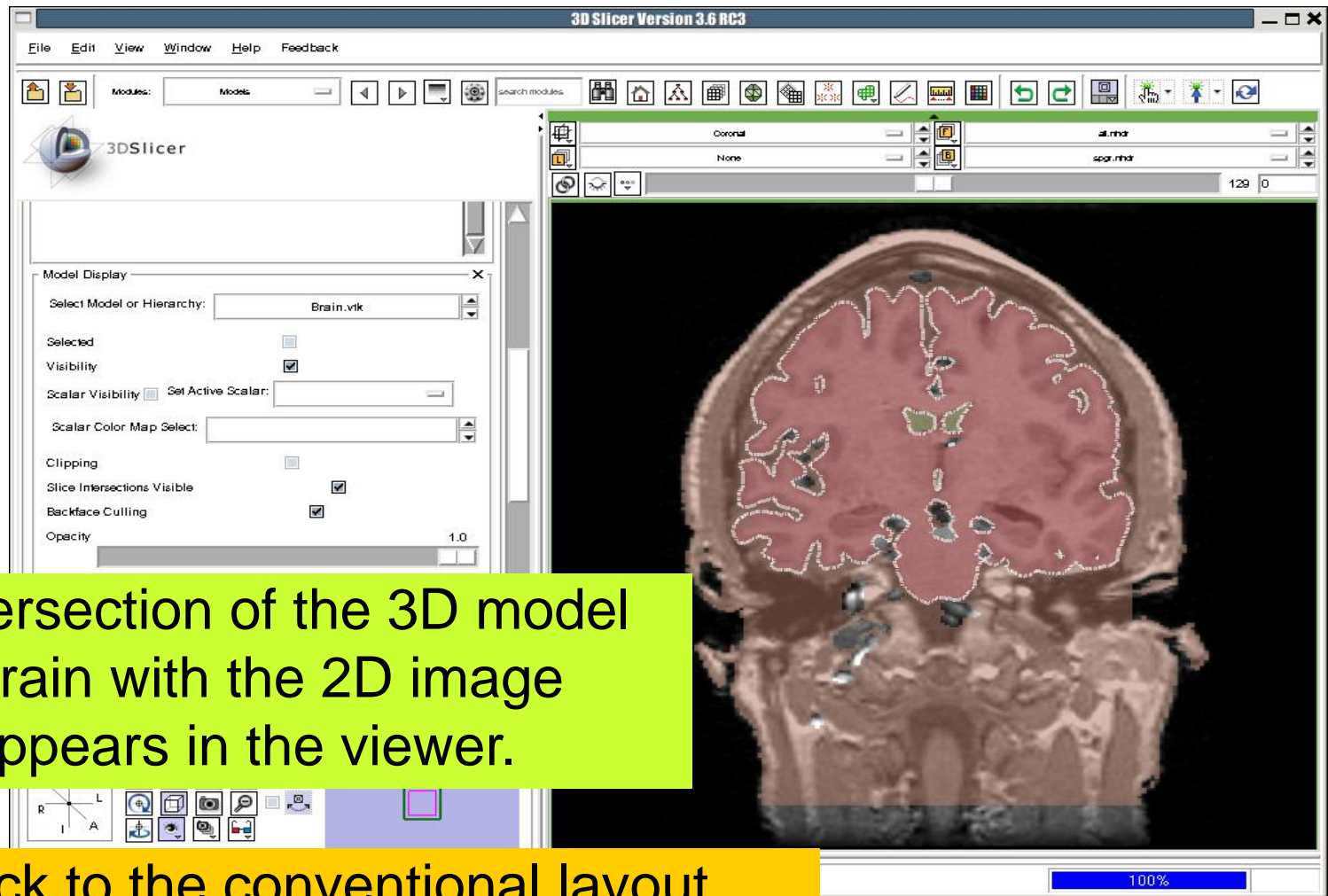


# Visualizing a 3D model



Select Slice Intersection Visible to display the model intersection on the slice plane.

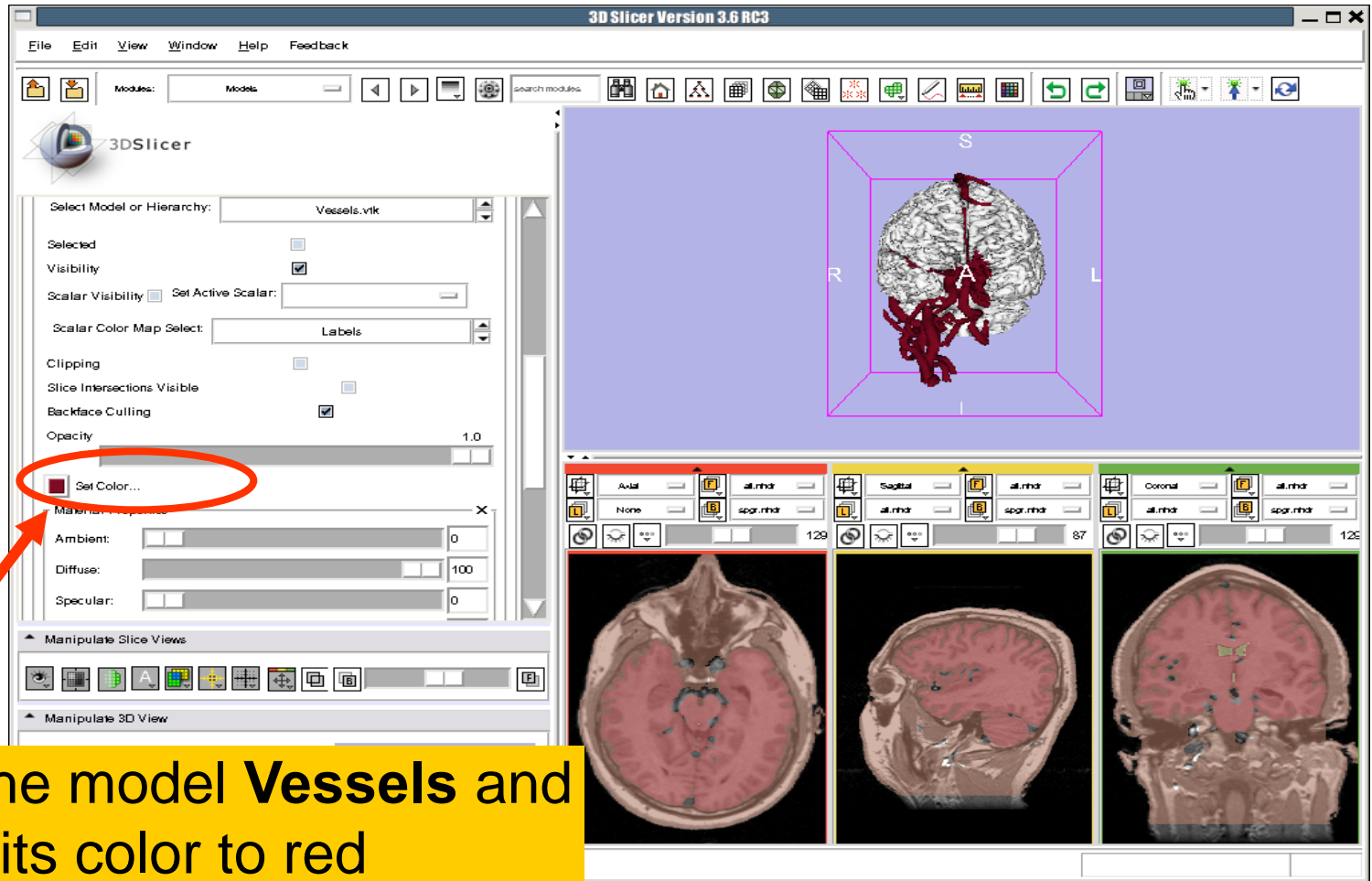
# Visualizing a 3D model



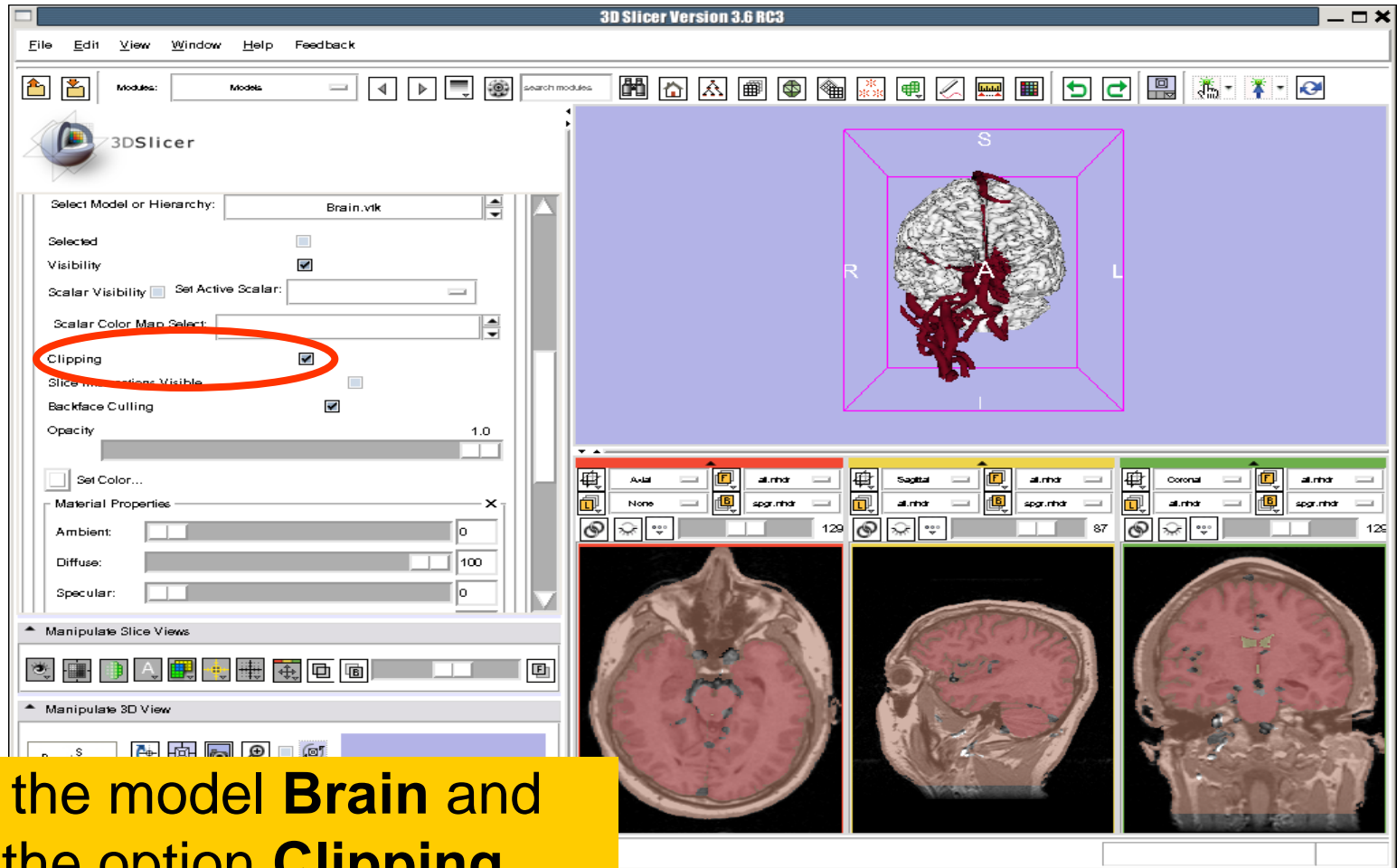
The intersection of the 3D model of the brain with the 2D image plane appears in the viewer.

Go back to the conventional layout

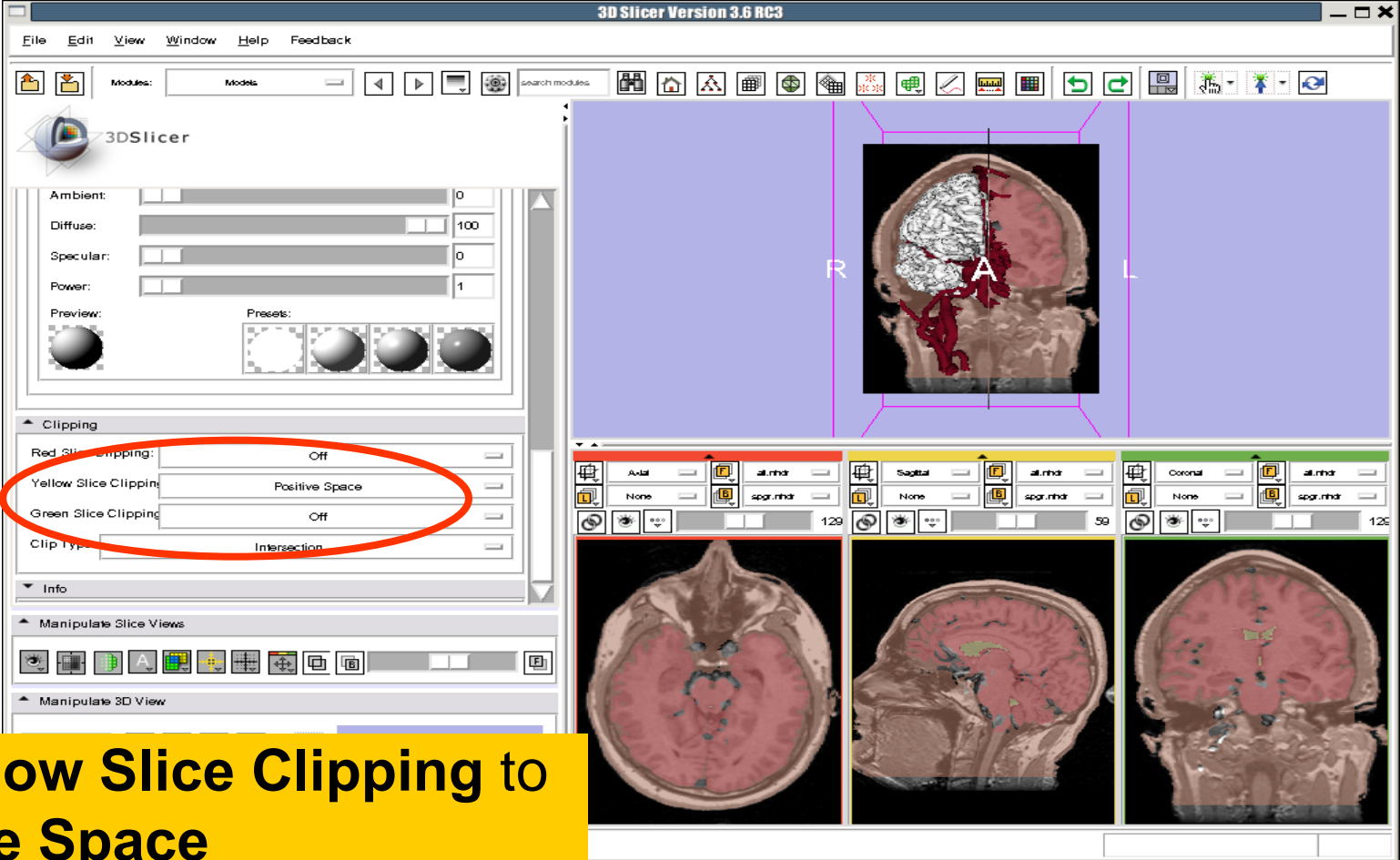
# Visualizing a 3D model



# Visualizing a 3D model



# Visualizing a 3D model



3D Slicer Version 3.6 RC3

File Edit View Window Help Feedback

Modules: Models

Ambient: 0  
Diffuse: 100  
Specular: 0  
Power: 1

Clipping

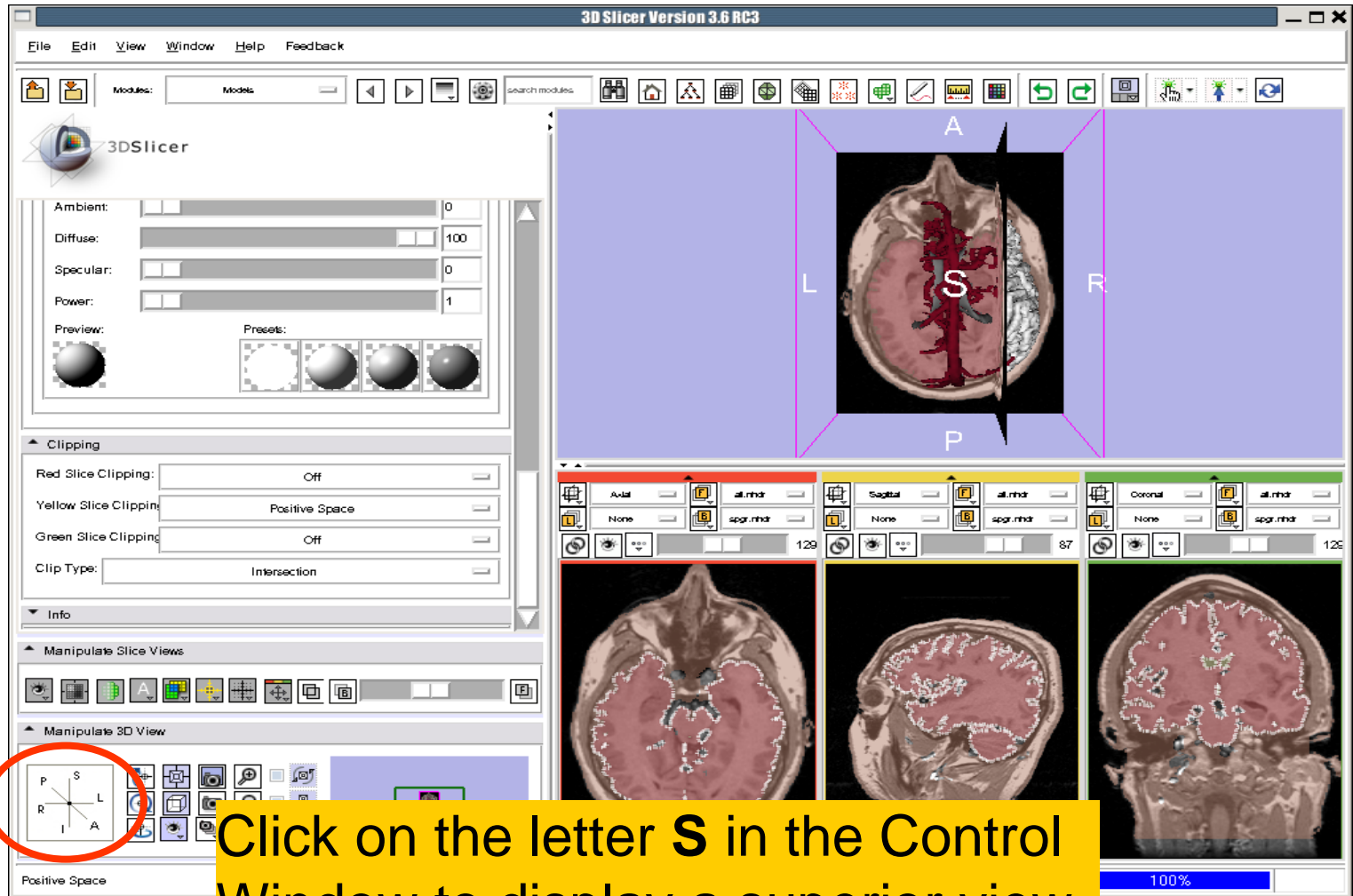
Red Slice Clipping: Off  
Yellow Slice Clipping: Positive Space  
Green Slice Clipping: Off  
Clip Type: Intersection

