

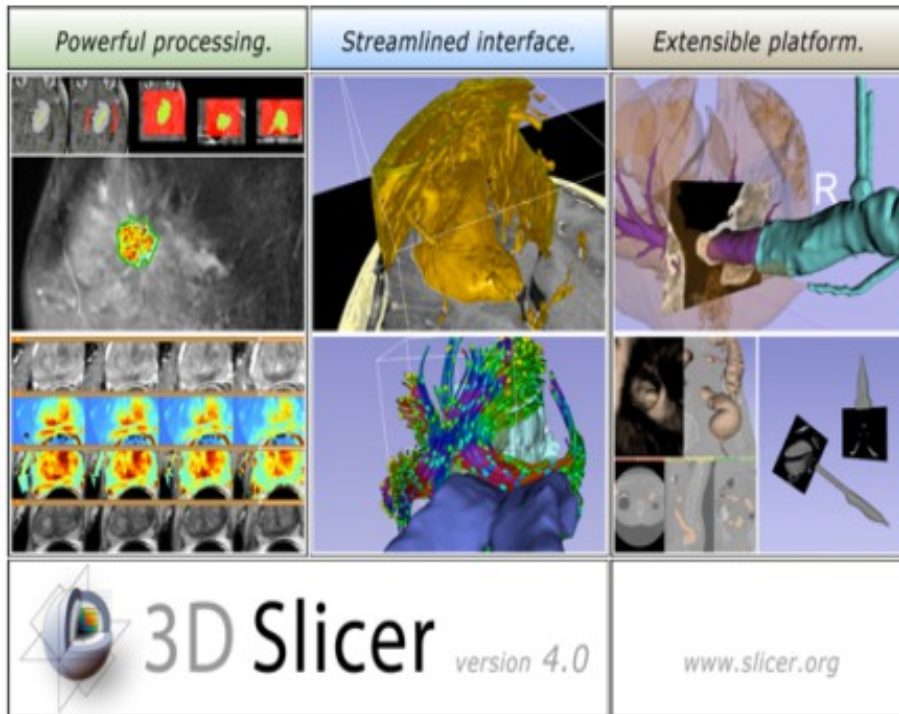


# 3D Data Loading and Visualization

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

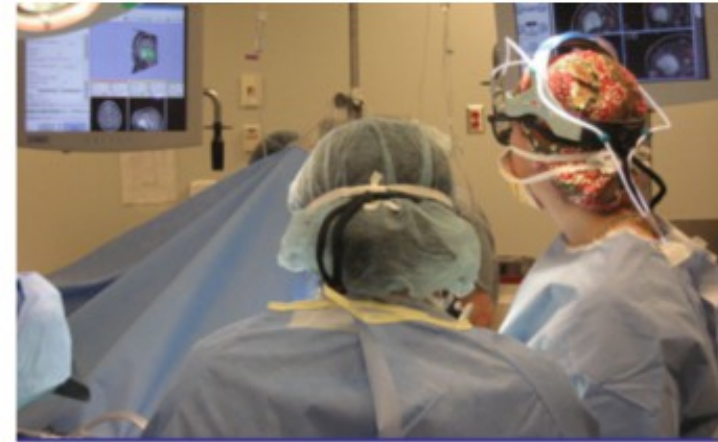
Slicer is a [multi-institutional effort](#) supported by the [National Institute of Health](#).



# Translational research



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



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

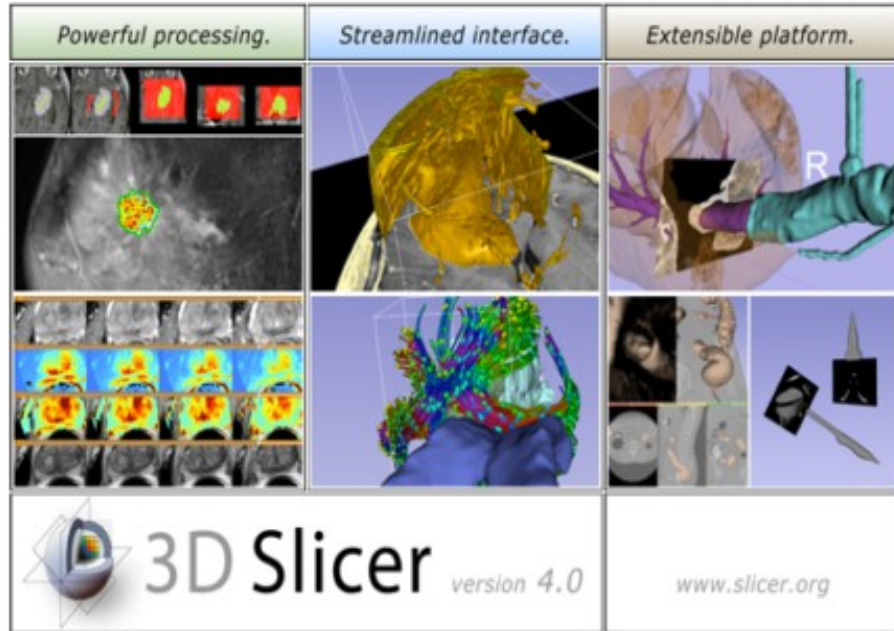
3D Slicer: an open-source platform for  
***translating*** innovative algorithms into  
clinical research applications



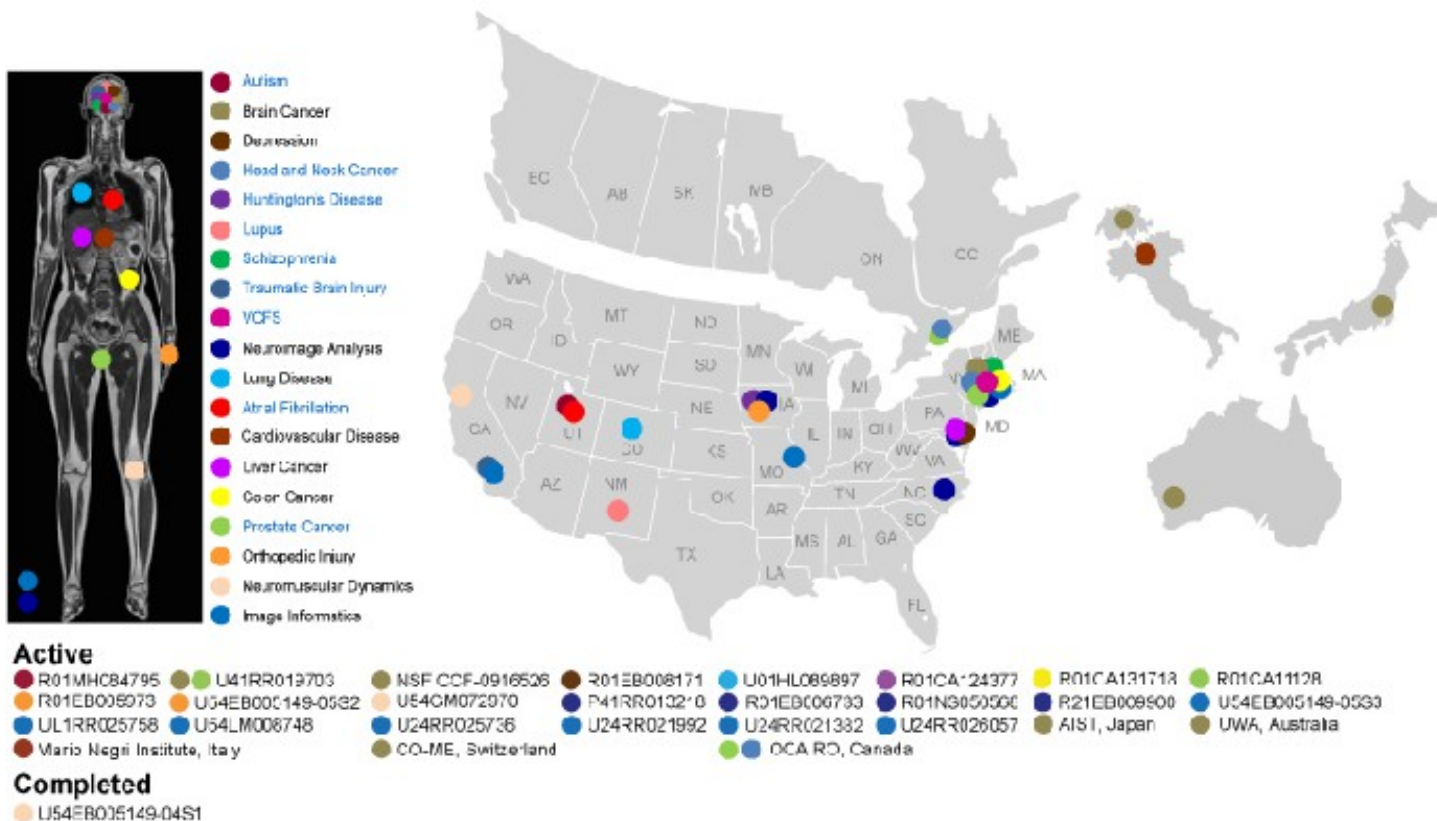
# 3DSlicer History

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



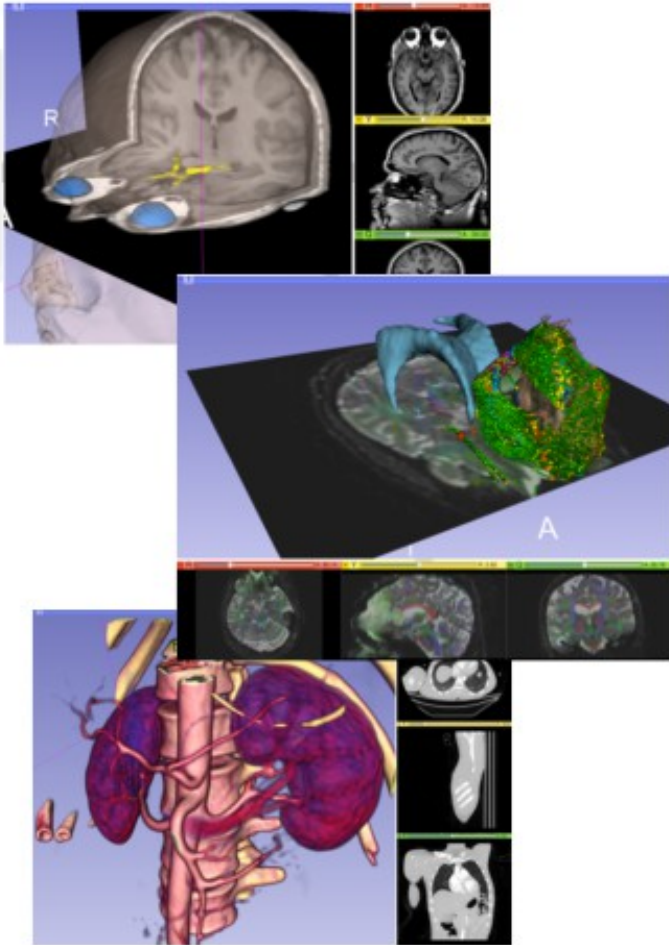
Iowa City, USA 2012



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



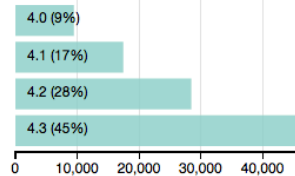
## Slicer4 download stats

101,101

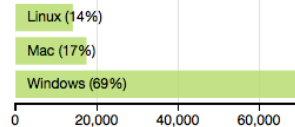
### Date range

Nov 28, 2011 - Sep 24, 2014

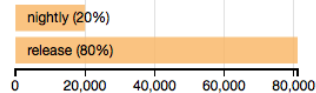
### Version



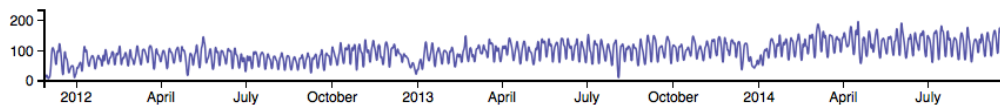
### Operating system



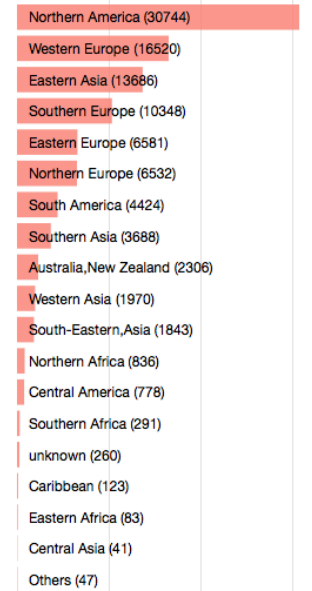
### Stability



### Downloads per day



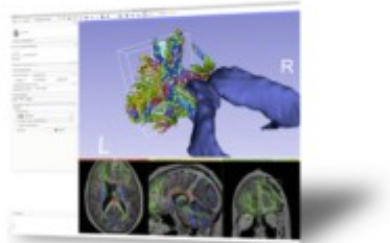
### Region



### Country



# 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

Safari File Edit View History Bookmarks Window Help  
CDash - Slicer4  
http://www.cdash.org/Slicer4/index.php?project=Slicer4

Dashboard Calendar Previous Current Project

WARNING: This CDash instance is running the bleeding edge svn trunk CDash code, and is updated frequently. You are 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-Qt-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-Qt-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-Qt-Release	1	0	0	0	13	0	28	459	13 hours ago	
stony-win7.kitware	Windows7-VS2008-64bits-QT4.7.1-PythonQt-With-Qt-Release	0	0	0	0	1000	0	28	461	4 hours ago	
stony-win7.kitware	Windows7-VS2008-32bits-QT4.7.1-PythonQt-With-Qt-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-Qt-Release	1	0	0	27	190	0	95	301				11 hours ago	
upl.sci.utah.edu	OpenSuse-c++4.5.0-64bits-QT4.6.3-PythonQt-With-Qt-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-Qt-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-Qt-NoCLI-Coverage-Release	0	0	0	0	12	0	23	287				11 hours ago	
garmaths.kitware	Linux-g++4.3.3-QT4.7-PythonQt-With-Qt-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-Qt-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

