

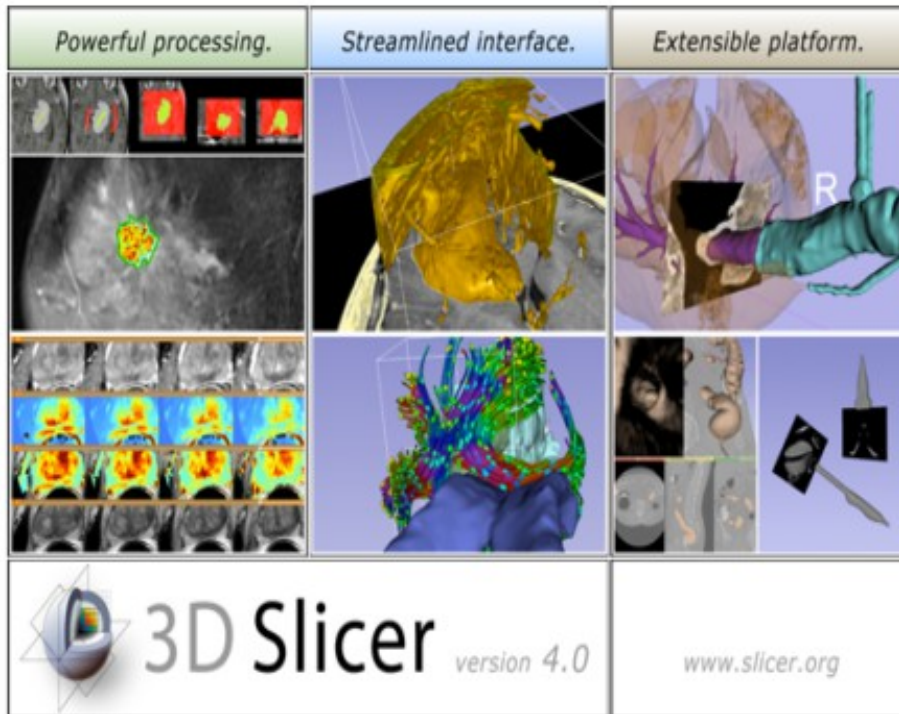


# 3D Data Loading and Visualization

Sonia Pujol, Ph.D.

Surgical Planning Laboratory  
Harvard University

# 3DSlicer



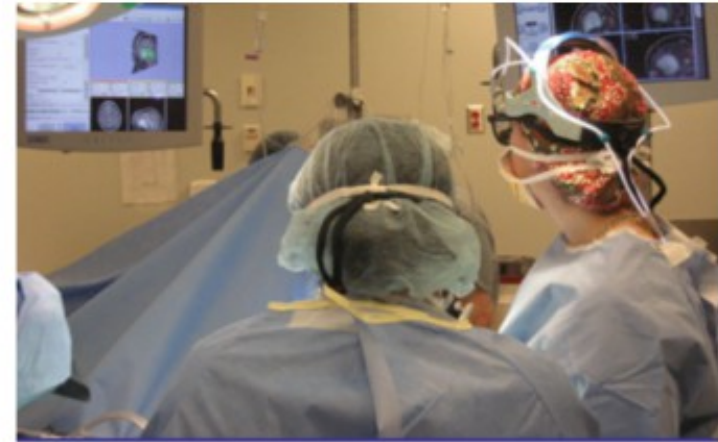
Slicer is a freely available [open-source](#) platform for segmentation, registration and 3D visualization of medical imaging data

Slicer is a [multi-institutional effort](#) supported by the [National Institute of Health](#).

# Translational research



An **open-source environment**  
for software developers



An **end-user application**  
for clinical investigators  
and scientists

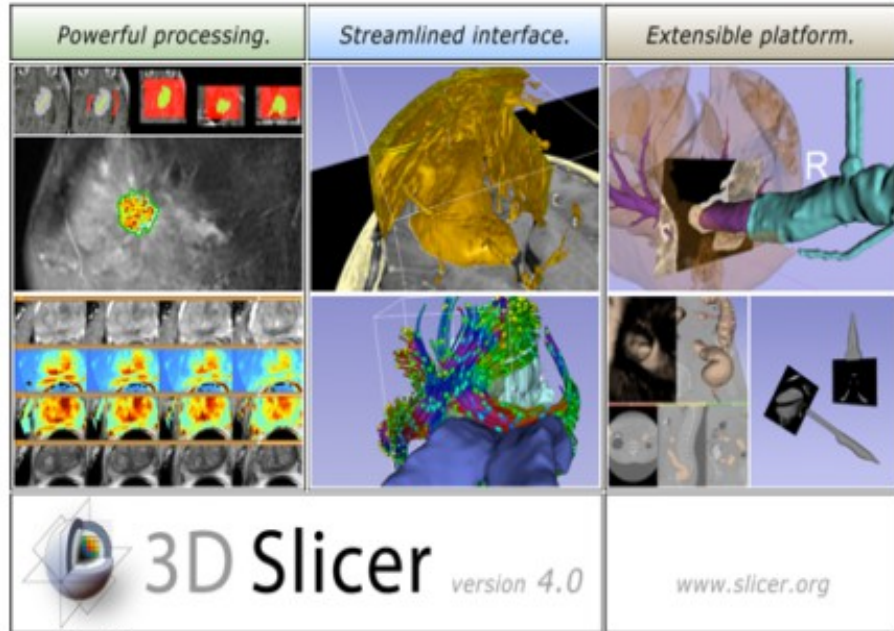
3D Slicer: an open-source platform for  
***translating*** innovative algorithms into  
clinical research applications



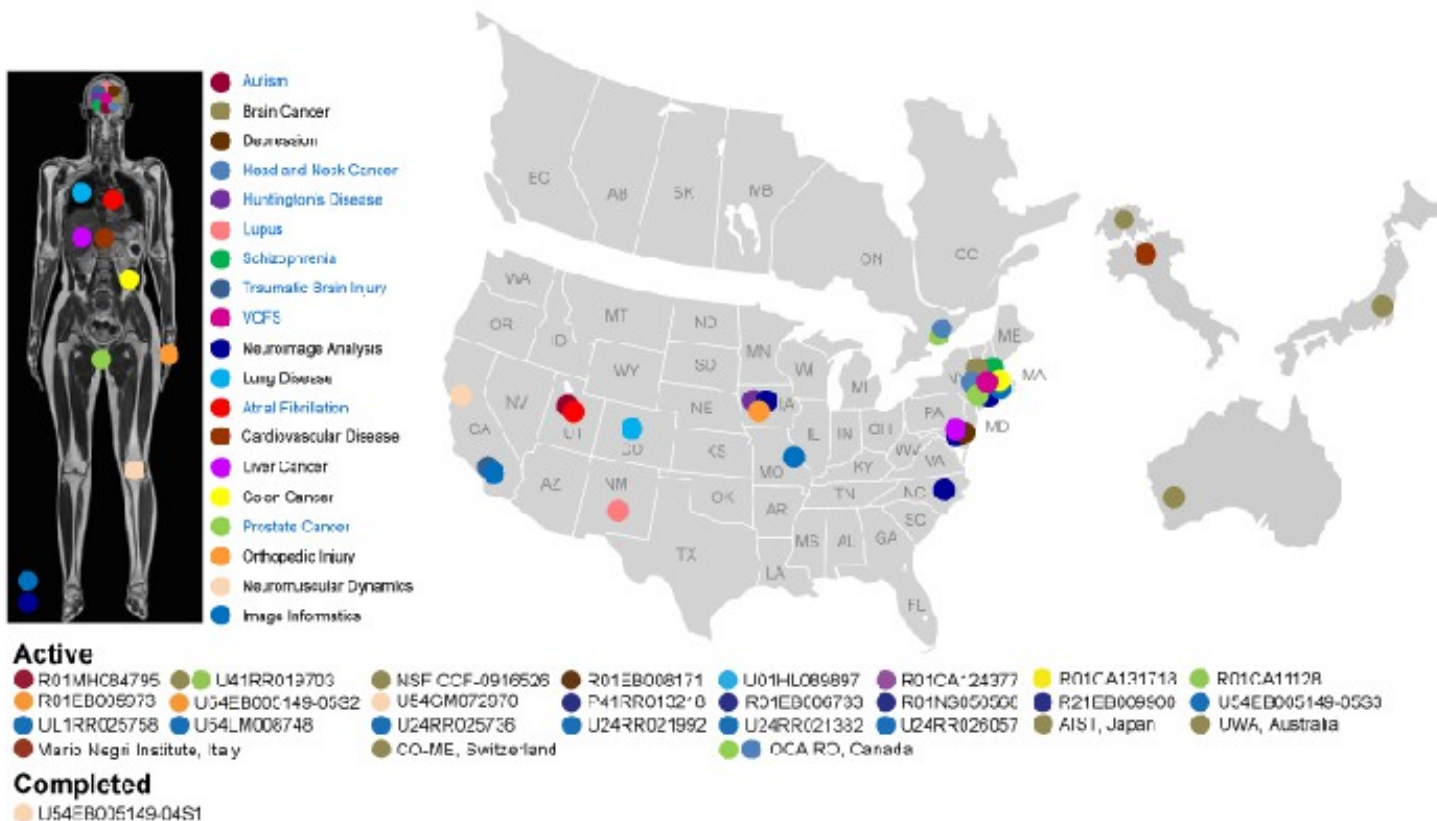
# 3DSlicer History

1997: Slicer started as a research project between the Surgical Planning Lab (Harvard) and the CSAIL (MIT)

2014: Multi-institution effort to share the latest advances in image analysis with clinicians and scientists



# A Multi-institution Effort



- Infrastructure grants fund the platform
- Collaborative projects (e.g. Canada, Japan, Australia, Italy) fund the application packages

# Slicer Is Open

- Open Science  
= Open Source  
+ Open Data  
+ Open Community

Madrid 2012



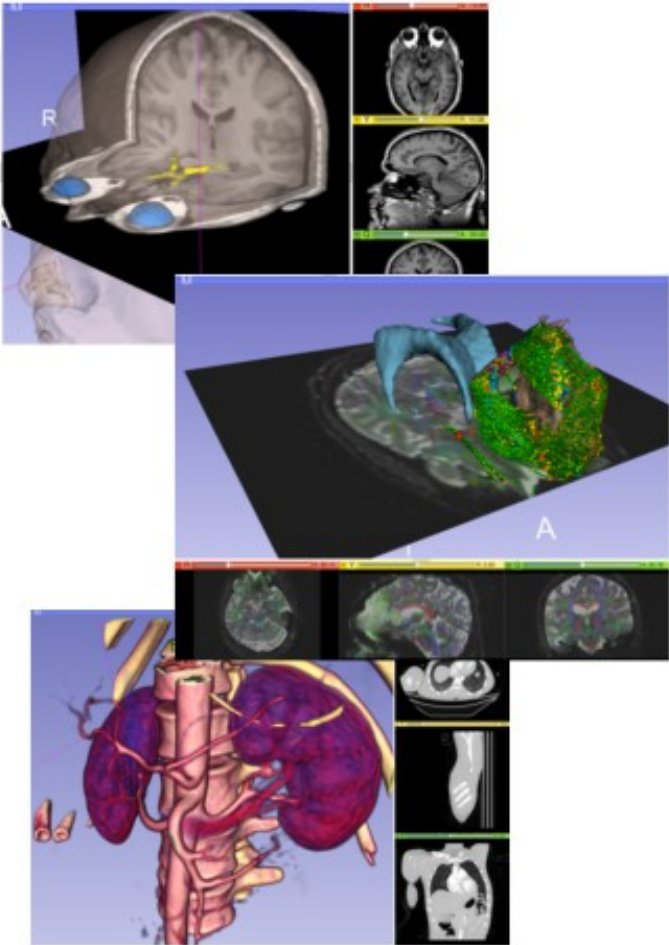
Iowa City, USA 2012



Courtesy R. Kikinis

# Slicer Open Community

- 80 authorized developers contributing to the source code of Slicer
- Over 700 subscribers on Slicer user and Slicer developer mailing list





# Nov.2011-March.2014 Downloads



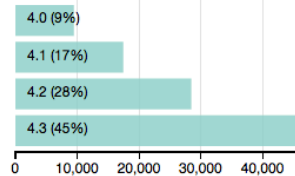
## Slicer4 download stats

101,101

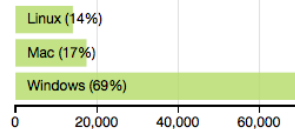
### Date range

Nov 28, 2011 - Sep 24, 2014

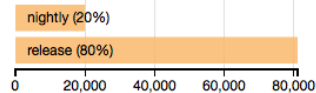
### Version



### Operating system



### Stability



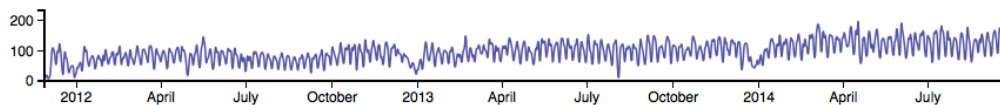
### Region



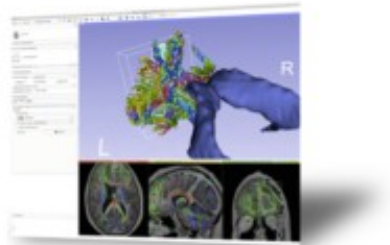
### Country



### Downloads per day



# 3D Slicer in practice



## Get Slicer 4.

Slicer 4 is the latest stable version of 3D Slicer, a free, comprehensive software platform for medical image analysis and visualization developed with NIH support.

3D Slicer is distributed under a permissive BSD-style open source license. It has a thriving user and developer community.

### Pre-compiled binaries

	Windows	Mac OS X	Linux
stable release	64 bit 4.1.0 64 bit installer 2012-04-11 r19888 (153.8MB)	4.1.0 64 bit installer 2012-04-11 r18888 (236.9MB)	4.1.0 64 bit archive 2012-04-11 r19888 (251.5MB)
	32 bit 4.1.0 32 bit installer 2012-04-11 r19888 (153.3MB)		
nightly build	64 bit nightly 64 bit installer 2012-04-29 r19953 (180.4MB)	nightly 64 bit installer 2012-04-27 r18851 (257.4MB)	nightly 64 bit archive 2012-04-29 r19953 (252.0MB)
	32 bit nightly 32 bit installer 2012-04-29 r19953 (154.2MB)		

### System requirements

Slicer requires 1GB of RAM absolute minimum, with more highly recommended. Common data sets may require 4GB or more RAM for processing. A fast graphics card or GPU that supports OpenGL is also recommended.

Slicer is built and tested on many hardware and software platforms. 3D Slicer runs on Microsoft Windows XP, Vista, and Windows 7; Mac OS X versions 10.5 (Leopard), 10.6 (Snow Leopard), and 10.7 (Lion); and a variety of Linux distributions.

- Slicer is open-source
- Slicer works on Windows, Linux, and Mac
- Slicer is distributed under a BSD-style license agreement with no restriction on use

# Slicer: Behind the scenes

**Slicer4**  
Dashboard Calendar Previous Current Project

WARNING: This CDash instance is running the bleeding edge svn trunk CDash code, and is updated frequently. You have been notified by email. Last changed by 1 author as of Sunday, November 27 2011 - 22:00 EST

**ightly-Packages**

Site	Build Name	Update			Configure			Build			Build Time
		Files	Error	Warn	Error	Warn	Not Run	Fail	Pass		
stony-win7.kitware	Windows7-VS2010-32bits-QT4.7.1-PythonQt-With-Tcl-CLI-Release	0	0	0	2	107	0	0	0	47 minutes ago	
stony-mac-64bits.kitware	SnowLeopard-g++4.2.1-64bits-QT4.7-PythonQt-With-Tcl-CLI-Release	1	0	0	0	14	0	28	459	9 hours ago	
stony-ubuntu-64bits.kitware	Linux-g++4.3-64bits-QT4.7-PythonQt-With-Tcl-CLI-Release	1	0	0	0	13	0	28	459	13 hours ago	
stony-win7.kitware	Windows7-VS2008-64bits-QT4.7.1-PythonQt-With-Tcl-CLI-Release	0	0	0	0	1000	0	28	461	4 hours ago	
stony-win7.kitware	Windows7-VS2008-32bits-QT4.7.1-PythonQt-With-Tcl-CLI-Release	1	0	0	0	1000	0	28	463	11 hours ago	

**ightly**

Site	Build Name	Update			Configure			Build			Test			Build Time
		Files	Error	Warn	Error	Warn	Not Run	Fail	Pass	Not Run	Fail	Pass		
ibcube.kitware	SnowLeopard-gcc4.2.1-QT4.7.5-PythonQt-With-Tcl-Release	1	0	0	27	190	0	96	301				11 hours ago	
upl.sci.utah.edu	OpenSuse-c++4.5.0-64bits-QT4.6.3-PythonQt-With-Tcl-NoCLI-Release	0	0	0	0	15	0	304	6				11 hours ago	
s.kitware	Linux-g++4.4-QT4.6.3-PythonQt-CLI-Release	1	0	0	0	15	0	38	431				3 hours ago	
stony-ubuntu-64bits.kitware	Linux-g++4.3-QT4.7-PythonQt-With-Tcl-CLI-Valgrind-Release	0	0	0	0	12	0	27	460				11 hours ago	
stony-ubuntu-64bits.kitware	Linux-g++4.3-64bits-QT4.7-PythonQt-With-Tcl-NoCLI-Coverage-Release	0	0	0	0	12	0	23	287				11 hours ago	
gammath.kitware	Linux-g++4.3.3-QT4.7-PythonQt-With-Tcl-NoCLI-Release	0	0	0	0	12	0	22	288				12 hours ago	

**ontinuous**

Site	Build Name	Update			Configure			Build			Test			Build Time
		Files	Error	Warn	Error	Warn	Not Run	Fail	Pass	Not Run	Fail	Pass		
upl.sci.utah.edu	OpenSuse-c++4.5.0-64bits-QT4.6.3-PythonQt-With-Tcl-NoCLI-Release	2	0	0	0	0	0	0	304	6			1 hour ago	