Manipulate Slice Views

Manipulate 3D View

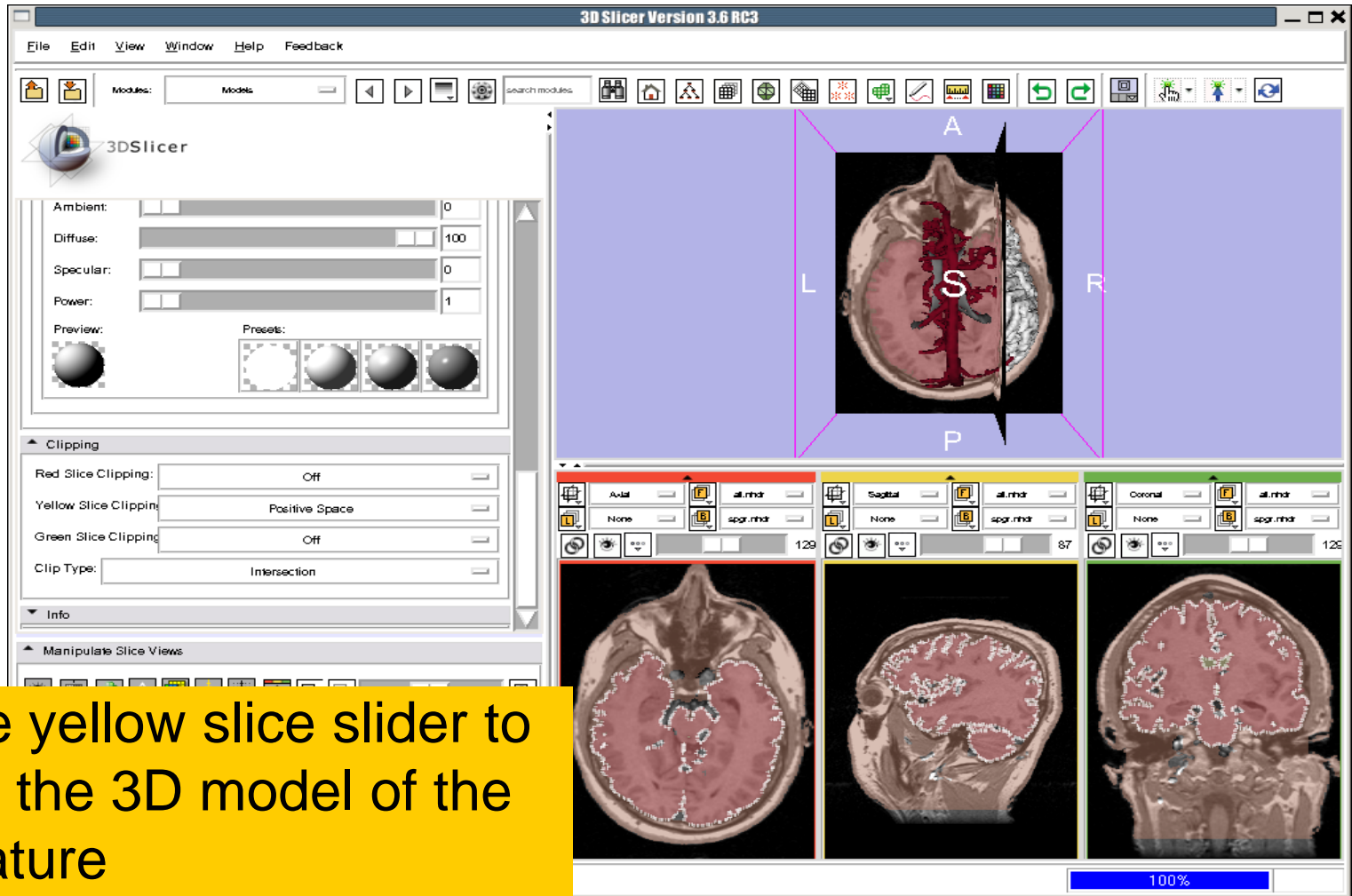
Set Yellow Slice Clipping to Positive Space

# Visualizing a 3D model

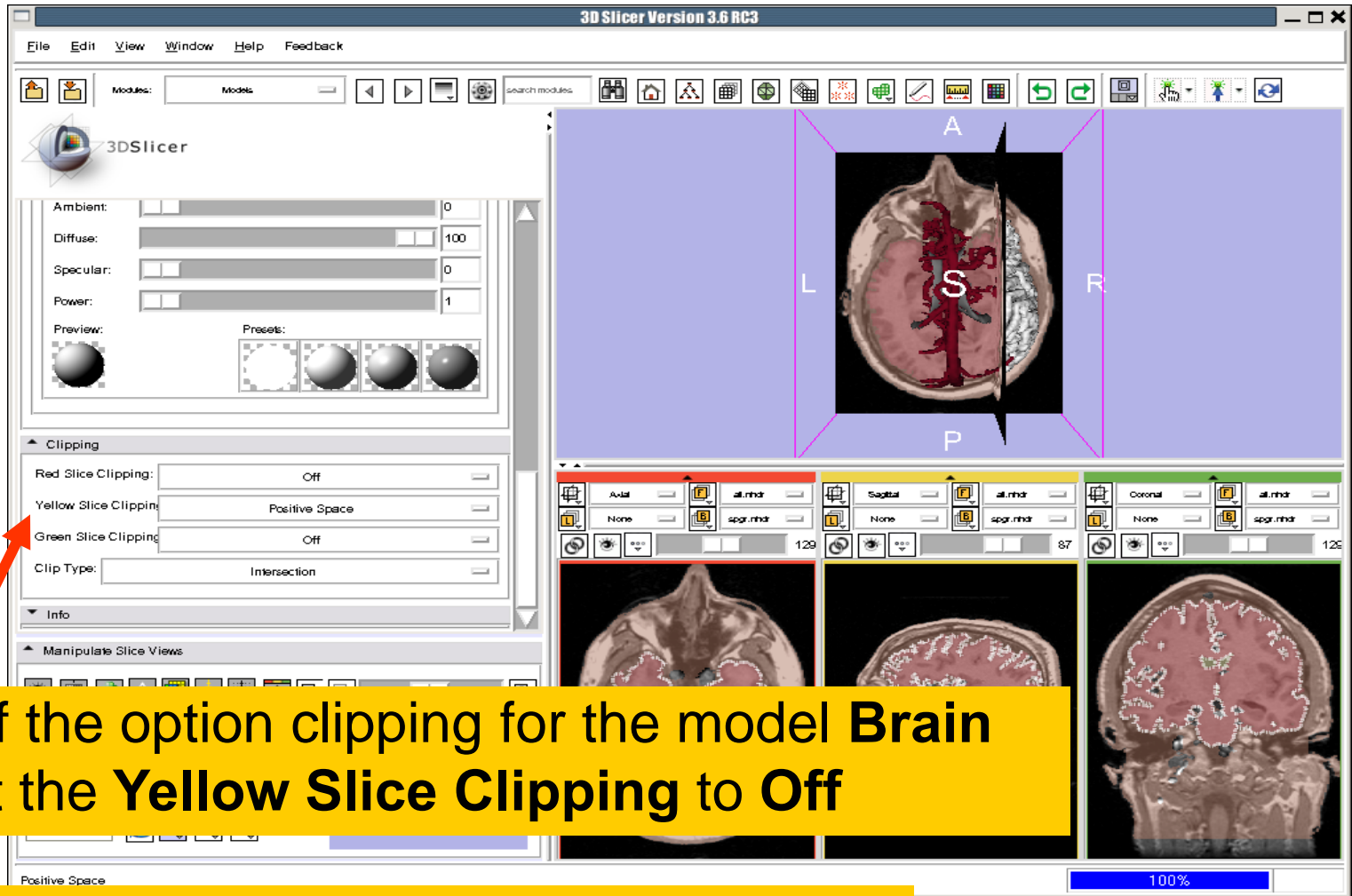


Click on the letter **S** in the Control Window to display a superior view of the 3D models

# Visualizing a 3D model



# Visualizing a 3D model

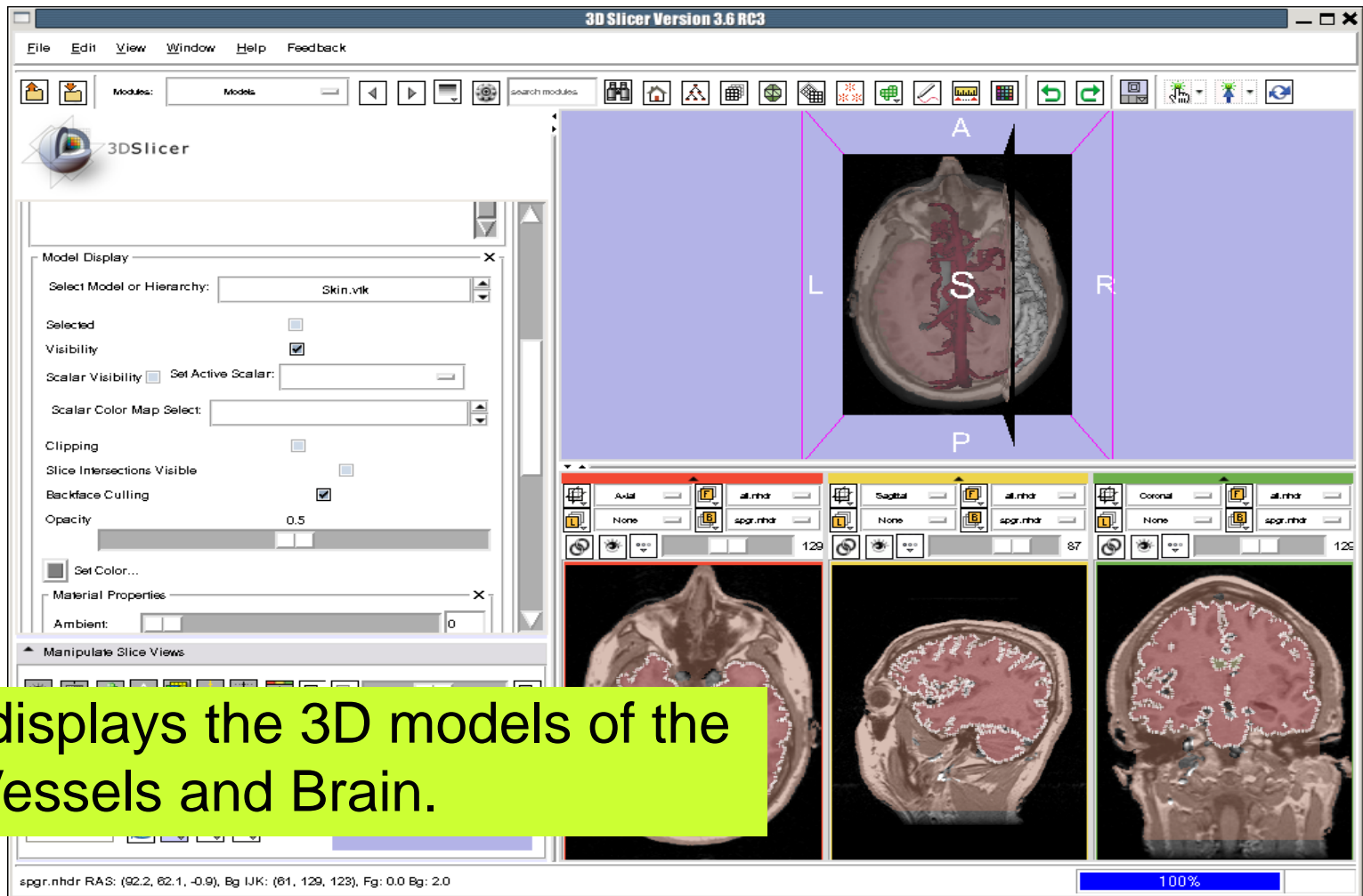


Turn off the option clipping for the model **Brain** and set the **Yellow Slice Clipping** to **Off**

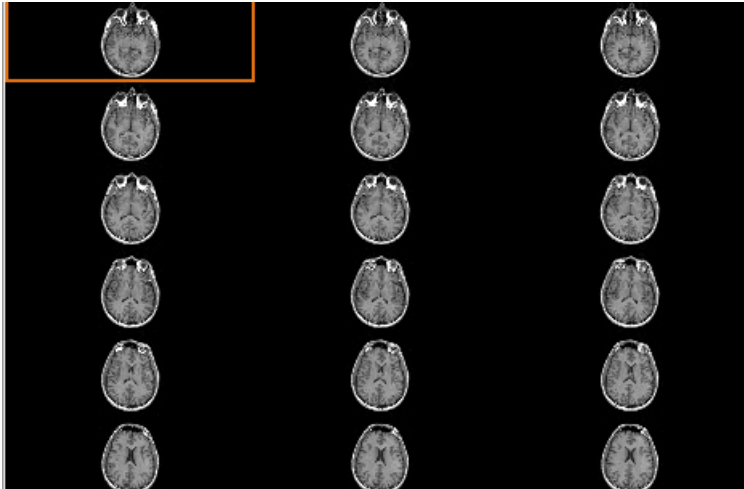
Turn on the visibility of the model **Skin**



# Visualizing a 3D model

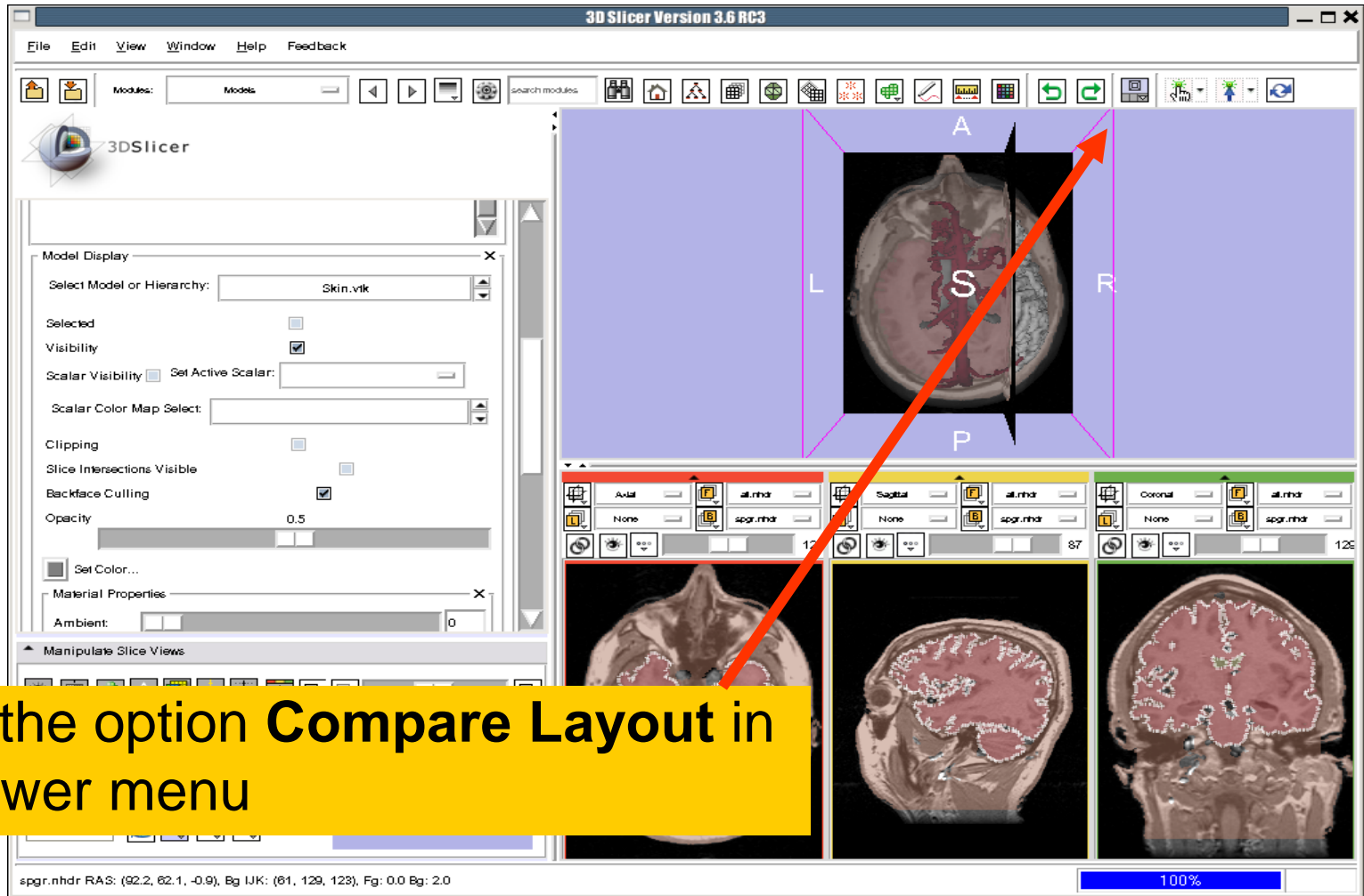


Slicer displays the 3D models of the Skin, Vessels and Brain.