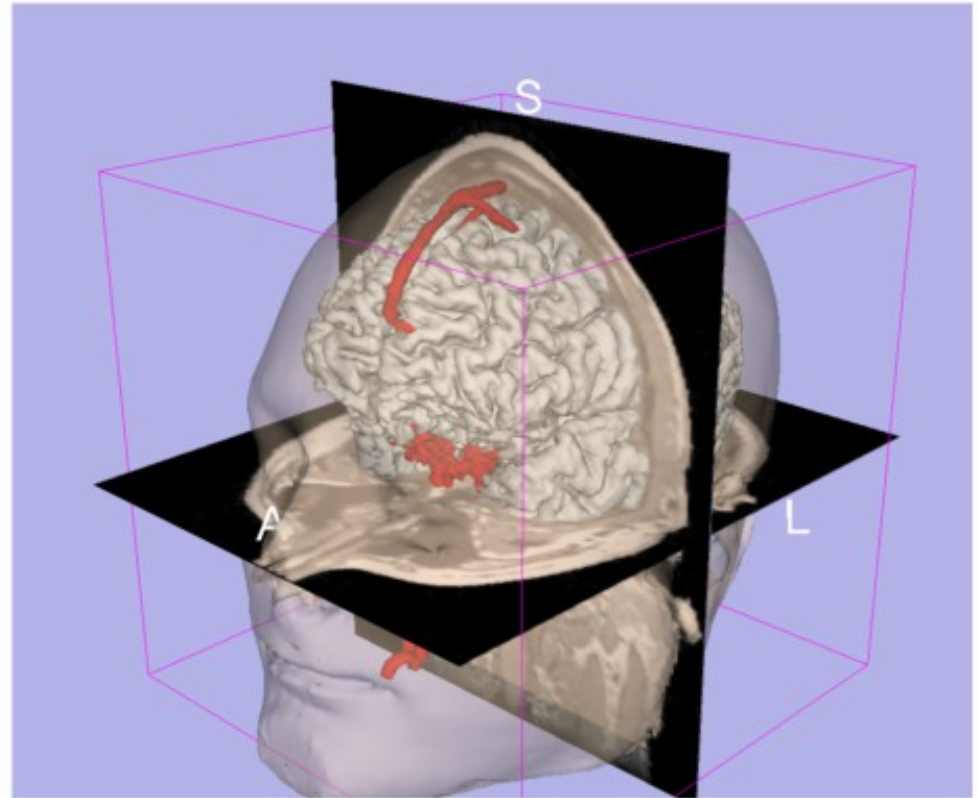
# Slicer Training



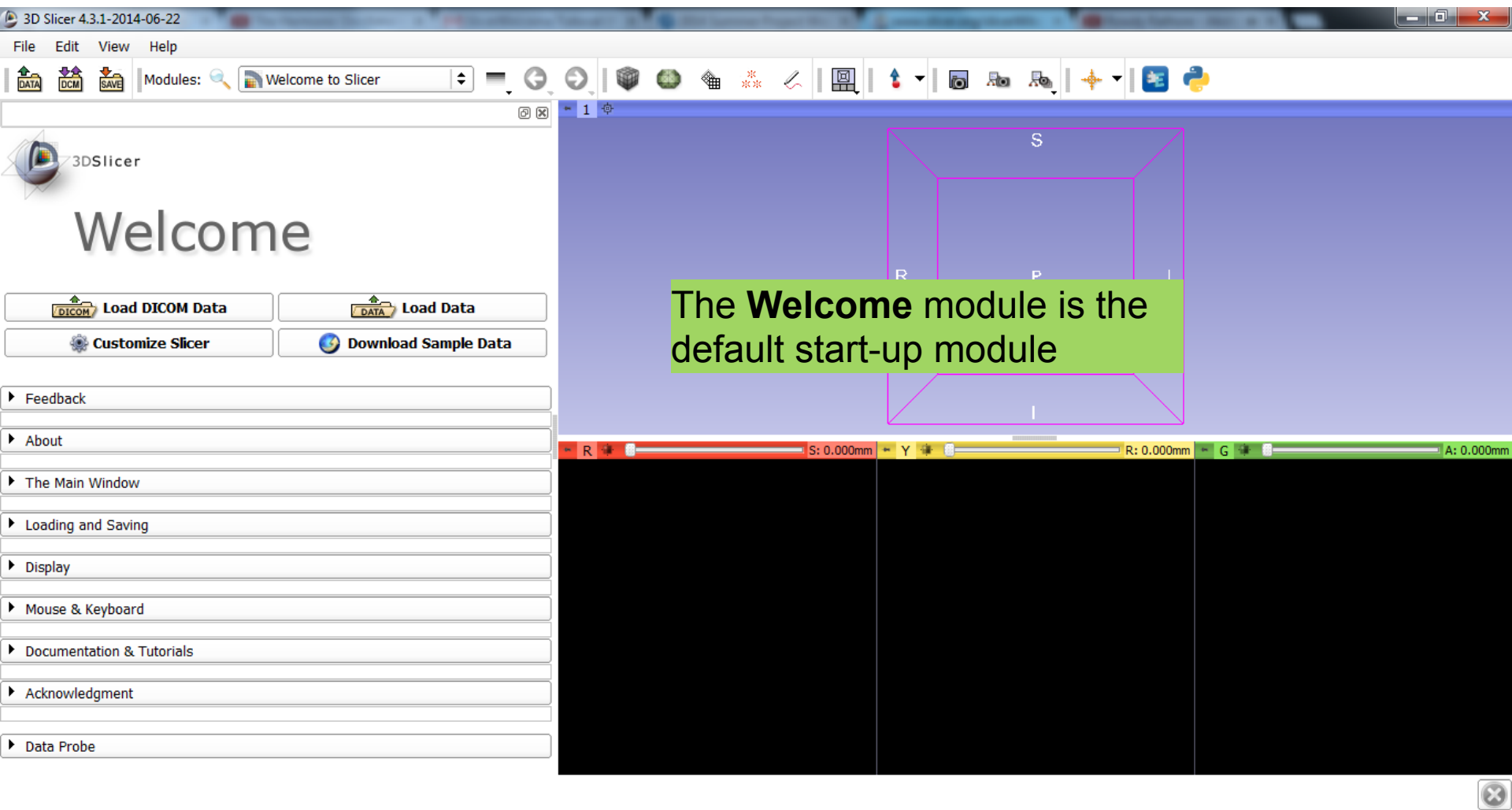
- Hands-on training workshops at national and international venues
- >3,000 clinicians, clinical researchers and scientists trained since 2005

# 3D Visualization of the Anatomy

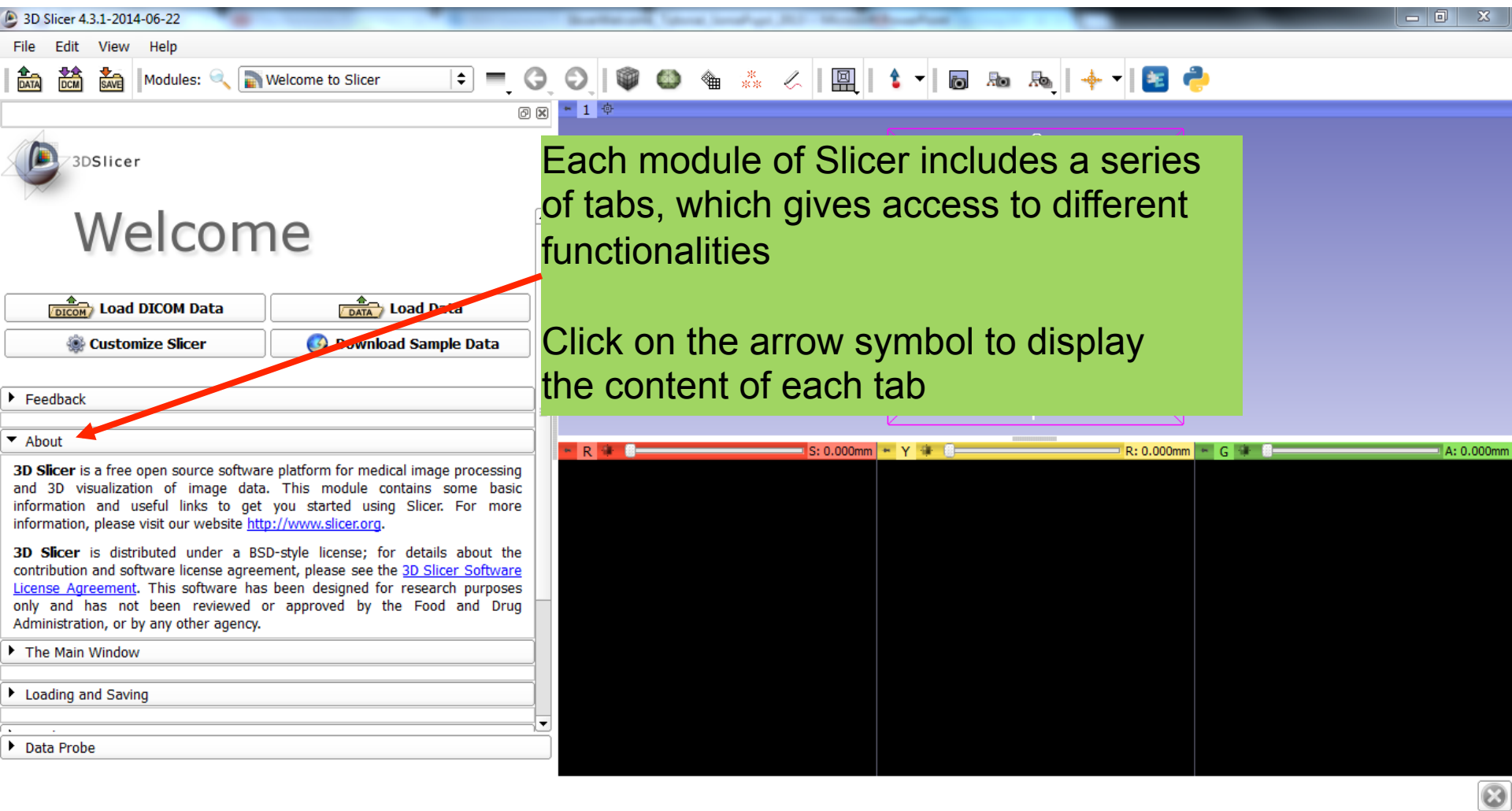
Following this tutorial, you will be able to **load and visualize volumes** within Slicer4, and to **interact in 3D** with structural images and models of the anatomy.



# 3D Slicer Version4



# 3D Slicer Version4



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 rectangular object labeled 'S' on a blue background. The sidebar on the left contains several sections: 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. Below these are 'Feedback' and 'About' sections. The 'The Main Window' section is expanded, showing a diagram of the UI layout with labels: File Menu, GUI Panel, Data Probe, Toolbar, 3D Viewer, Slice Viewers, and Message Bar. A red arrow points from the text box to the 'The Main Window' section.

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

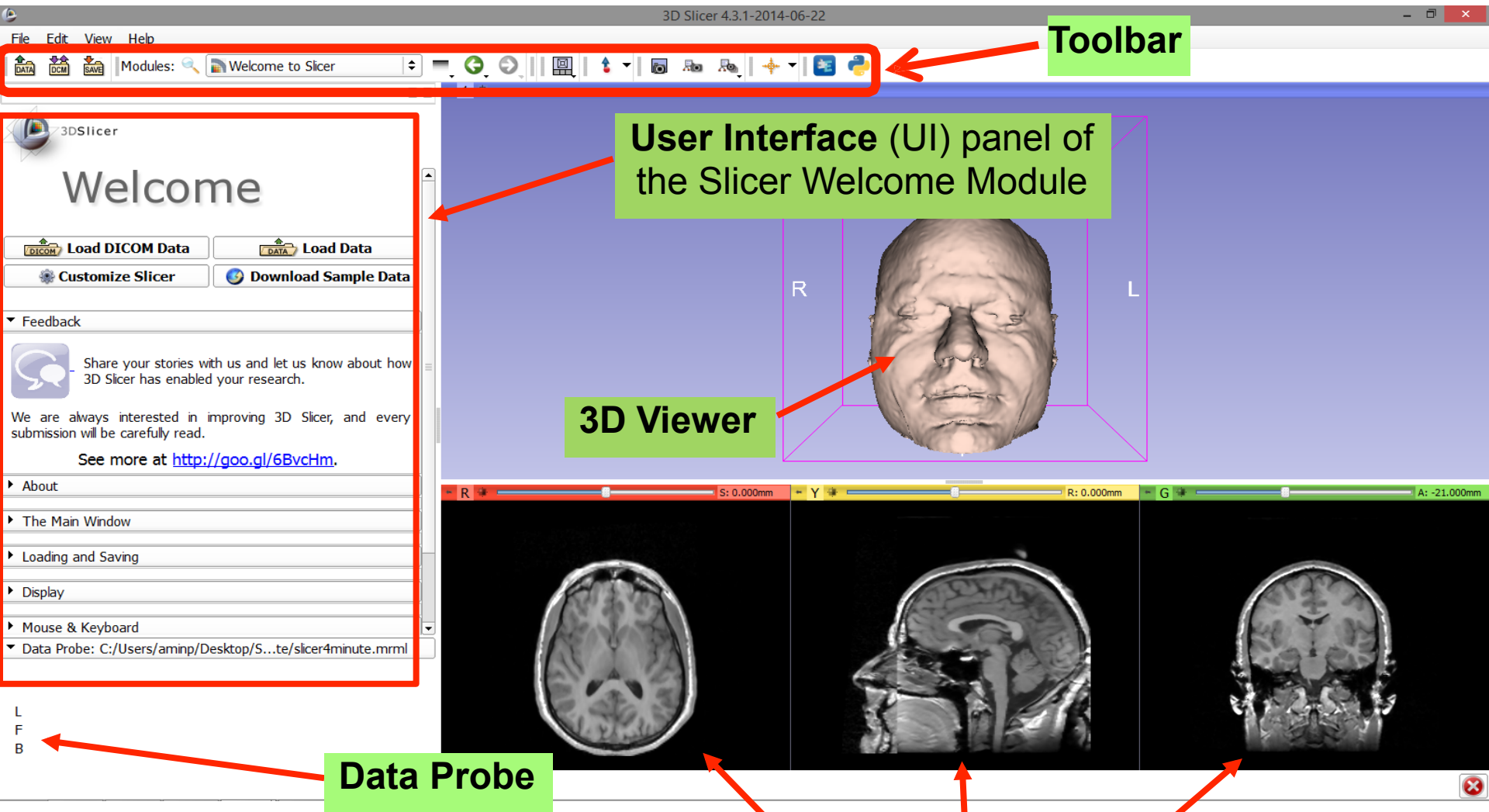
Scroll down to see all the contents

**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



Toolbar

User Interface (UI) panel of the Slicer Welcome Module

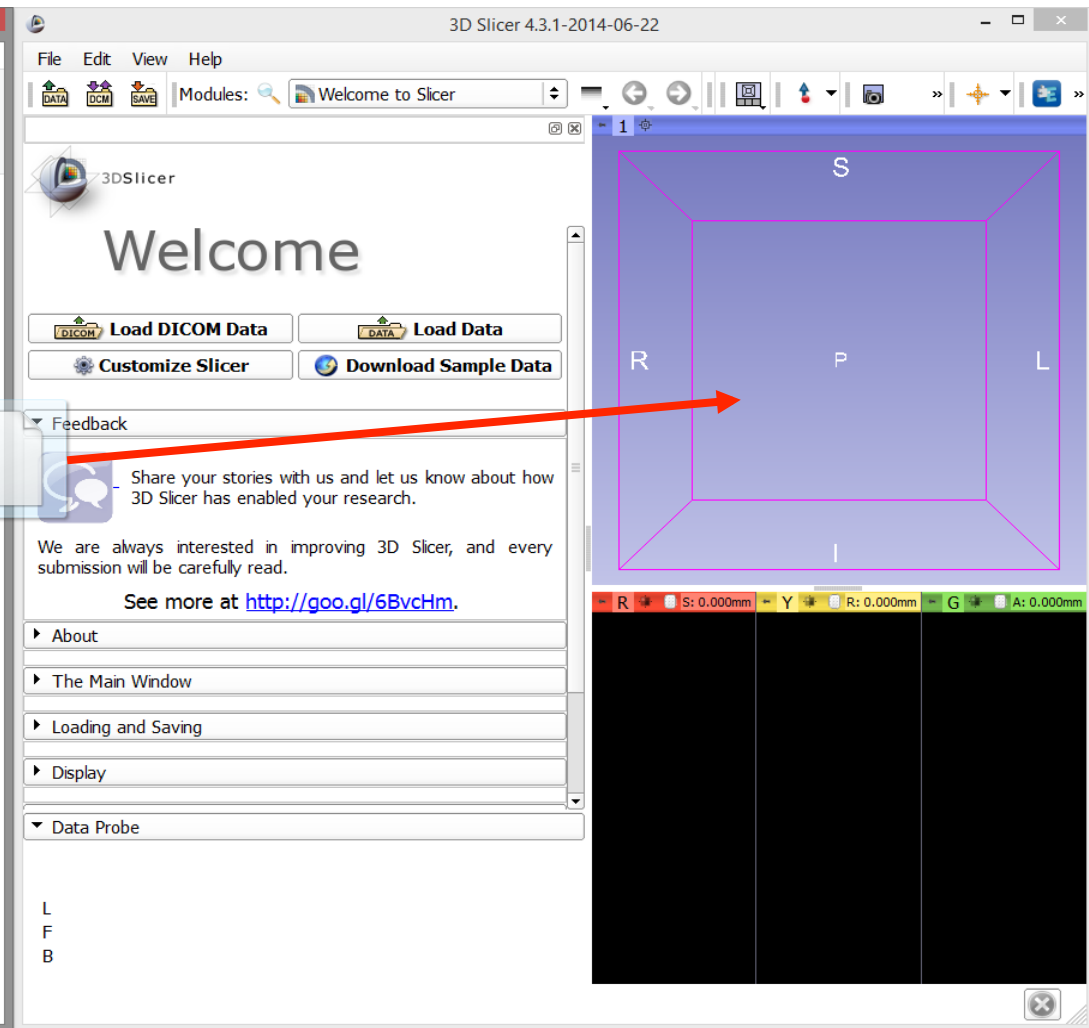
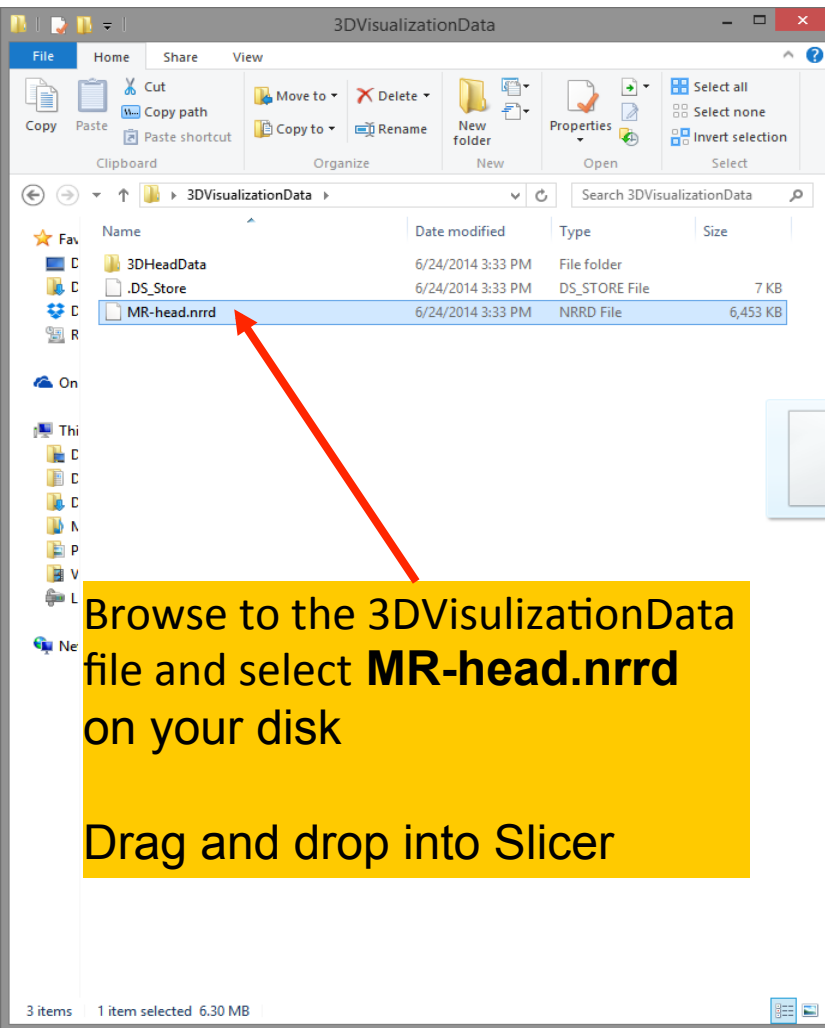
3D Viewer