Slicer is built every night on Windows, Mac and Linux platforms

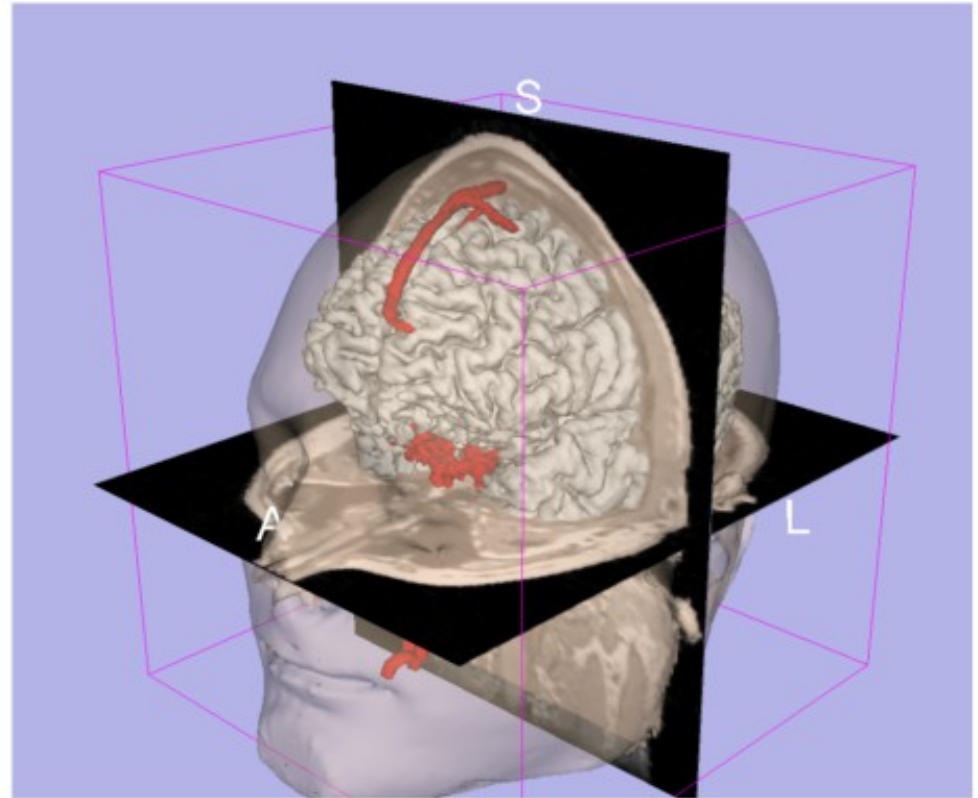
# Slicer Training



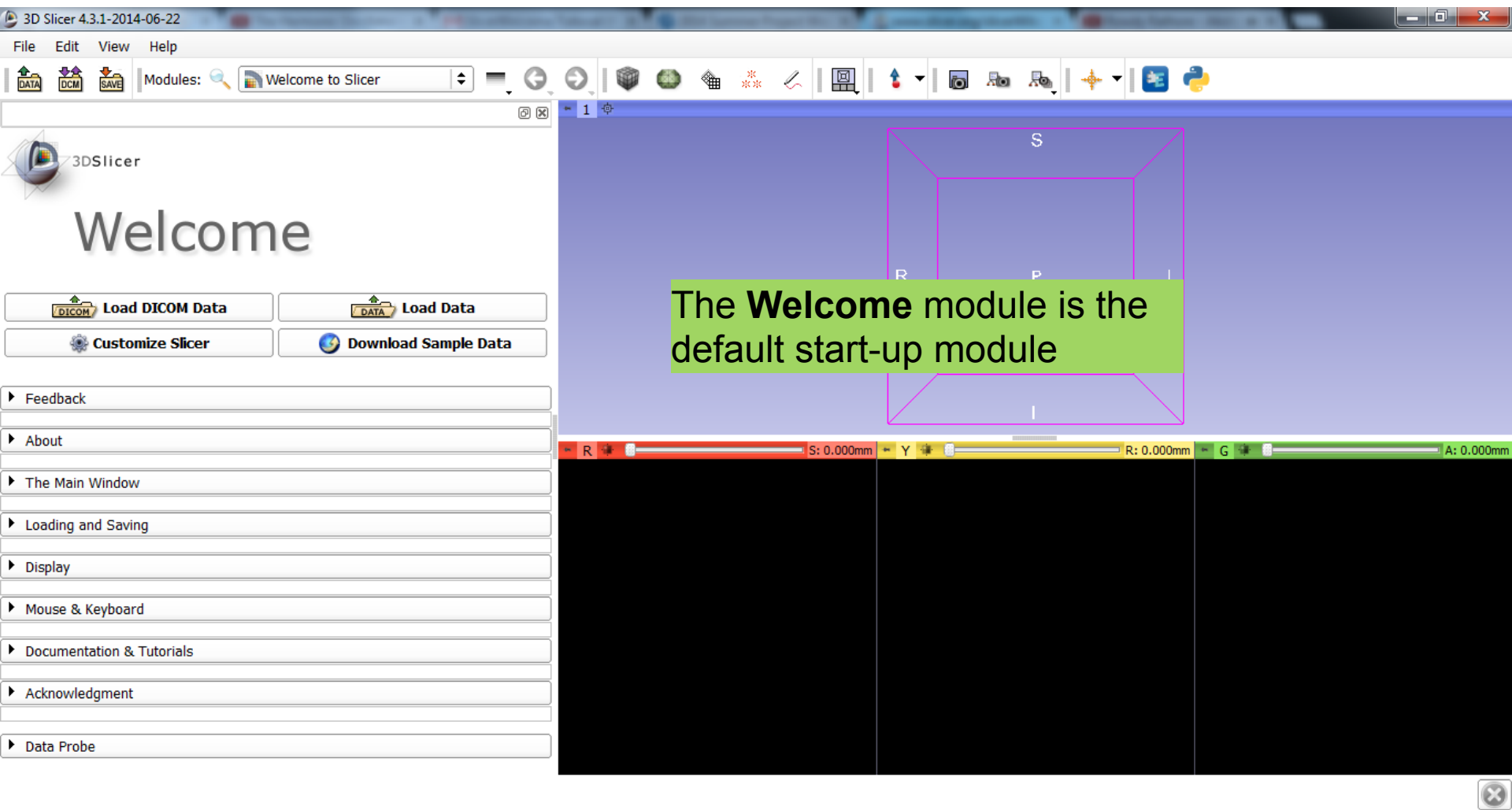
- Hands-on training workshops at national and international venues
- >3,000 clinicians, clinical researchers and scientists trained since 2005

# 3D Visualization of the Anatomy

Following this tutorial, you will be able to **load and visualize volumes** within Slicer4, and to **interact in 3D** with structural images and models of the anatomy.



# 3D Slicer Version4



# 3D Slicer Version4

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Welcome to Slicer

3DSlicer

## Welcome

Load DICOM Data Load Data

Customize Slicer Download Sample Data

Feedback

About

**3D Slicer** is a free open source software platform for medical image processing and 3D visualization of image data. This module contains some basic information and useful links to get you started using Slicer. For more information, please visit our website <http://www.slicer.org>.

**3D Slicer** is distributed under a BSD-style license; for details about the contribution and software license agreement, please see the [3D Slicer Software License Agreement](#). This software has been designed for research purposes only and has not been reviewed or approved by the Food and Drug Administration, or by any other agency.

The Main Window

Loading and Saving

Data Probe

S: 0.000mm Y R: 0.000mm G A: 0.000mm

Each module of Slicer includes a series of tabs, which gives access to different functionalities

Click on the arrow symbol to display the content of each tab

# 3D Slicer Version4

The screenshot displays the 3D Slicer 4.3.1-2014-06-22 interface. The main window shows a 3D view of a pink rectangular prism labeled 'S' on a blue background. The sidebar on the left contains several sections: 'Load DICOM Data', 'Load Data', 'Customize Slicer', 'Download Sample Data', 'Feedback', 'About', and 'The Main Window'. The 'The Main Window' section features a diagram of the UI layout with labels: File Menu, GUI Panel, Data Probe, Toolbar, 3D Viewer, Slice Viewers, and Message Bar. Below the diagram, text explains the basic organization of the UI and lists the components. A red arrow points from the text box to the 'The Main Window' section. A green text box is overlaid on the main window with text and a scroll bar.

**The Main Window** tab contains information on the basic organization of Slicer's user interface

Scroll down to see all the contents

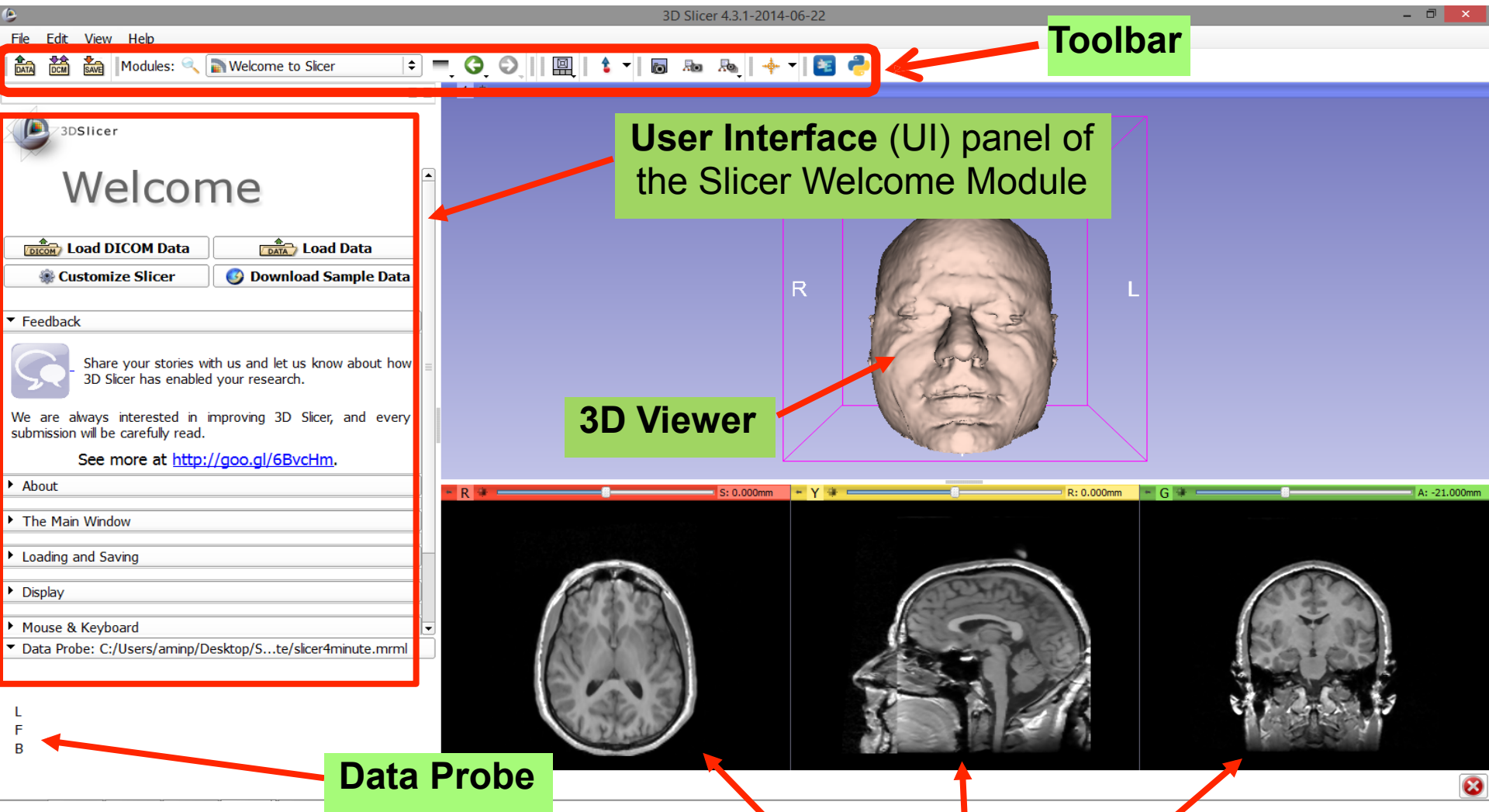
**File Menu**  
Contains basic load and save functionality, access to application settings, Tcl and Python interfaces for developers, help and mechanisms for users to provide feedback.

**Toolbar:**

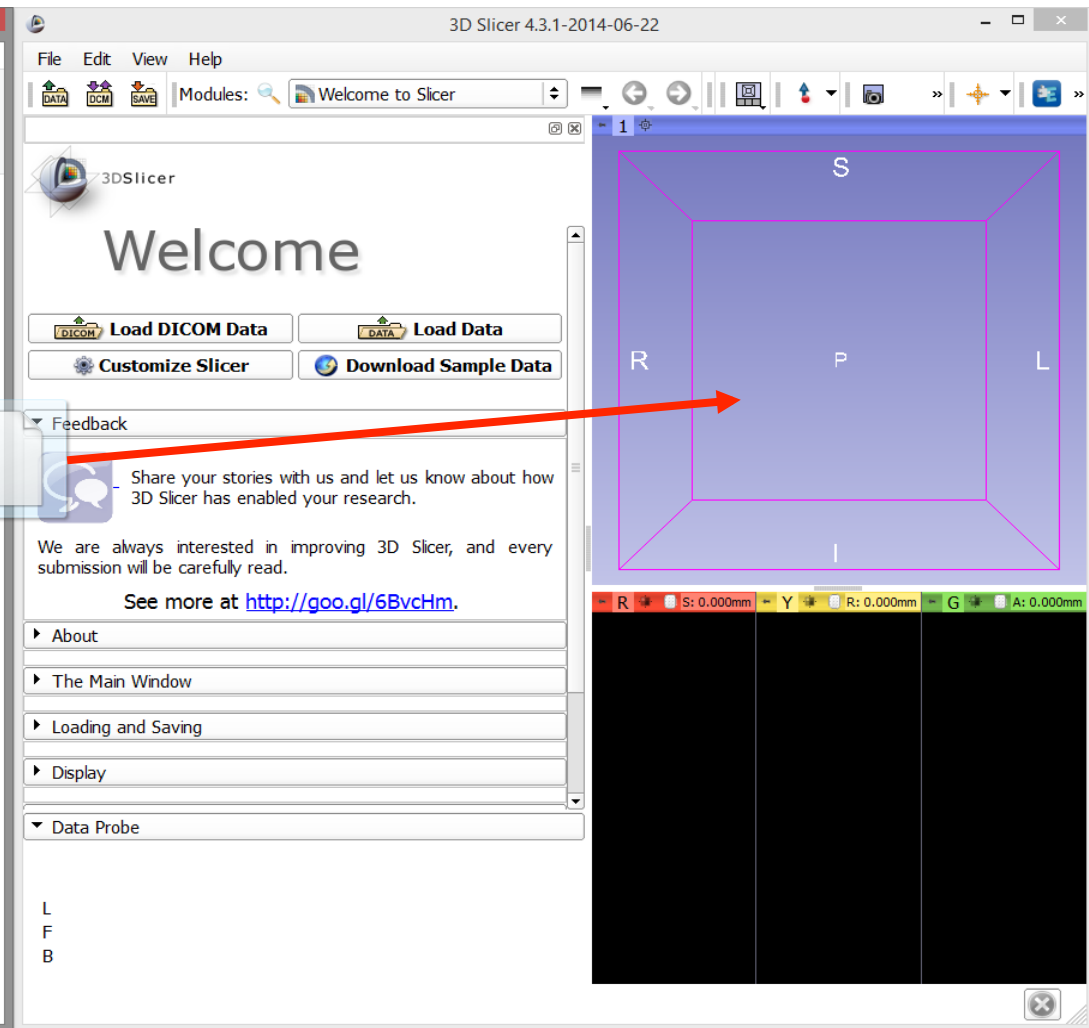
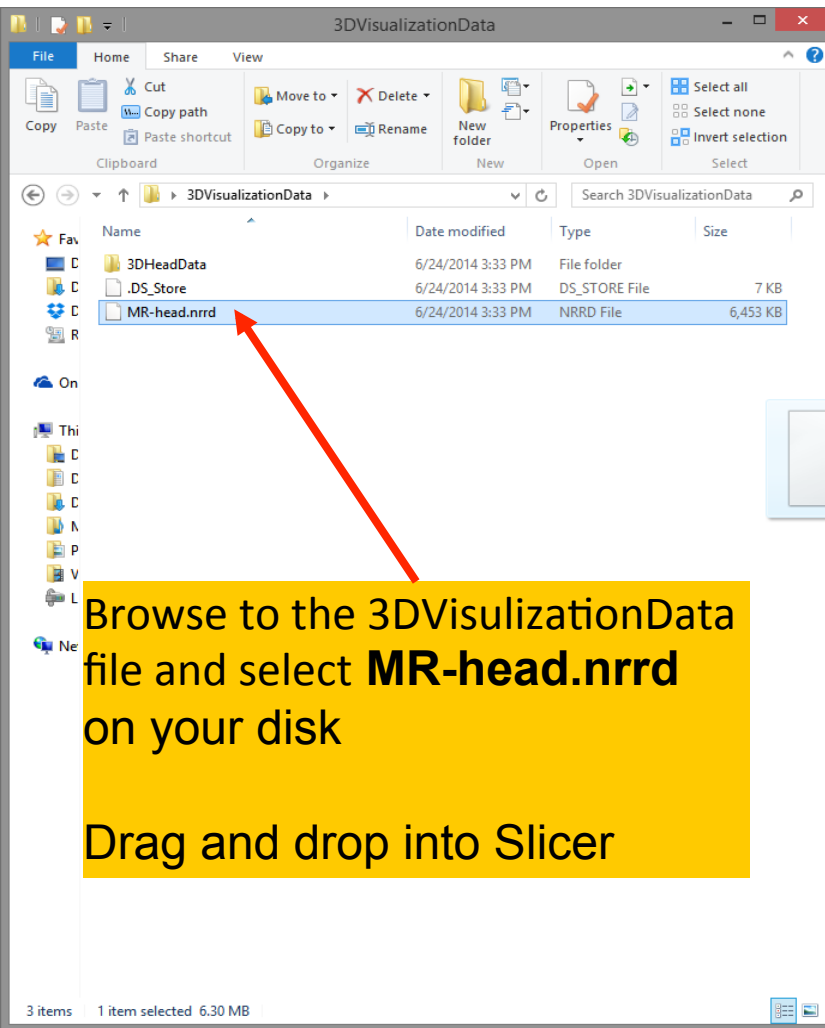
**Data Probe**



# Slicer User Interface



# Slicer4



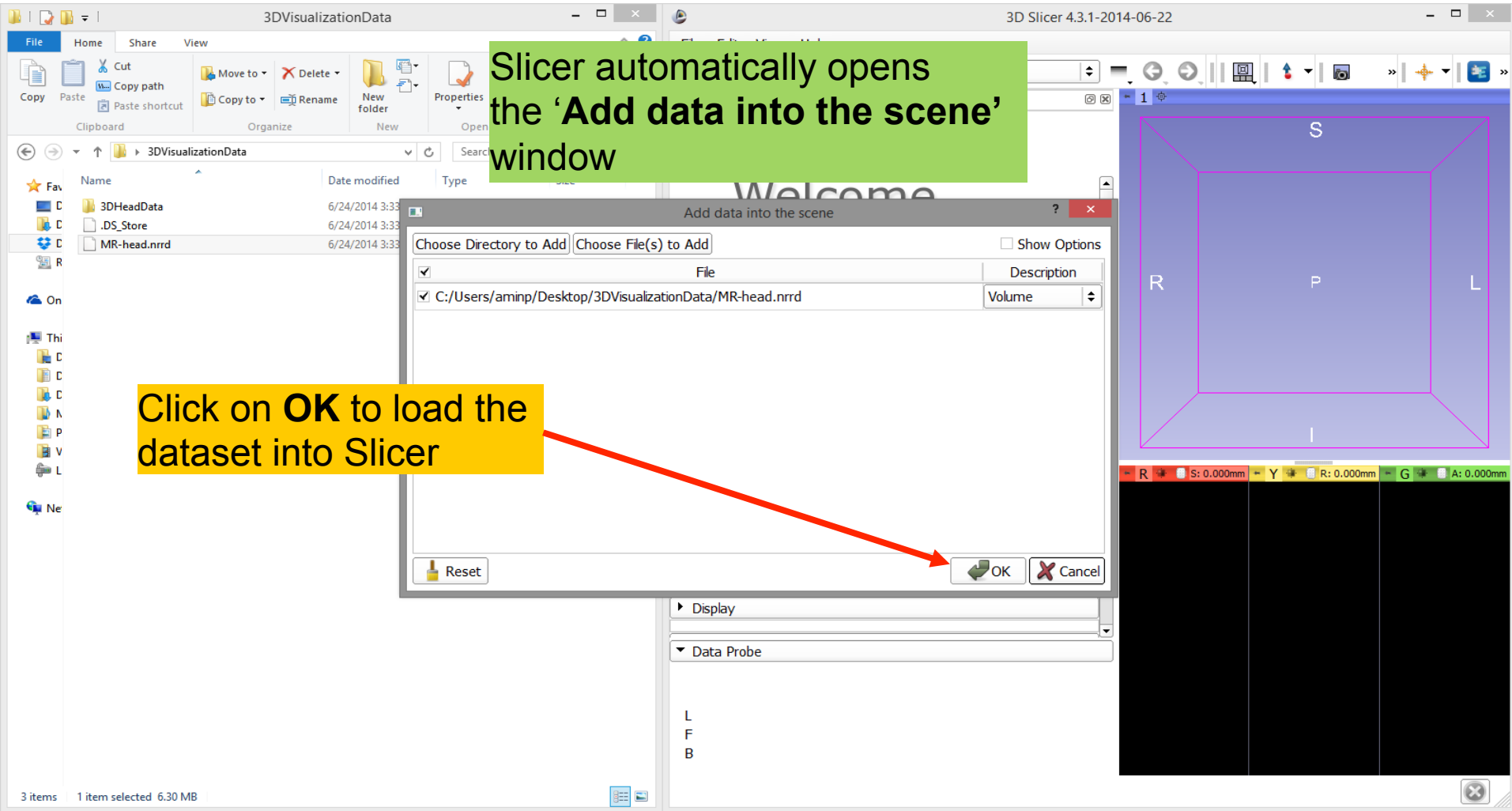
Browse to the 3DVisualizationData file and select **MR-head.nrrd** on your disk