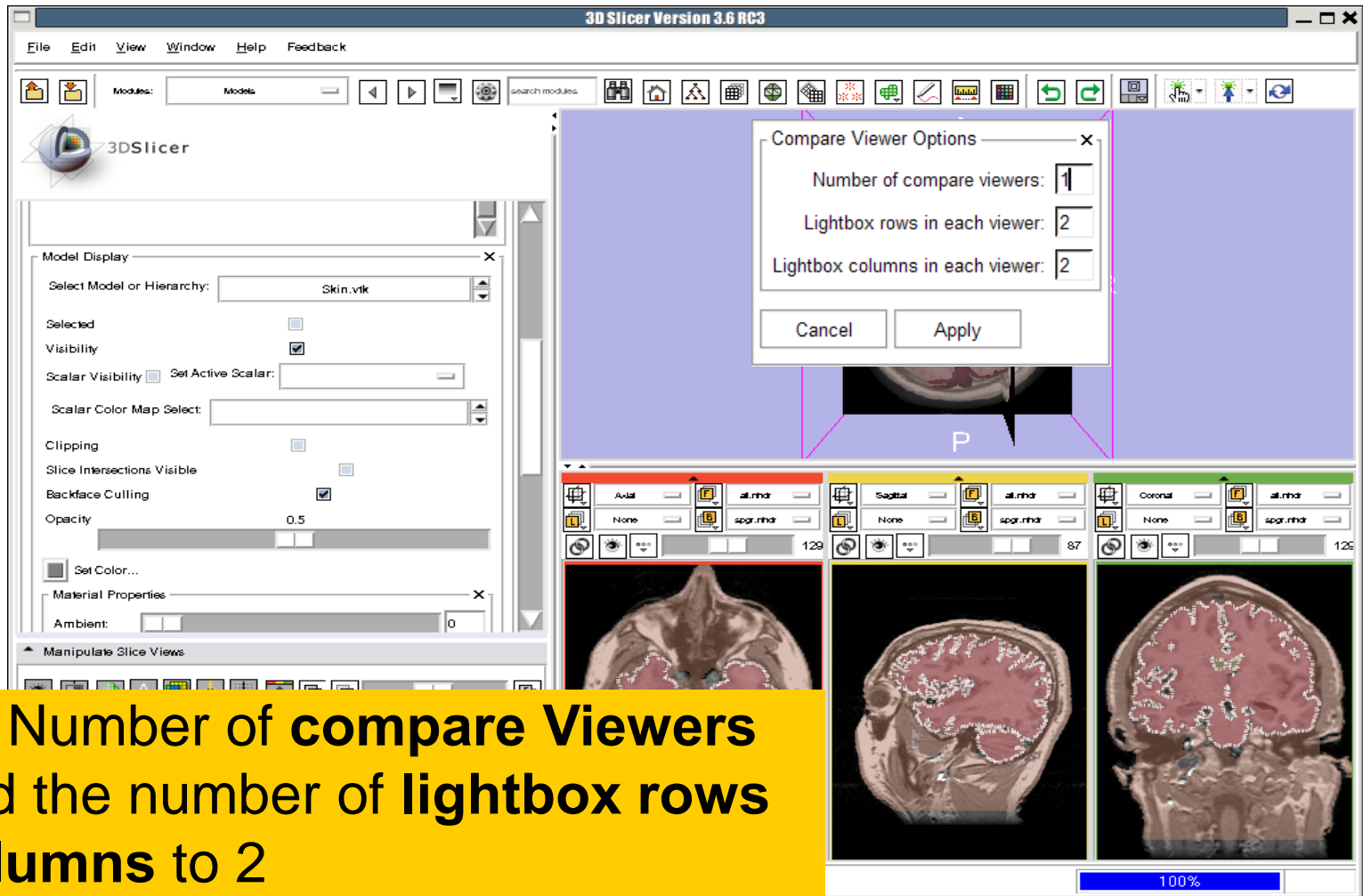


## Part 4: Lightbox viewer

# Visualizing a 3D model



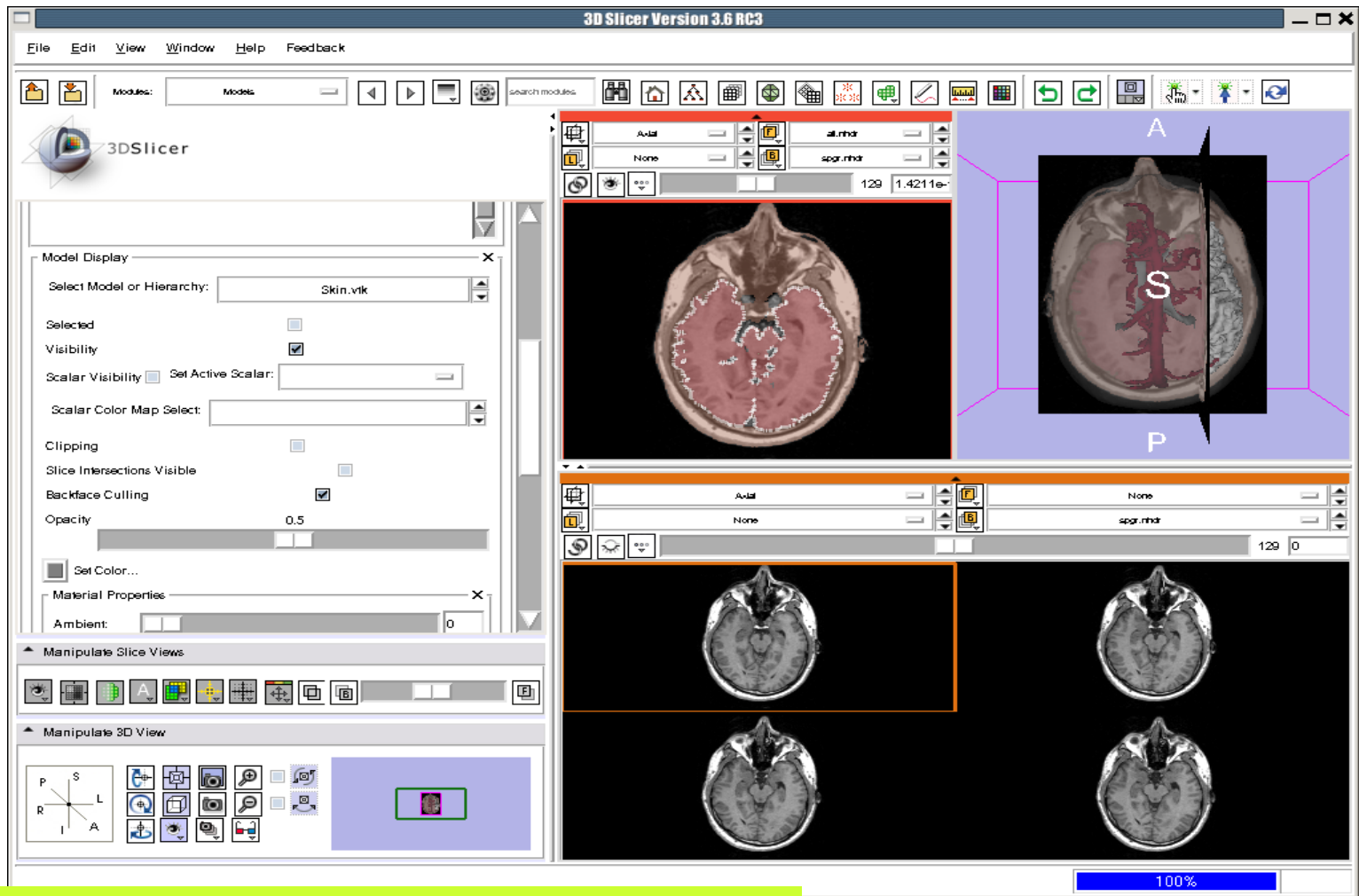
# Visualizing a 3D model



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

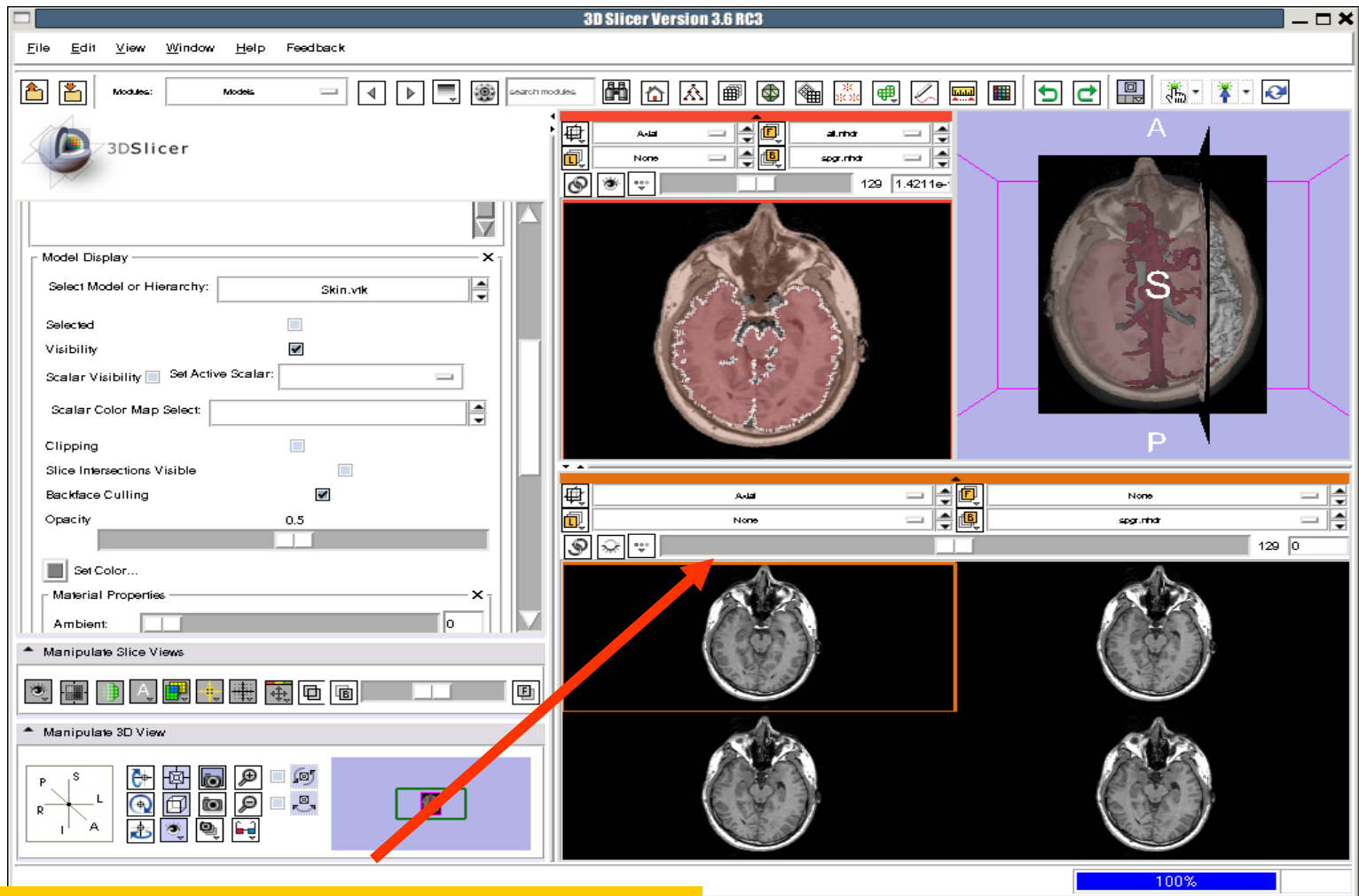
Click on **Apply**

# Lightbox viewer



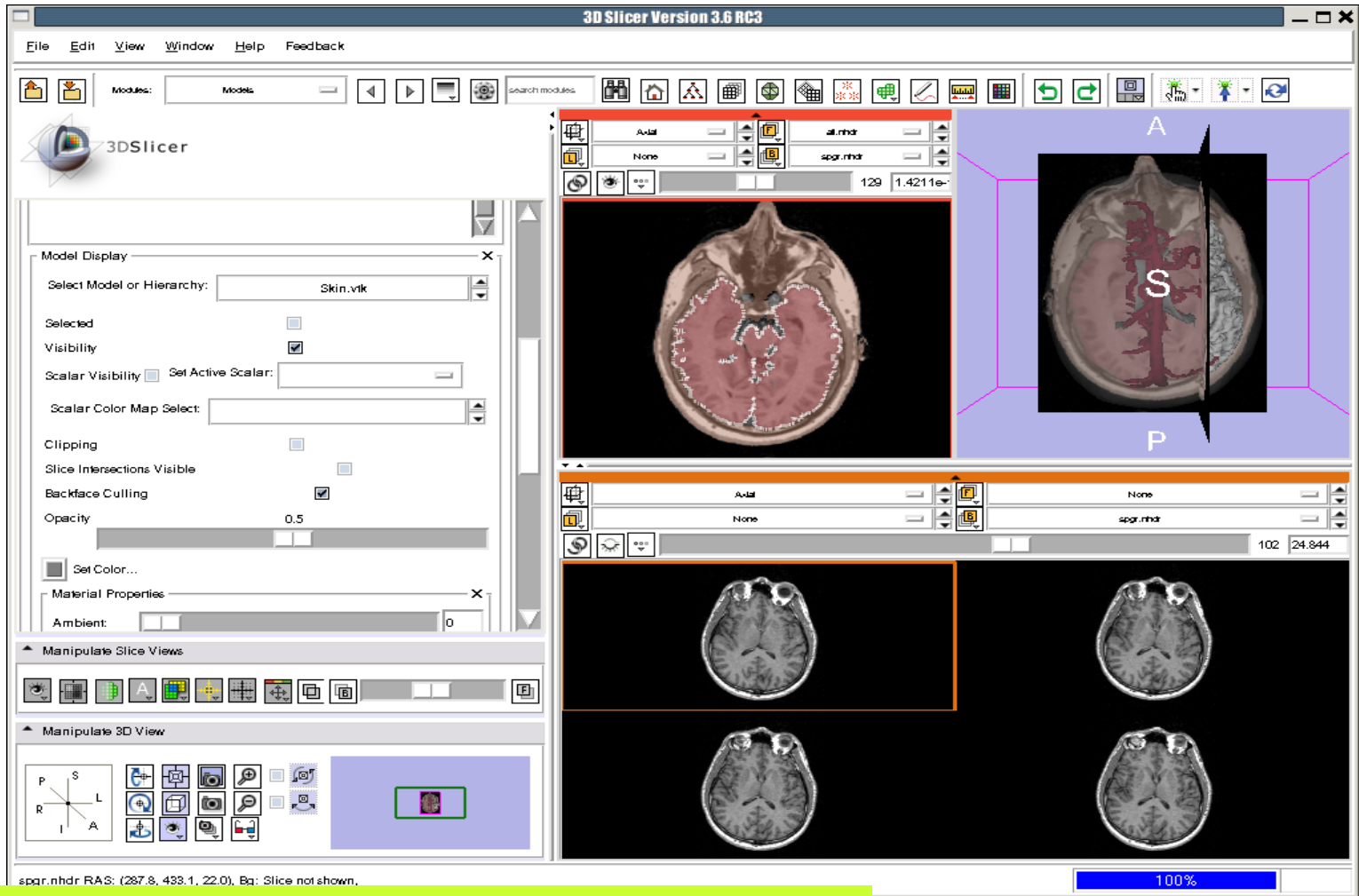
Slicer displays a lightbox view of the Background dataset.

# Lightbox viewer



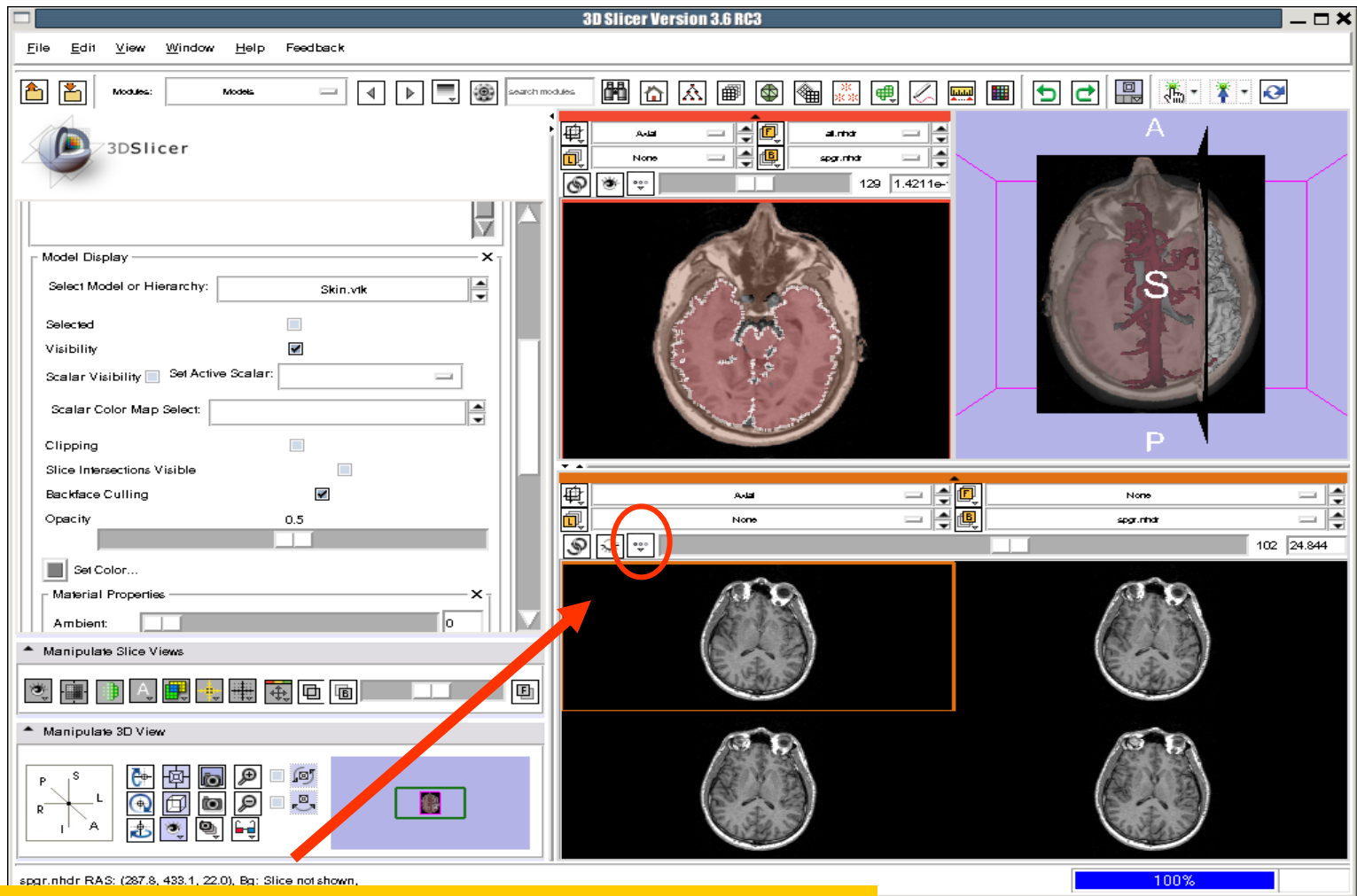
Browse through the spgr volume using the lightbox slider