Data Probe

2D anatomical viewers



# Slicer4

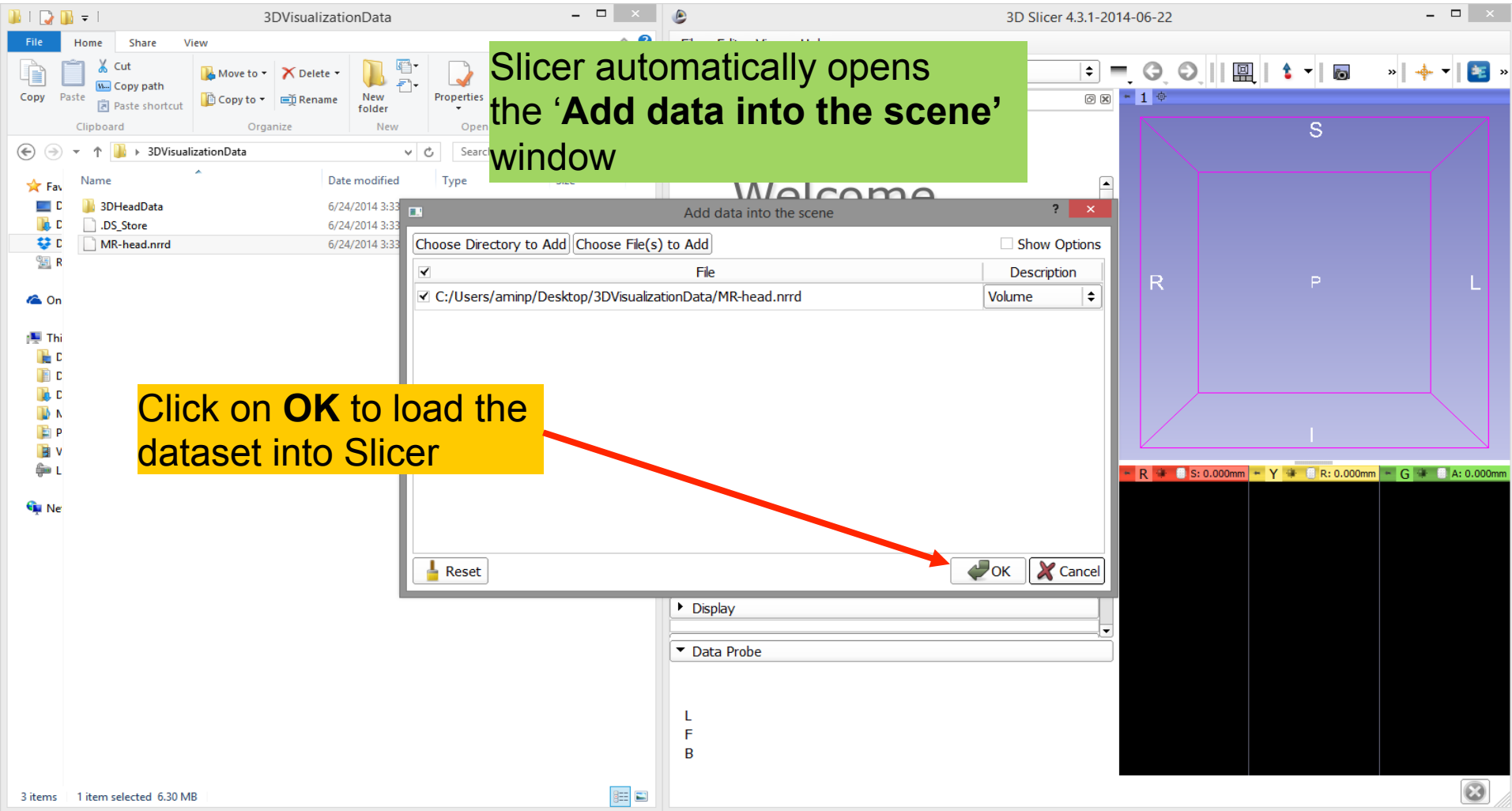




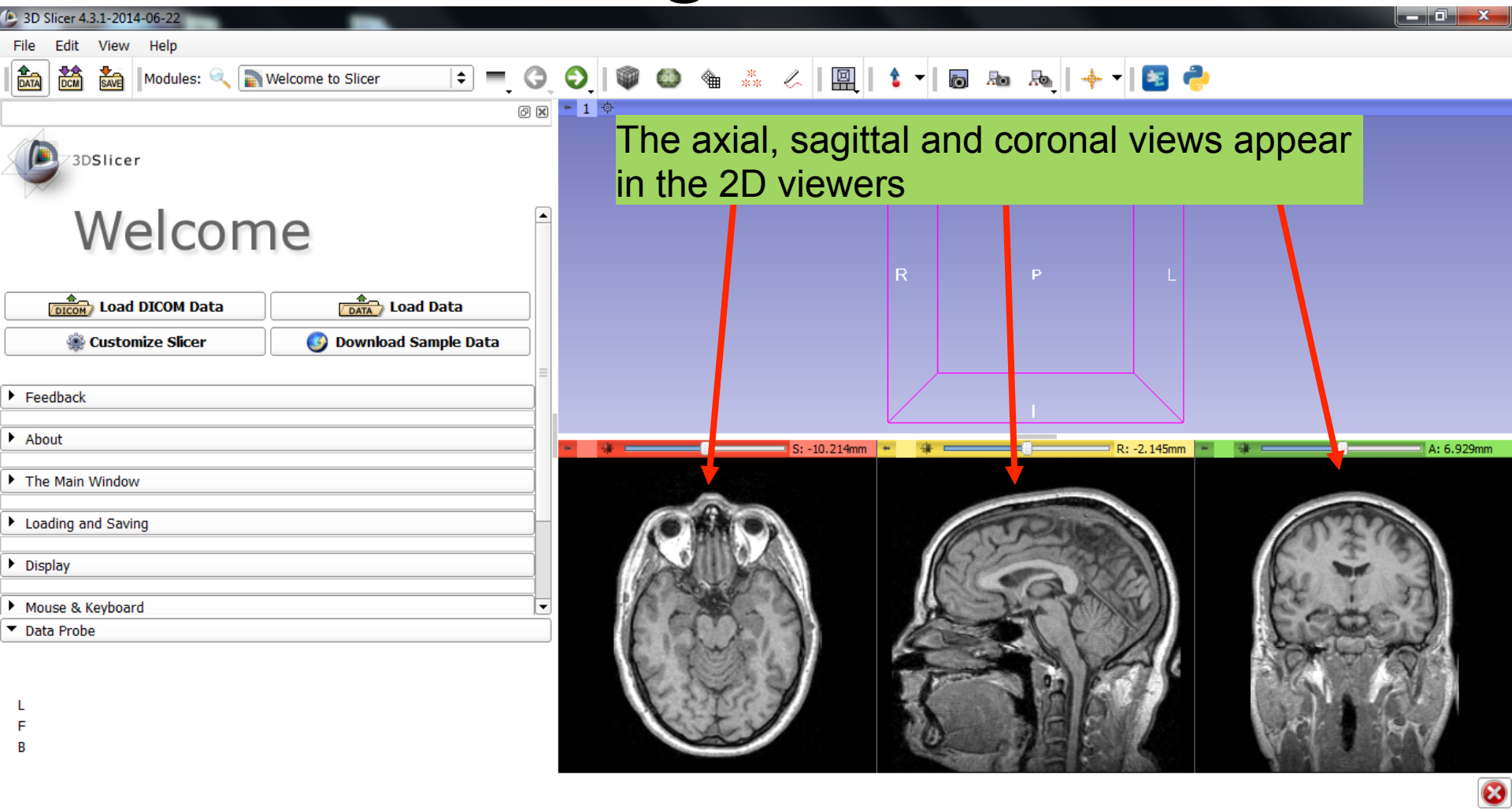
# Slicer4

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

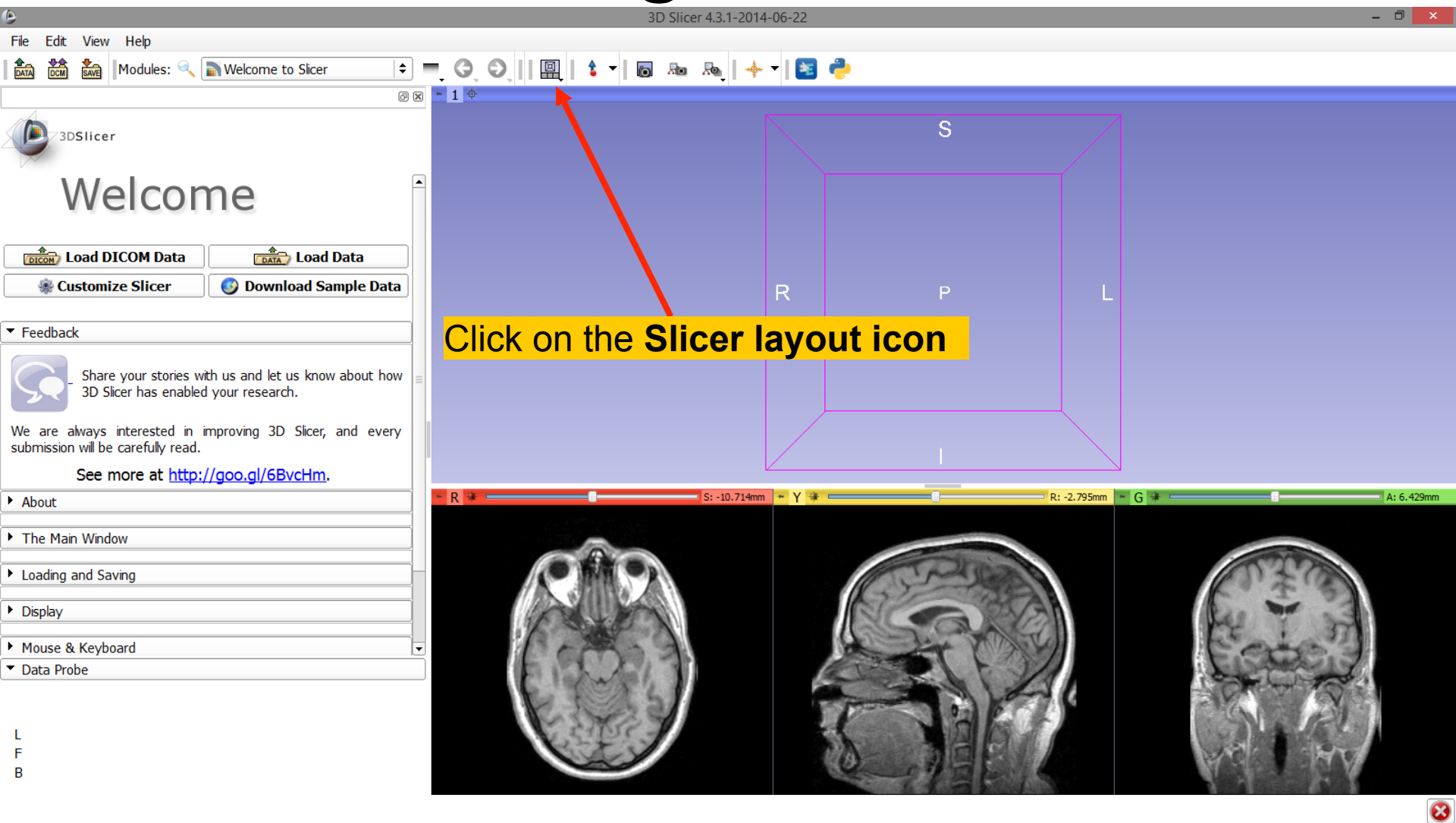
Click on **OK** to load the dataset into Slicer



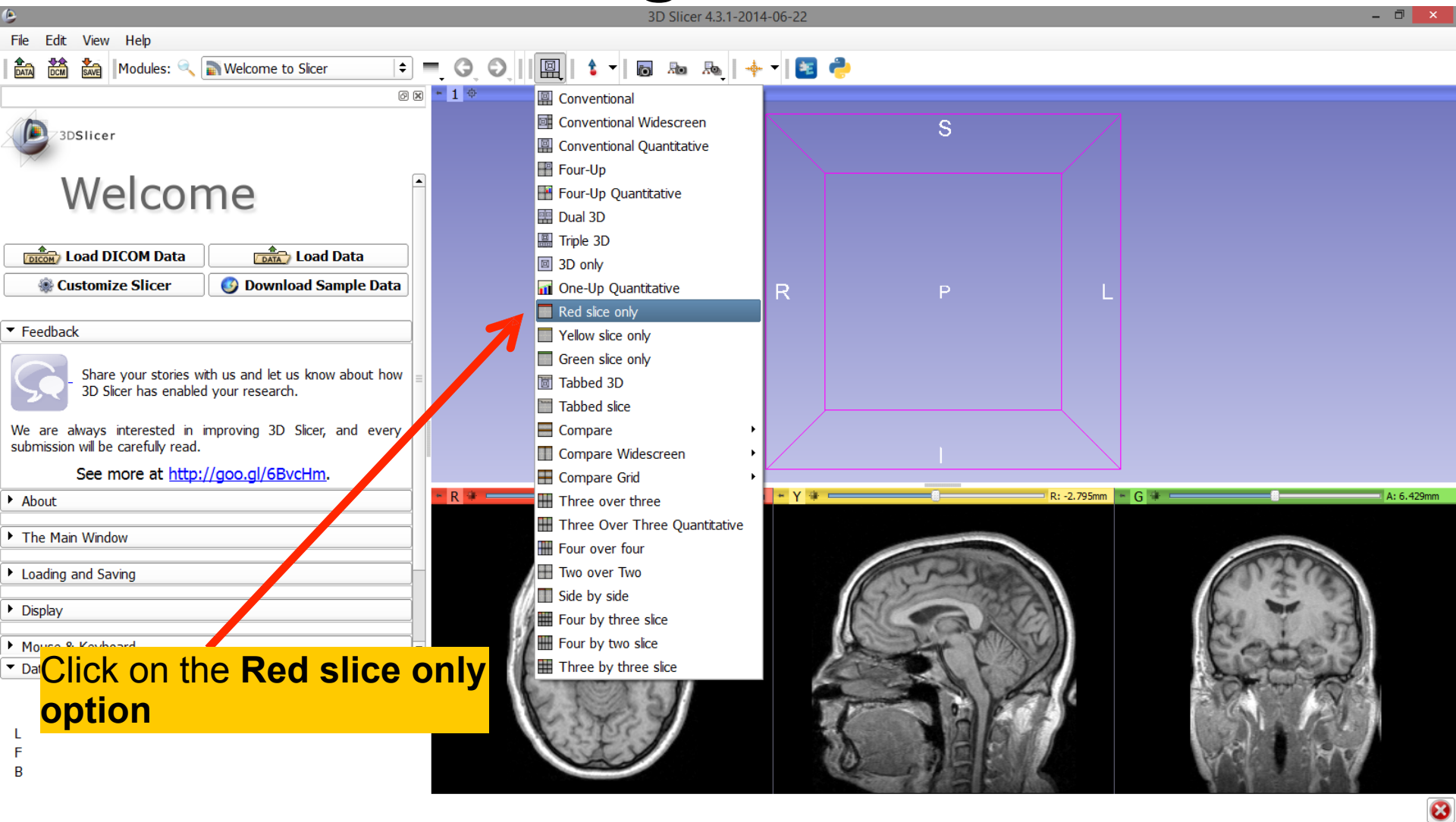
# Loading a volume



# Loading a volume



# Loading a volume



# Loading a volume

The screenshot shows the 3D Slicer 4.3.1-2014-06-22 interface. The 'Welcome' dialog is open on the left, displaying options like 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. A red arrow points from a yellow callout box to a pin icon in the toolbar. The main window displays a brain MRI slice.