Drag and drop into Slicer

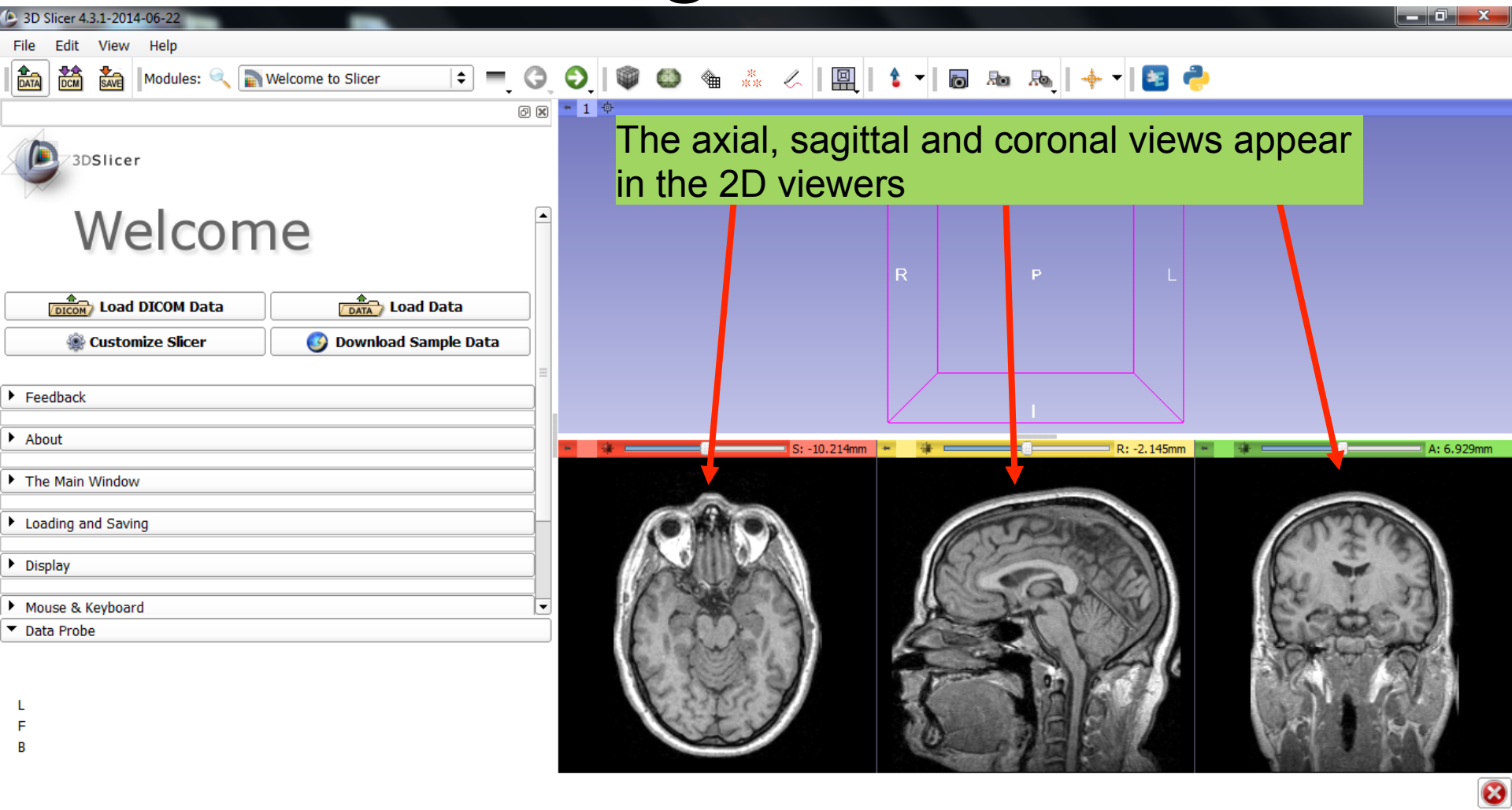
# Slicer4

Slicer automatically opens the 'Add data into the scene' window

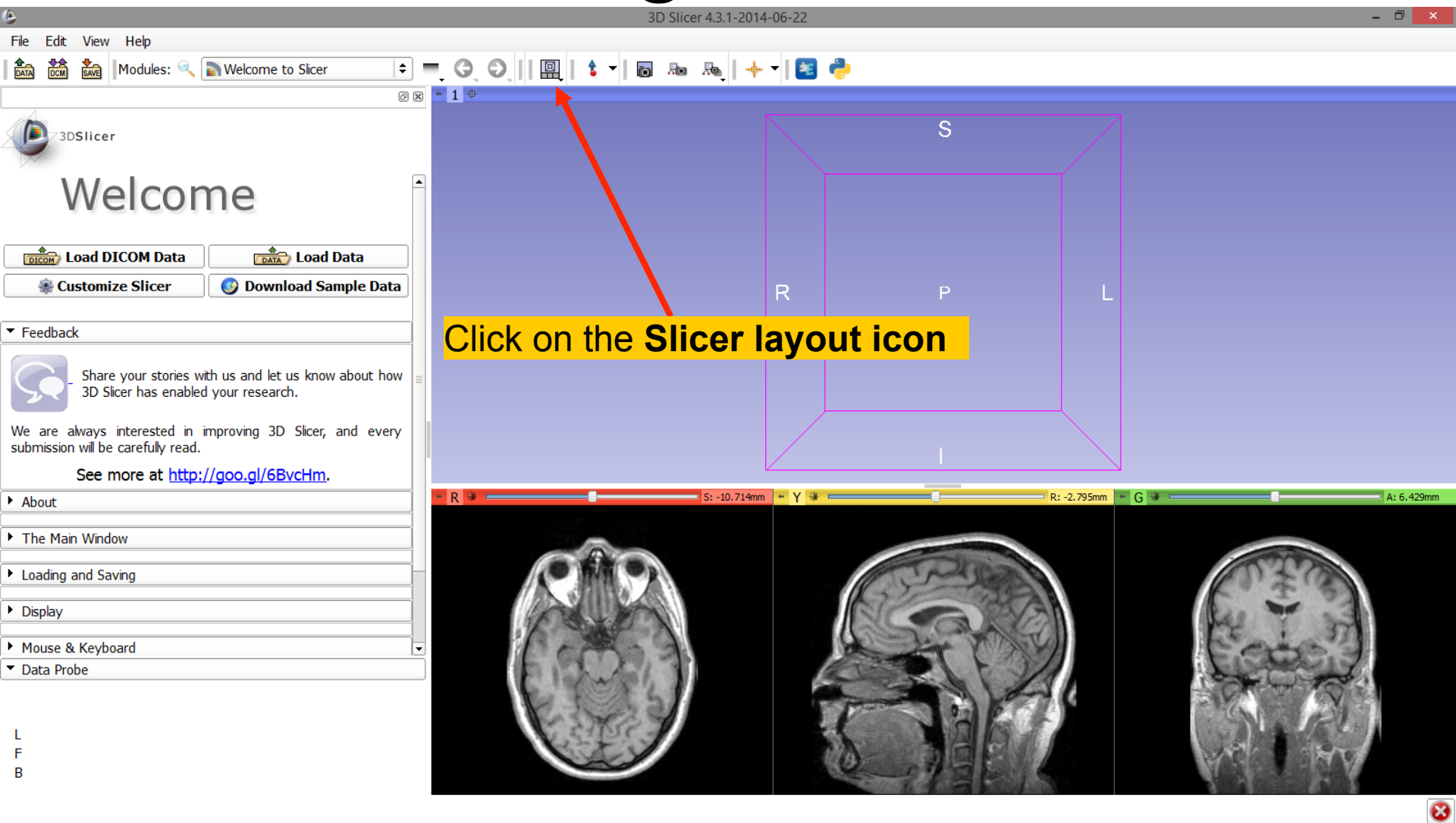
Click on **OK** to load the dataset into Slicer



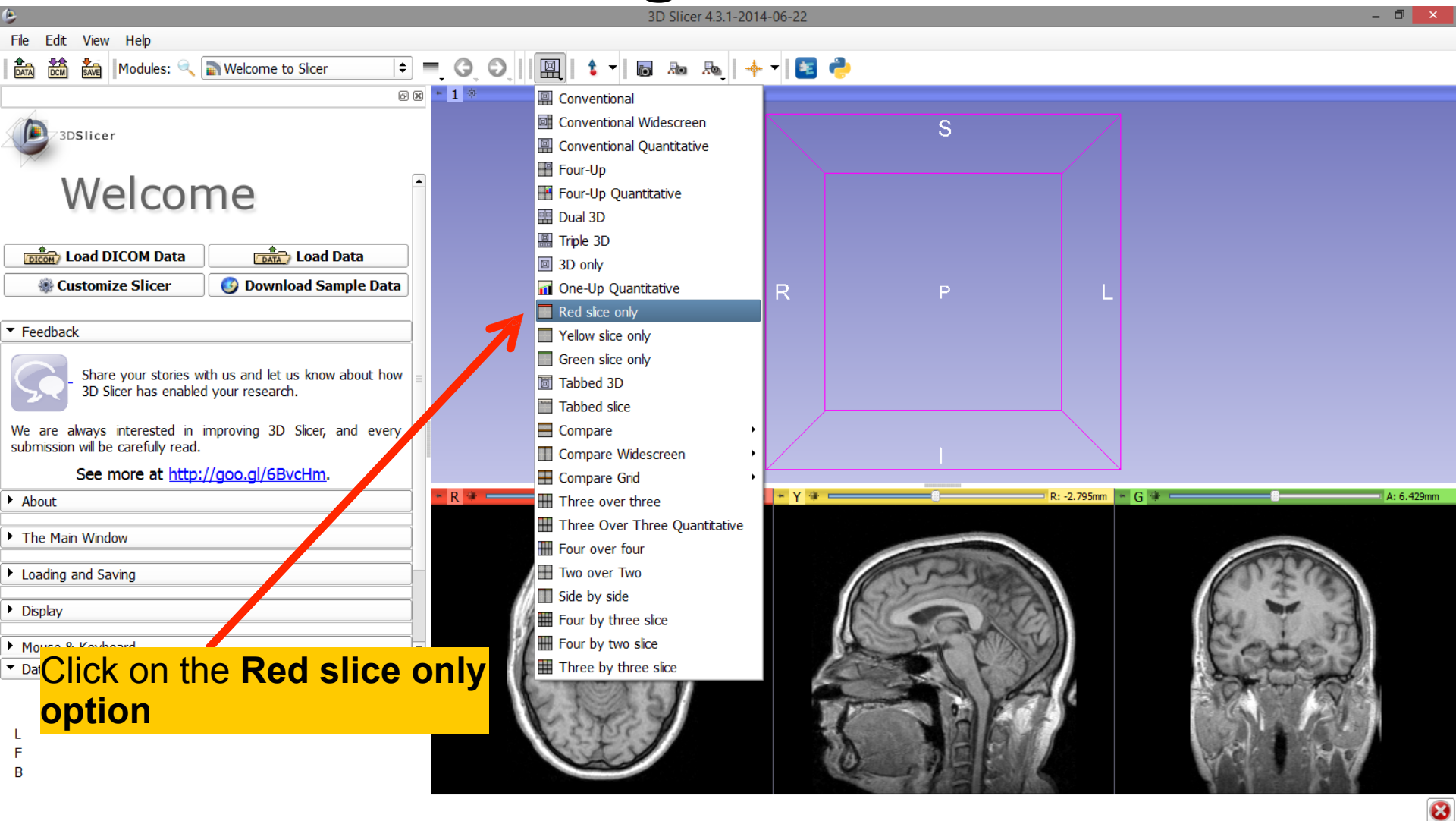
# Loading a volume



# Loading a volume



# Loading a volume



# Loading a volume

The screenshot shows the 3D Slicer 4.3.1-2014-06-22 interface. The main window displays a brain MRI slice. The left sidebar contains a 'Welcome' message and several buttons: 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. Below these are sections for 'Feedback', 'About', 'The Main Window', 'Loading and Saving', 'Display', 'Mouse & Keyboard', and 'Data Probe'. A red arrow points from a yellow callout box to a pin icon in the top toolbar. The callout box contains the text: 'Position your mouse over the pin icon to display the slice viewer toolbar'.

Position your mouse over the pin icon to display the slice viewer toolbar

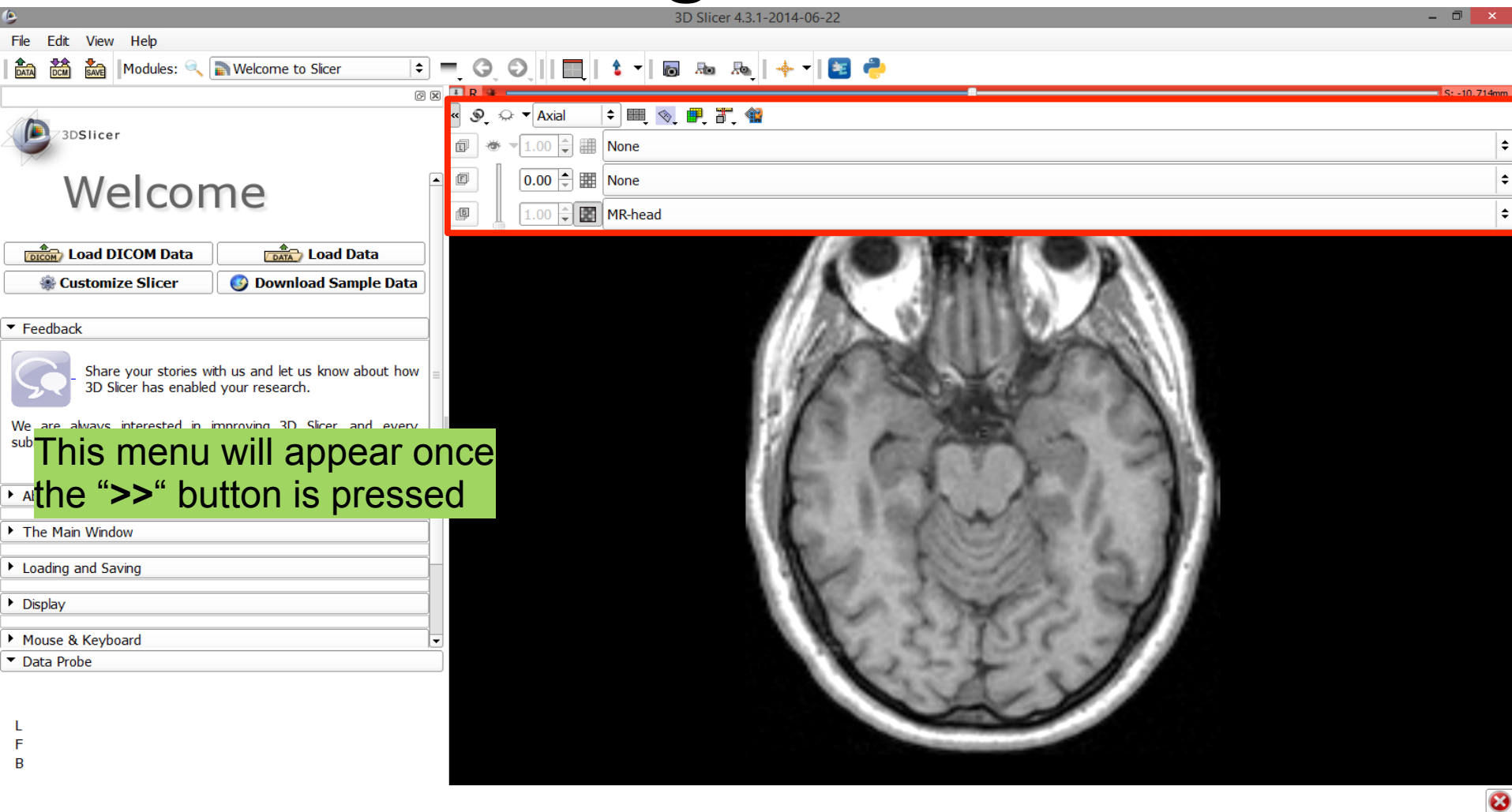
# Loading a volume

The screenshot shows the 3D Slicer interface. The top menu bar includes File, Edit, View, and Help. Below it is a toolbar with icons for loading and saving data. The main window is titled 'Welcome' and contains several buttons: 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. A 'Feedback' section is also visible. On the right, the 'Slice Viewer' toolbar is active, showing 'Axial' and 'MR-head' views. The main display area shows an axial MRI slice of a brain. A red arrow points from a yellow text box at the bottom left to the '>>' button in the slice viewer toolbar.

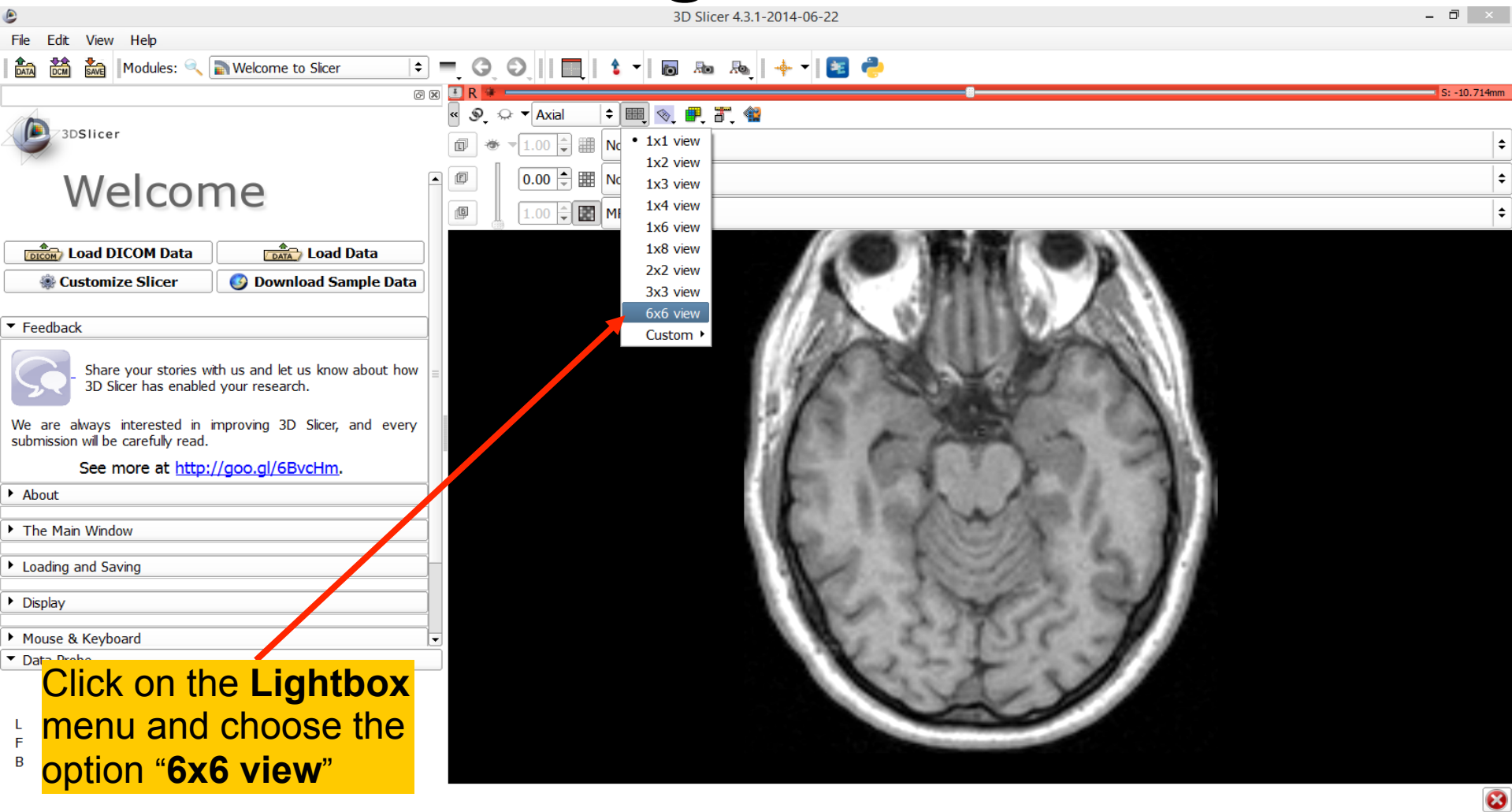
Once the slice viewer toolbar is displayed, click on the ">>"



# Loading a volume



# Loading a volume



3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Welcome to Slicer

3DSlicer

## Welcome

Load DICOM Data Load Data

Customize Slicer Download Sample Data

Feedback

Share your stories with us and let us know about how 3D Slicer has enabled your research.

We are always interested in improving 3D Slicer, and every submission will be carefully read.

See more at <http://goo.gl/6BvcHm>.