# Lightbox viewer



Slicer displays 4 adjacent axial slices of the spgr volume simultaneously

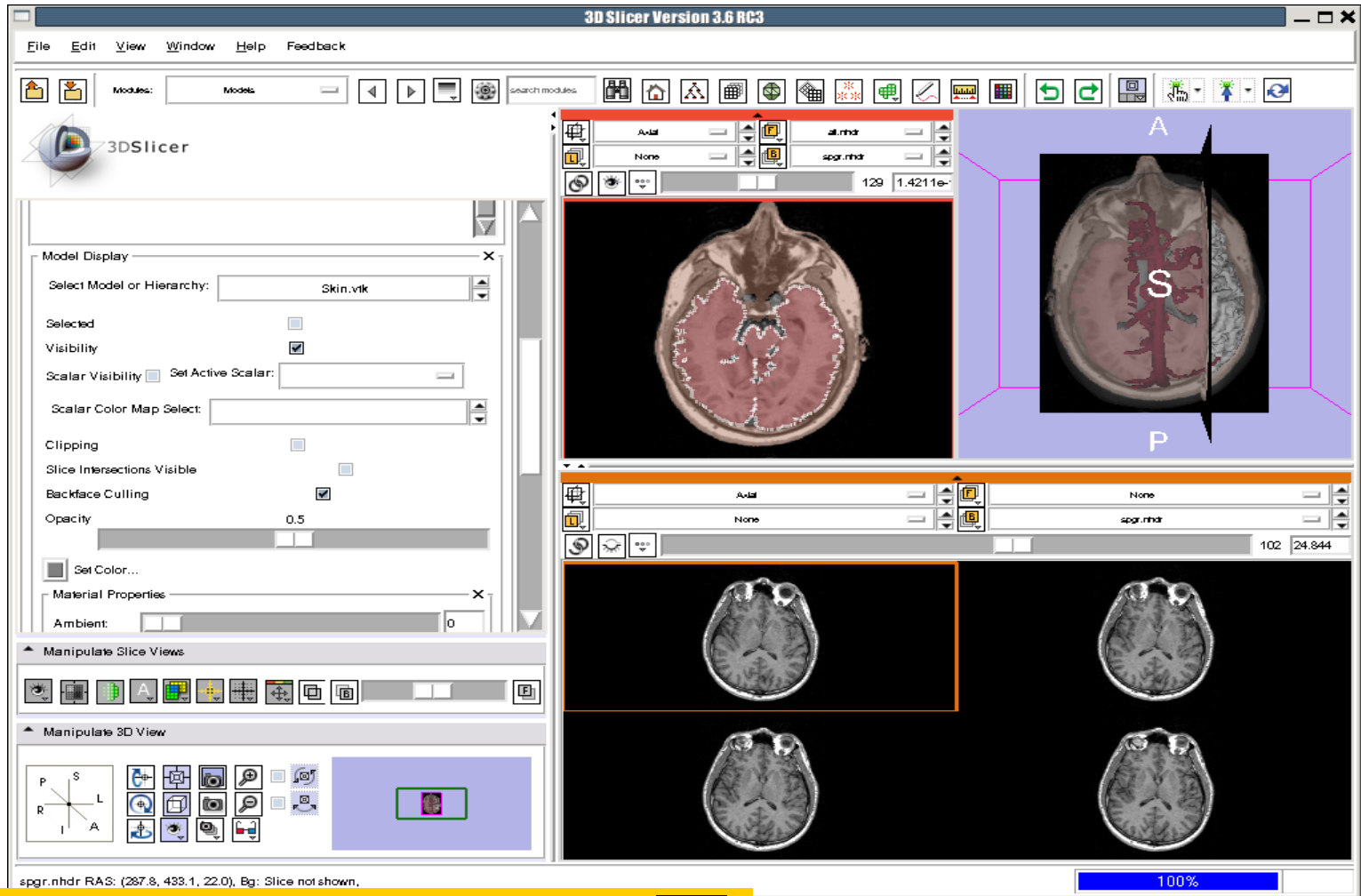
# Lightbox viewer



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



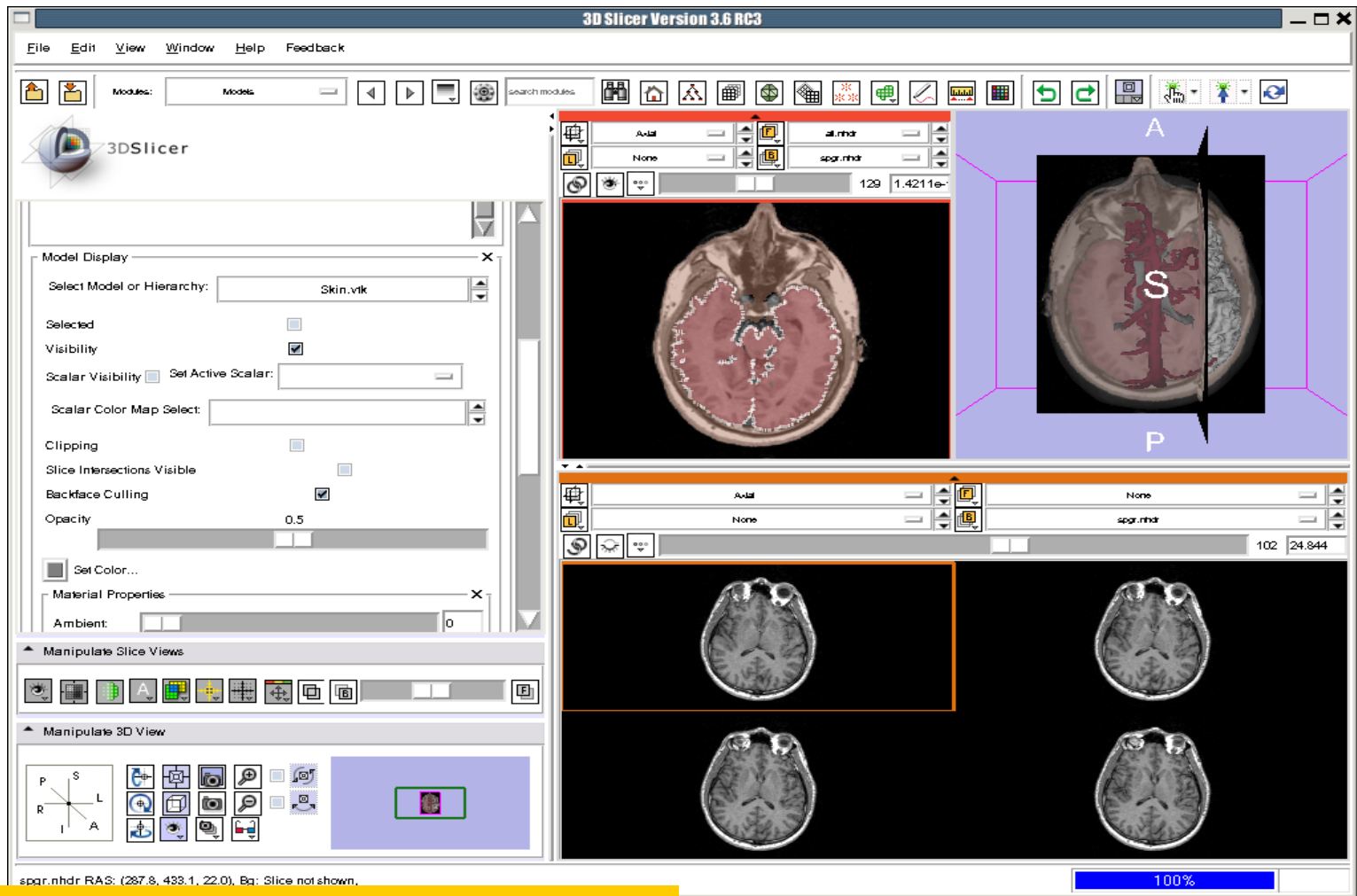
# Lightbox viewer



Select the **lightbox view** option

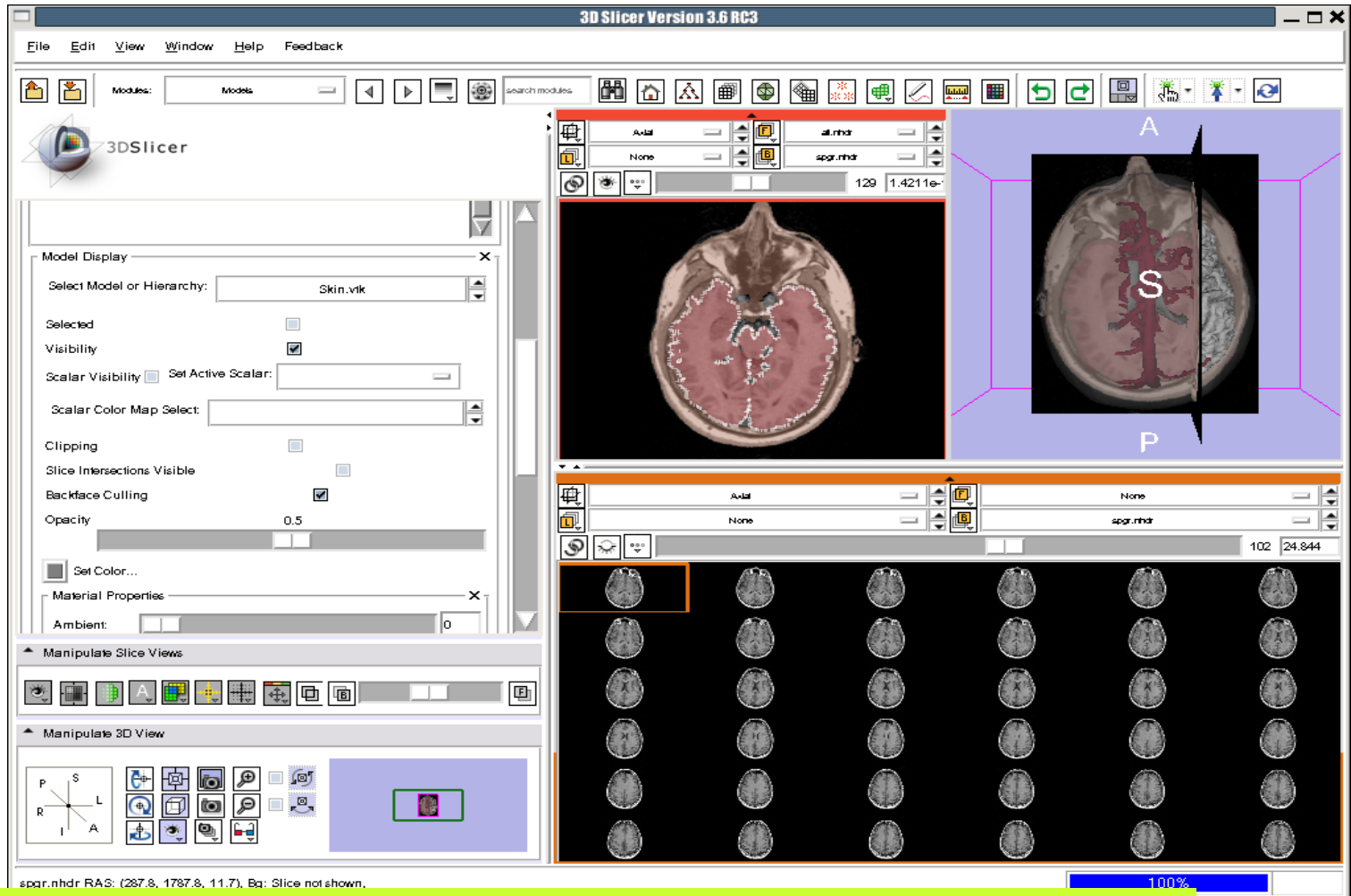


# Lightbox viewer



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

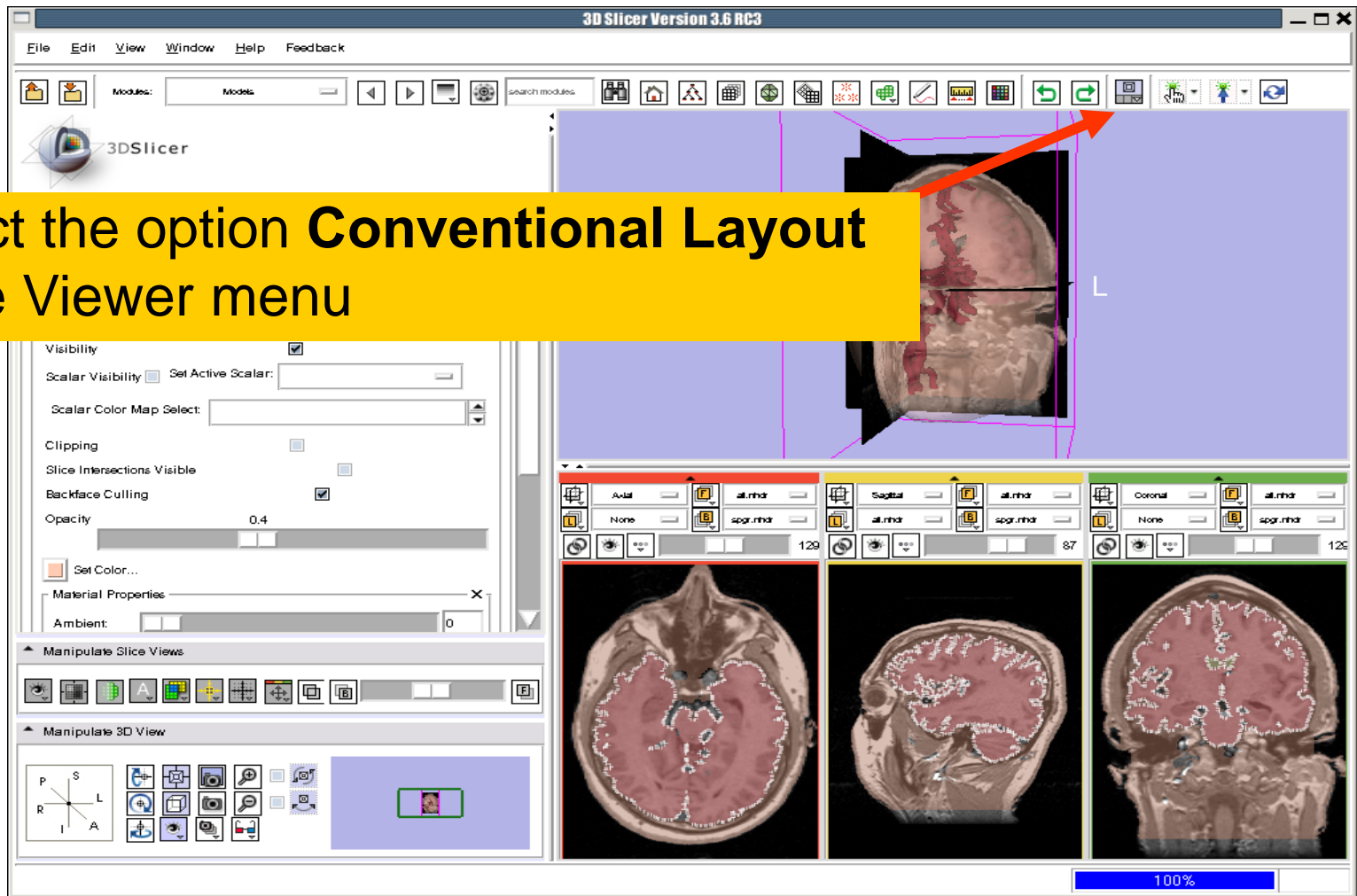
# Lightbox viewer

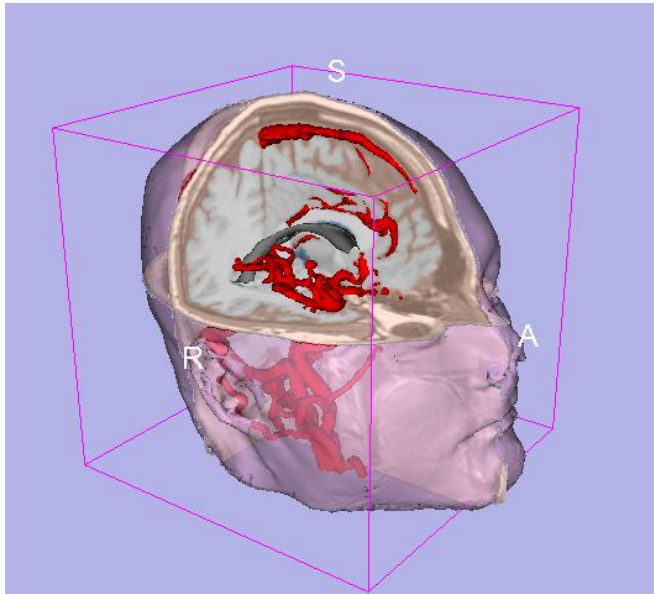


Slicer displays a matrix of 36 adjacent axial slices of the spgr volume.