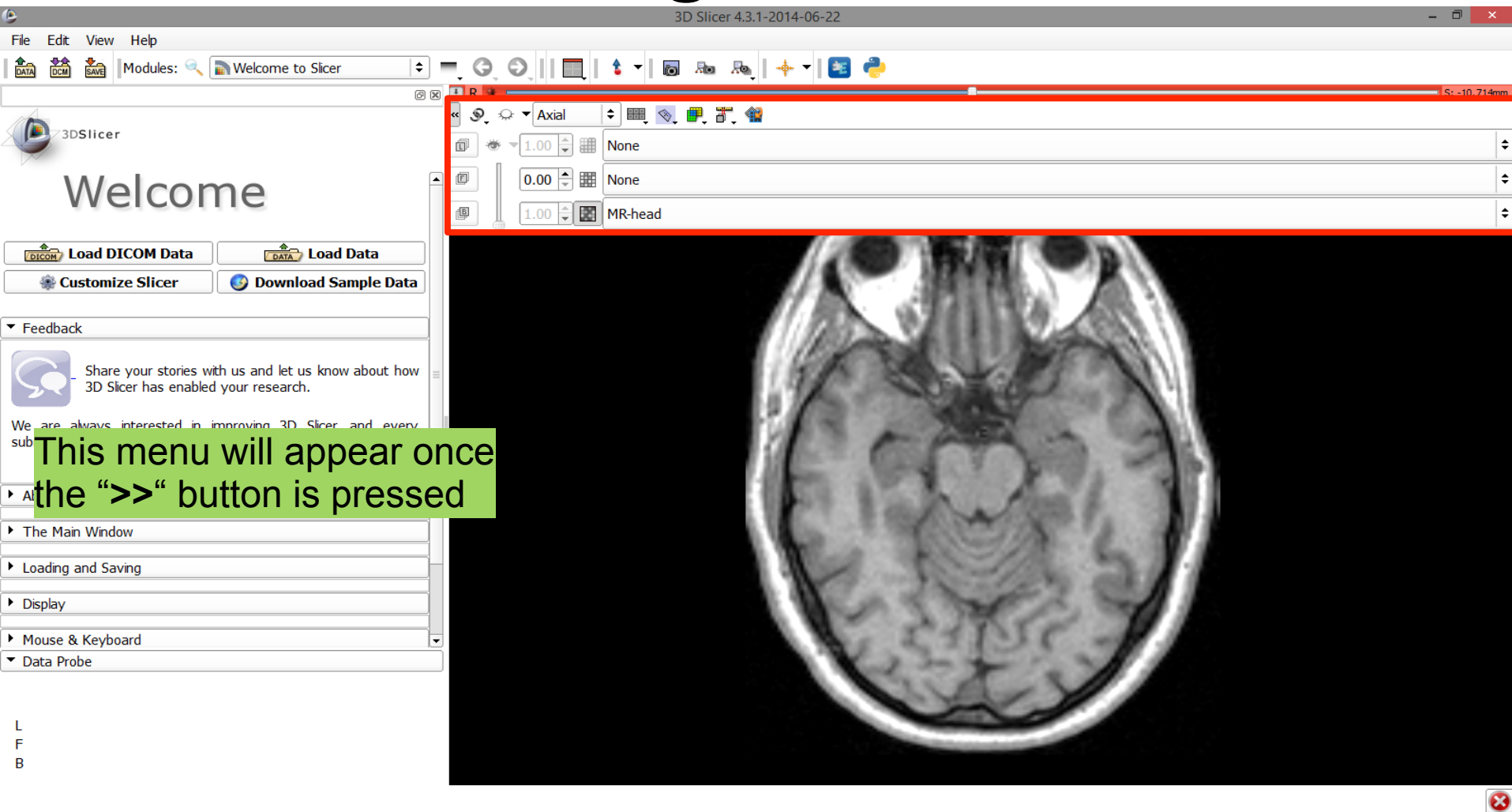
**Position your mouse over the pin icon to display the slice viewer toolbar**

# 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 to Slicer' 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 callout box to the '>>' button in the slice viewer toolbar.

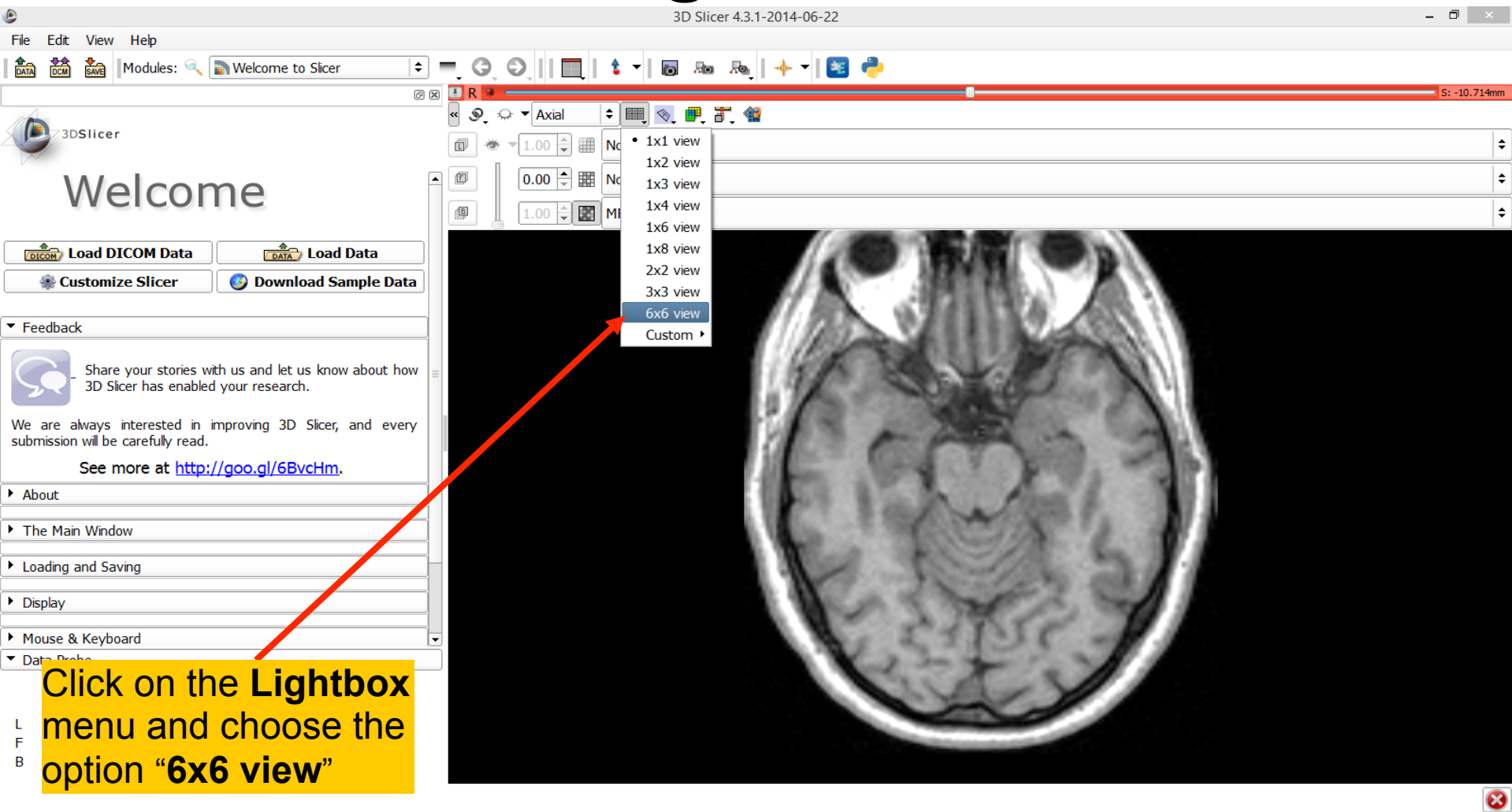
Once the slice viewer toolbar is displayed, click on the ">>"

# Loading a volume





# Loading a volume

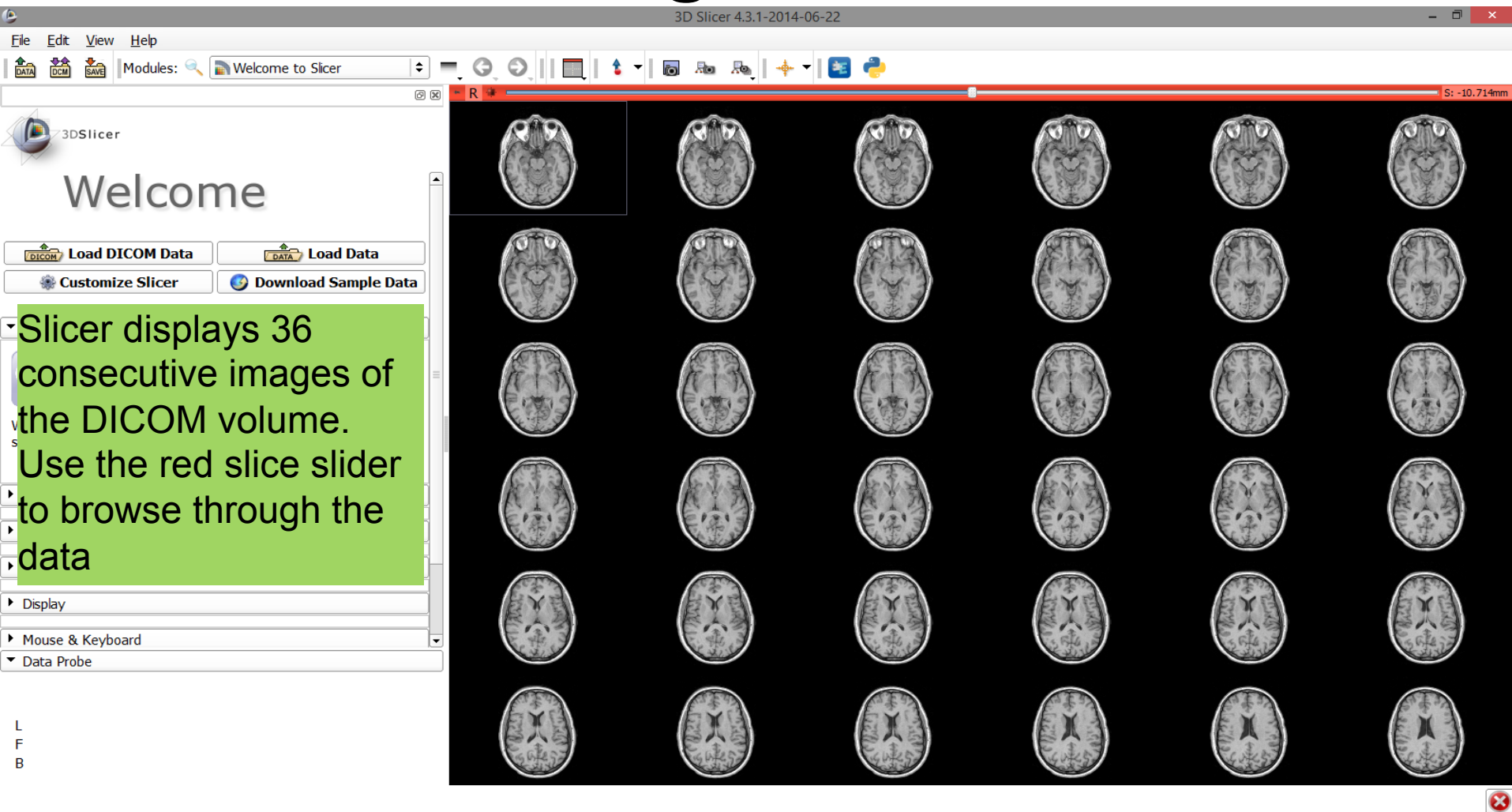


The screenshot shows the 3D Slicer interface. The 'Lightbox' menu is open, listing various view options: 1x1 view, 1x2 view, 1x3 view, 1x4 view, 1x6 view, 1x8 view, 2x2 view, 3x3 view, 6x6 view (highlighted), and Custom. A red arrow points from a yellow text box to the '6x6 view' option. The main window displays an axial MRI brain scan.

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



# 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 in the 'Conventional' layout. The left sidebar contains a 'Welcome' message and navigation options.

File Edit View Help  
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

Slicer layout 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

# 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. Another red arrow points from the yellow text box to the 'Lightbox' menu icon in the toolbar. The toolbar also shows the 'Pin' icon, which is highlighted by the yellow text box.

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

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

L  
F  
B

# Loading a volume

File Edit View Help

3D Slicer 4.3.1-2014-06-22

Welcome to Slicer

3DSlicer

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>.