About

The Main Window

Loading and Saving

Display

Mouse & Keyboard

Data Probe

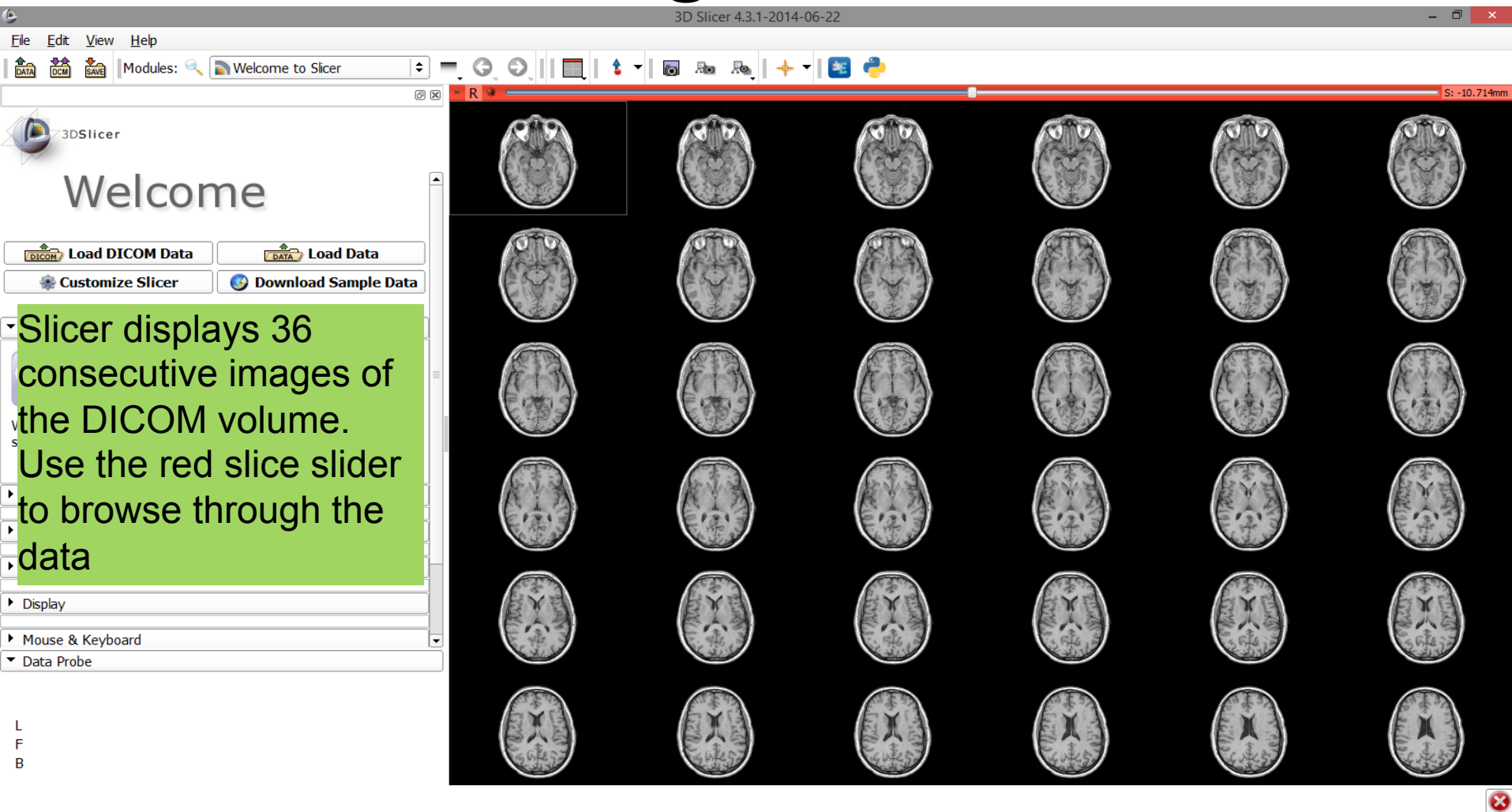
Lightbox

- 1x1 view
- 1x2 view
- 1x3 view
- 1x4 view
- 1x6 view
- 1x8 view
- 2x2 view
- 3x3 view
- 6x6 view**
- Custom

Click on the **Lightbox** menu and choose the option "**6x6 view**"

L  
F  
B

# Loading a volume



# Loading a volume

The screenshot shows the 3D Slicer 4.3.1-2014-06-22 interface. The 'Slicer layout' menu is open, displaying various layout options. The 'Conventional' layout is selected and highlighted in blue. A red arrow points from a yellow callout box to the 'Conventional' option. The main window displays a grid of axial brain slices. The left sidebar contains a 'Welcome' message and navigation options.

**Click on the Slicer layout icon and select Conventional**

- Conventional
- Conventional Widescreen
- Conventional Quantitative
- Four-Up
- Four-Up Quantitative
- Dual 3D
- Triple 3D
- 3D only
- One-Up Quantitative
- Red slice only
- Yellow slice only
- Green slice only
- Tabbed 3D
- Tabbed slice
- Compare
- Compare Widescreen
- Compare Grid
- Three over three
- Three Over Three Quantitative
- Four over four
- Two over Two
- Side by side
- Four by three slice
- Four by two slice
- Three by three slice

# Loading a volume

The screenshot shows the 3D Slicer interface. The main window displays a 3D view of a brain volume with a purple wireframe box labeled with 'S' (Superior), 'I' (Inferior), 'R' (Right), and 'L' (Left). The 'Lightbox' menu is open, showing a grid of view icons. A red arrow points from a yellow text box to the '1x1 view' icon in the Lightbox. The yellow text box contains the following instructions:

Position your arrow again on the **pin icon** of the red viewer, select the **Lightbox** menu and change it back to **"1x1 view"**

Below the main window, there are two smaller 2D view windows showing axial and sagittal slices of the brain. The interface includes a menu bar (File, Edit, View, Help), a toolbar with icons for data loading and saving, and a sidebar with a 'Data Probe' section.

# Loading a volume

Position your arrow again on the **pin icon** of the red viewer and click on the links icon to link all three viewers

Share your stories with us and let us know about how 3D Slicer has enabled your research.

We are always interested in improving 3D Slicer, and every submission will be carefully read.

See more at <http://goo.gl/6BvcHm>.

Viewports: Axial, Sagittal, Coronal

Coordinates: S: -10.214mm, R: -2.145mm, A: 6.929mm

MR-head

L  
F  
B

# Loading a volume

3DSlicer

## Welcome

Once the icons are linked, click on the **eye icon** to display all 3 anatomical slices in the 3D viewer

See more at <http://goo.gl/6BvcHm>.

File Edit View Help

DATA DCM SAVE Modules: Welcome to Slicer

3DSlicer

1

R L

Axial

1.00 None

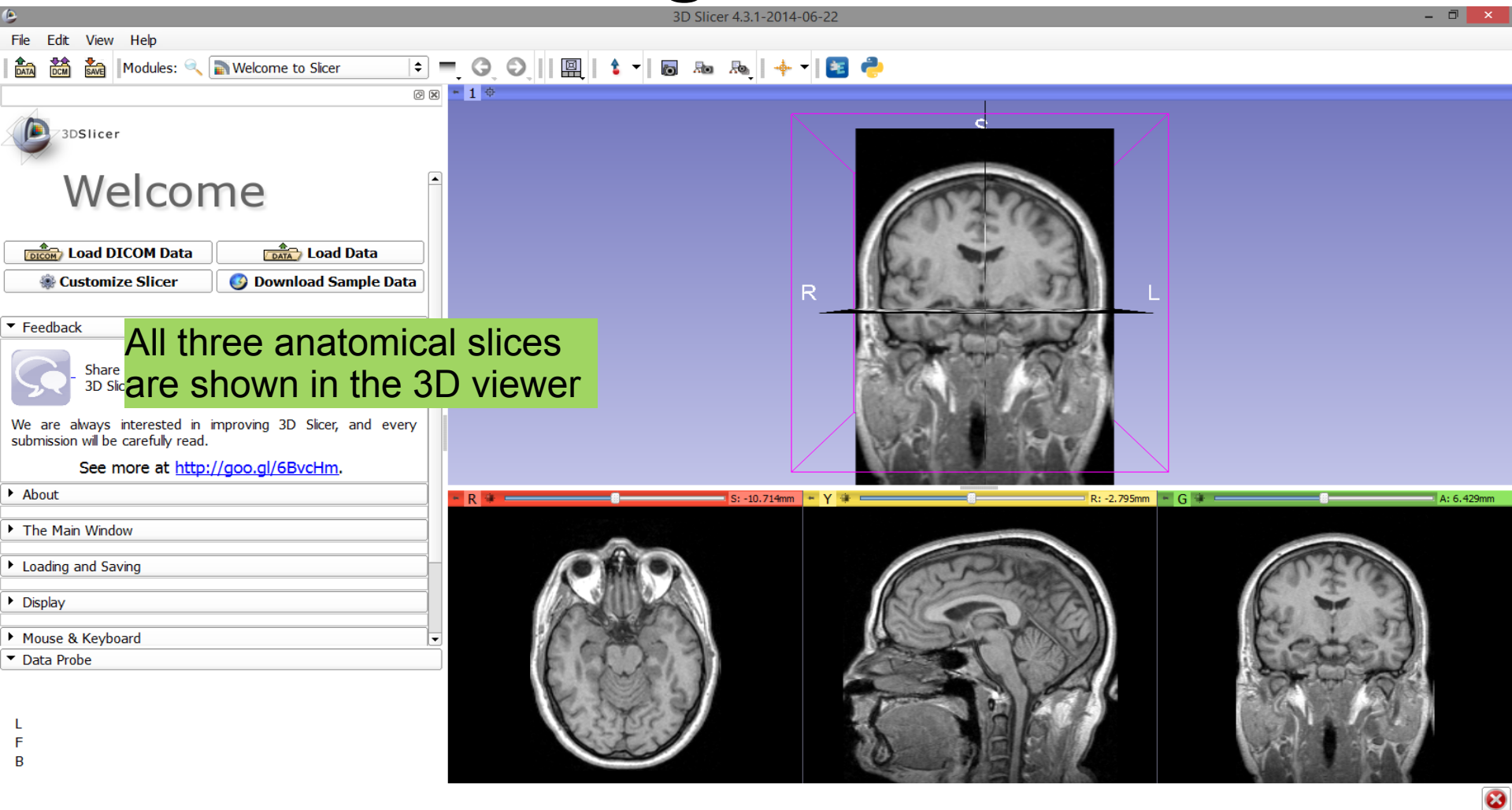
0.00 None

1.00 MR-head

S: -10.714mm Y: -2.795mm G: 6.429mm

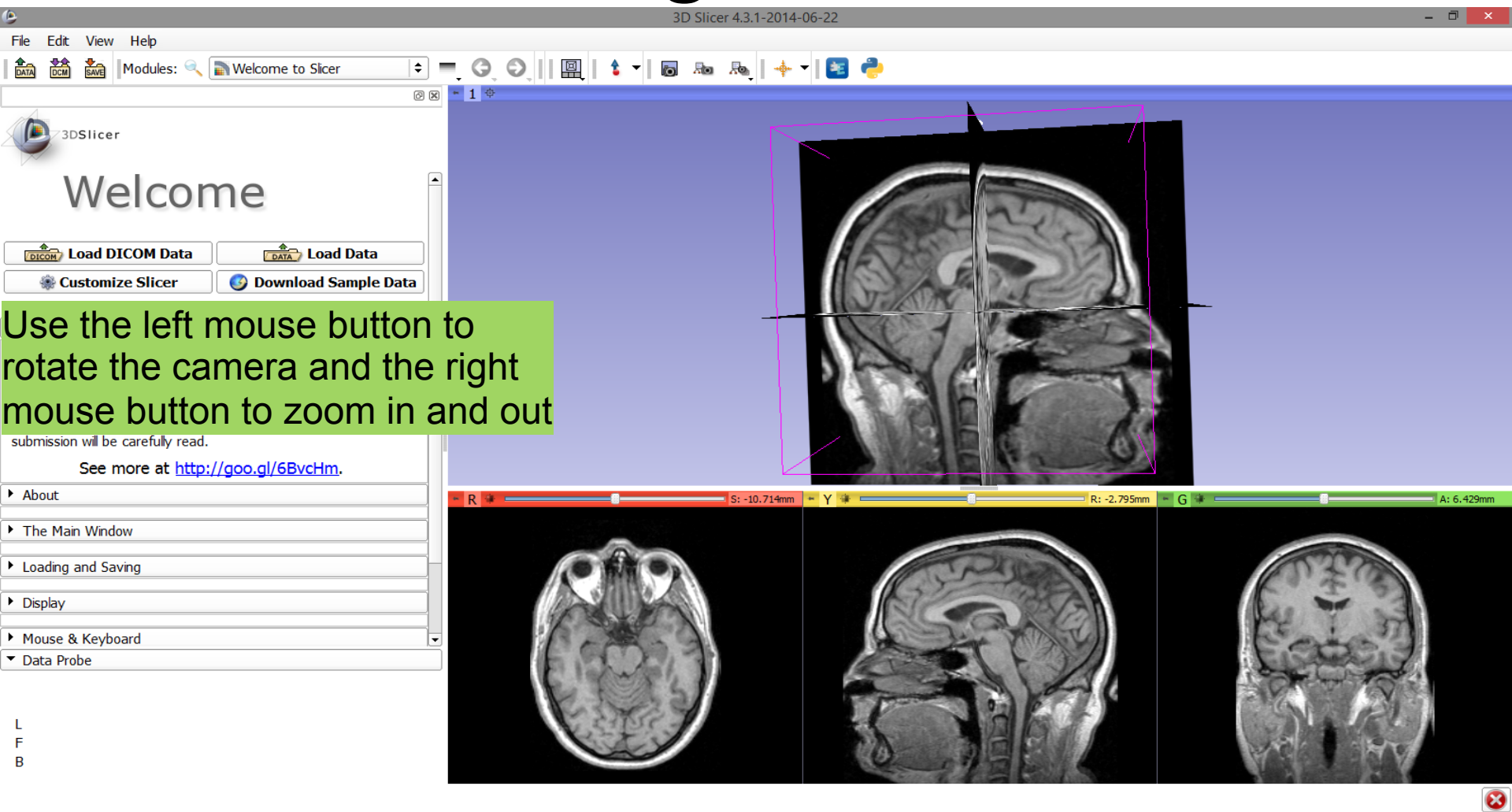
L  
F  
B

# Loading a volume

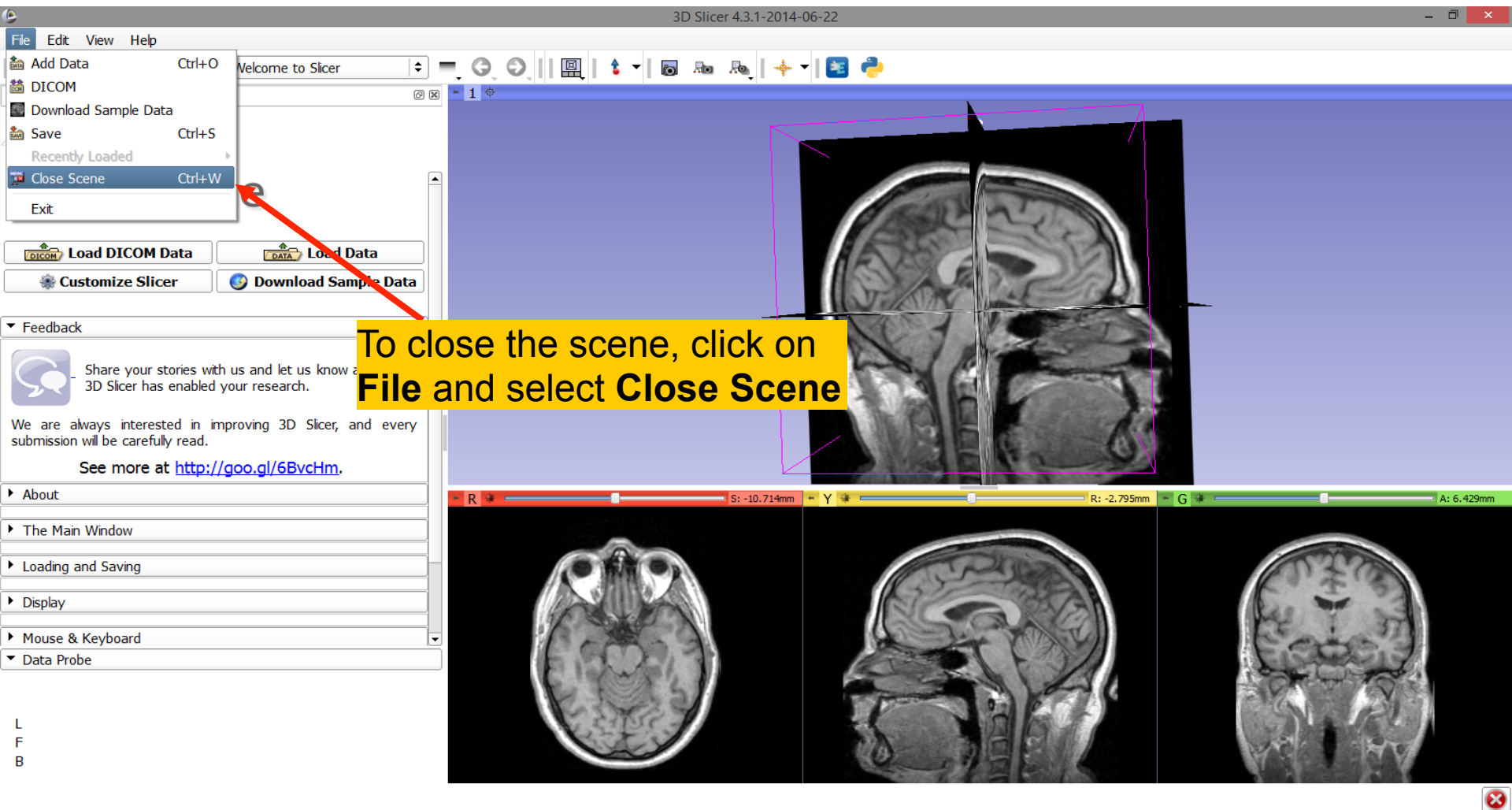




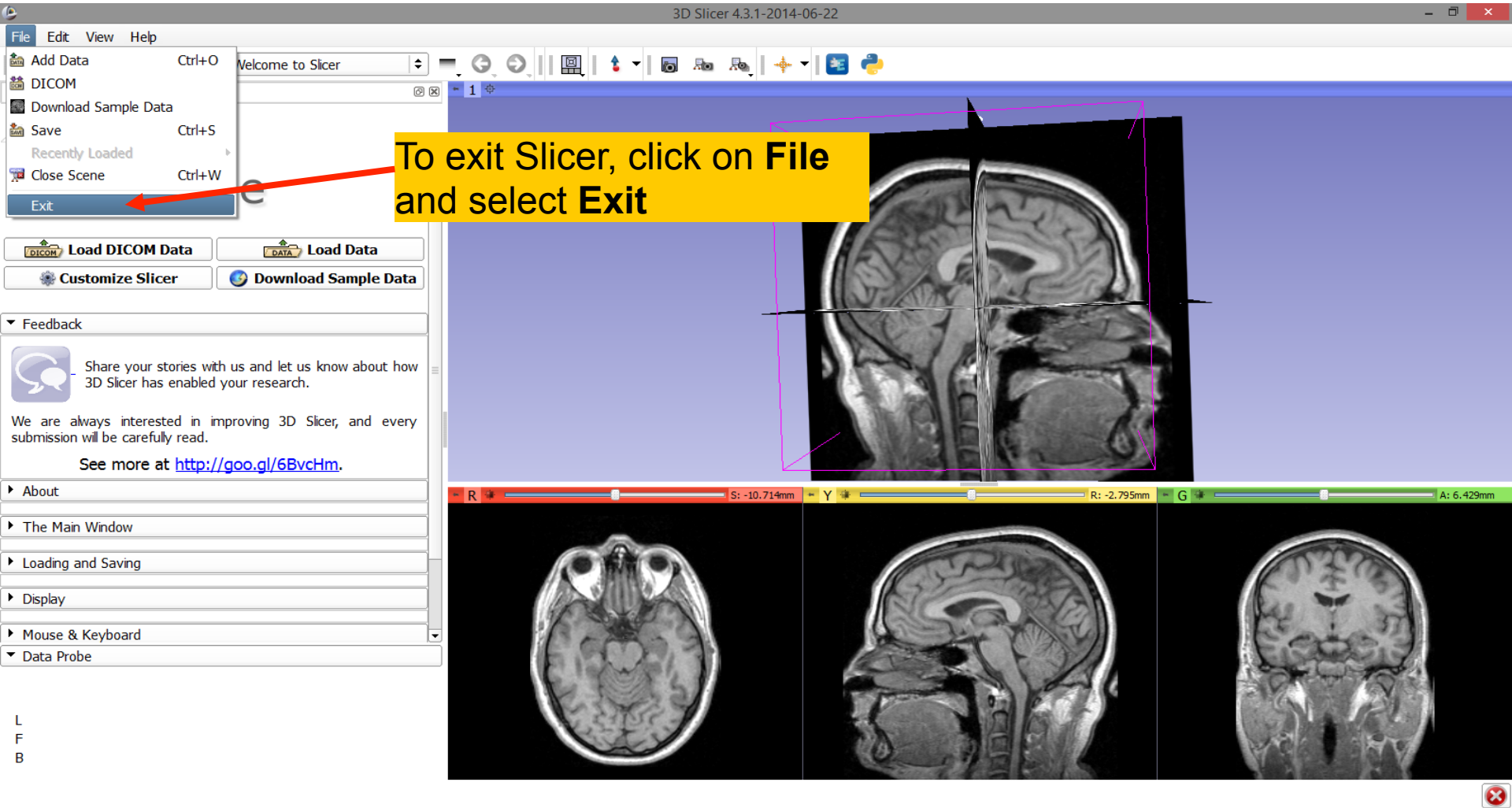
# Loading a volume



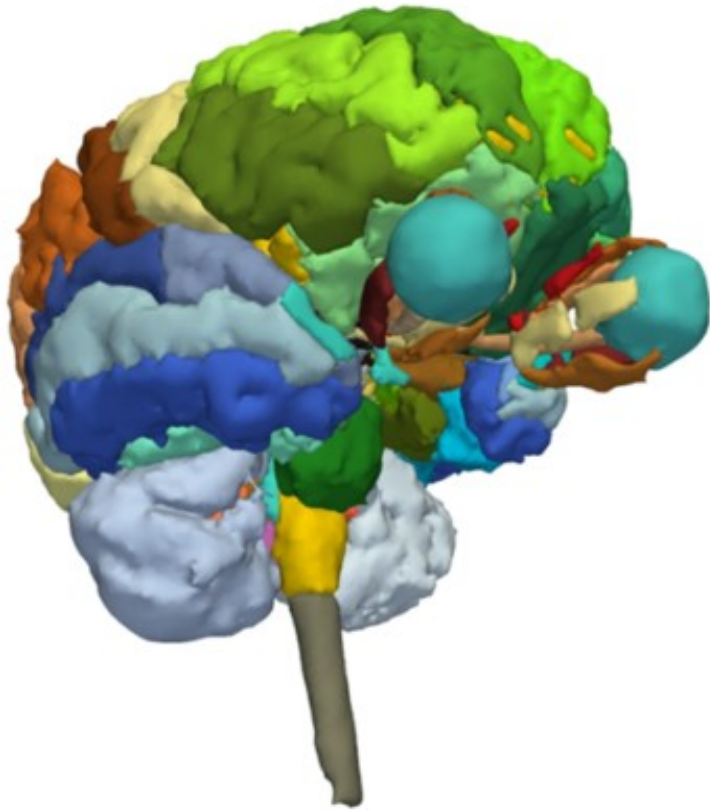
# Close the scene



# Exit Slicer



# Part 2



## 3D Visualization of Surface Models of the Brain

# Loading a Scene

The image shows two windows side-by-side. On the left is a Windows Explorer window titled '3DHeadData' showing a file list. A red arrow points from the file '3DHeadScene.mrml' in the list to the 'Load Data' button in the 3D Slicer window on the right. The 3D Slicer window shows a 'Welcome' screen with a 'Load Data' button and a 3D view area with axes labeled S, R, P, L, I.