# Lightbox viewer

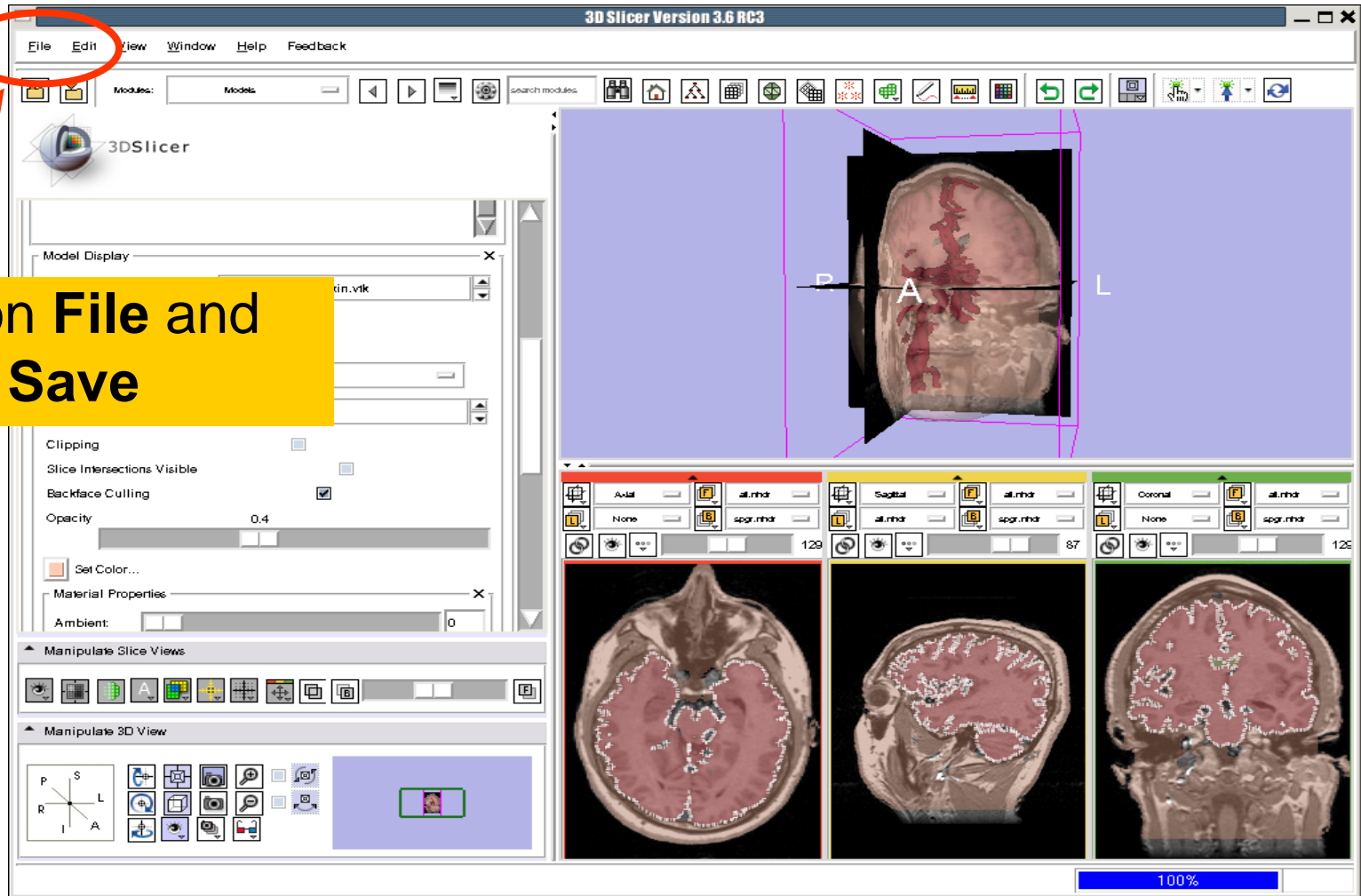
Select the option **Conventional Layout** in the Viewer menu



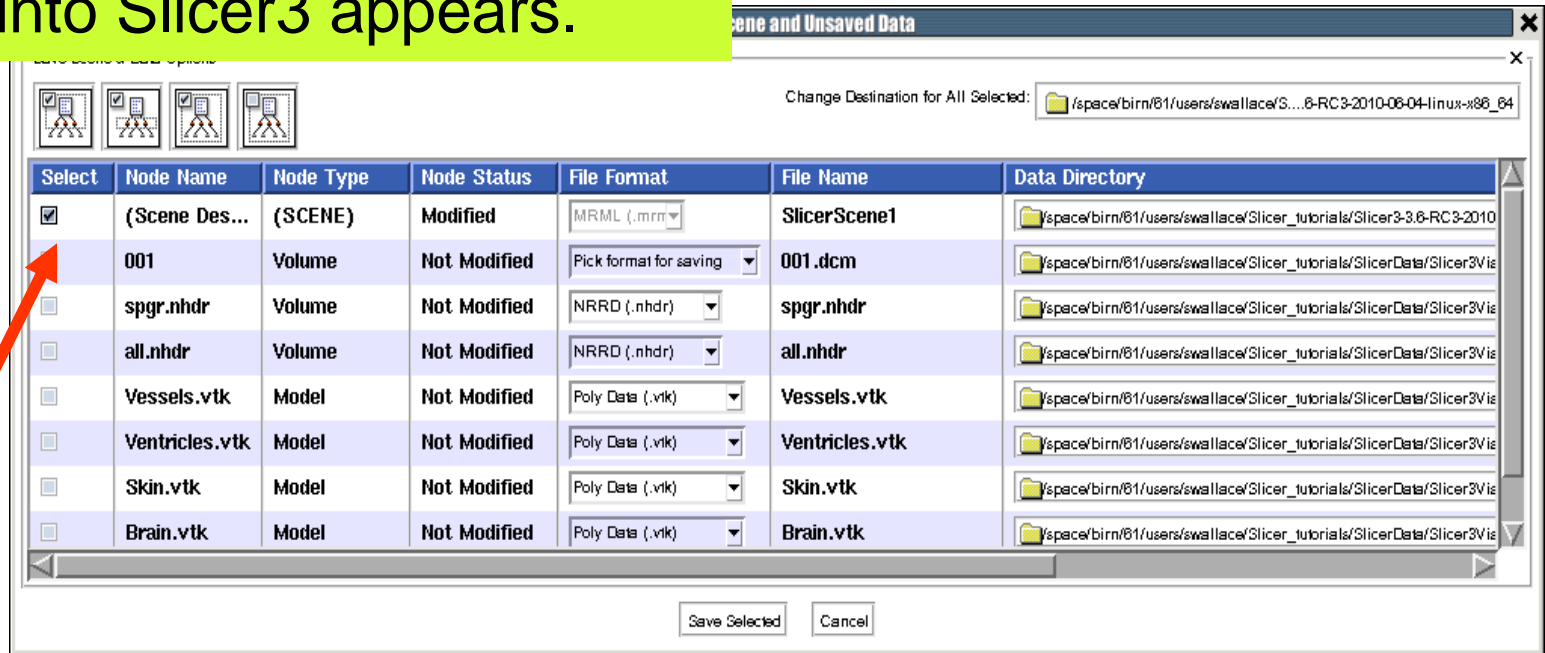


## Part 5: Loading and saving a Scene

# Saving Data



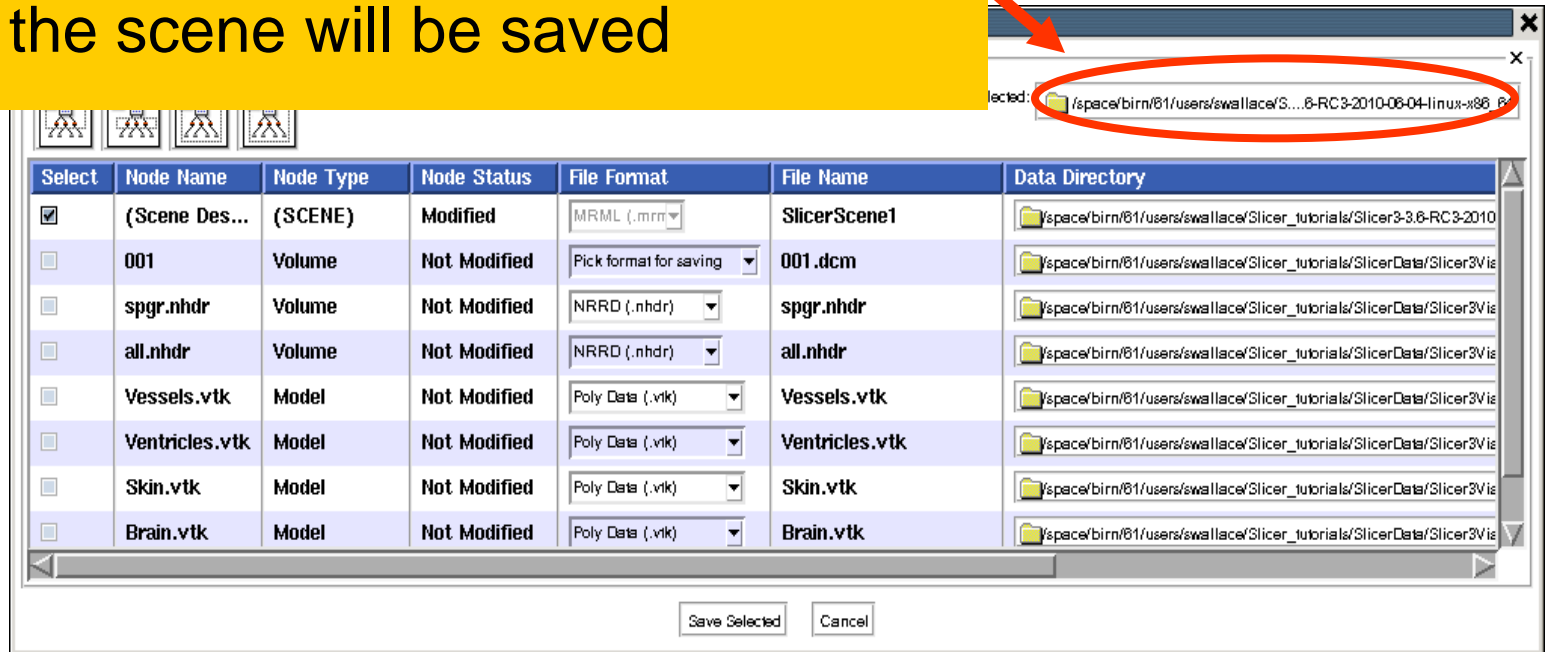
The list of elements currently loaded into Slicer3 appears.



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



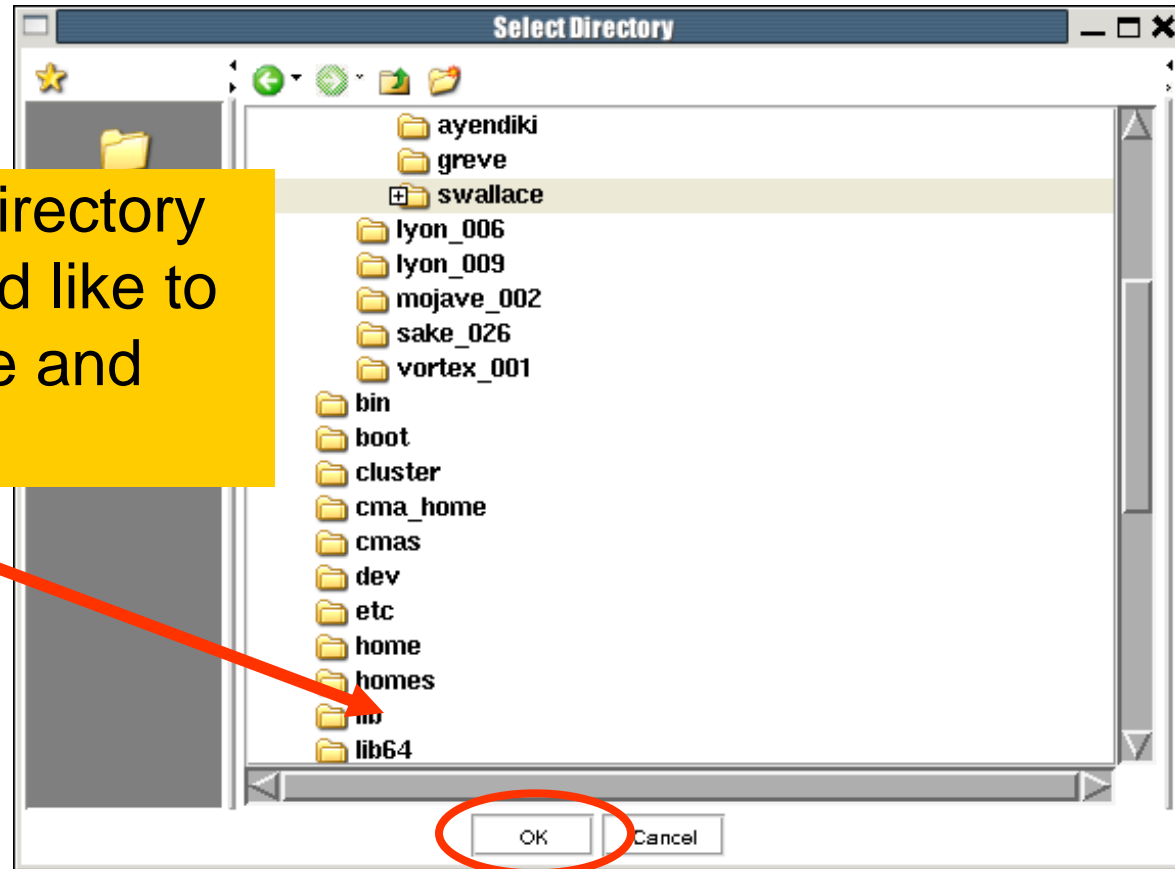
Select	Node Name	Node Type	Node Status	File Format	File Name	Data Directory
<input checked="" type="checkbox"/>	(Scene Des...	(SCENE)	Modified	MRML (.mrm)	SlicerScene1	/space/birn/81/users/swallace/Slicer_tutorials/Slicer3-3.8-RC3-2010
<input type="checkbox"/>	001	Volume	Not Modified	Pick format for 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