About

The Main Window

Loading and Saving

Display

Mouse & Keyboard

Data Probe

L  
F  
B

S  
R  
P  
L  
I

Axial

1.00 None

0.00 None

1.00 MR-head

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

# 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

3D Slicer 4.3.1-2014-06-22

1

S

R L

Axial

1.00 None

0.00 None

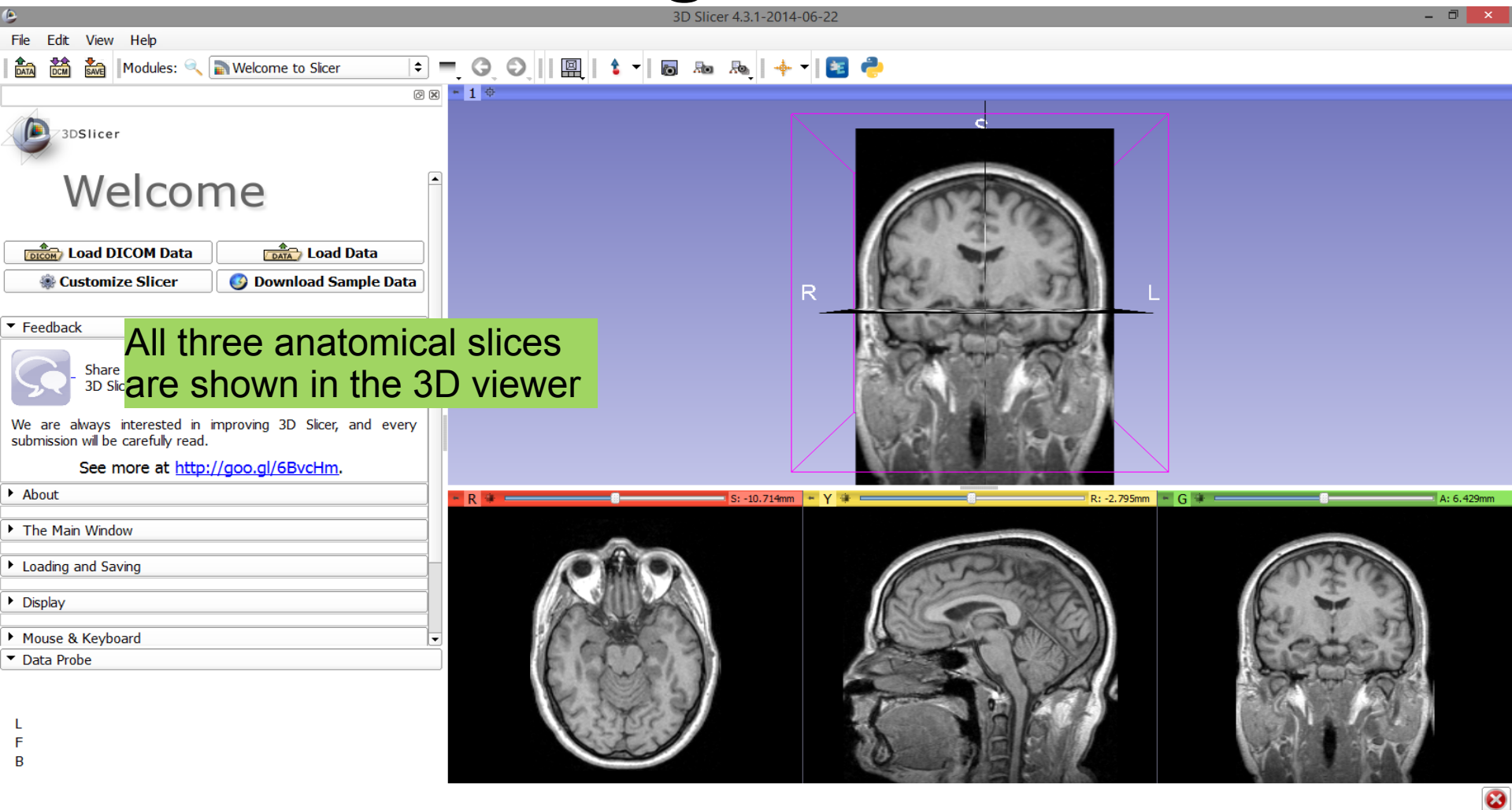
1.00 MR-head

L

F

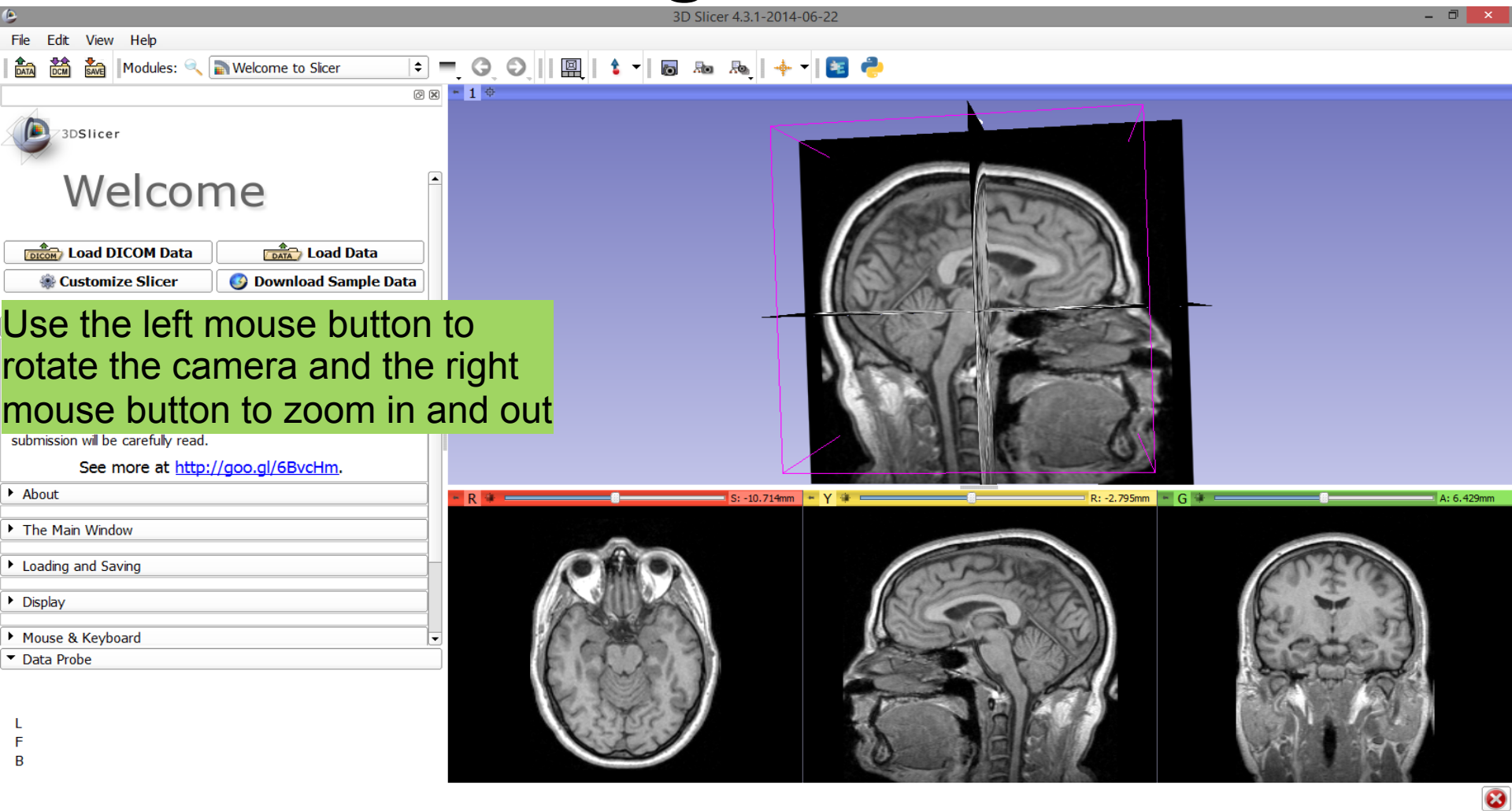
B

# Loading a volume

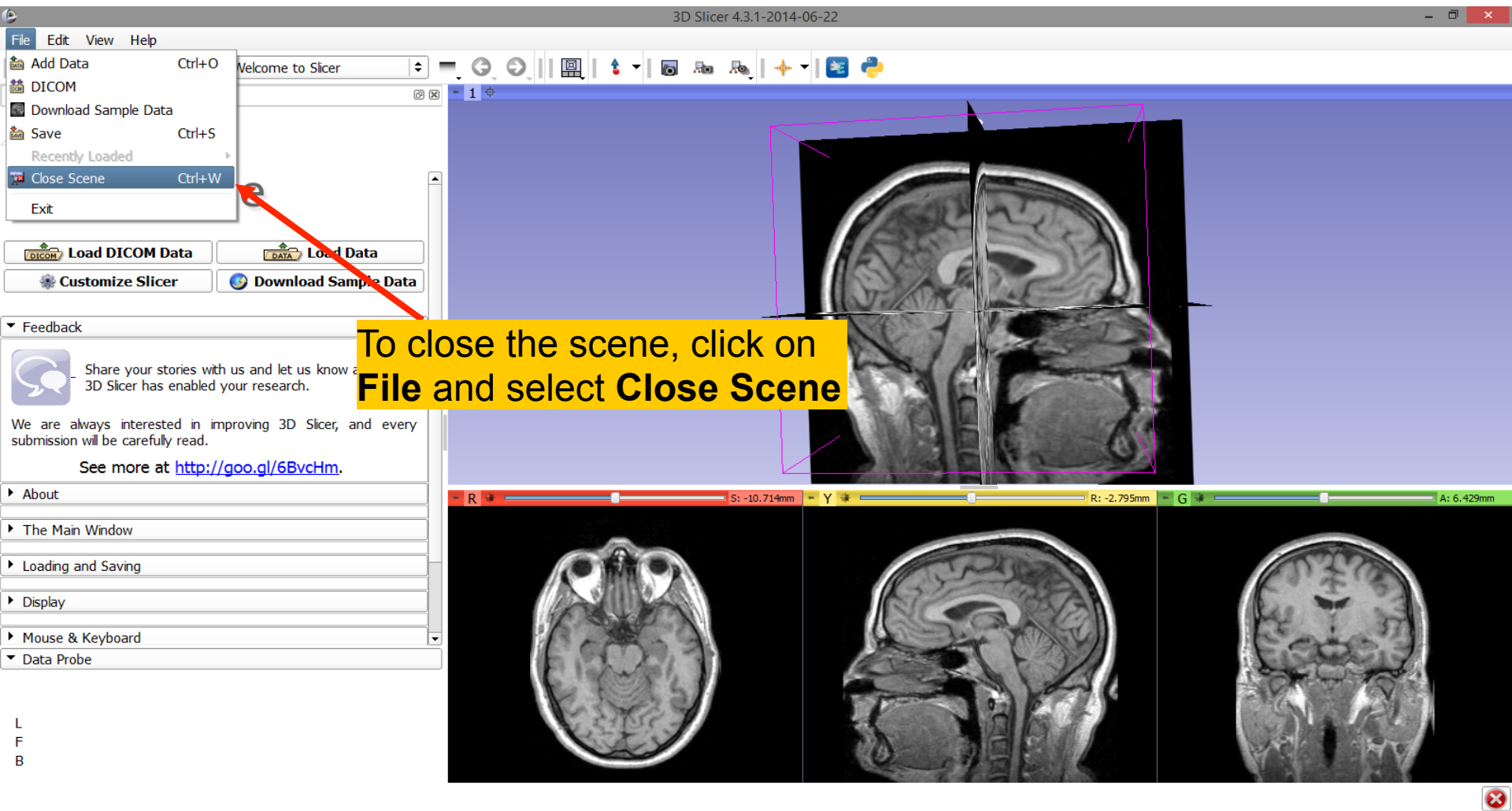




# Loading a volume

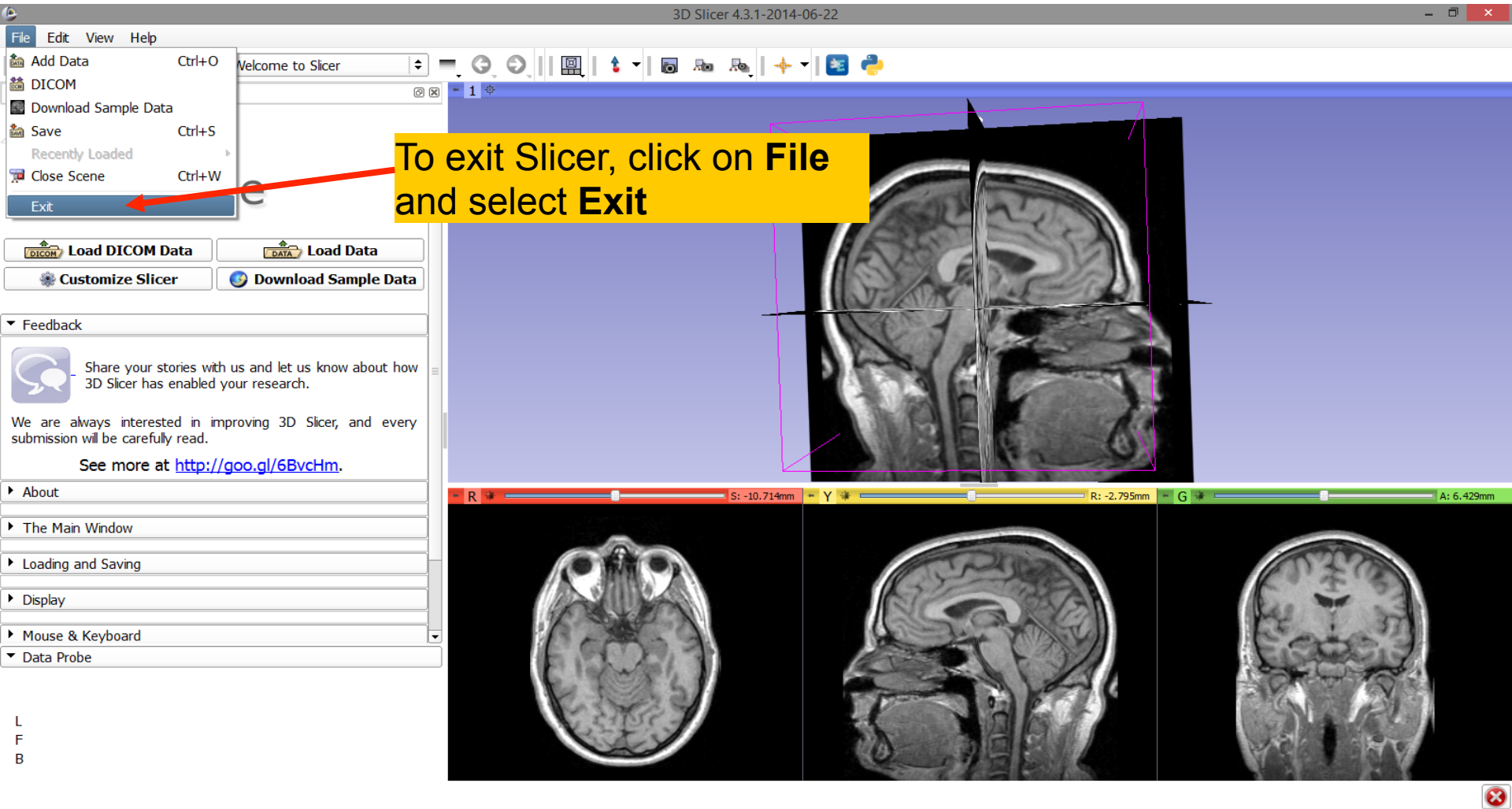


# Close the scene

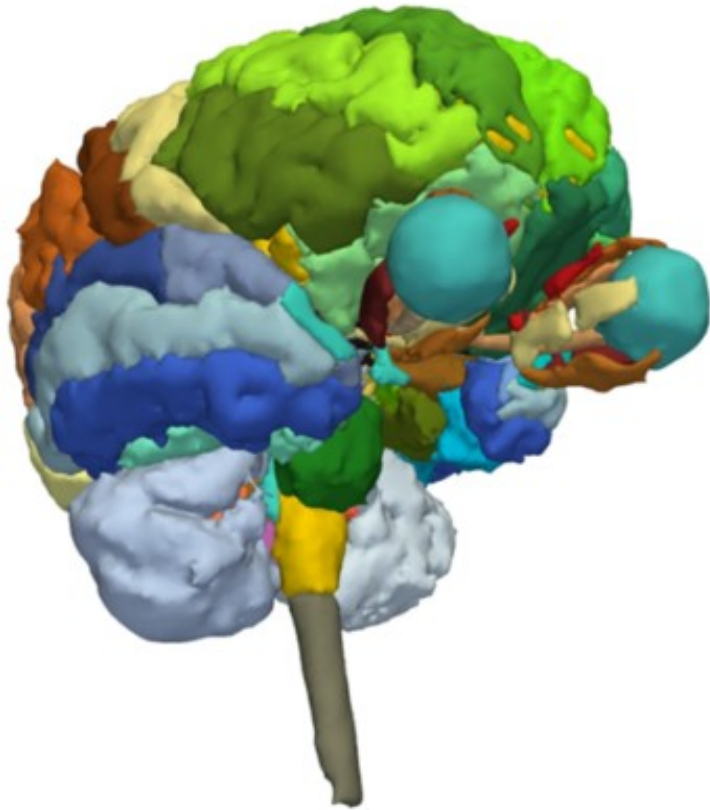




# Exit Slicer



# 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. Another red arrow points from the 'Load Data' button to the 'P' (Planar) view in the 3D Slicer interface.