Name	Date modified	Type	Size
.3DHeadScene.mrml.swp	6/24/2014 3:33 PM	SWP File	164 KB
.DS_Store	6/24/2014 3:33 PM	DS_STORE File	7 KB
3DHeadScene	6/24/2014 3:33 PM	Slicer supported file	142 KB
grayscale.nrrd	6/24/2014 3:33 PM	NRRD File	20,353 KB
hemispheric_white_matter.vtk	6/24/2014 3:33 PM	VTK File	6,270 KB
left_eyeball.vtk	6/24/2014 3:33 PM	VTK File	56 KB
Master Scene View	6/24/2014 3:33 PM	PNG image	604 KB
optic_chiasm.vtk	6/24/2014 3:33 PM	VTK File	14 KB
optic_nerve_L.vtk	6/24/2014 3:33 PM	VTK File	28 KB
optic_nerve_R.vtk	6/24/2014 3:33 PM	VTK File	29 KB
optic_tract_L.vtk	6/24/2014 3:33 PM	VTK File	18 KB
optic_tract_R.vtk	6/24/2014 3:33 PM	VTK File	16 KB
right_eyeball.vtk	6/24/2014 3:33 PM	VTK File	52 KB
Skin.vtk	6/24/2014 3:33 PM	VTK File	3,393 KB
skull_bone.vtk	6/24/2014 3:33 PM	VTK File	4,712 KB

**Drag and drop the file '3DHeadScene.mrml' into Slicer**

3D Slicer 4.3.1-2014-06-22

Welcome

Load DICOM Data Load Data

Customize Slicer Download Sample Data

Feedback

Share your stories with us and let us know about how 3D Slicer has enabled your research.

We are always interested in improving 3D Slicer, and every submission will be carefully read.

See more at <http://goo.gl/6BvcHm>.

About

The Main Window

Loading and Saving

Display

Data Probe

L  
F  
B

S  
R  
P  
L  
I

S: 0.000mm R: 0.000mm A: 0.000mm

Axial None

# Loading a Scene

3DHeadData

3D Slicer 4.3.1-2014-06-22

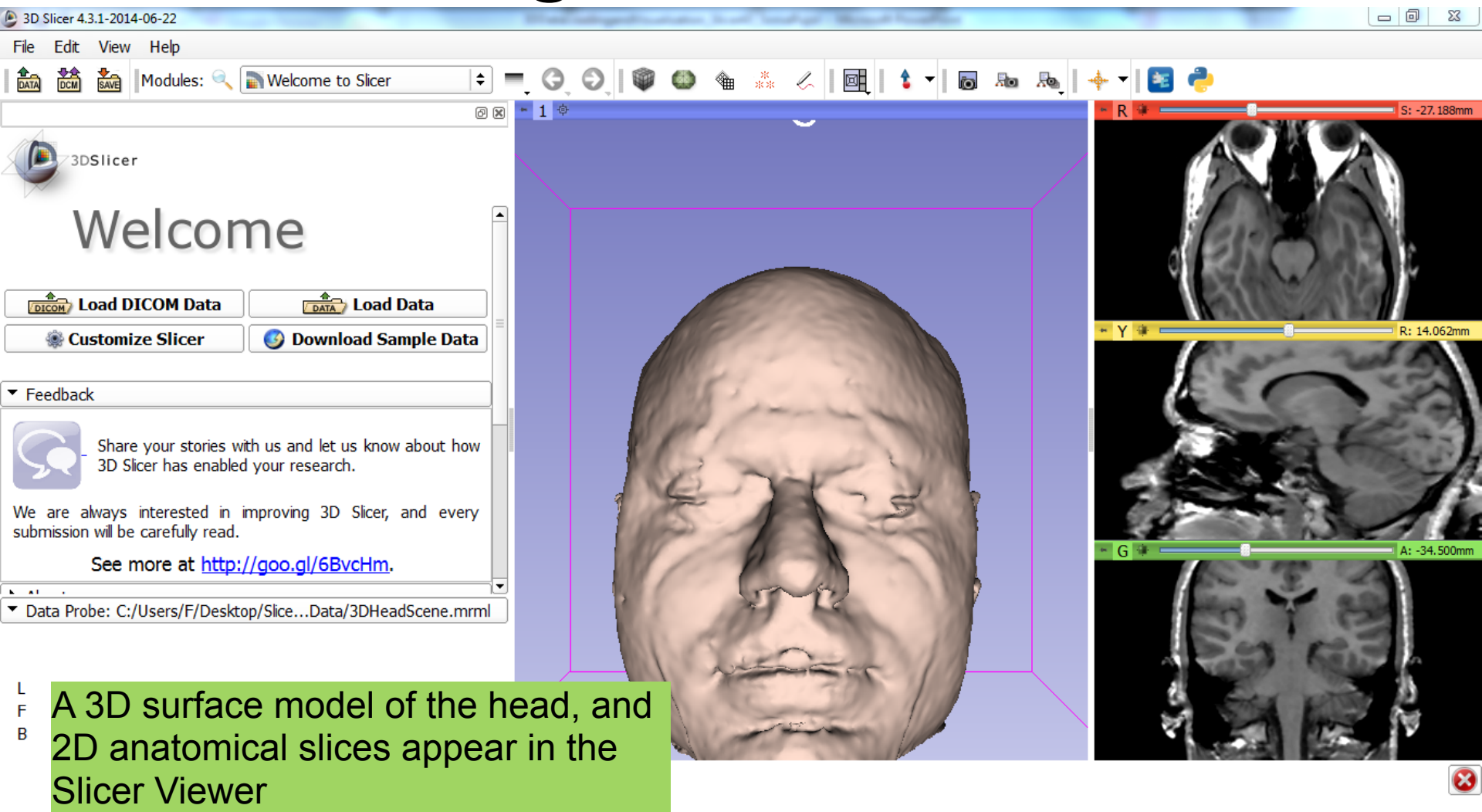
Add data into the scene

File	Description
<input checked="" type="checkbox"/> C:/Users/aminp/Desktop/3DVisualizationData/3DHeadData/3DHeadScene.mrml	MRML Scene

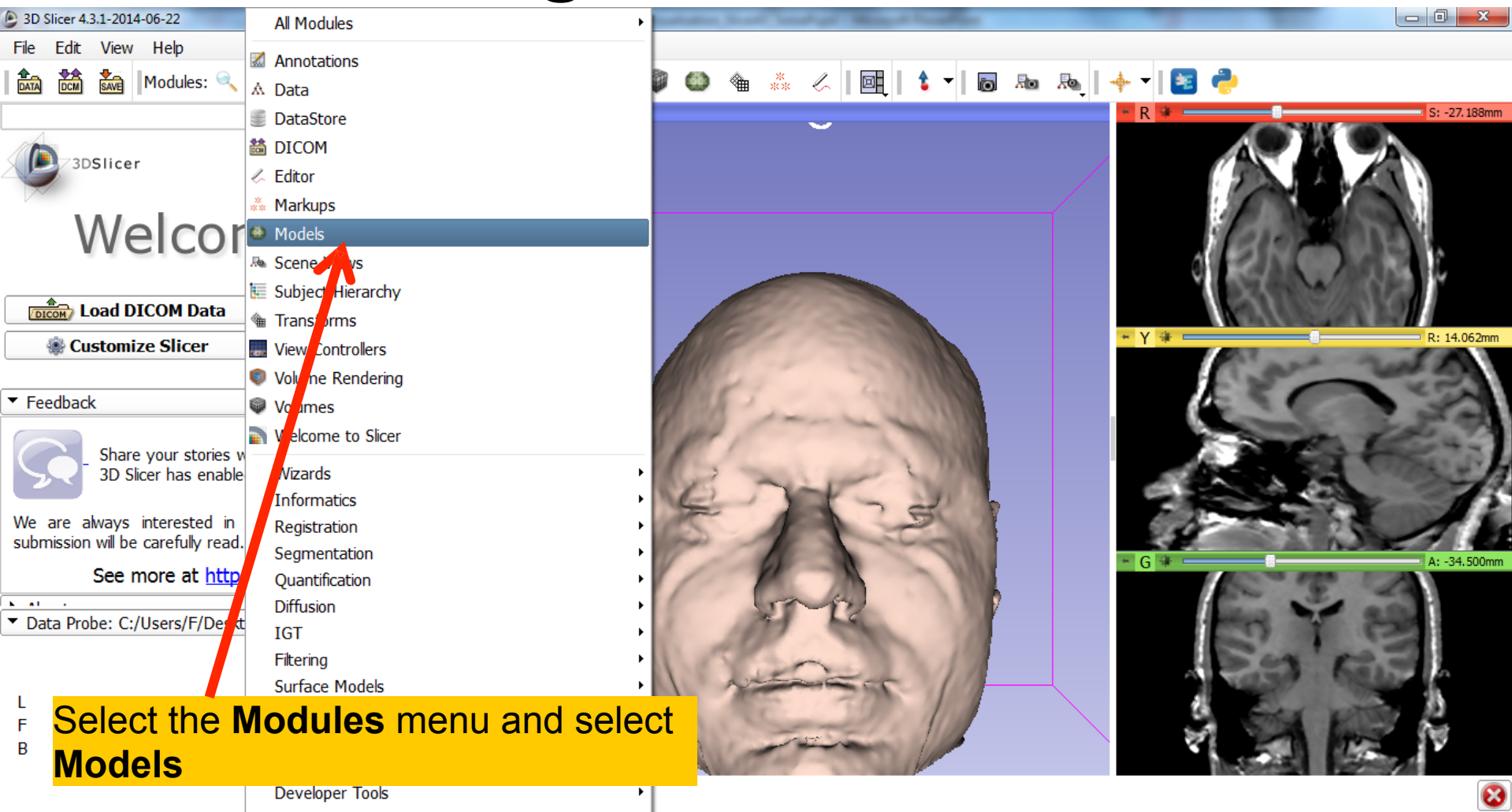
Reset OK Cancel

Slicer automatically opens the 'Add data into the scene' window. Click on **OK** to load the scene file.

# Loading the Slicer Scene



# Loading the Slicer Scene



The screenshot displays the 3D Slicer 4.3.1 interface. On the left, the 'Modules' menu is open, listing various tools. A red arrow points to the 'Models' option. The main window shows a 3D model of a human face. On the right, there are three orthogonal views (axial, sagittal, and coronal) of a brain MRI scan. A yellow box at the bottom left contains the text: 'Select the **Modules** menu and select **Models**'. The interface includes a top menu bar (File, Edit, View, Help), a toolbar, and a status bar at the bottom.

3D Slicer 4.3.1-2014-06-22

File Edit View Help

DATA DCM SAVE Modules:

3DSlicer

Welcome

Load DICOM Data

Customize Slicer

Feedback

Share your stories with 3D Slicer has enabled

We are always interested in your submission will be carefully read.

See more at <http://www.slicer.org>

Data Probe: C:/Users/F/Desktop

All Modules

- Annotations
- Data
- DataStore
- DICOM
- Editor
- Markups
- Models**
- Scene Views
- Subject Hierarchy
- Transforms
- View Controllers
- Volume Rendering
- Volumes
- Welcome to Slicer
- Wizards
- Informatics
- Registration
- Segmentation
- Quantification
- Diffusion
- IGT
- Filtering
- Surface Models
- Developer Tools