Save Selected    Cancel



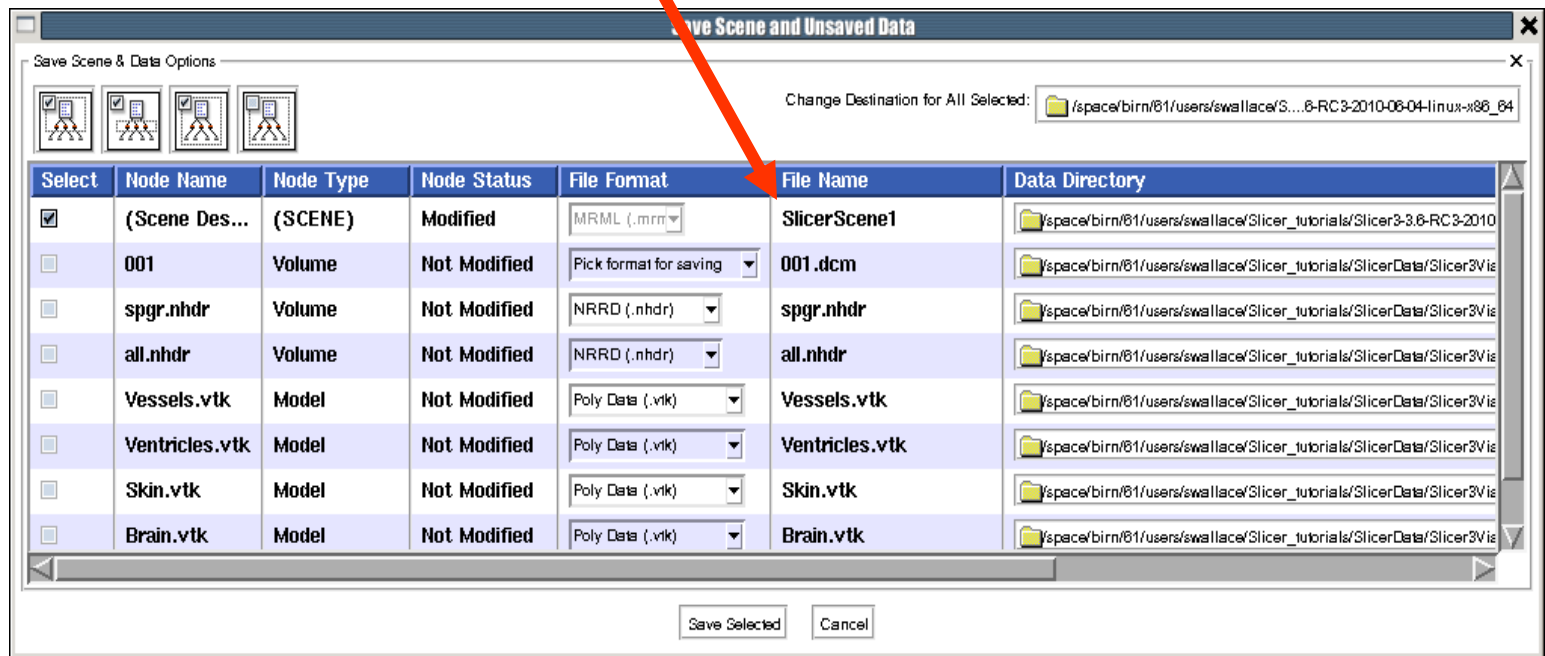
# Saving Data

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

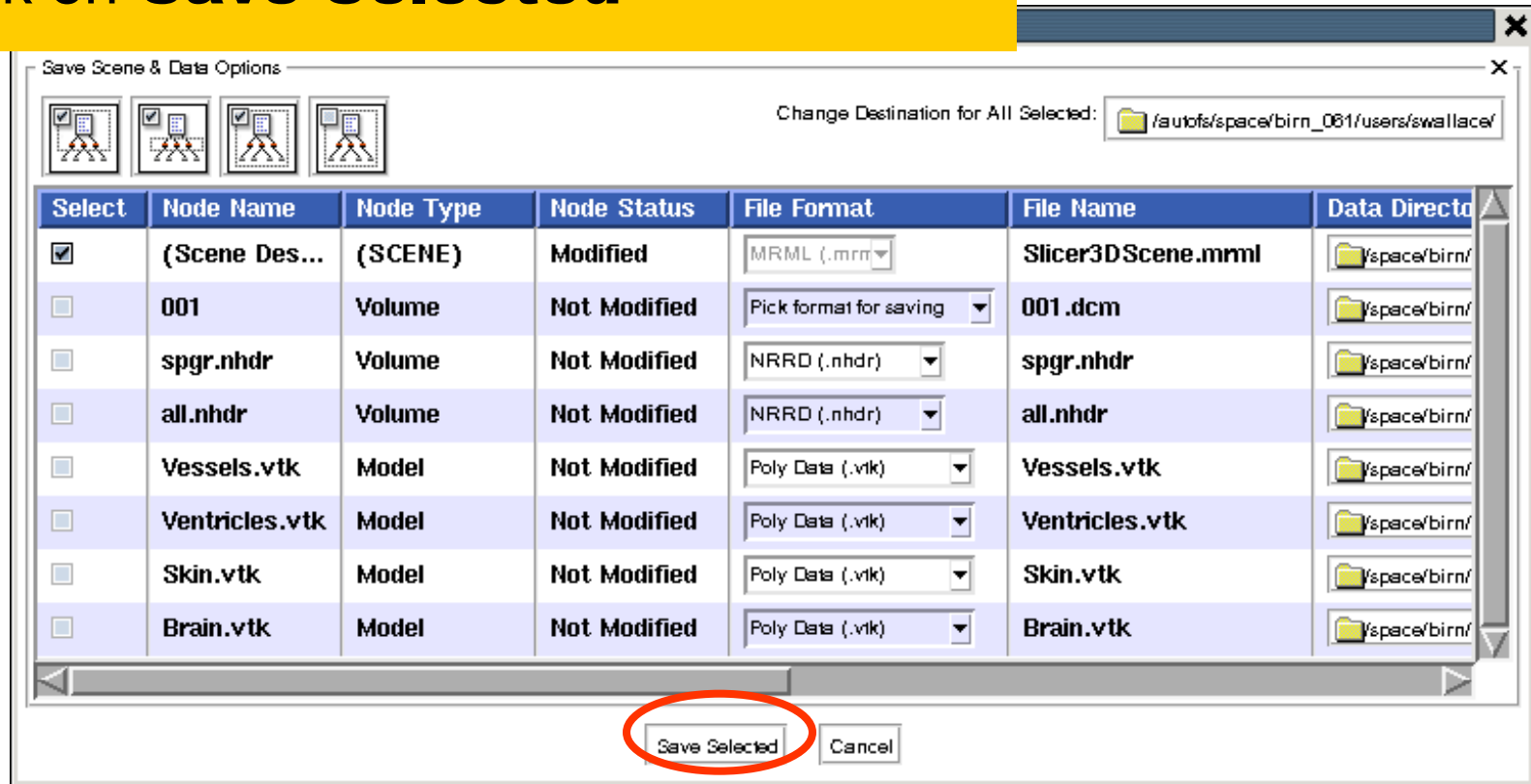


# Saving Data

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

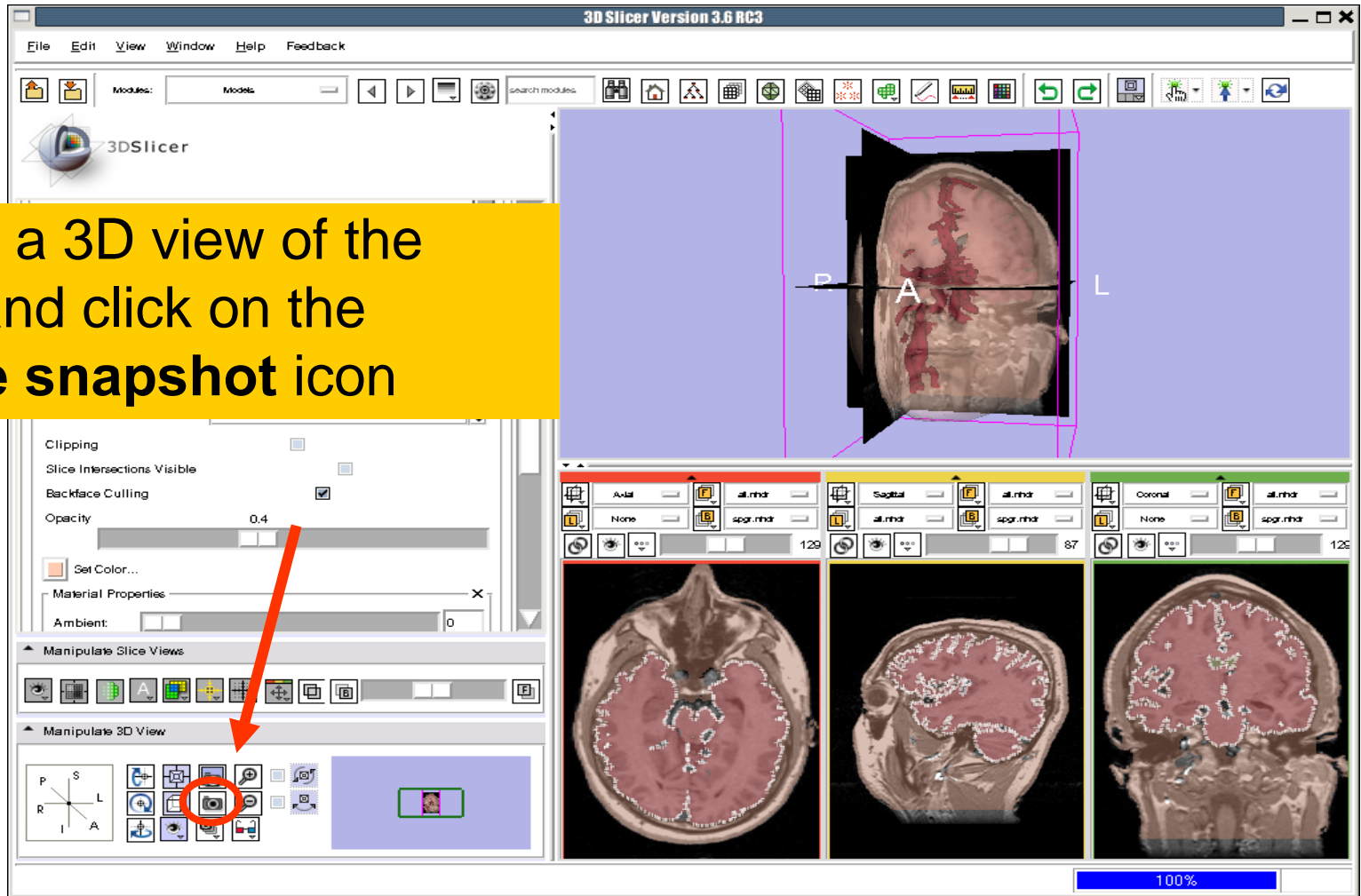


Click on **Save Selected**

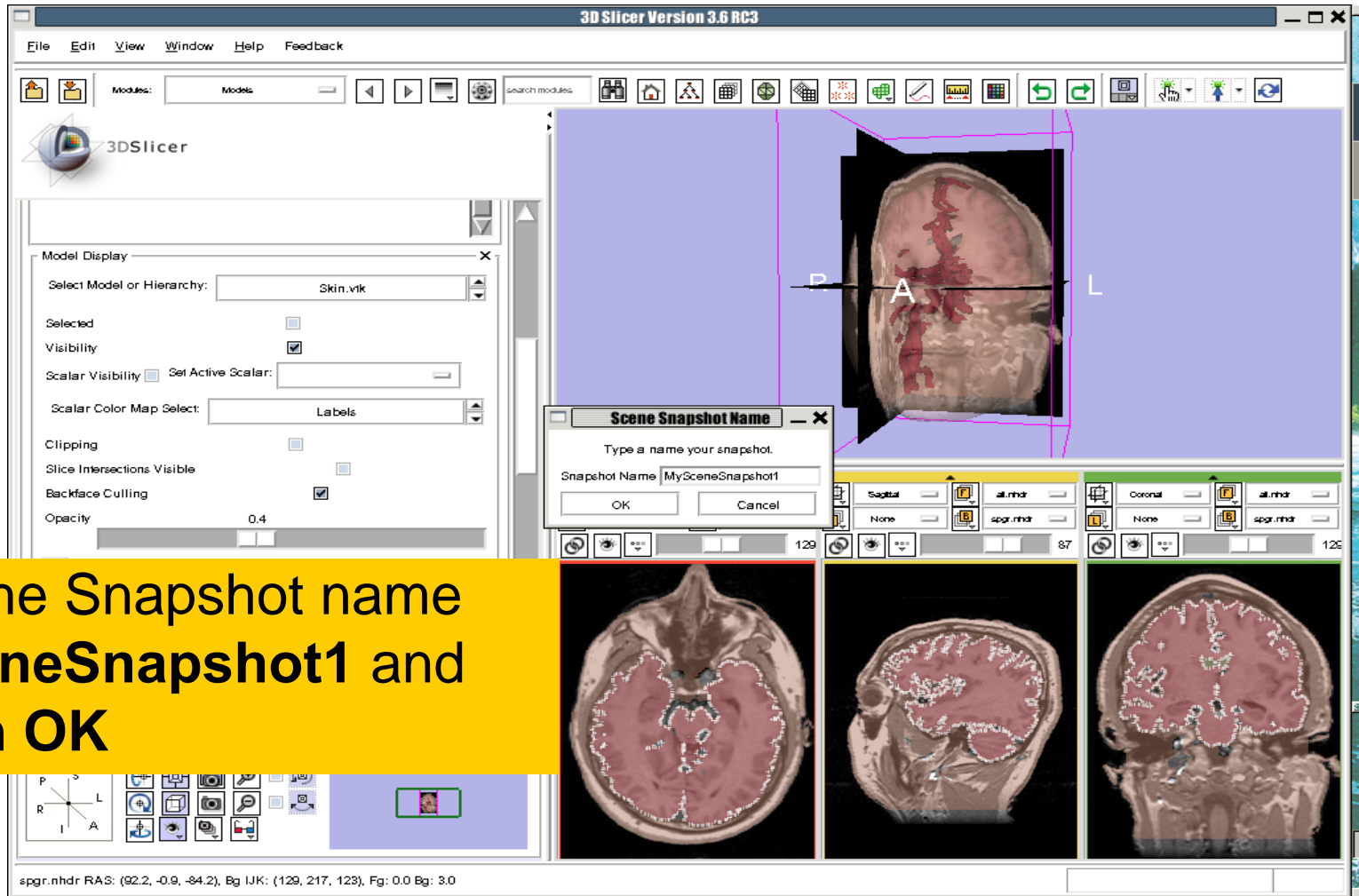


# Creating Scene Snapshots

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