**3DHeadData File List:**

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
<b>3DHeadScene</b>	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

**3D Slicer 4.3.1-2014-06-22 Interface:**

- Buttons: Load DICOM Data, Load Data, Customize Slicer, Download Sample Data
- Feedback section: Share your stories with us and let us know about how 3D Slicer has enabled your research.
- Navigation: About, The Main Window, Loading and Saving, Display, Data Probe
- View: Axial, None
- Dimensions: S: 0.000mm, R: 0.000mm, A: 0.000mm
- Orientation: L, F, B

**3D Viewport:** A purple rectangular area with labels S (Superior), R (Right), P (Planar), and L (Left).

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

# Loading a Scene

3DHeadData

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Welcome to Slicer

3DSlicer

Welcome

Add data into the scene

Choose Directory to Add Choose File(s) to Add Show Options

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.

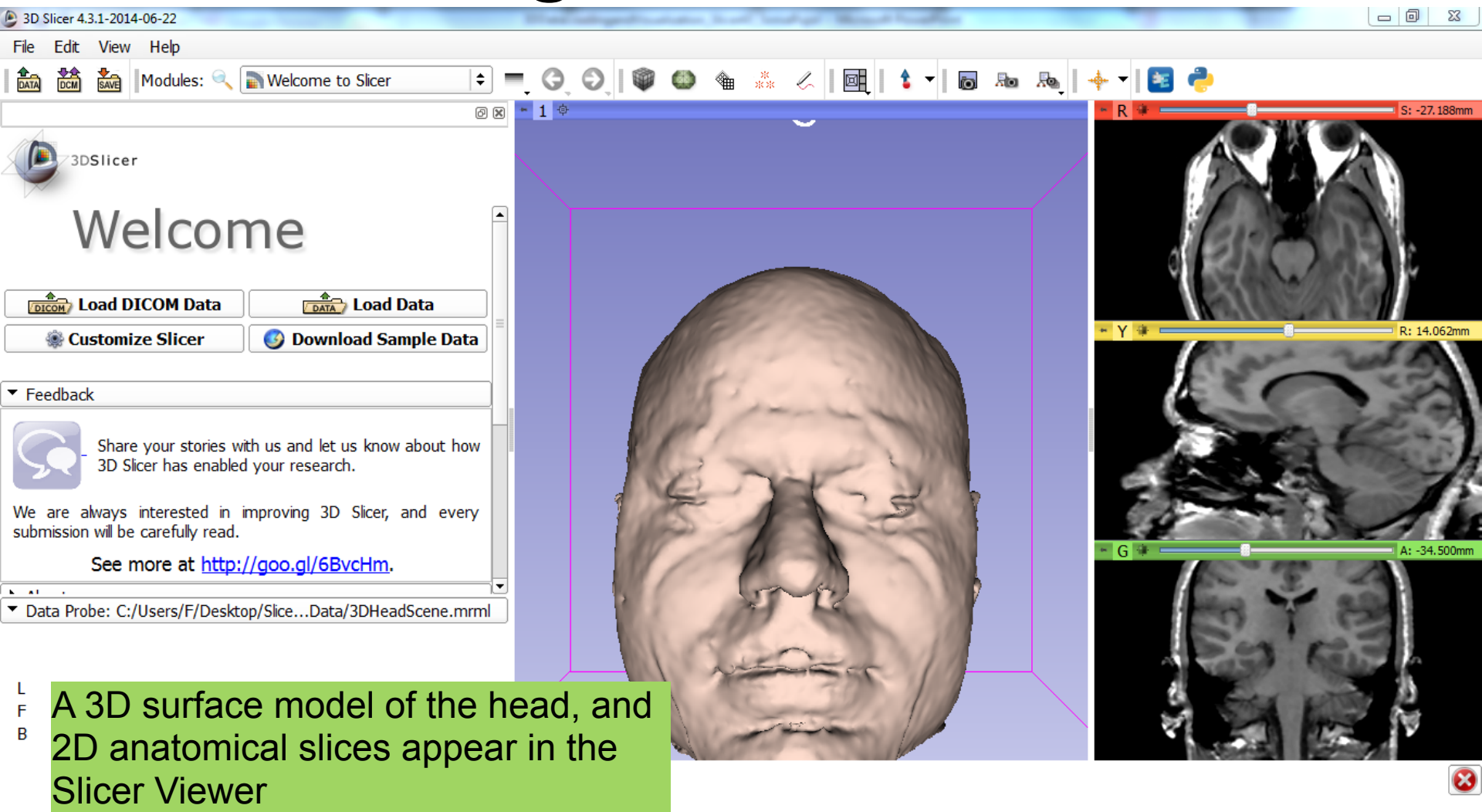
15 items 1 item selected 141 KB

Display

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

Axial None

# Loading the Slicer Scene



# Loading the Slicer Scene

3D Slicer 4.3.1-2014-06-22

File Edit View Help

DATA DCM SAVE Modules:

3DSlicer

## Welcome

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/Devel

All Modules

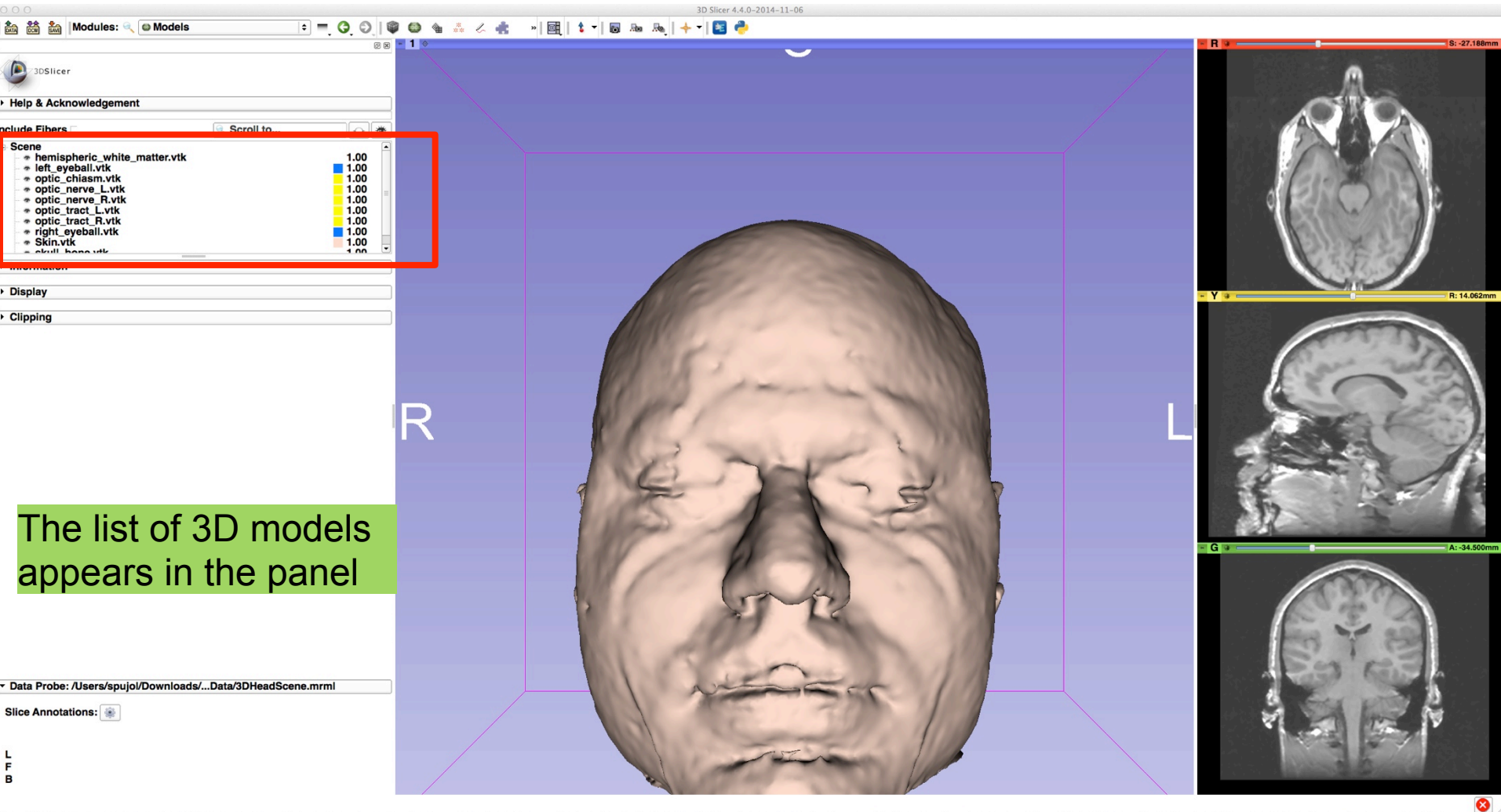
- Annotations
- Data
- DataStore
- DICOM
- Editor
- Markups
- Models**
- Scene Views
- Subject Hierarchy
- Transforms
- View Controllers
- Volume Rendering
- Volumes
- Welcome to Slicer
- Wizards
- Informatics
- Registration
- Segmentation
- Quantification
- Diffusion
- IGT
- Filtering
- Surface Models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

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

3D Slicer interface showing a 3D model of a human face and three orthogonal MRI slices (axial, sagittal, and coronal).

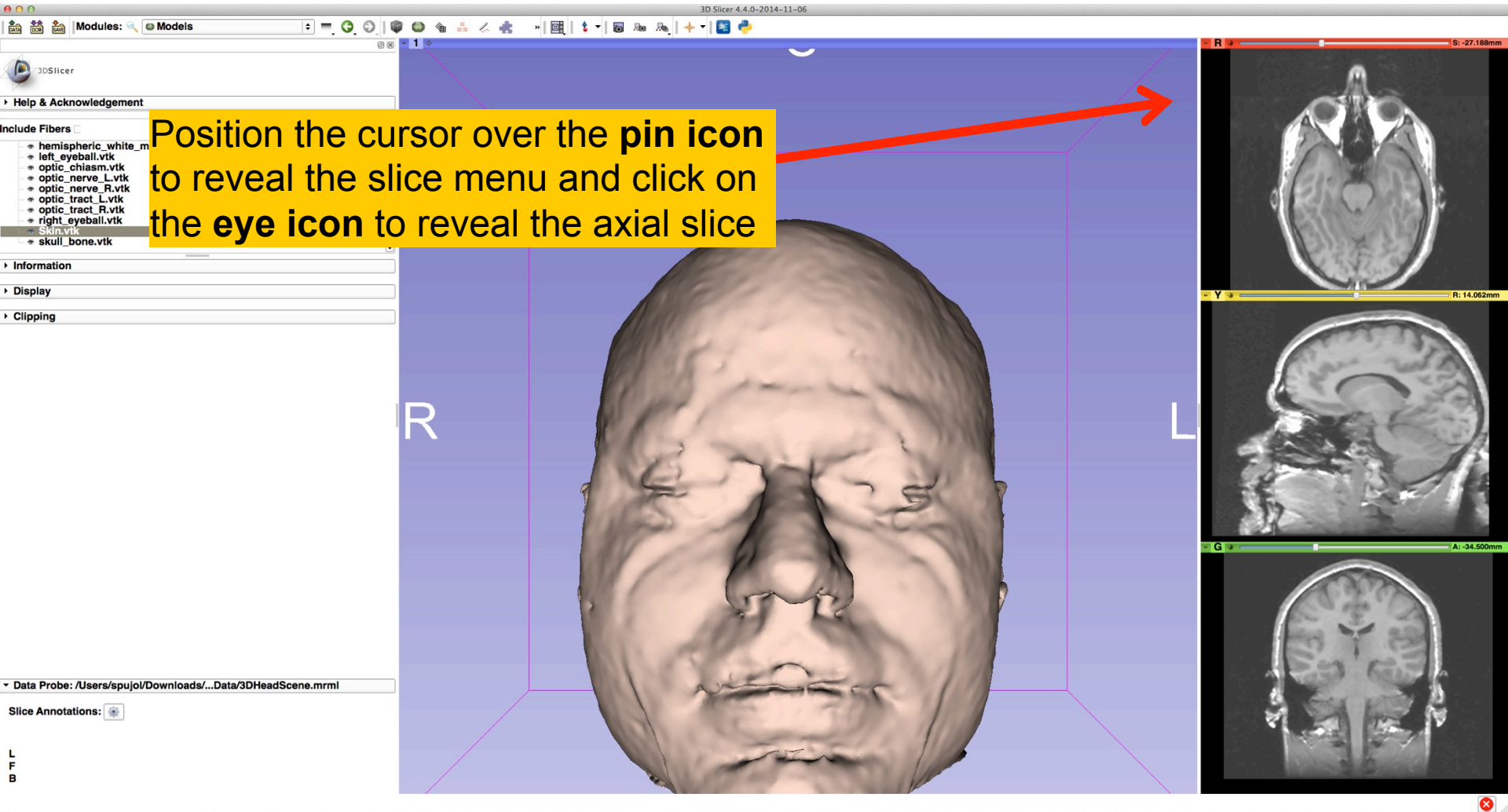


# Models Module



The list of 3D models appears in the panel

# 3D Visualization





# 3D Visualization

The screenshot displays the 3D Slicer interface. On the left, the 'Models' panel lists various anatomical components: 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, and skull\_bone.vtk. A red arrow points from the 'Skin.vtk' entry to the 3D model. The central 3D viewer shows a realistic 3D reconstruction of a human head with an axial MRI slice overlaid. A green callout box with a red arrow pointing to the slice contains the text: 'Notice the axial slice through the 3D model of the head'. On the right, three orthogonal MRI slices are shown: an axial slice (top), a sagittal slice (middle), and a coronal slice (bottom). The 3D model is labeled with 'R' for right and 'L' for left. A yellow callout box at the bottom left contains the text: 'Once the axial slice is displayed in the 3D viewer, click on **Skin.vtk** in the list of 3D scenes'.

# 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
- Skull.vtk 1.00
- skull\_bone.vtk 1.00

Information

Display

Visibility

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color  #ffddcc

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Material

Scalars

Clipping

R

L

R: -27.188mm

V: R: 14.062mm

G: A: -34.500mm

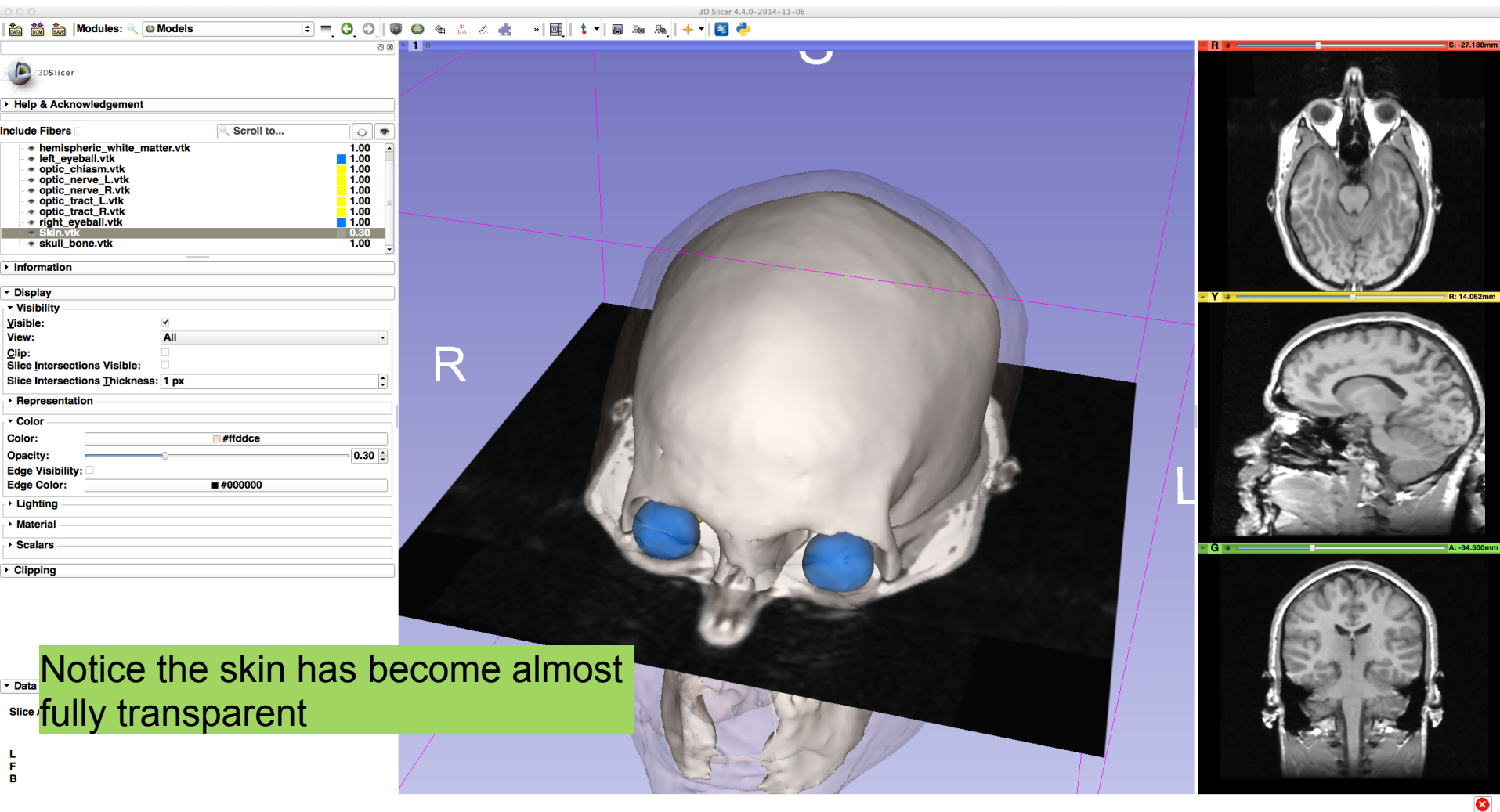
Date

Slice

LFB

Scroll down the **Display** tab and locate the **“Color”** tab. Lower the **Opacity** to a transparent level, around 0.30

# 3D Visualization



# 3D Visualization

The screenshot displays the 3D Slicer interface. On the left, the 'Models' panel shows a list of loaded models under 'Include Fibers'. A red arrow points to the 'skull\_bone.vtk' entry. Below this, the 'Display' panel is visible, with a yellow text box overlaid on it containing the instruction: 'Scroll back up to the 3D scenes menu and select skull\_bone.vtk'. The main 3D view shows a skull model with blue eyes, set against a purple background with a white 'R' marker. To the right, three MRI slices are shown in axial, sagittal, and coronal views. The top slice is axial (R: -27.188mm), the middle is sagittal (R: 14.062mm), and the bottom is coronal (A: -34.500mm).