L  
F  
B

Select the **Modules** menu and select **Models**

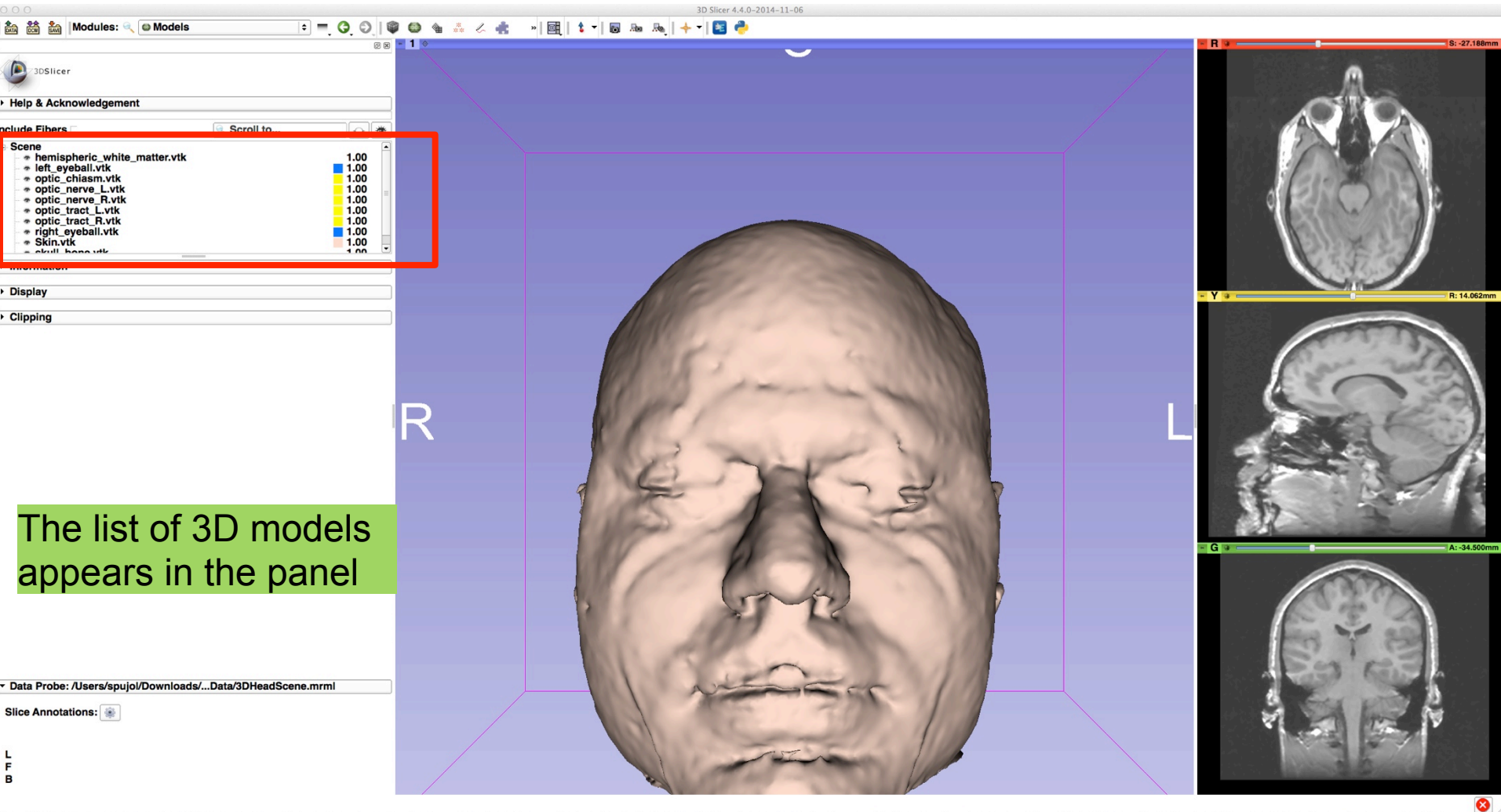
R S: -27.188mm

Y R: 14.062mm

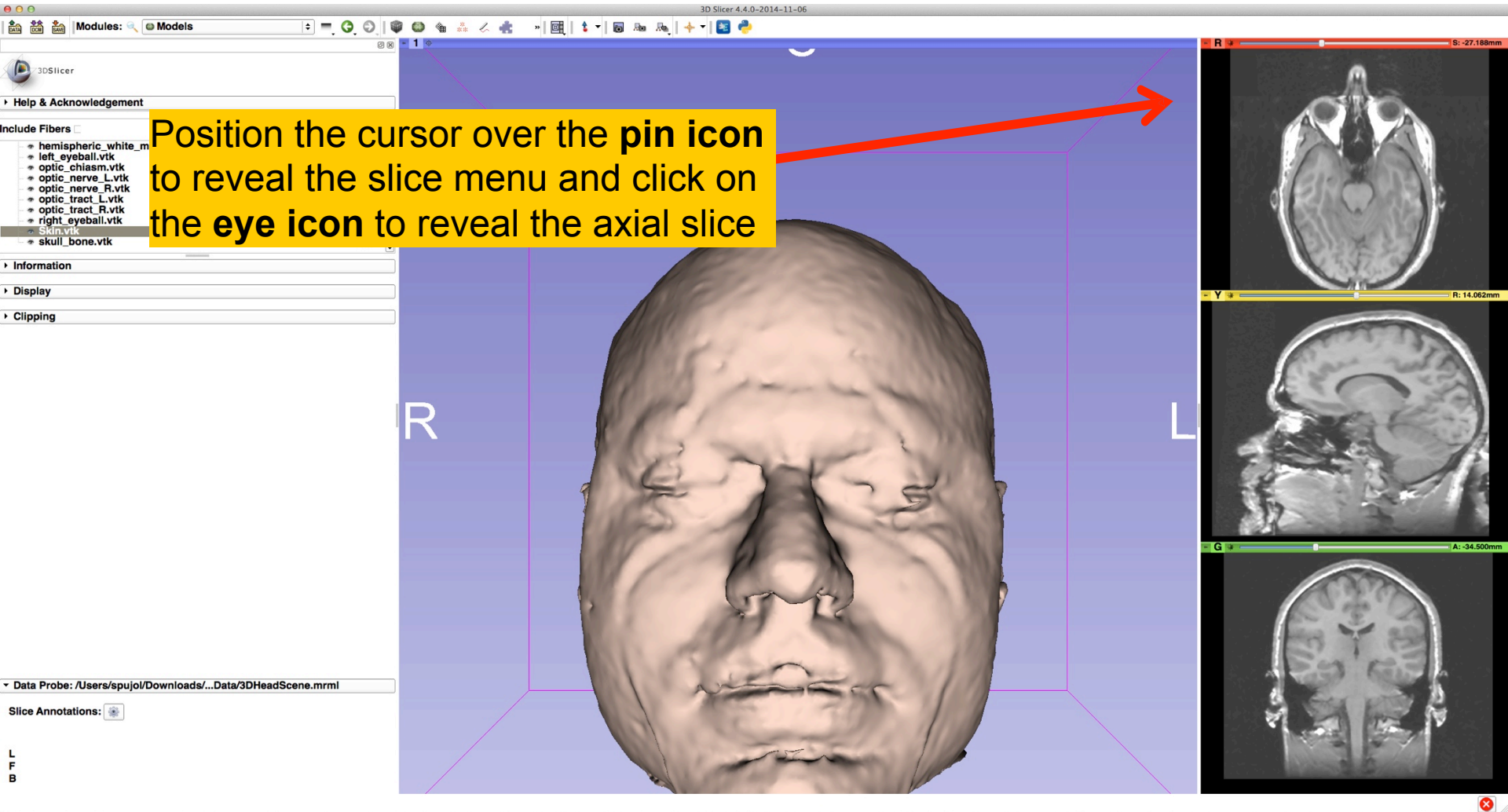
G A: -34.500mm



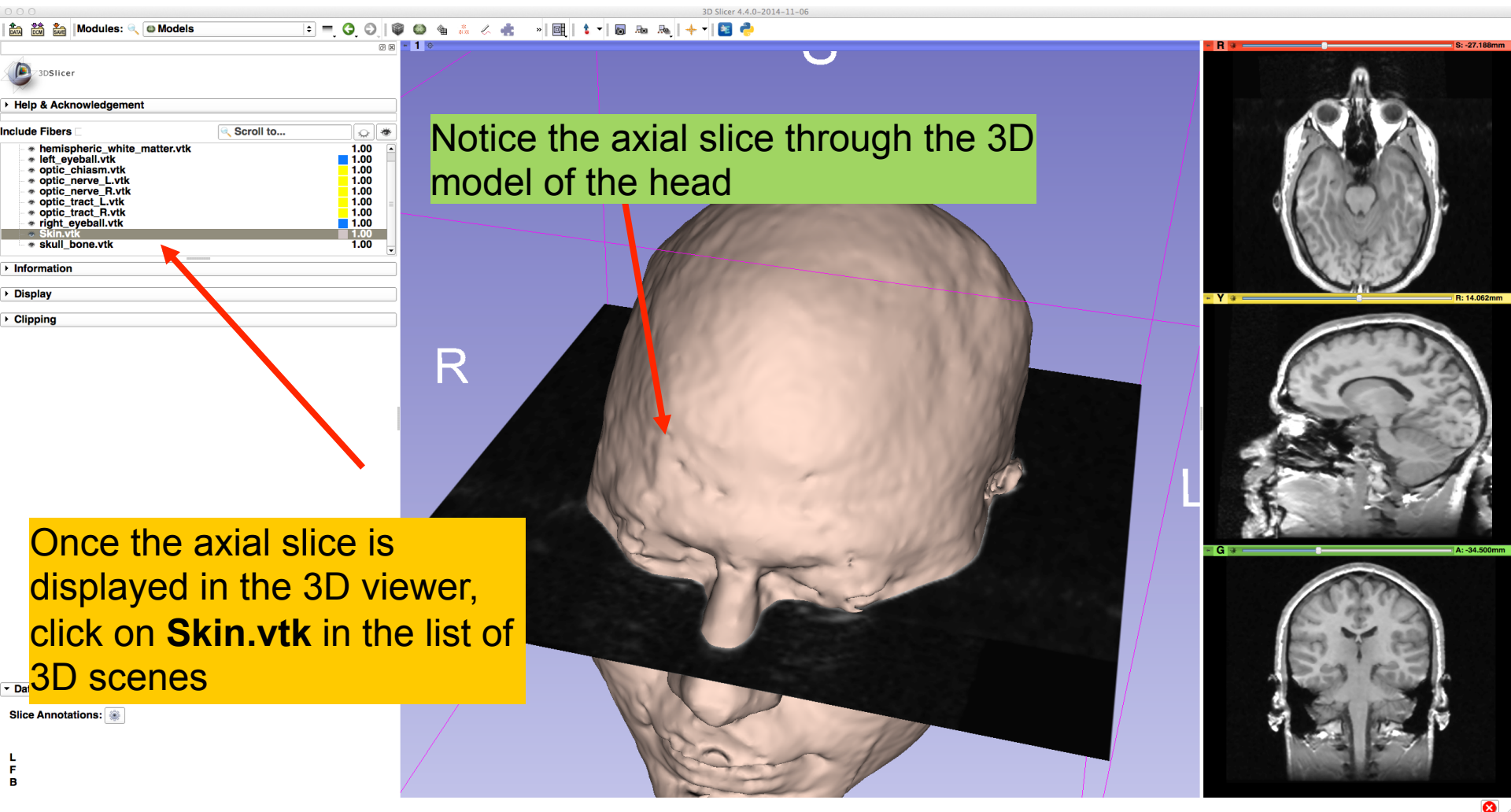
# Models Module



# 3D Visualization



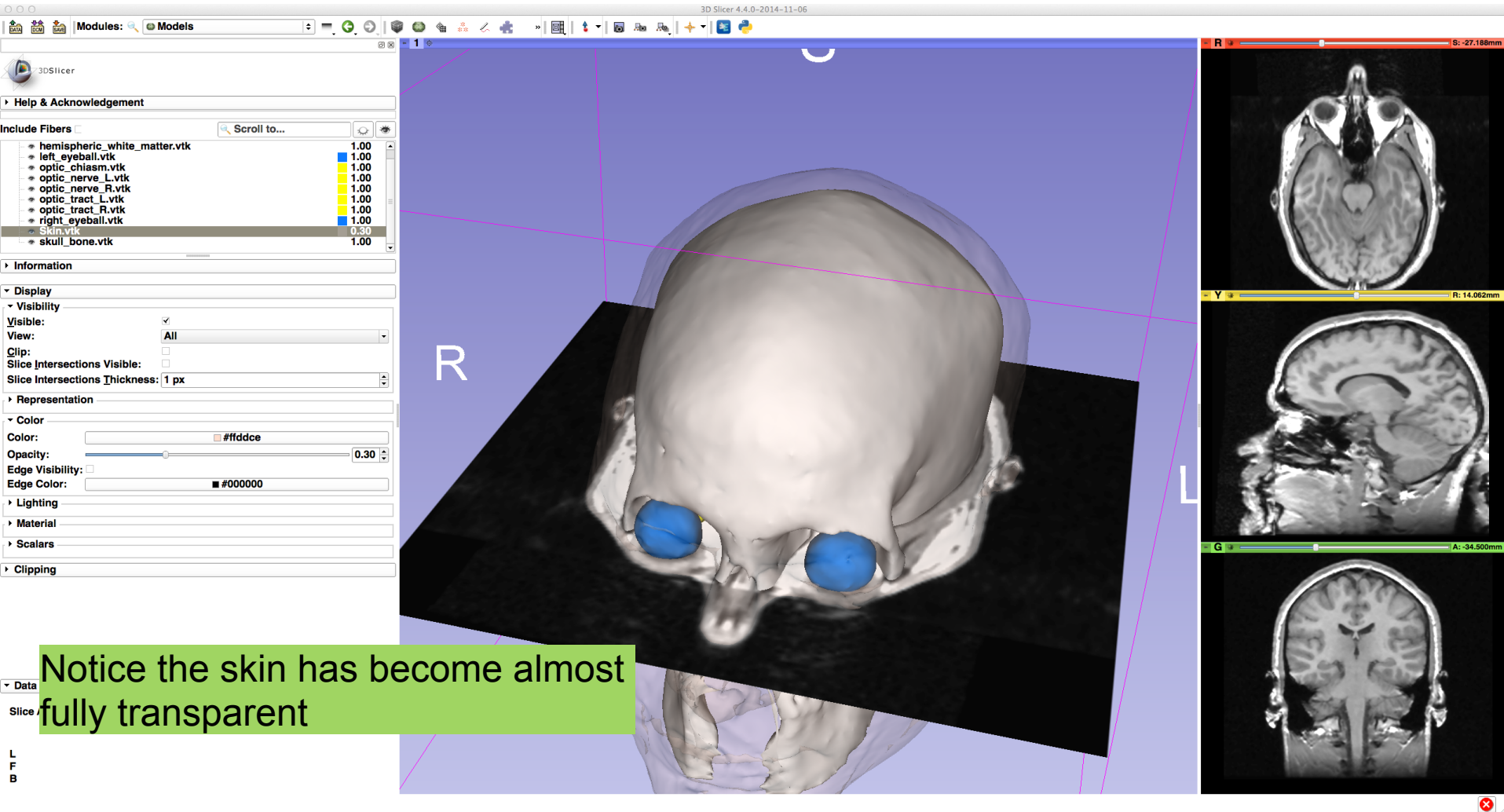
# 3D Visualization



# 3D Visualization

The screenshot shows the 3D Slicer interface. On the left, the 'Display' tab is selected, and the 'Color' sub-tab is highlighted with a red box. The 'Opacity' slider is set to 1.00, and a red arrow points to it. A yellow text box in the bottom left corner contains the following text: 'Scroll down the **Display** tab and locate the “**Color**” tab. Lower the **Opacity** to a transparent level, around 0.30'. The main 3D view shows a semi-transparent 3D model of a human head and brain. On the right, three axial, sagittal, and coronal MRI slices are displayed. The top slice is labeled 'R' and 'S: -27.108mm'. The middle slice is labeled 'V' and 'R: 14.062mm'. The bottom slice is labeled 'G' and 'A: -34.500mm'.

# 3D Visualization



# 3D Visualization

The screenshot displays the 3D Slicer interface. The main 3D view shows a skull model with blue eyes. The left sidebar contains the 'Models' panel with a list of loaded models and their visibility/opacity settings. A red arrow points to the 'skull\_bone.vtk' model. The right sidebar shows three orthogonal MRI slices (axial, sagittal, and coronal). A yellow text box at the bottom left contains the instruction: 'Scroll back up to the 3D scenes menu and select **skull\_bone.vtk**'.

3D Slicer 4.4.0-2014-11-06

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers  Scroll to...

- hemispheric\_white\_matter.vtk 1.00
- left\_eyeball.vtk 1.00
- optic\_chiasm.vtk 1.00
- optic\_nerve\_L.vtk 1.00
- optic\_nerve\_R.vtk 1.00
- optic\_tract\_L.vtk 1.00
- optic\_tract\_R.vtk 1.00
- right\_eyeball.vtk 1.00
- Skin.vtk 0.30
- skull\_bone.vtk 1.00

Information

Display

Visibility

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffffff

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Material

Scalars

Clipping

Data

Slice

L F B

R

L

R: -27.188mm

Y

R: 14.062mm

G

A: -34.500mm

Scroll back up to the 3D scenes menu and select **skull\_bone.vtk**

# 3D Visualization

3D Slicer 4.4.0-2014-11-06

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers

- hemispheric\_white\_matter.vtk 1.00
- left\_eyeball.vtk 1.00
- optic\_chiasm.vtk 1.00
- optic\_nerve\_L.vtk 1.00
- optic\_nerve\_R.vtk 1.00
- optic\_tract\_L.vtk 1.00
- optic\_tract\_R.vtk 1.00
- right\_eyeball.vtk 1.00
- Skin.vtk 0.30
- skull\_bone.vtk 1.00

Information

Display

Visibility

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 p

Representation

Color

Color: #ffffff

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Material

Scalars

Clipping

Turn off its visibility by unchecking the **Visibility** option and notice the bone disappearing from the 3D view of the head

R

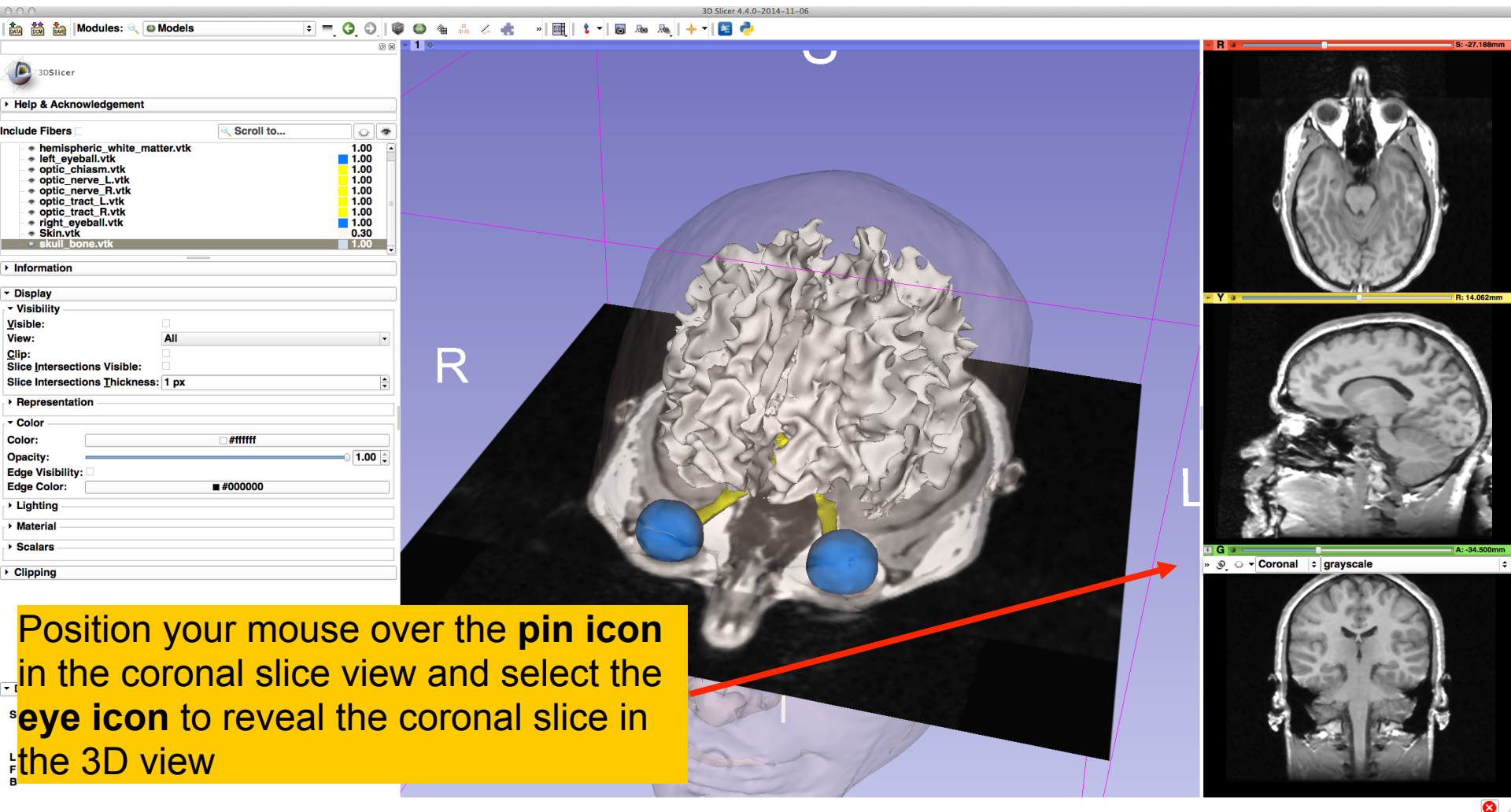
L

R: -27.18mm

Y: R: 14.062mm

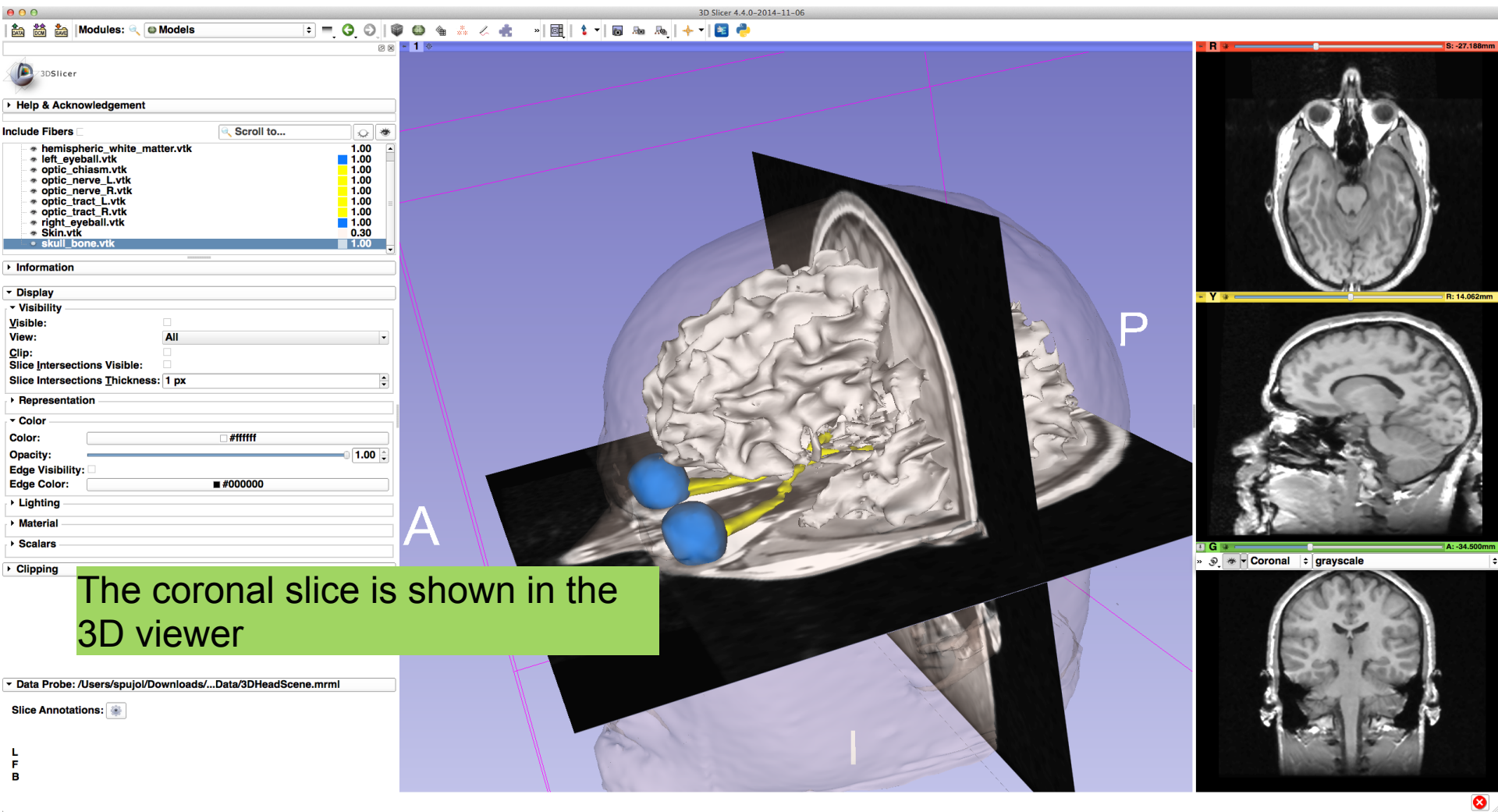
G: A: -34.500mm

# 3D Visualization





# 3D Visualization



# 3D Visualization

The image shows a screenshot of the 3D Slicer software interface. The main window displays a 3D visualization of a brain model with a yellow fiber tract and two blue spheres. The interface includes a 'Modules' panel on the left, a '3D Slicer' window, and a 'Data Probe' panel at the bottom. A yellow text box with a red arrow points to the 'hemispheric\_white\_matter.vtk' entry in the 'Include Fibers' list. Another red arrow points to the 'Clip' checkbox in the 'Visibility' tab of the 'Information' panel. On the right side, there are three axial MRI slices of the brain, with the top one showing the fiber tract. The bottom right corner shows a 'Coronal' slice in 'grayscale' mode.