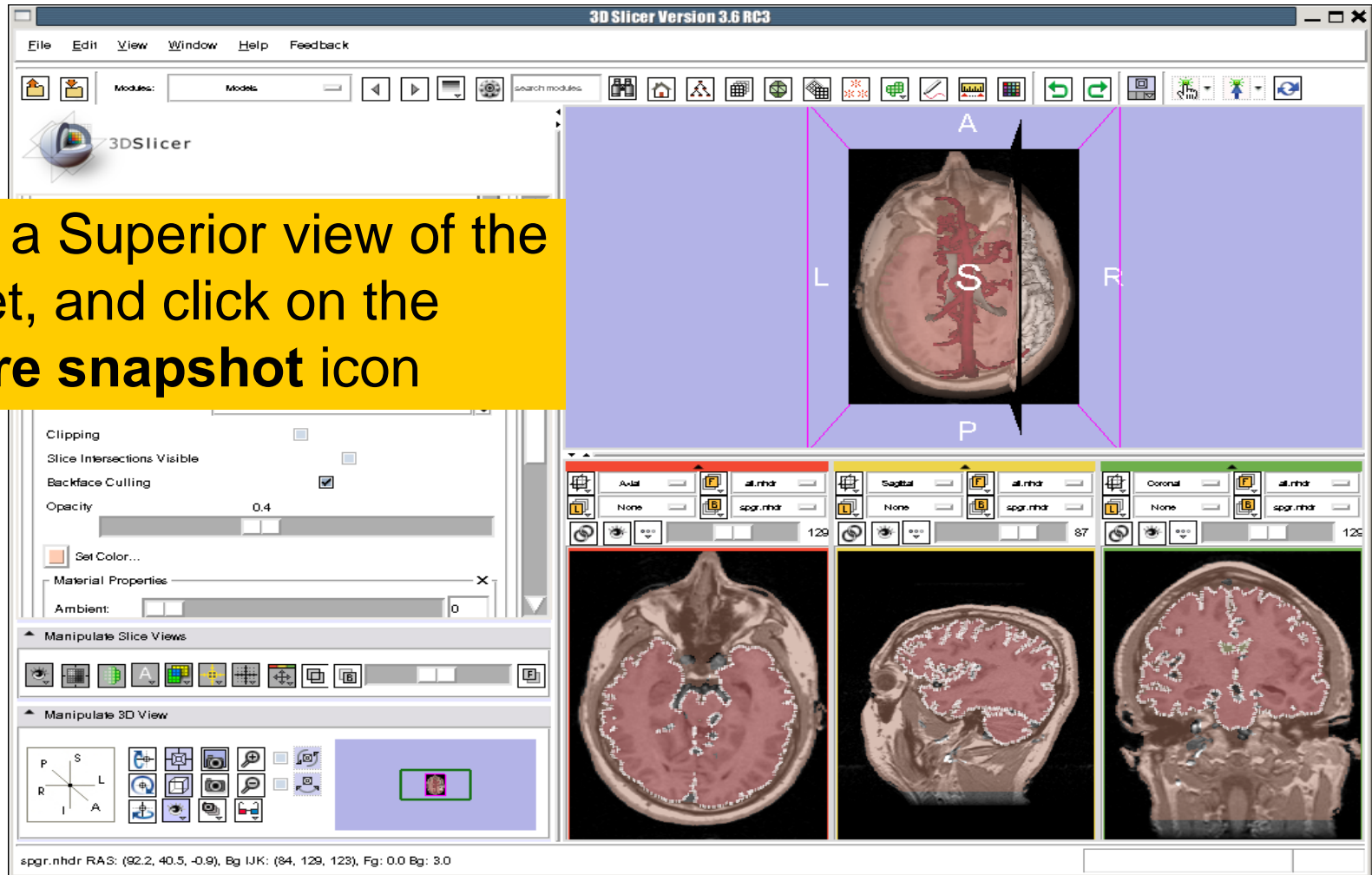


# Creating Scene Snapshots

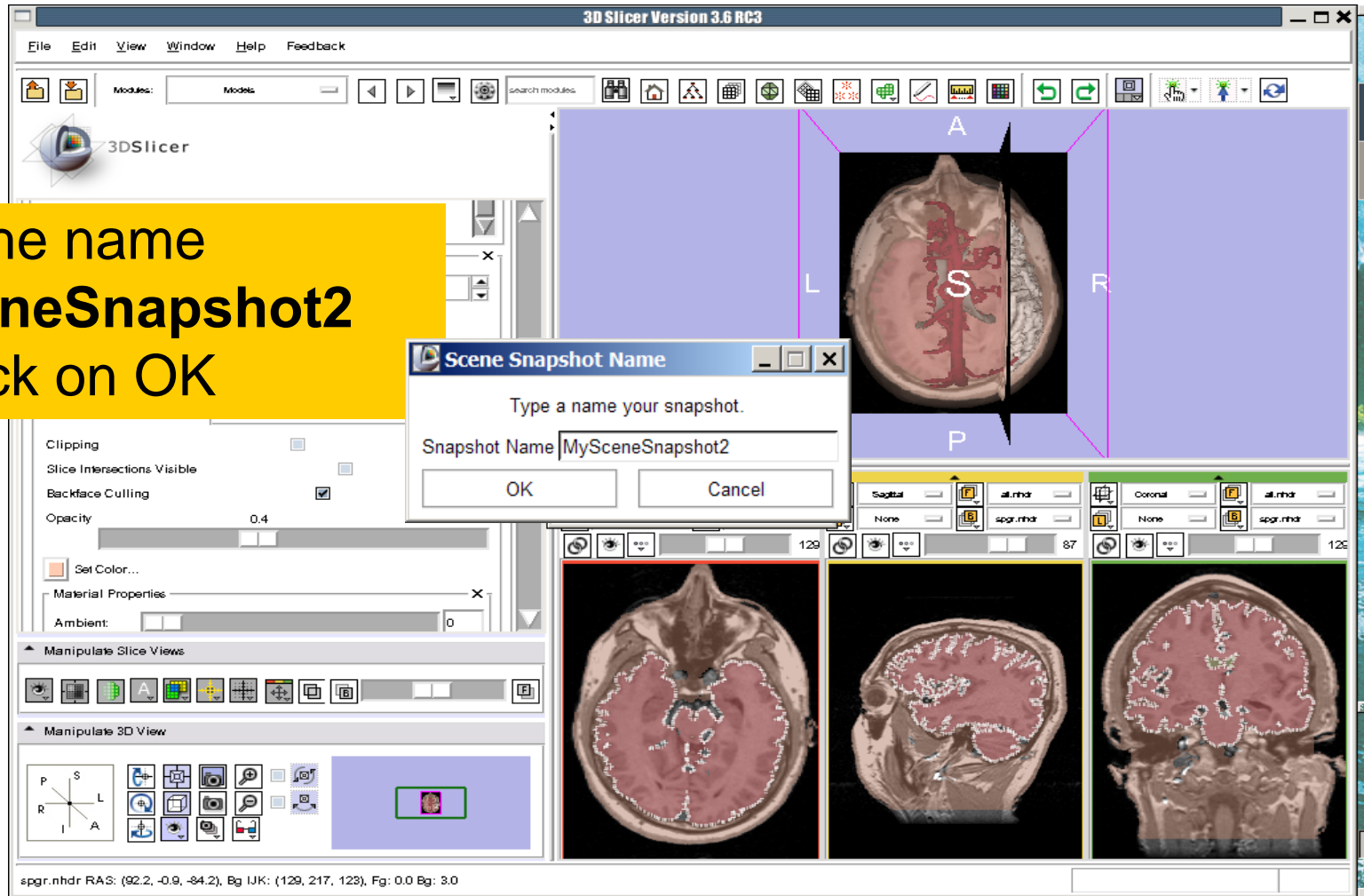


# Creating Scene Snapshots

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

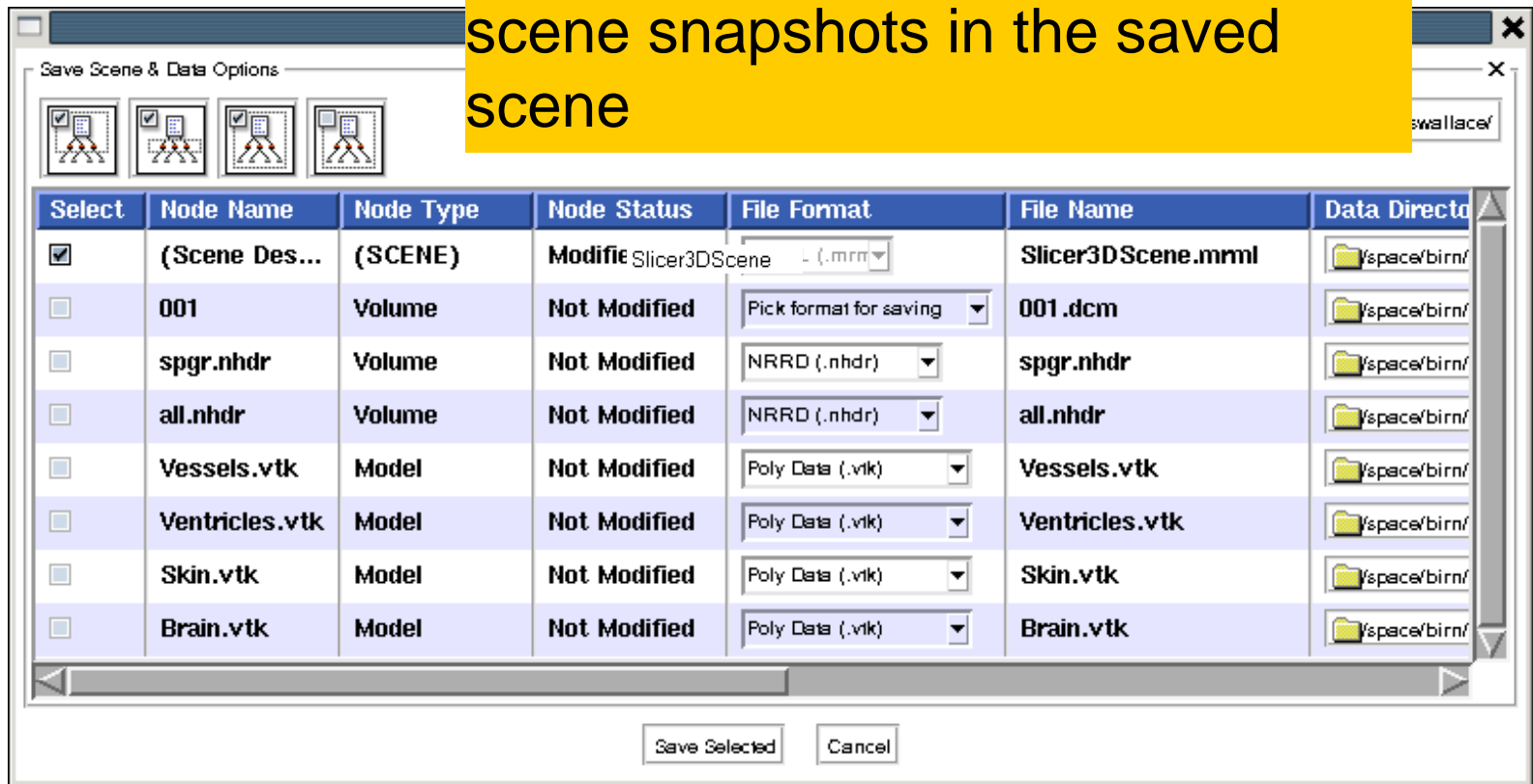


# Creating Scene Snapshots



# Creating Scene Snapshots

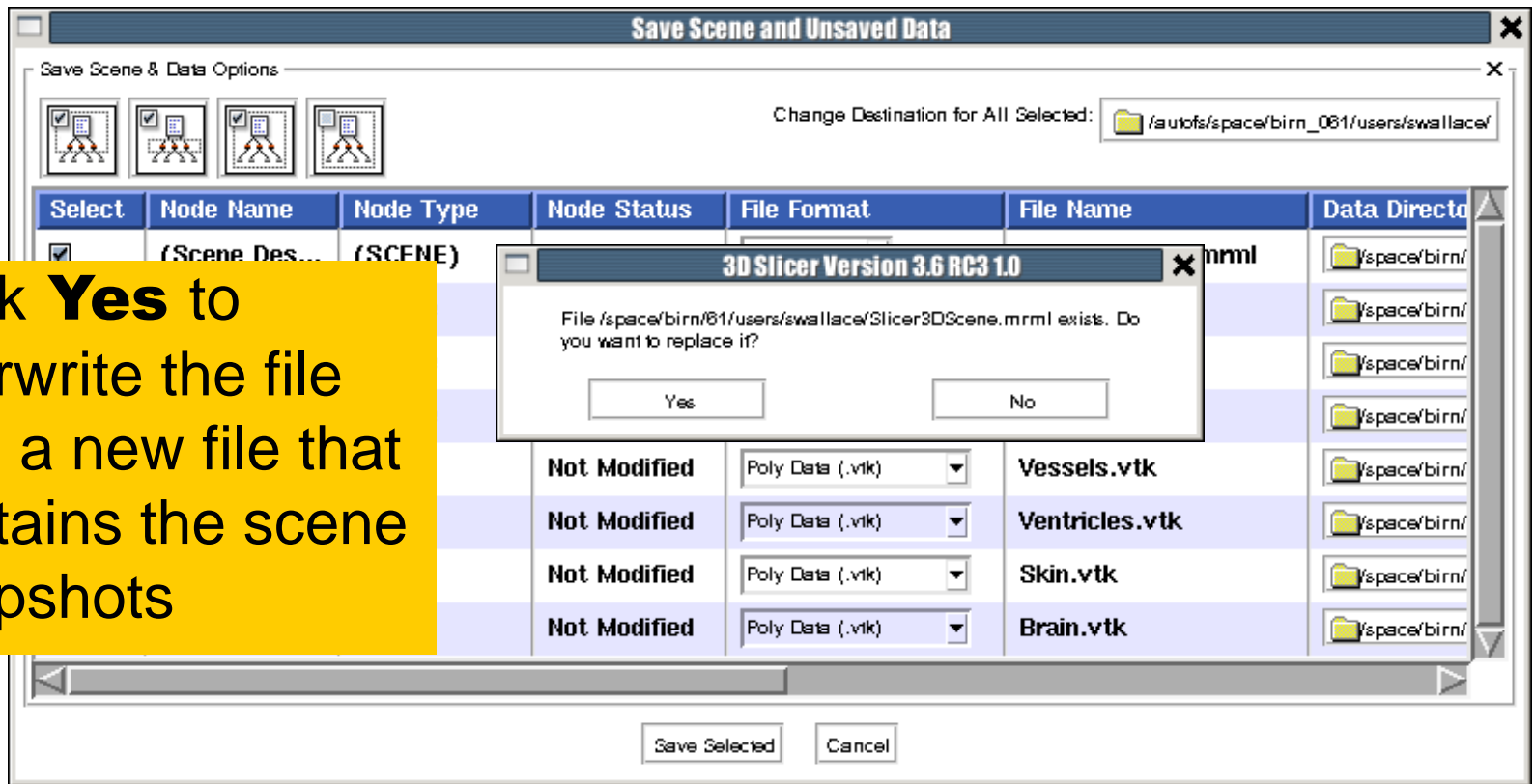
Select **File** → **Save** and click on **Save Selected** to include the two scene snapshots in the saved scene