# 3D Visualization

The image shows a screenshot of the 3D Slicer software interface. The main window displays a 3D visualization of a skull and brain. The skull is rendered in a light gray color, and the brain is shown in a darker gray. A yellow callout box with a red arrow points to the 'Visibility' checkbox in the 'Display' panel, which is currently checked. The callout box contains the text: 'Turn off its visibility by unchecking the **Visibility** option and notice the bone disappearing from the 3D view of the head'. The 'Display' panel also shows 'Visible: All' and 'Slice Intersections Visible: 1 p'. The 'Representation' panel shows 'Color: #ffffff', 'Opacity: 1.00', 'Edge Visibility: 0', and 'Edge Color: #000000'. The 'Data Panel' shows 'Slice Anterior' and 'L F B' labels. On the right side, there are three axial, sagittal, and coronal MRI slices of the brain. The top slice is labeled 'R' and 'S: -27.18mm'. The middle slice is labeled 'Y' and 'R: 14.062mm'. The bottom slice is labeled 'G' and 'A: -34.500mm'. The 3D view is labeled 'R' and 'L'.

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

# 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 px

Representation

Color

Color: #ffffff

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Material

Scalars

Clipping

R

L

R: -27.188mm

Y

R: 14.062mm

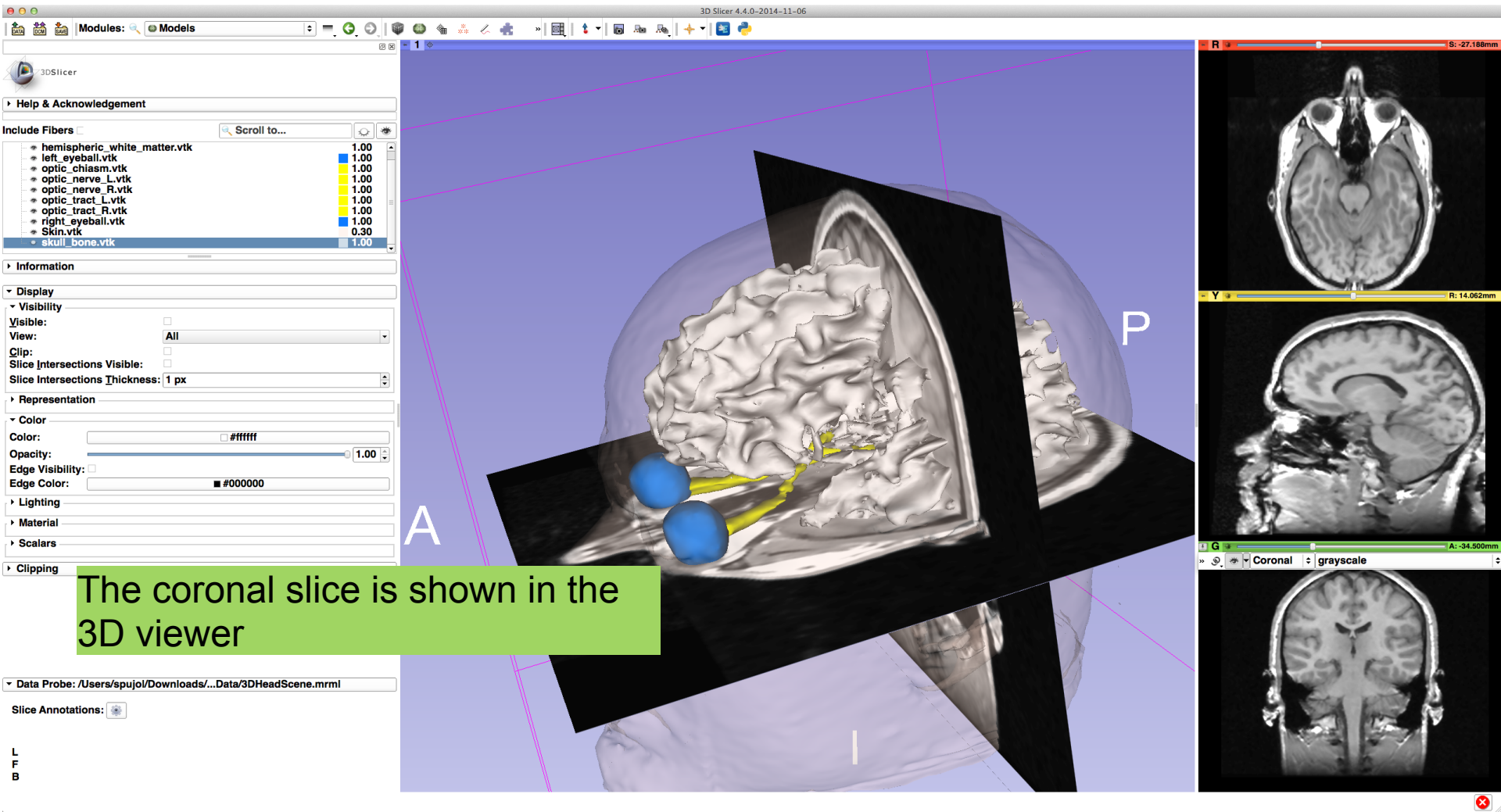
G

A: -34.500mm

Coronal grayscale

Position your mouse over the **pin icon** in the coronal slice view and select the **eye icon** to reveal the coronal slice in the 3D view

# 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' window at the bottom. A yellow text box with red arrows points to the 'hemispheric\_white\_matter.vtk' entry in the 'Include Fibers' list and the 'Clip' checkbox in the 'Visibility' tab.

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  
P  
A

Scroll up and select the 3D scene **hemispheric\_white\_matter.vtk**, then check off the option for **Clip** under the **Visibility** tab