3D Slicer 4.4.0-2014-11-06

Modules: Models

3D Slicer

Help & Acknowledgement

Include Fibers

- hemispheric\_white\_matter.vtk 1.00
- left\_eyeball.vtk 1.00
- optic\_chiasm.vtk 1.00
- optic\_nerve\_L.vtk 1.00
- optic\_nerve\_R.vtk 1.00
- optic\_tract\_L.vtk 1.00
- optic\_tract\_R.vtk 1.00
- right\_eyeball.vtk 1.00
- Skin.vtk 0.30
- skull\_bone.vtk 1.00

Information

Display

Visibility

Visible:

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffffff

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Material

Scalars

Clipping

Data Probe: /Users/spujol/Downloads/...Data/3DHeadScene.mrml

Slice Annotations: [icon]

L  
F  
B

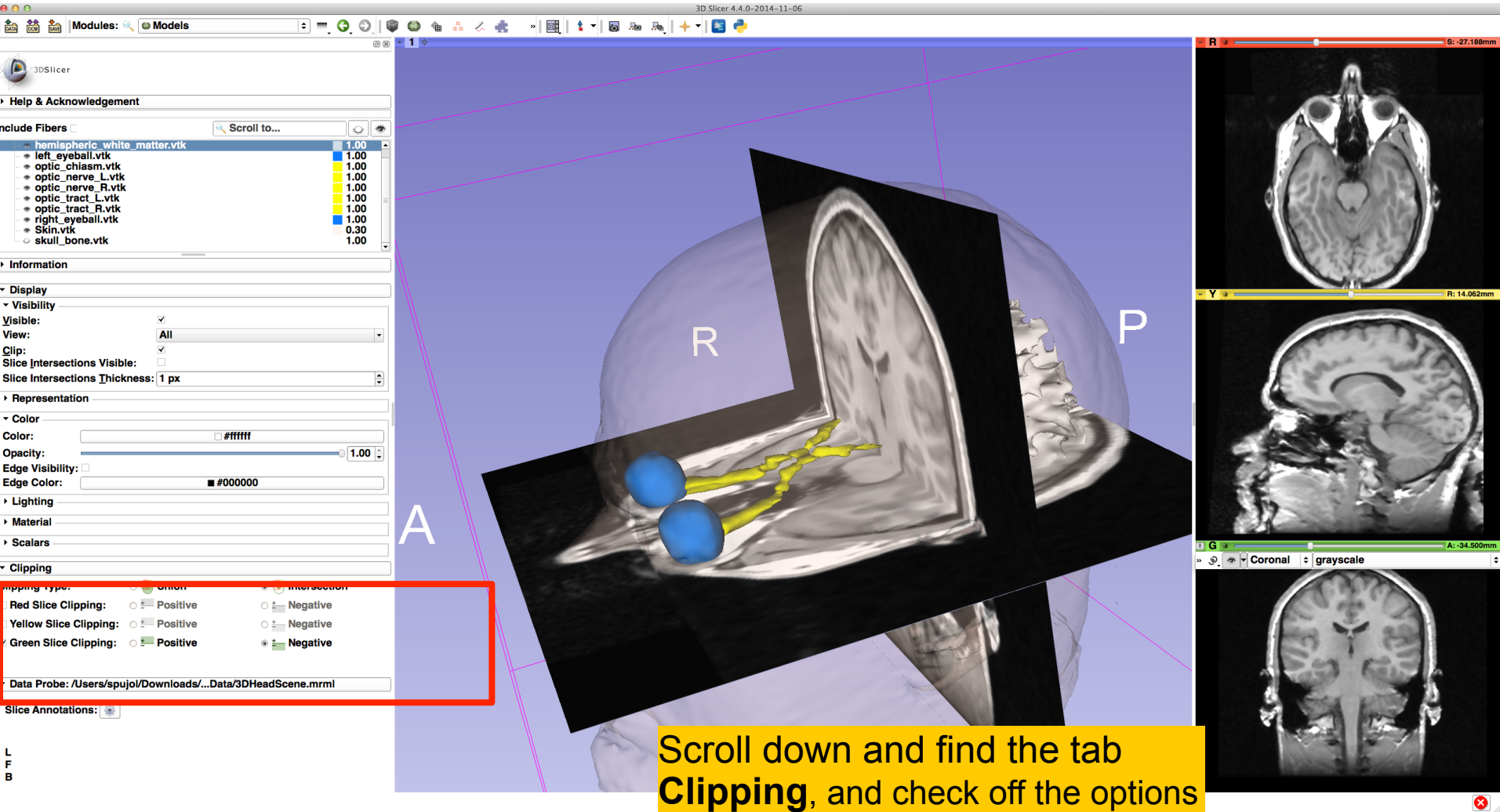
R  
S: -27.168mm

Y  
R: 14.062mm

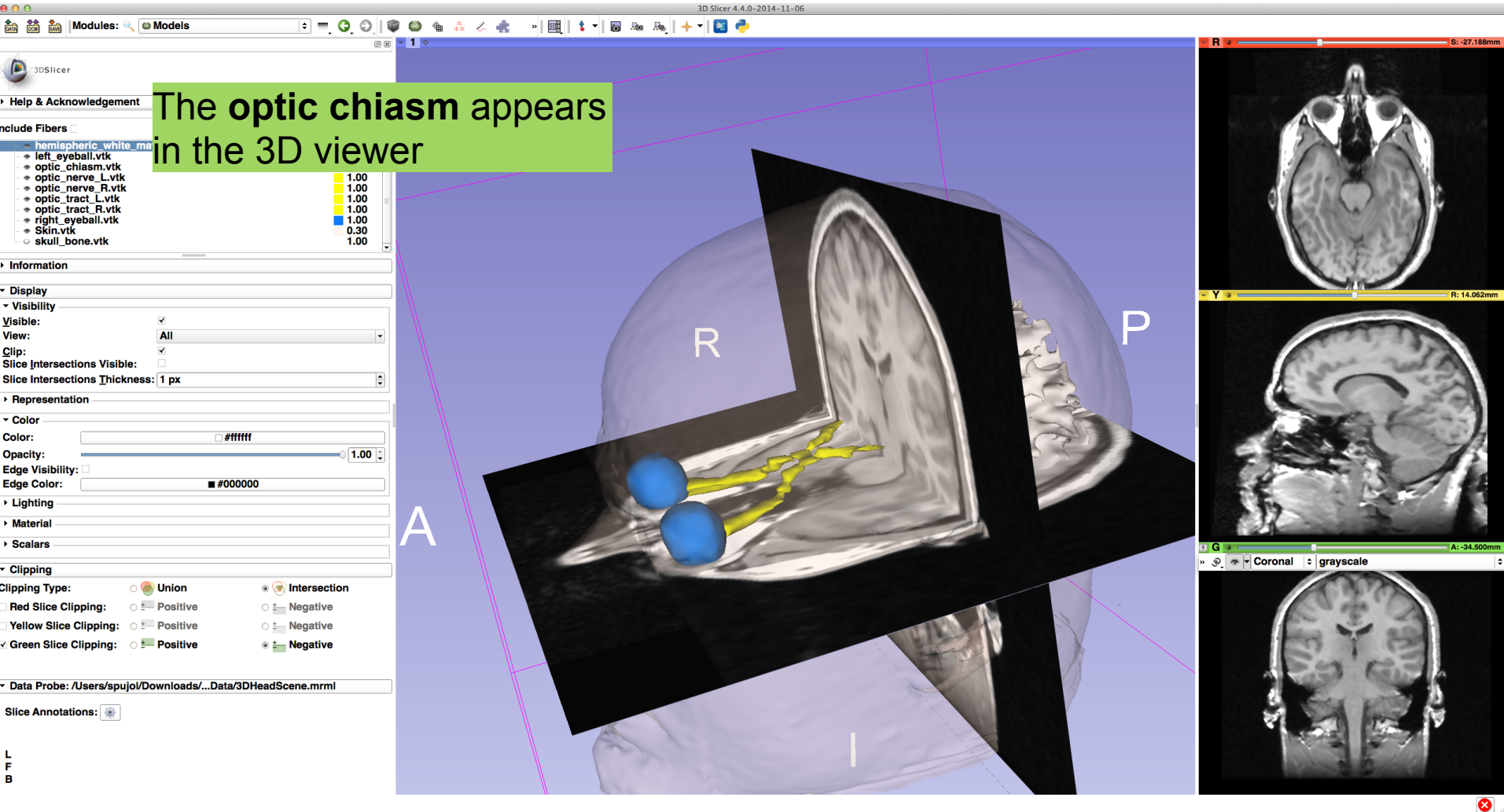
G  
A: -34.500mm

Coronal | grayscale

# 3D Visualization



# 3D Visualization



# 3D Visualization

3D Slicer 4.4.0-2014-11-06

Modules: Models

Include Fibers

- hemispheric\_white\_matter.vtk
- left\_eyeball.vtk
- optic\_chiasm.vtk
- optic\_nerve\_L.vtk
- optic\_nerve\_R.vtk
- optic\_tract\_L.vtk
- optic\_tract\_R.vtk
- right\_eyeball.vtk
- Skin.vtk
- skull\_bone.vtk

Information

Display

Visibility

Visible:  **Clip**

View: All

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffffff

Opacity: 0.40

Edge Visibility:

Edge Color: #000000

Lighting

Material

Scalars

Clipping

Clipping Type:  Union  Intersection

Red Slice Clipping:  Positive  Negative

Yellow Slice Clipping:  Positive  Negative

Green Slice Clipping:  Positive  Negative

Data Probe: /Users/spujol/Downloads/...Data/3DHeadScene.mrml

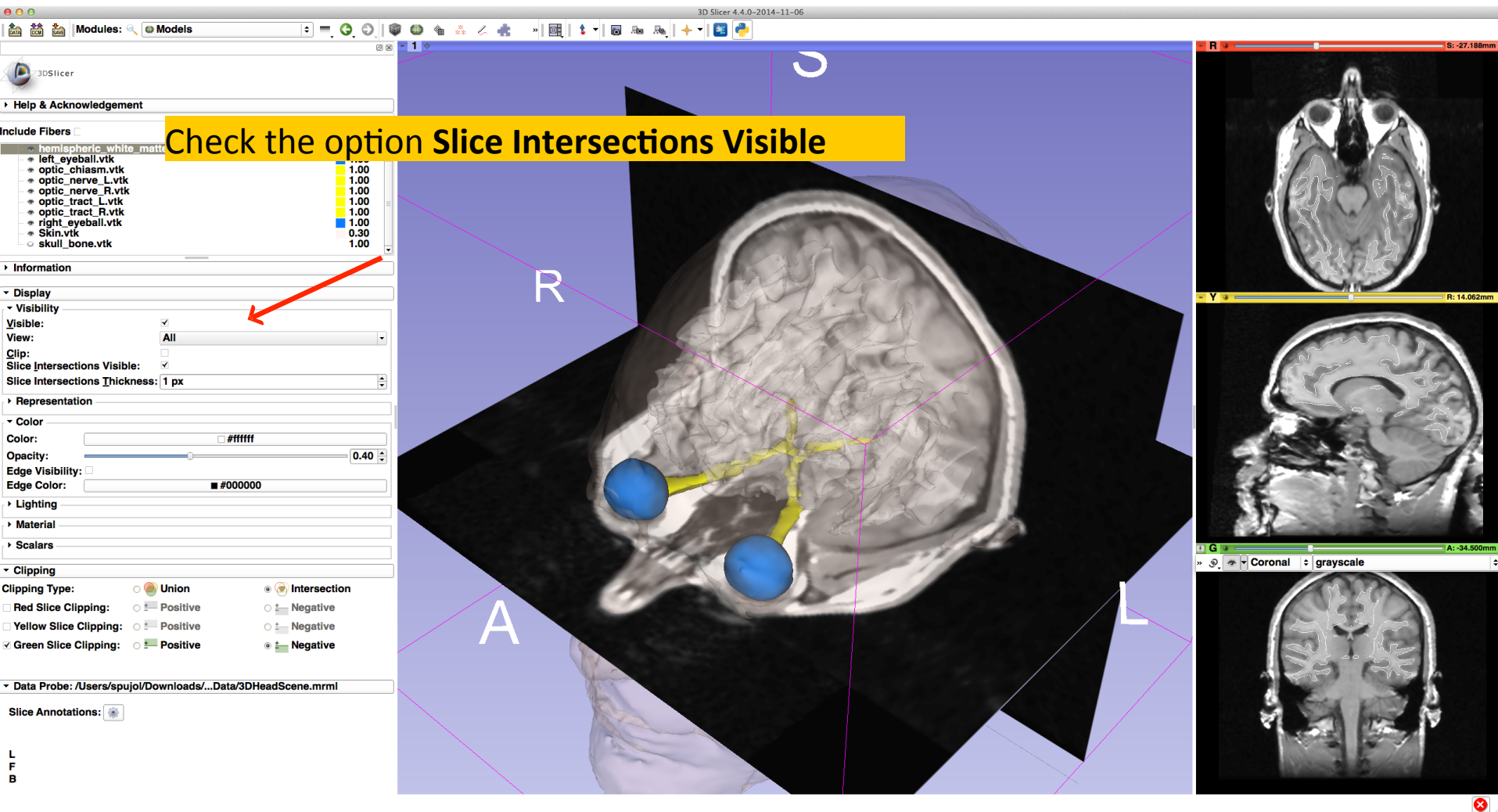
Slice Annotations: [icon]

L  
F  
B

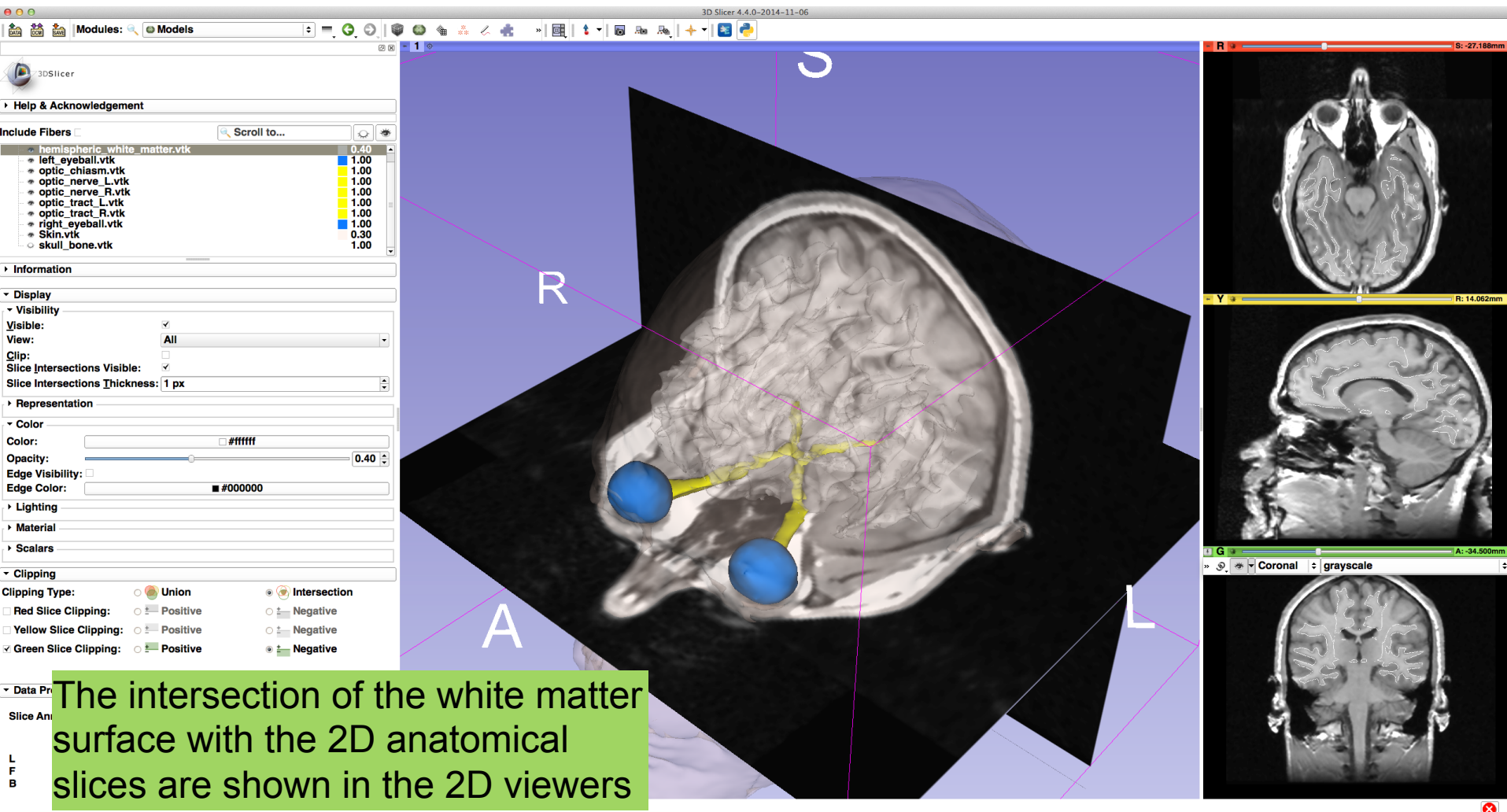
R  
A  
L

R: -27.188mm  
R: 14.052mm  
A: -34.500mm  
Coronal | grayscale

# 3D Visualization



# 3D Visualization



# 3D Visualization

3D Slicer 4.4.0-2014-11-06

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers

- hemispheric\_white\_matter.vtk 0.40
- left\_eyeball.vtk 1.00
- optic\_chiasm.vtk 1.00
- optic\_nerve\_L.vtk 1.00
- optic\_nerve\_R.vtk 1.00
- optic\_tract\_L.vtk 1.00
- optic\_tract\_R.vtk 1.00
- right\_eyeball.vtk 1.00
- Skin.vtk 0.30
- skull\_bone.vtk 1.00

Information

Display

Visibility

Visible:    
View: All

Clip:    
Slice Intersections Visible:    
Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffffff   
Opacity: 0.40   
Edge Visibility:    
Edge Color: #000000

Lighting

Material

Scalars

Clipping

Clipping Type:  Union  Intersection   
 Red Slice Clipping:  Positive  Negative   
 Yellow Slice Clipping:  Positive  Negative

Position your cursor over the pin icon in the coronal slice view and unselect the eye icon



# 3D Visualization

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers  Scroll to...

Scene

hemispheric_white_matter.vtk	0.30
left_eyeball.vtk	1.00
optic_chiasm.vtk	1.00
optic_nerve_L.vtk	1.00
optic_nerve_R.vtk	1.00
optic_tract_L.vtk	1.00
optic_tract_R.vtk	1.00
right_eyeball.vtk	1.00

Information

Display

Visibility

Data Probe: C:/Users/F/Desktop/Slice...Data/3DHeadScene.mrml

View Menu:

- Conventional
- Conventional Widescreen
- Conventional Quantitative
- Four-Up
- Four-Up Quantitative
- Dual 3D
- Triple 3D
- 3D only
- One-Up Quantitative
- Red slice only
- Yellow slice only
- Green slice only
- Tabbed 3D
- Tabbed slice
- Compare
- Compare Widescreen
- Compare Grid
- Three over three
- Three Over Three Quantitative
- Four over four
- Two over Two
- Side by side
- Four by three slice
- Four by two slice
- Three by three slice

Click on the **Slicer Layout** icon and select **Conventional**

R S: -27.188mm

Y R: 14.062mm

G A: -34.500mm

Coronal grayscale





## Part 3:

# Saving a scene

# Saving a Scene

The screenshot shows the 3D Slicer interface. The 'File' menu is open, and the 'Save' option (Ctrl+S) is highlighted. A red arrow points from the 'Save' option to a yellow callout box at the bottom left. The main 3D view shows a 3D model of a human head with a brain scan overlay. The axes are labeled S (Superior), R (Right), and L (Left). The 'Scene' panel on the left lists various models and their visibility settings. The 'Data Probe' at the bottom shows the file path: C:/Users/aminp/Desktop/3...Data/3DHeadScene.mrml.

Click on **File** and select **Save** or press **Ctrl+S**



# Saving a Scene

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers  Scroll to...

Scene

- hemispheric\_white\_matter.vtk
  - left\_eyeball.vtk
  - optic\_chiasm.vtk
  - optic\_nerve\_L.vtk
  - optic\_nerve\_R.vtk
  - optic\_tract\_L.vtk
  - optic\_tract\_R.vtk
  - right\_eyeball.vtk
  - Skin.vtk
  - skull\_bone.vtk

Information

Display

Clipping

Data Pr...

L  
F  
B

Save Scene and Unsaved Data

File Name	File Format	Directory
<input type="checkbox"/> 3DHeadScene.mrml	MRML Scene (.mrml)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> hemispheric_white_matter.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> left_eyeball.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_chiasm.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_nerve_L.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_nerve_R.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_tract_L.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_tract_R.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> right_eyeball.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Skin.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> skull_bone.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input type="checkbox"/> grayscale.nrrd	NRRD (.nrrd)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Axial.png	PNG (.png)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Sagittal.png	PNG (.png)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Coronal.png	PNG (.png)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData

Change directory for selected files

Save Cancel

Show options

Double click on the box next to **File Name** to unselect all the files

R S: -27.188mm

Y R: 14.062mm

G A: -34.500mm

# Saving a Scene

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers  Scroll to...

Scene

- hemispheric\_white\_matter.vtk
  - left\_eyeball.vtk
  - optic\_chiasm.vtk
  - optic\_nerve\_L.vtk
  - optic\_nerve\_R.vtk
  - optic\_tract\_L.vtk
  - optic\_tract\_R.vtk
  - right\_eyeball.vtk
  - Skin.vtk
  - skull\_bone.vtk

Information

Display

Clipping

Data Pr...