# 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)				
			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/

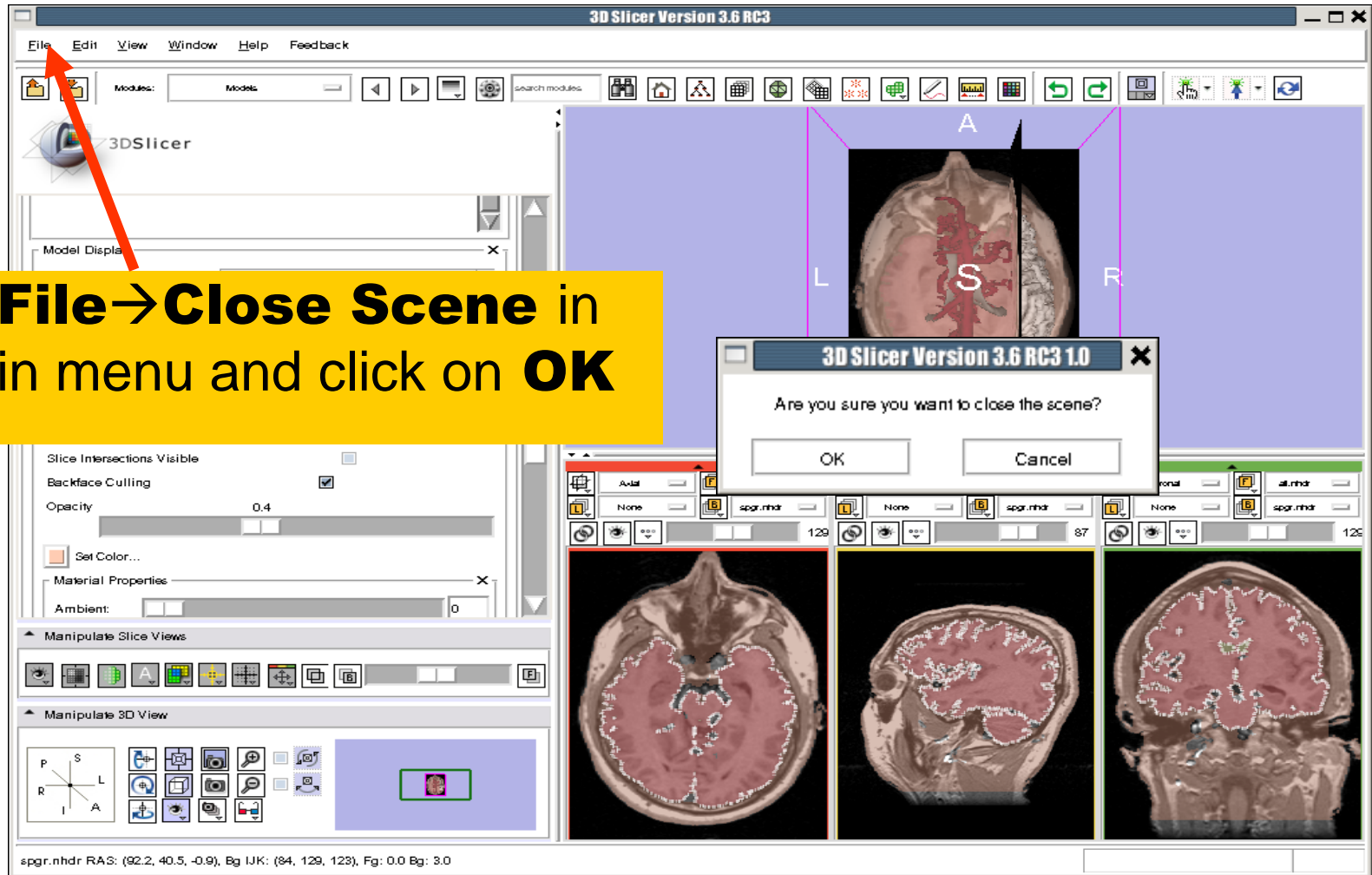
3D Slicer Version 3.6 RC3 1.0

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

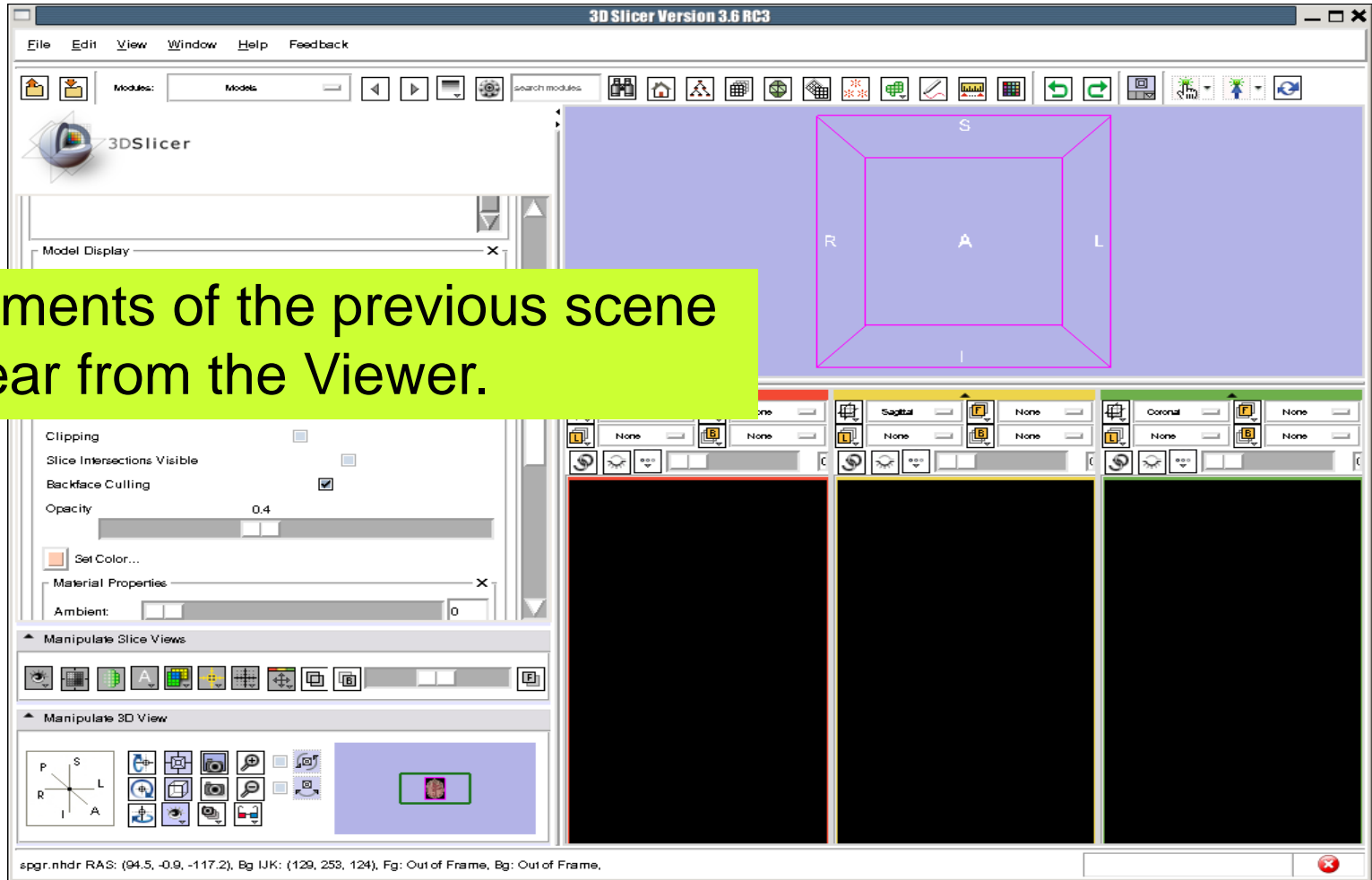
Yes No

Save Selected Cancel

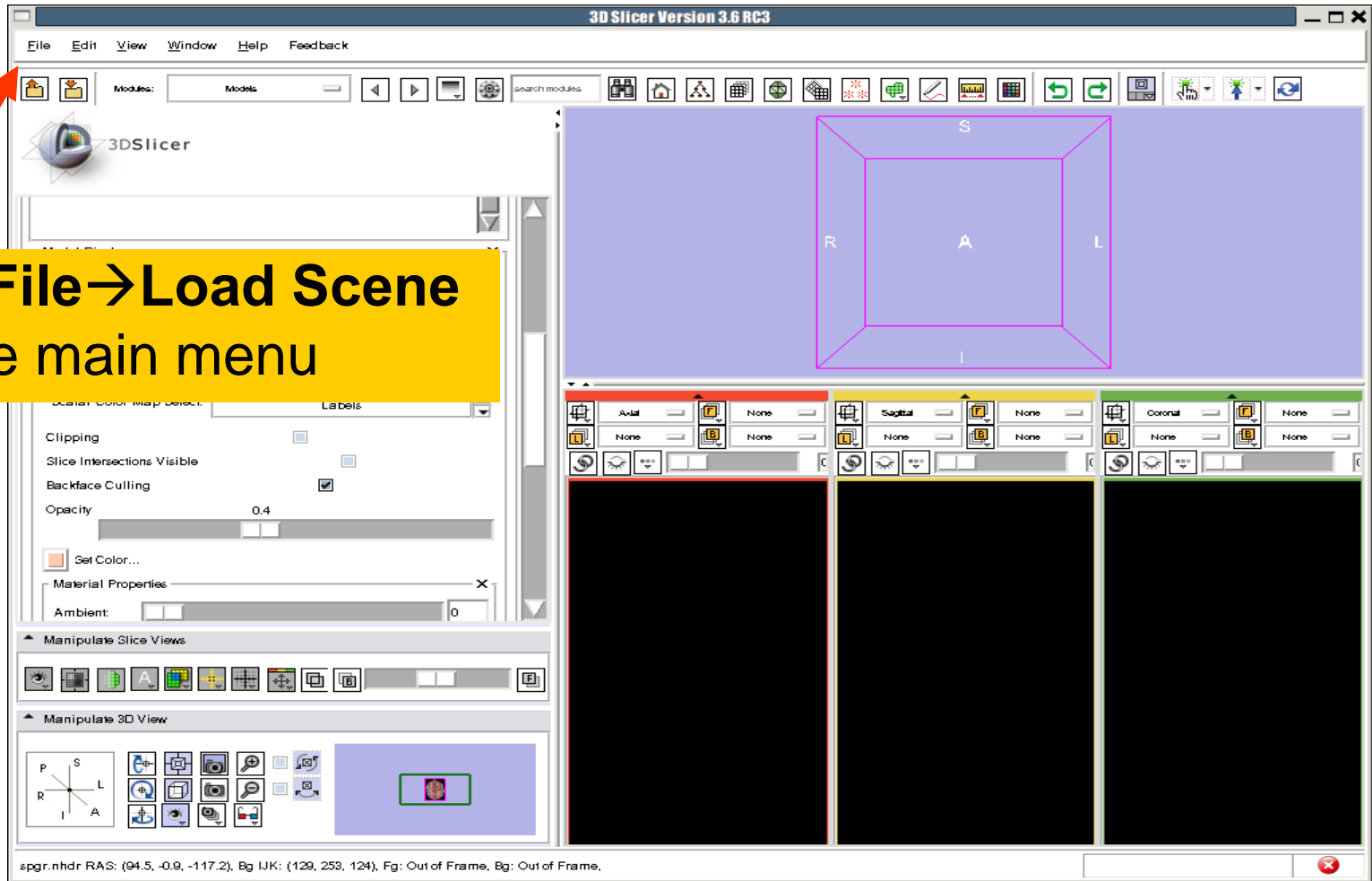
# Saving Data



# Saving Data

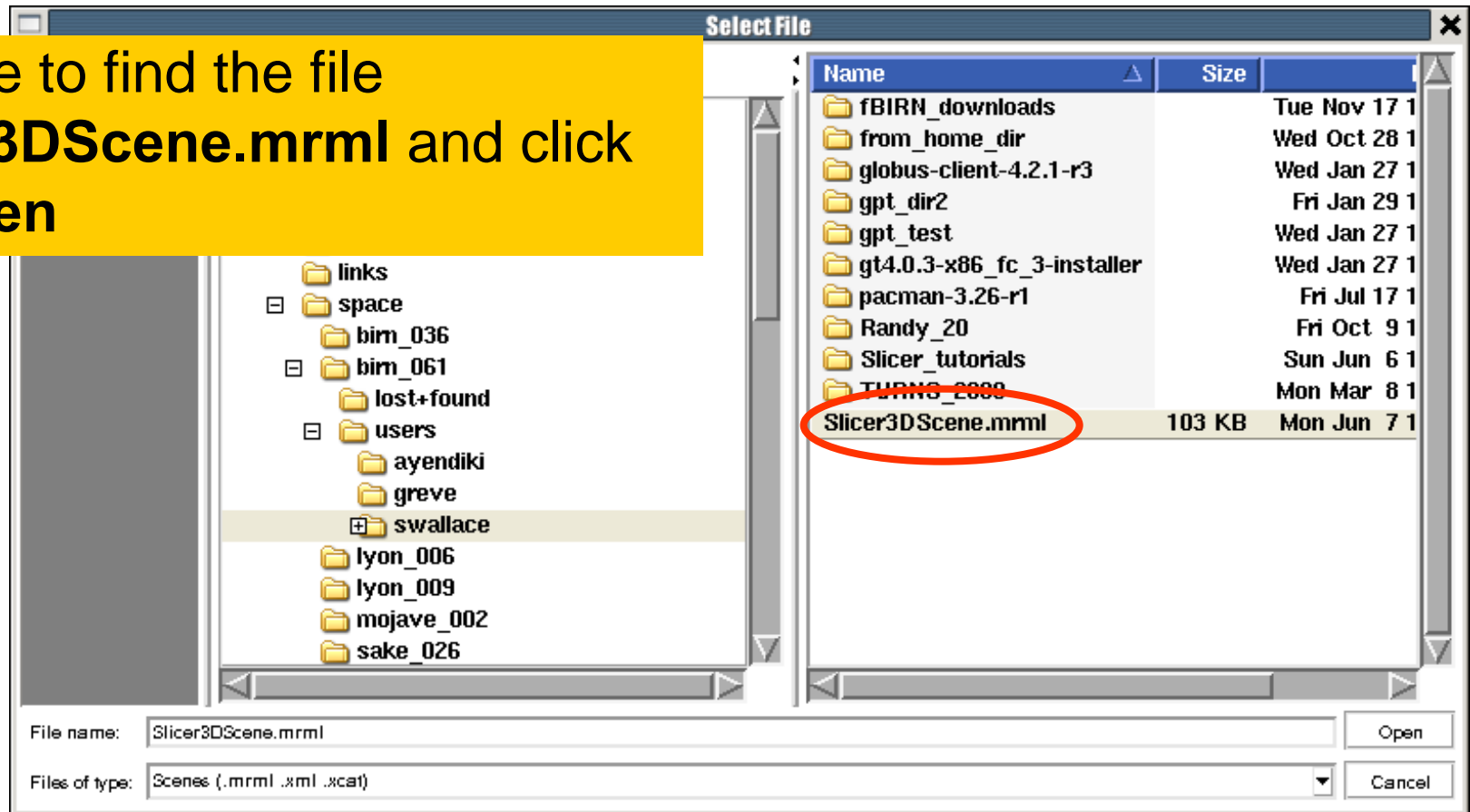


# Saving Data

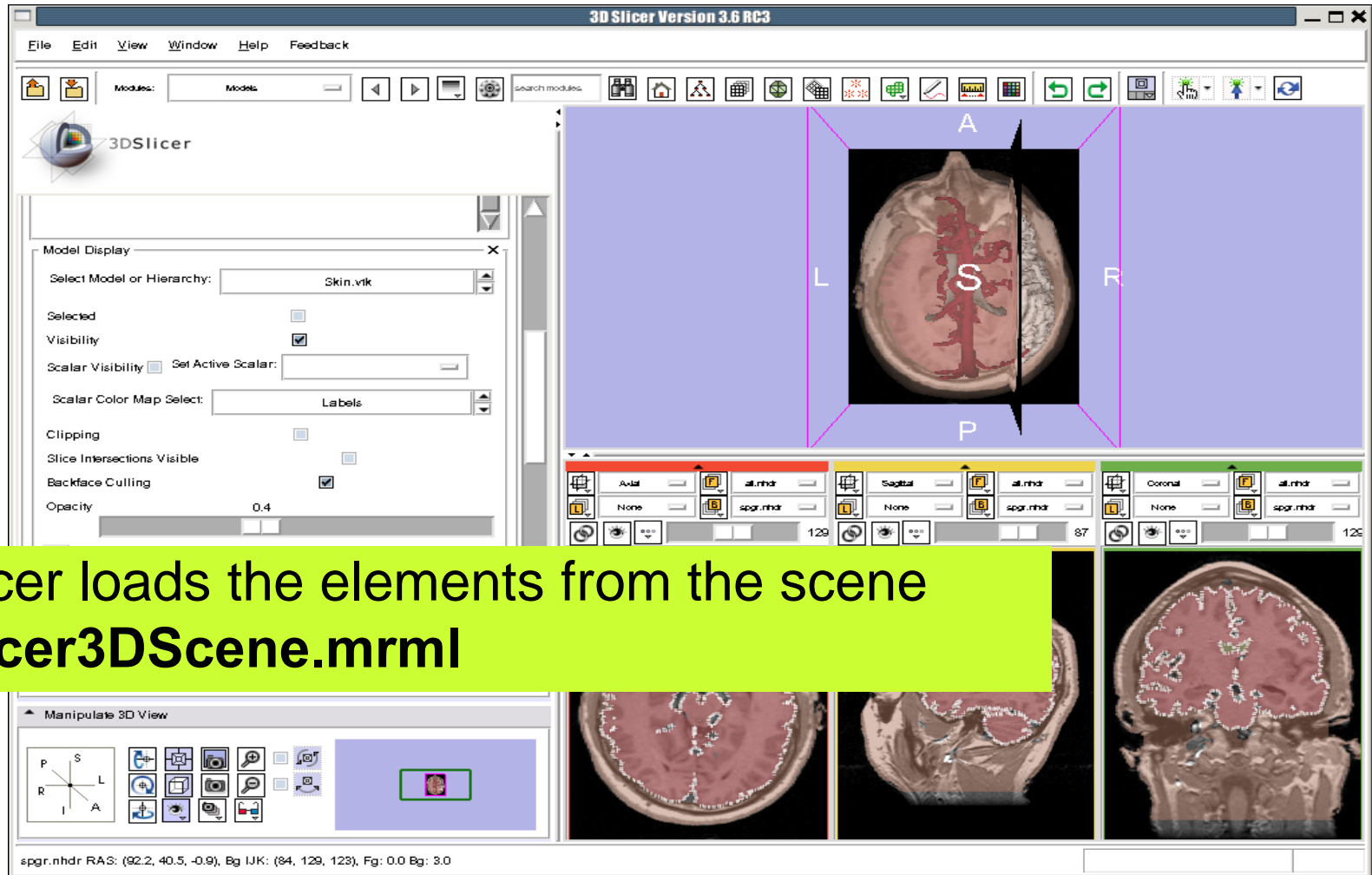


# Saving Data

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



# Loading a Scene

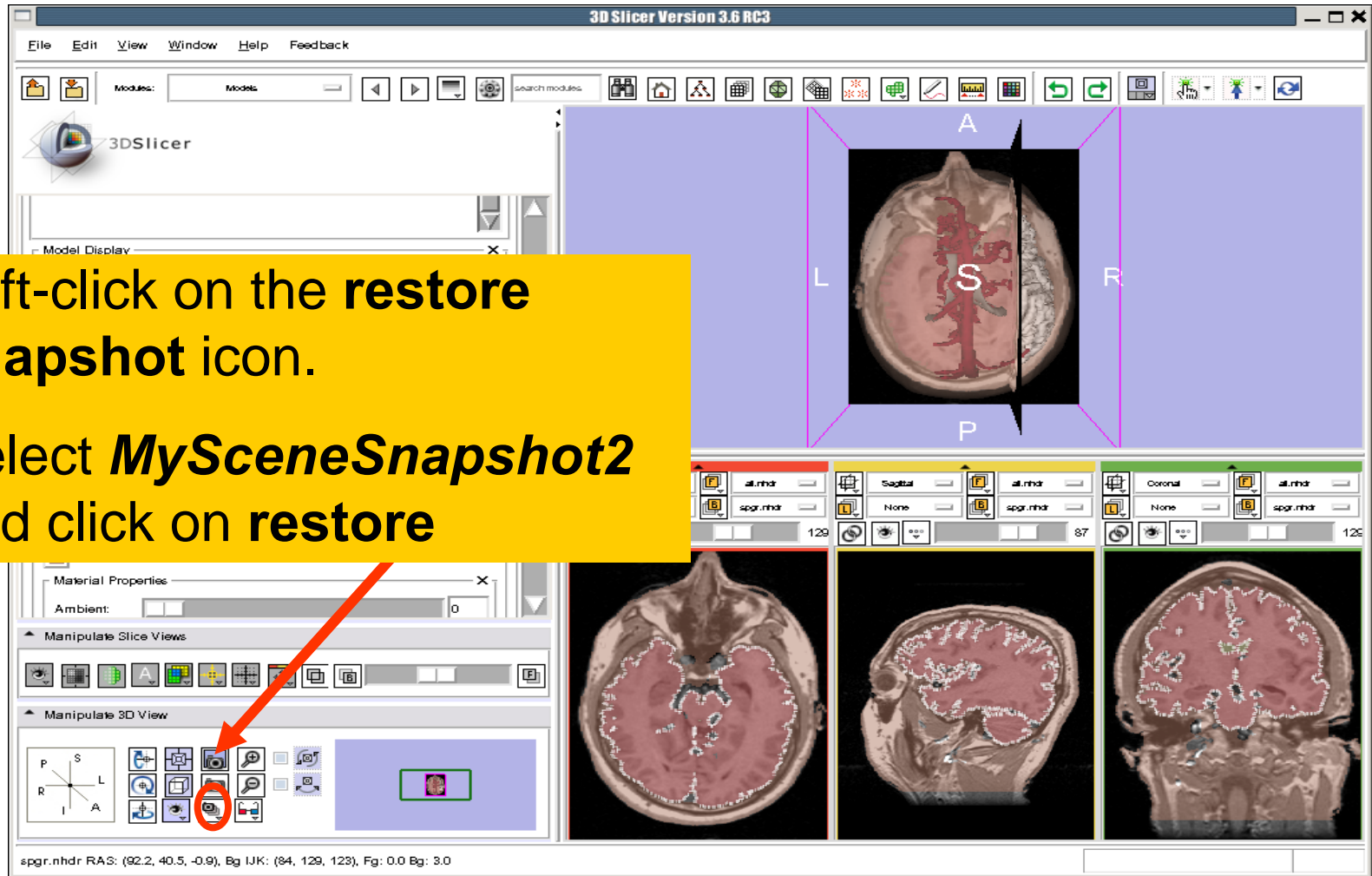


Slicer loads the elements from the scene  
**Slicer3DScene.mrml**

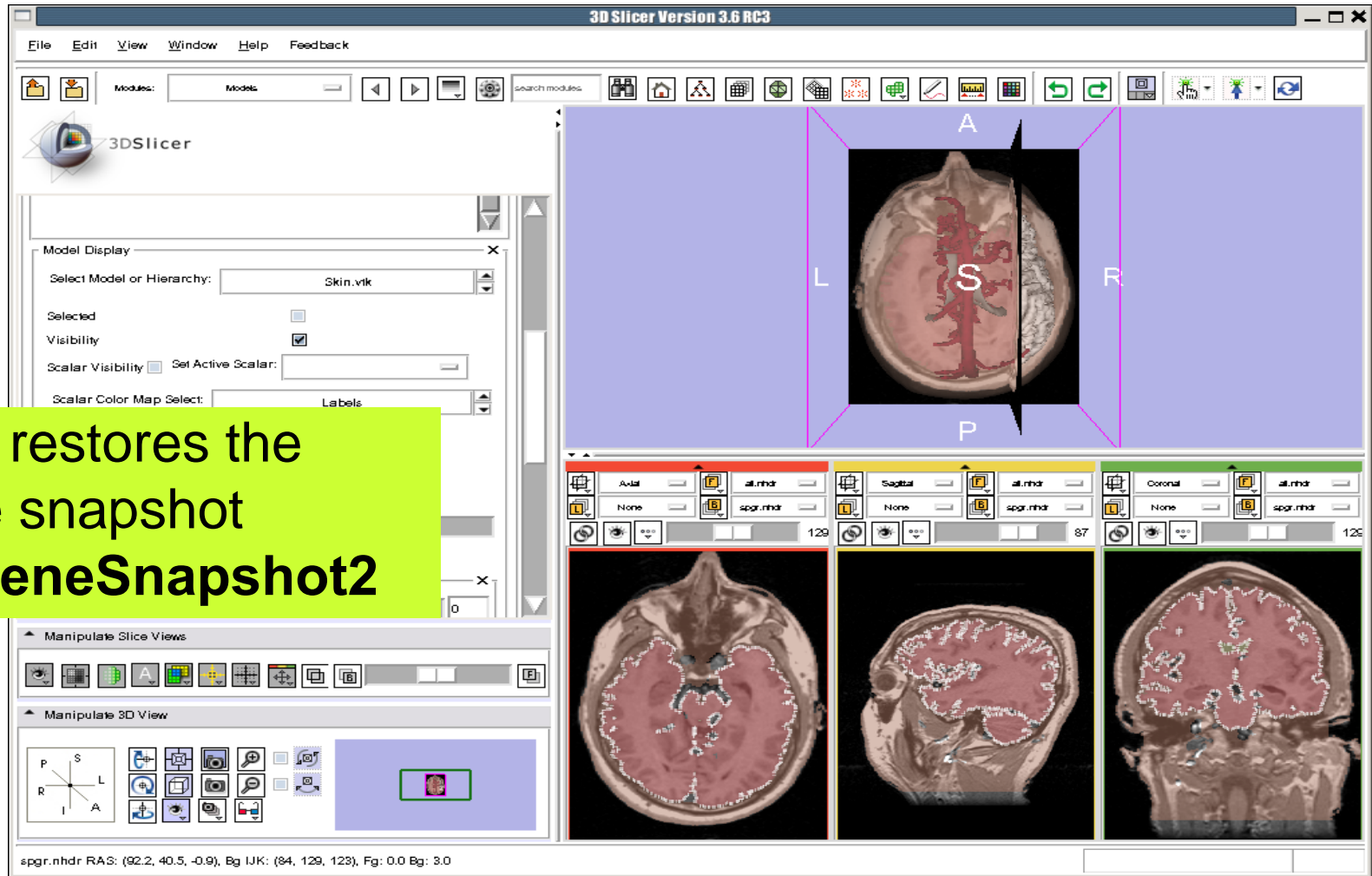
# Loading a Scene

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

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

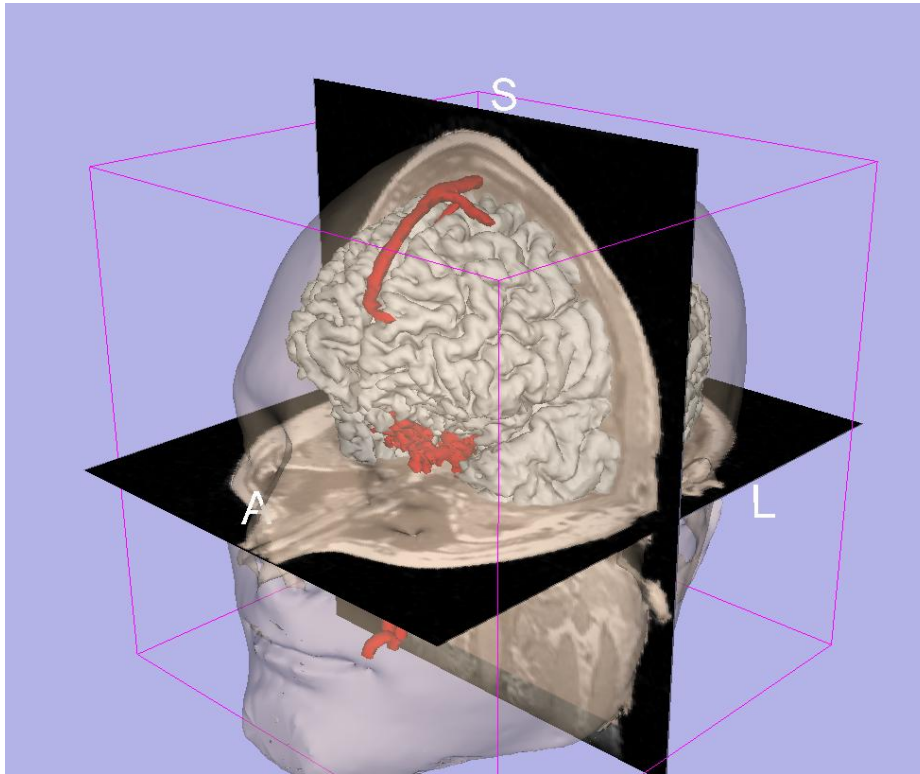


# Loading a Scene





# Conclusion



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



# Acknowledgments

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