L  
F  
B

Save Scene and Unsaved Data

File Name	File Format	Directory
<input type="checkbox"/> 3DHeadScene.mrml	MRML Scene (.mrml)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> hemispheric_white_matter.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> left_eyeball.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_chiasm.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_nerve_L.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_nerve_R.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_tract_L.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> optic_tract_R.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> right_eyeball.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Skin.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> skull_bone.vtk.vtk	Poly Data (.vtk)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input type="checkbox"/> grayscale.nrrd	NRRD (.nrrd)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Axial.png	PNG (.png)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Sagittal.png	PNG (.png)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData
<input checked="" type="checkbox"/> Coronal.png	PNG (.png)	/Users/spujol/Downloads/3DVisualizationData/3DHeadData

Change directory for selected files

Save Cancel

Show options

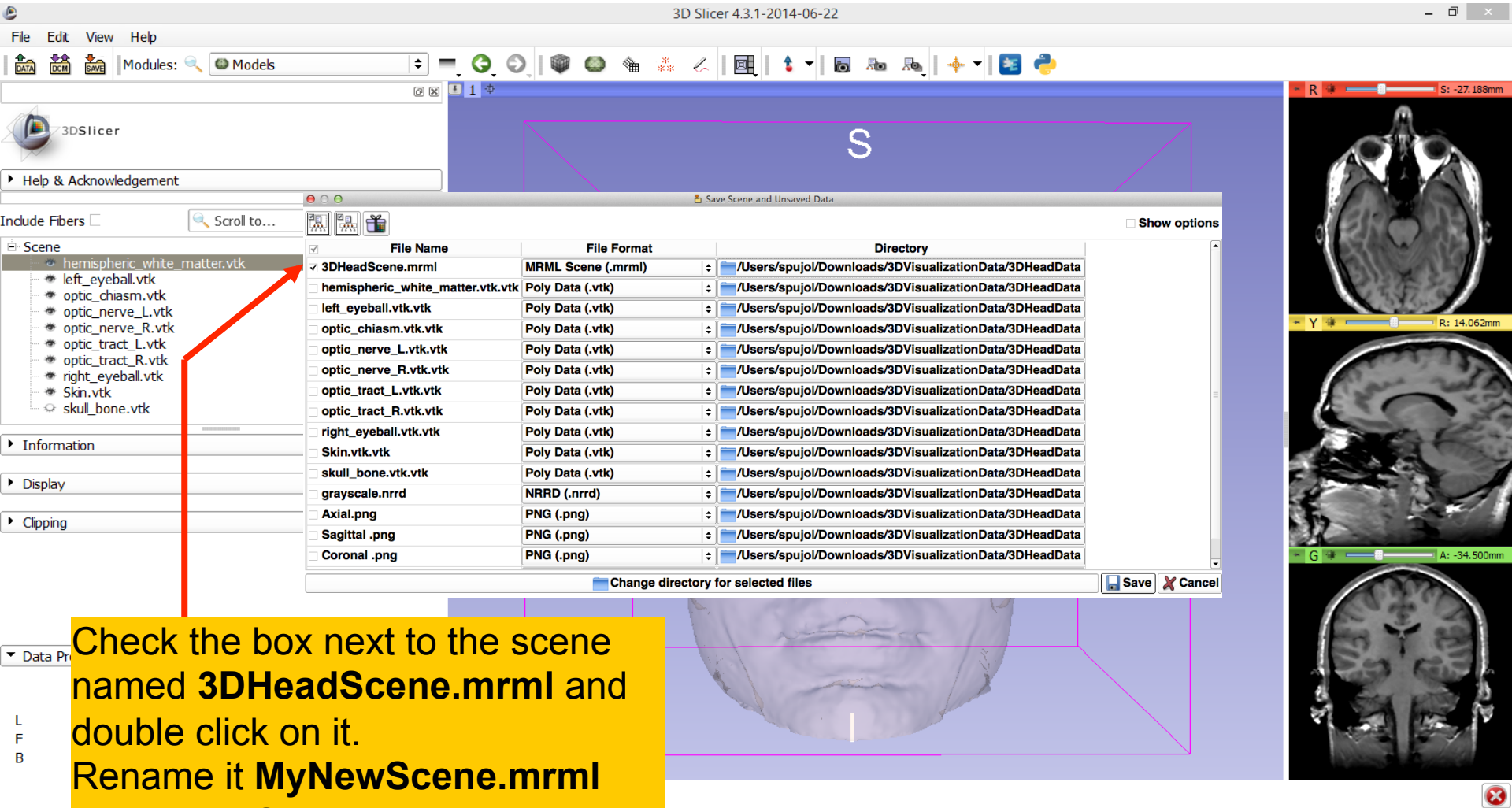
Double click on the box next to **File Name** to unselect all the files

R S: -27.188mm

Y R: 14.062mm

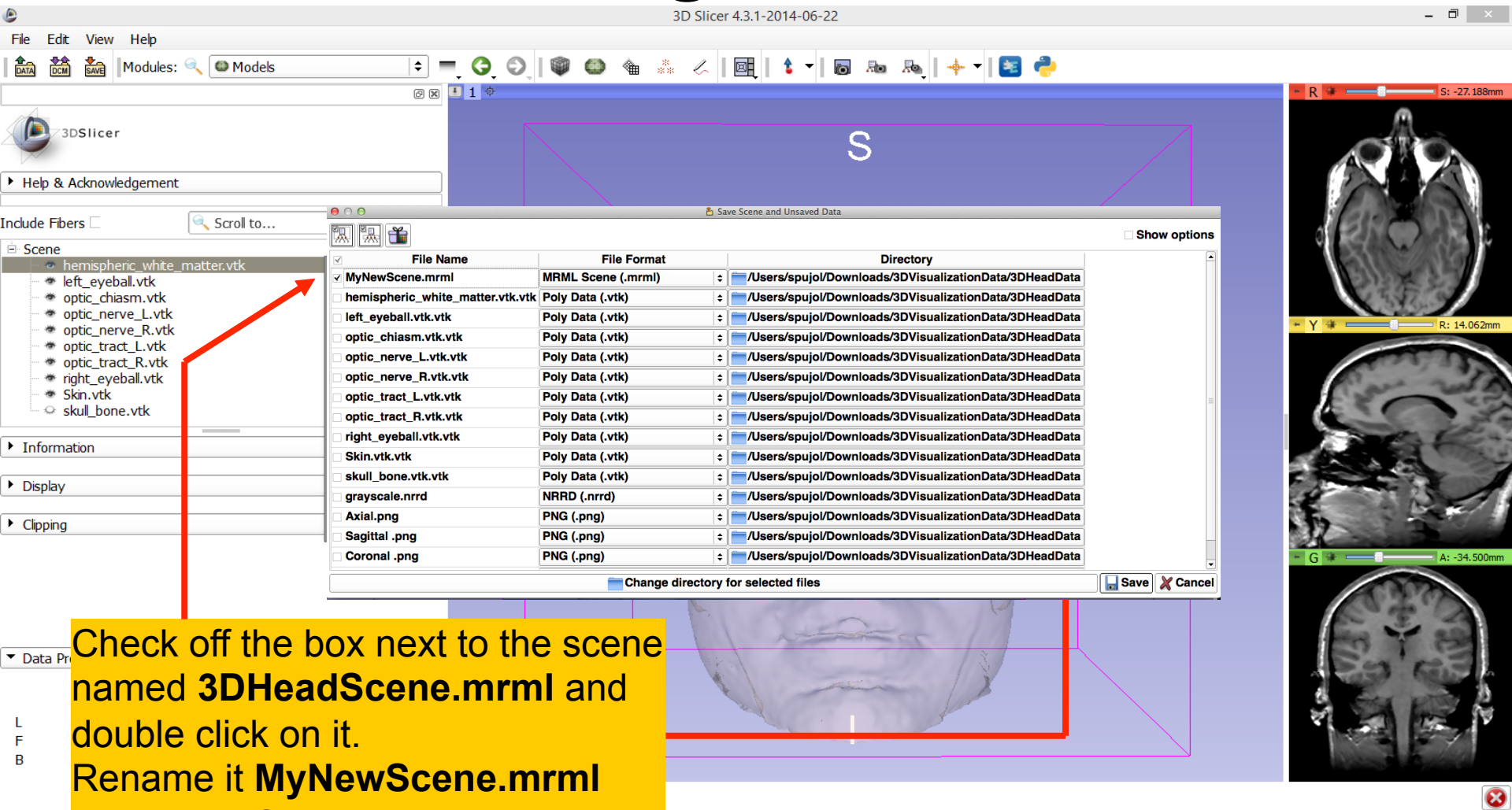
G A: -34.500mm

# Saving a Scene



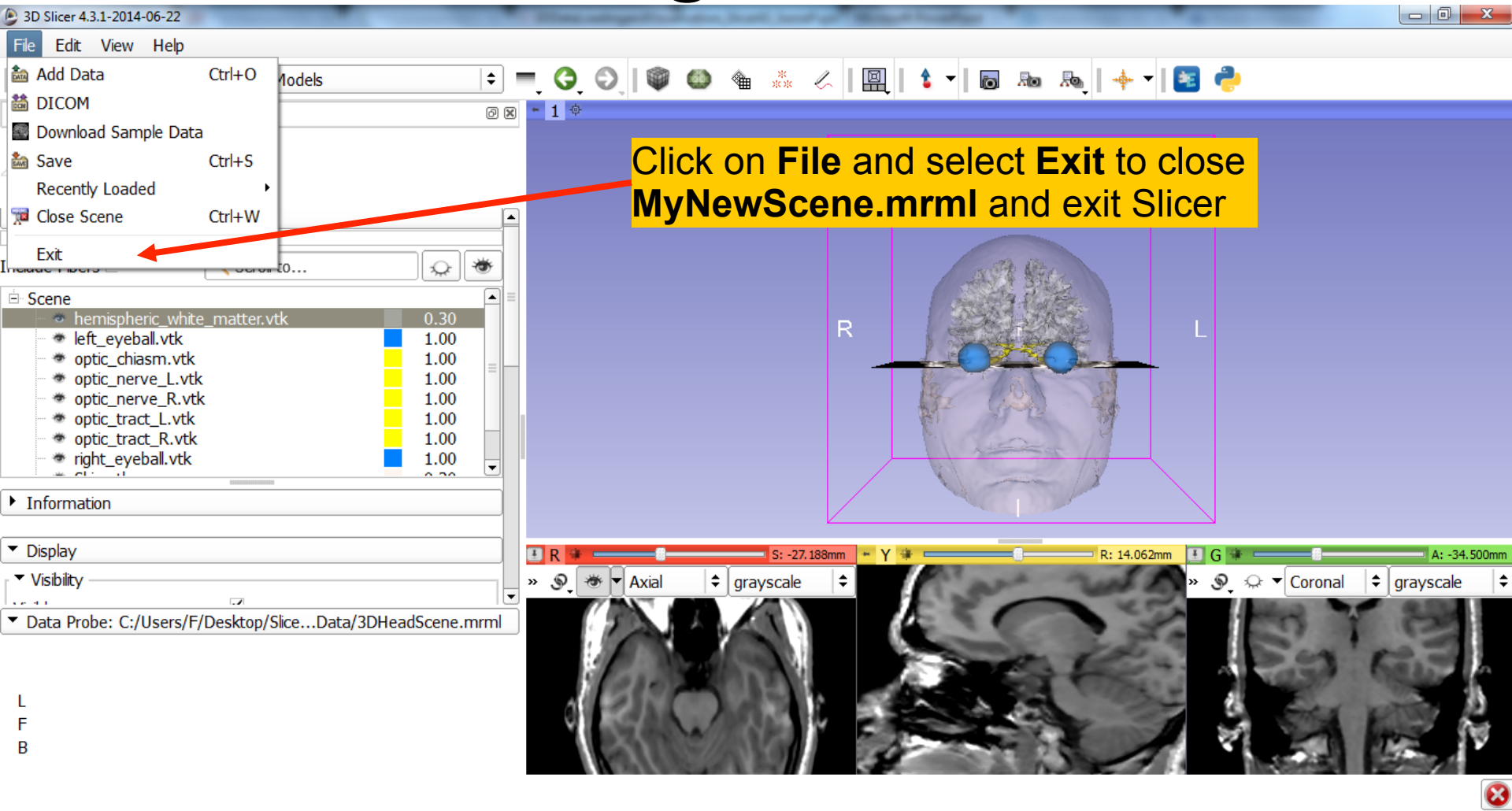


# Saving a Scene



Check off the box next to the scene named **3DHeadScene.mrml** and double click on it. Rename it **MyNewScene.mrml** and select **Save**

# Saving a Scene



# Scene Restore

Restart Slicer and find **MyNewScene.mrml** on your computer

Name	Date modified	Type	Size
.3DHeadScene.mrml.swp	6/24/2014 3:33 PM	SWP File	164 KB
.DS_Store	6/24/2014 3:33 PM	DS_STORE File	7 KB
3DHeadScene	6/24/2014 3:33 PM	Slicer supported file	142 KB
grayscale.nrrd	6/24/2014 3:33 PM	NRRD File	20,353 KB
hemispheric_white_matter.vtk	6/24/2014 3:33 PM	VTK File	6,270 KB
left_eyeball.vtk	6/24/2014 3:33 PM	VTK File	56 KB
Master Scene View	6/25/2014 11:37 AM	PNG image	405 KB
<b>MyNewScene</b>	6/25/2014 11:37 AM	Slicer supported file	166 KB
optic_chiasm.vtk	6/24/2014 3:33 PM	VTK File	14 KB
optic_nerve_L.vtk	6/24/2014 3:33 PM	VTK File	28 KB
optic_nerve_R.vtk	6/24/2014 3:33 PM	VTK File	29 KB
optic_tract_L.vtk	6/24/2014 3:33 PM	VTK File	18 KB
optic_tract_R.vtk	6/24/2014 3:33 PM	VTK File	16 KB
right_eyeball.vtk	6/24/2014 3:33 PM	VTK File	52 KB
Skin.vtk	6/24/2014 3:33 PM	VTK File	3,393 KB
skull_bone.vtk	6/24/2014 3:33 PM	VTK File	4,712 KB

# Scene Restore

The image shows a Windows Explorer window on the left and the 3D Slicer 4.3.1 interface on the right. The Explorer window is open to the folder '3DHeadData' and lists various files, including 'MyNewScene.mrml' which is selected. The Slicer window shows a 'Welcome' screen with buttons for 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. A yellow text box with a red arrow points from the 'MyNewScene.mrml' file in the Explorer to the 'Load Data' button in the Slicer interface. The Slicer interface also shows a 'Feedback' section and a 'Data Probe' section at the bottom.

3DHeadData

File Edit View Help

DATA DCM SAVE Modules

3DSlicer

Welcome

Load DICOM Data Load Data

Customize Slicer Download Sample Data

Feedback

Share your stories with us and let us know about how 3D Slicer has enabled your research.

We are always interested in improving 3D Slicer, and every submission will be carefully read.

See more at <http://goo.gl/6BvcHm>.

About

The Main Window

Loading and Saving

Display

Data Probe: C:/Users/aminp/Desktop/3...dData/MyNewScene.mrml

L  
F  
B

3D VisualizationData > 3DHeadData

Name	Date modified	Type	Size
.3DHeadScene.mrml.swp	6/24/2014 3:33 PM	SWP File	164 KB
.DS_Store	6/24/2014 3:33 PM	DS_STORE File	7 KB
3DHeadScene	6/24/2014 3:33 PM	Slicer supported file	142 KB
grayscale.nrrd	6/24/2014 3:33 PM	NRRD File	20,353 KB
hemispheric_white_matter.vtk	6/24/2014 3:33 PM	VTK File	6,270 KB
left_eyeball.vtk	6/24/2014 3:33 PM	VTK File	56 KB
Master Scene View	6/25/2014 11:37 AM	PNG image	405 KB
MyNewScene	6/25/2014 11:37 AM	Slicer supported file	166 KB
optic_chiasm.vtk	6/24/2014 3:33 PM	VTK File	14 KB
optic_nerve_L.vtk	6/24/2014 3:33 PM	VTK File	28 KB
optic_nerve_R.vtk	6/24/2014 3:33 PM	VTK File	29 KB
optic_tract_L.vtk	6/24/2014 3:33 PM	VTK File	18 KB
optic_tract_R.vtk	6/24/2014 3:33 PM	VTK File	16 KB
right_eyeball.vtk	6/24/2014 3:33 PM	VTK File	52 KB
Skin.vtk	6/24/2014 3:33 PM	VTK File	3,393 KB
skull_bone.vtk	6/24/2014 3:33 PM	VTK File	4,712 KB

16 items 1 item selected 165 KB

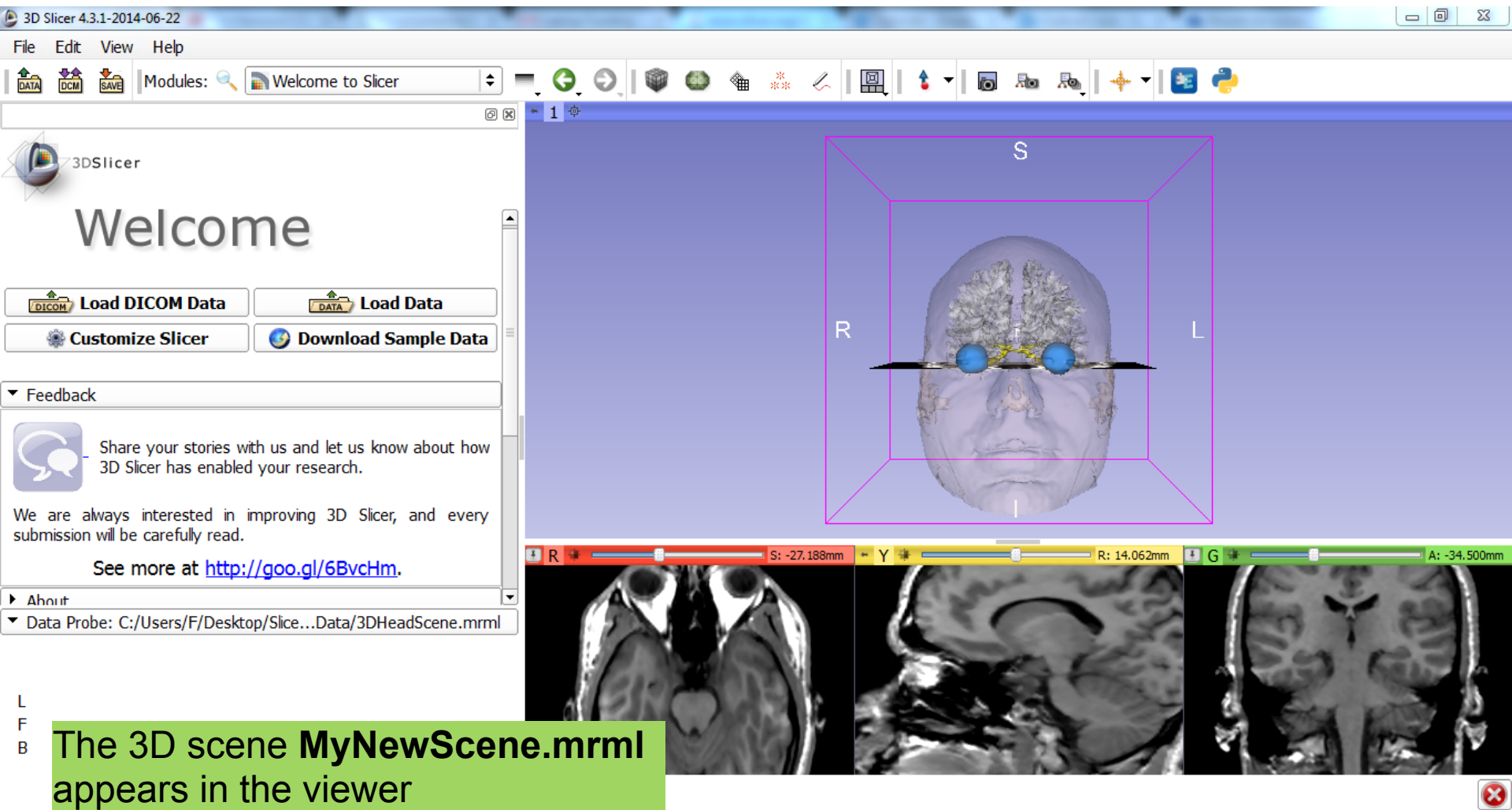
S: 0.000mm R: 0.000mm

# Scene Restore

The screenshot shows the 3D Slicer interface with a file selection dialog open. The dialog is titled "Add data into the scene" and contains a table of files to be added to the scene. The file "C:/Users/aminp/Desktop/3DVisualizationData/3DHeadData/MyNewScene.mrml" is selected. A red arrow points to the "OK" button, and a yellow box with the text "Click OK" is positioned below the arrow.

File	Description
<input checked="" type="checkbox"/> C:/Users/aminp/Desktop/3DVisualizationData/3DHeadData/MyNewScene.mrml	MRML Scene

# Slicer4



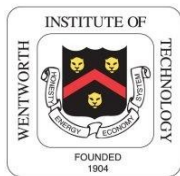
# Acknowledgments



- National Alliance for Medical Image Computing (NA-MIC)  
NIH U54EB005149



- Neuroimage Analysis Center (NAC)  
NIH P41 EB015902



- Parth Amin, WIT '16



- Farukh Kohistani, BC '16