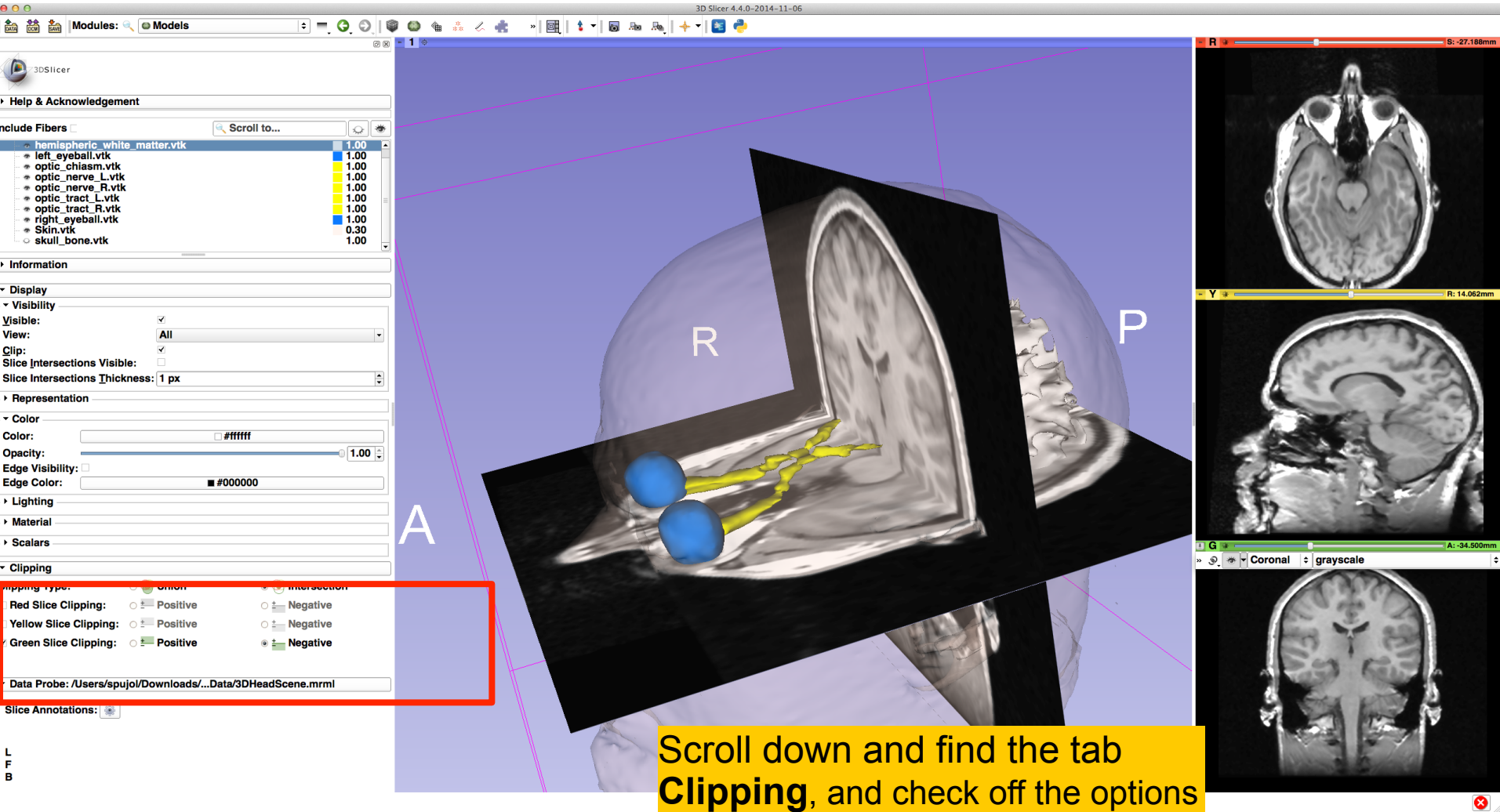
R: -27.168mm

Y: R: 14.062mm

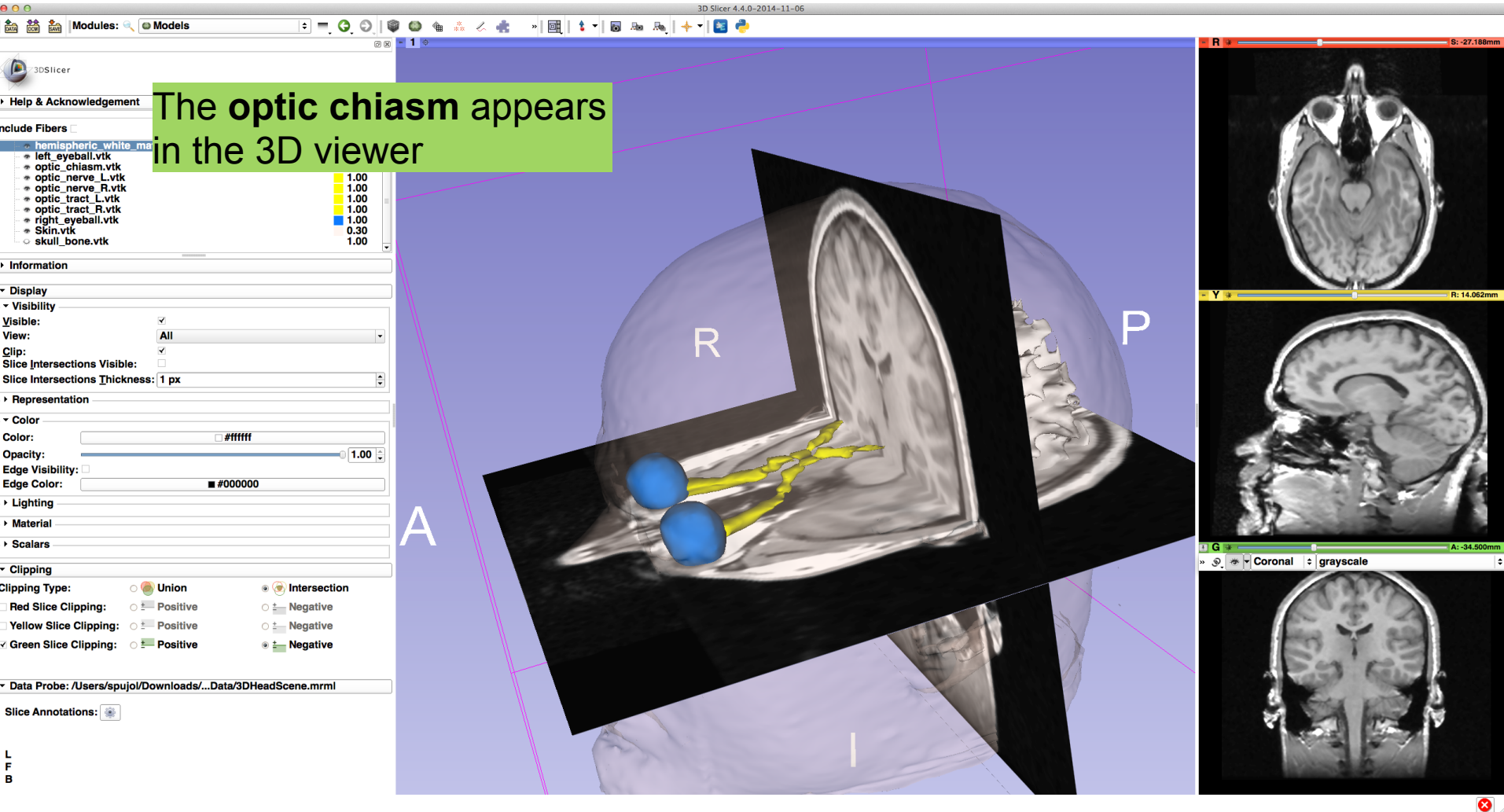
G: A: -34.502mm

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: \*

L  
F  
B

R  
A  
L

R: -27.188mm

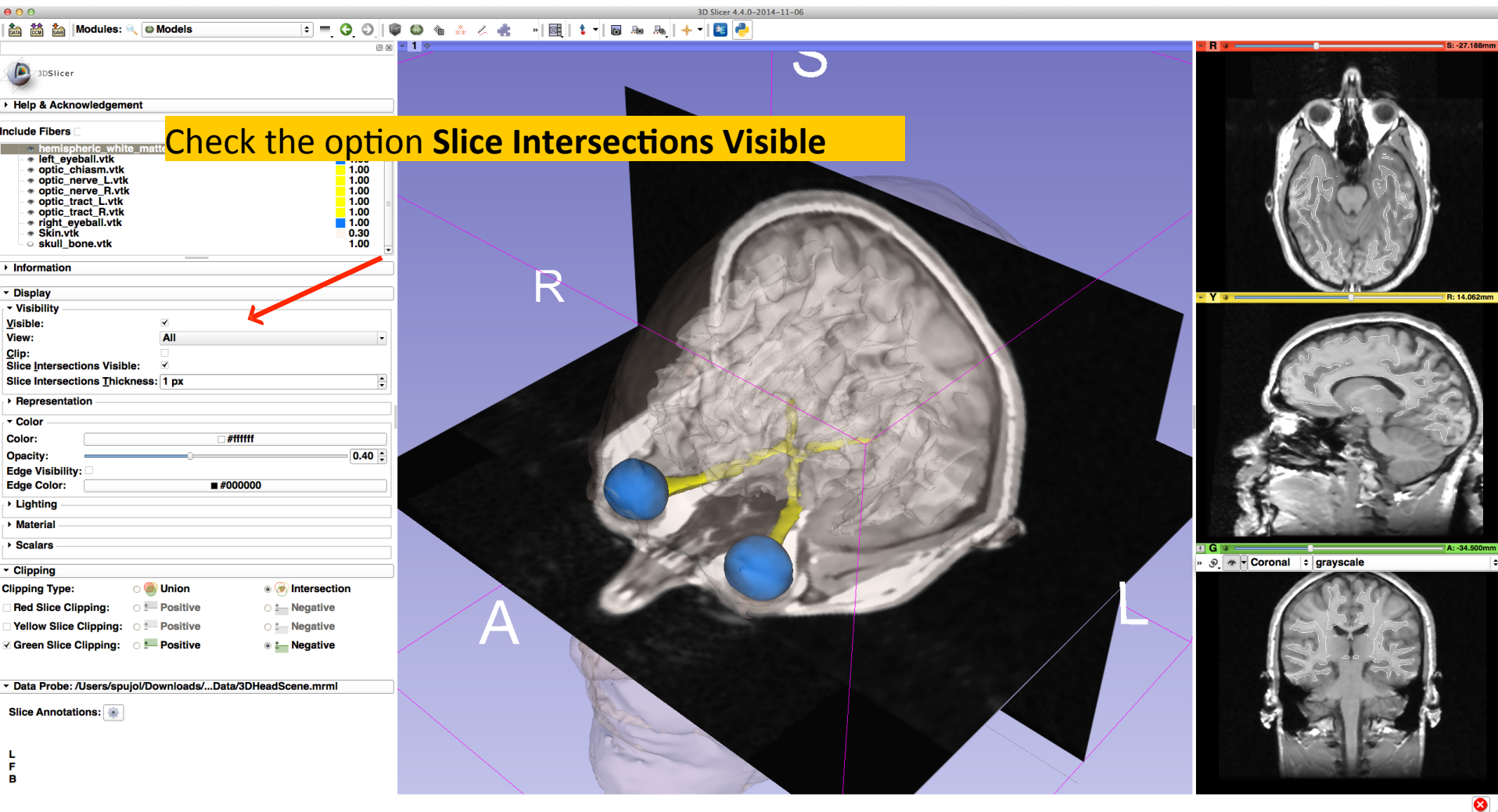
R: 14.052mm

G  
Coronal | grayscale  
A: -34.500mm

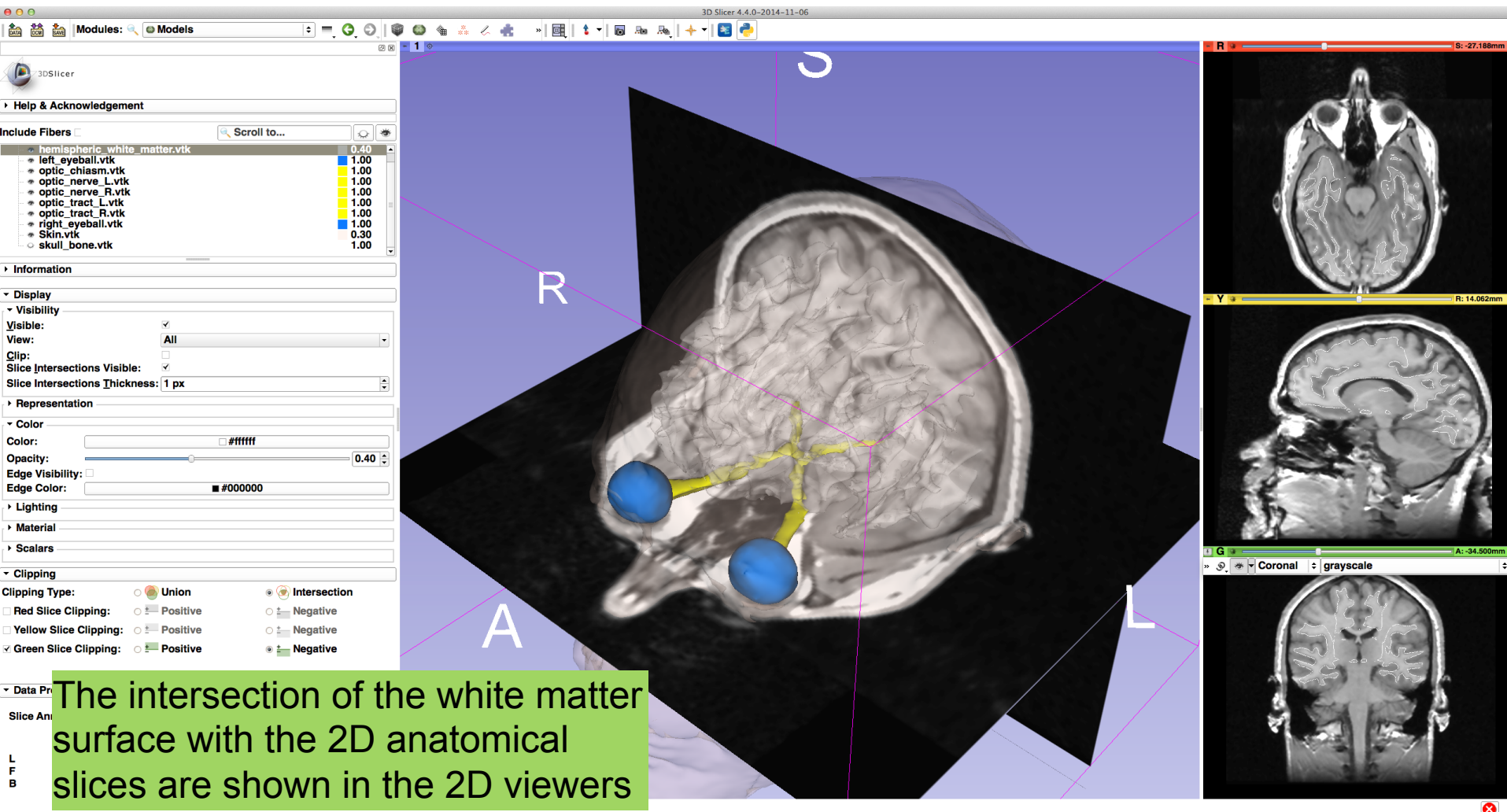
Scroll up and uncheck the option **Clip**  
Lower the **Opacity** of **hemispheric\_white\_matter.vtk**



# 3D Visualization



# 3D Visualization





# 3D Visualization

The image shows the 3D Slicer software interface. On the left, the 'Models' panel lists various anatomical models with their visibility and opacity settings. The central 3D view shows a brain model with yellow optic nerves and blue eyeballs. On the right, three orthogonal slice views are displayed: axial (top), sagittal (middle), and coronal (bottom). A red arrow points from a yellow callout box to the coronal slice view. The callout box contains the following text:

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

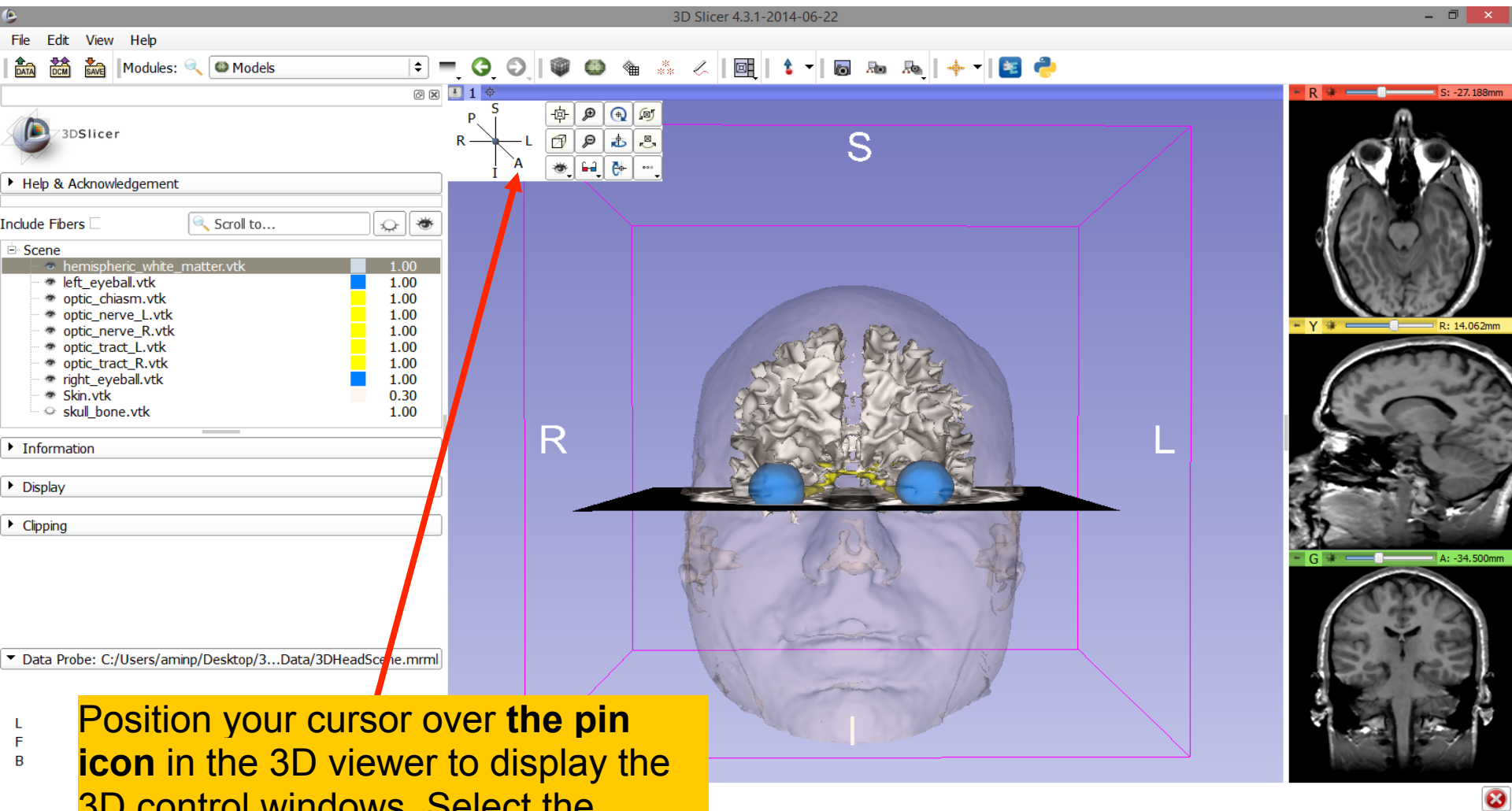
Data Probe: C:/Users/F/Desktop/Slice...Data/3DHeadScene.mrml

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

# 3D Visualization





## 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

DATA DCM SAVE Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers  Scrol

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 Probe: C:/Users/aminp/Desktop/3...Data/3DHeadScene.mrml

**The Save Scene and Unsaved Data window lists all the elements of the slicer scene**

Save Scene and Unsaved Data

Show options

File Name	File Format	
<input checked="" type="checkbox"/> 3DHeadScene.mrml	MRML Scene (.mrml)	/Users/spujol/workshop/
<input type="checkbox"/> hemispheric_white_matter.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/> left_eyeball.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/> optic_chiasm.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/> optic_nerve_L.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/> optic_nerve_R.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/> optic_tract_L.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/> optic_tract_R.vtk	Poly Data (.vtk)	/Users/spujol/workshop/

Change directory for selected files Save Cancel

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 t

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

Show options

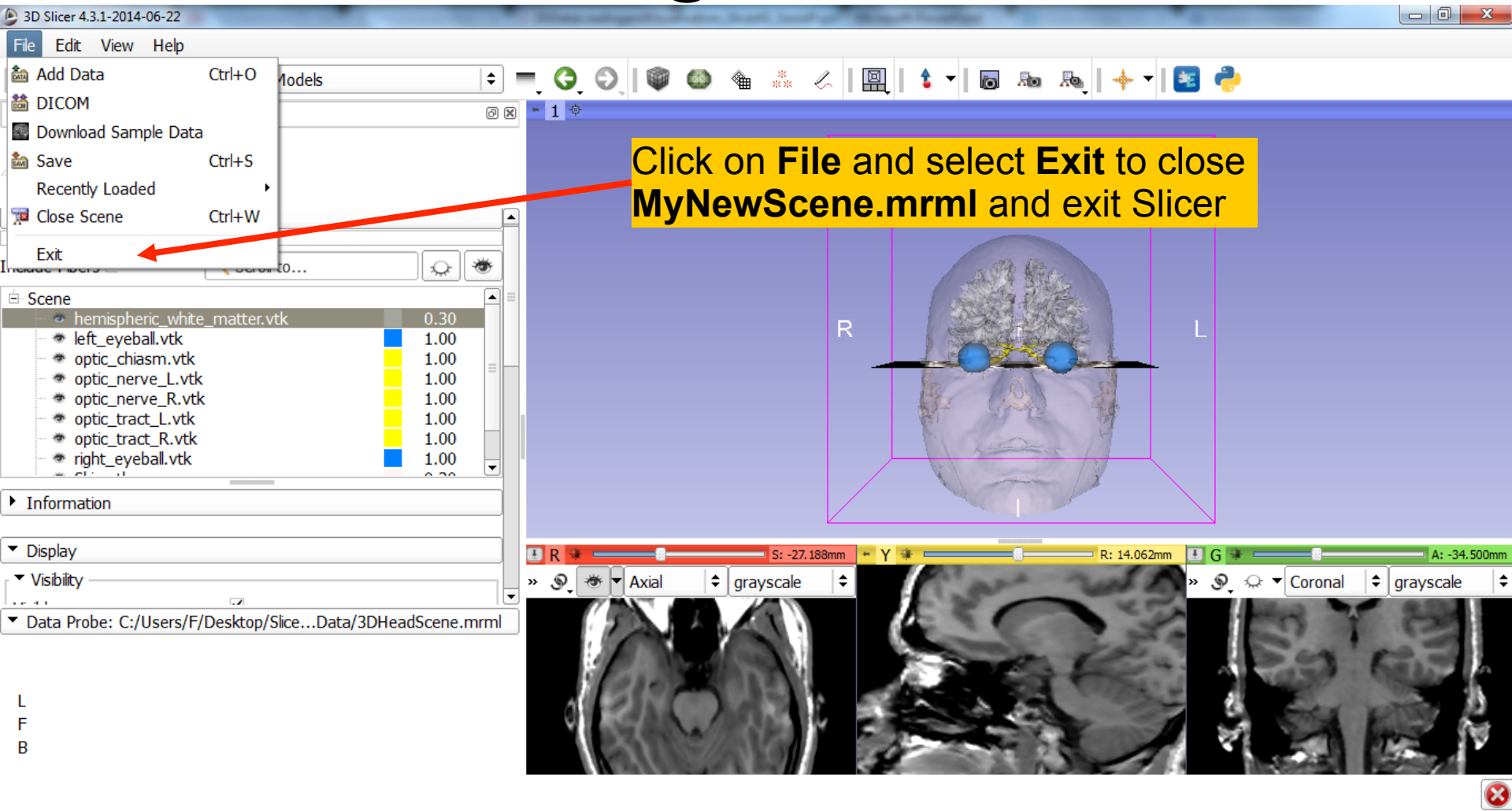
<input checked="" type="checkbox"/>	File Name	File Format	
<input checked="" type="checkbox"/>	MyScene.mrml	MRML Scene (.mrml)	/Users/spujol/workshop/
<input type="checkbox"/>	hemispheric_white_matter.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/>	left_eyeball.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/>	optic_chiasm.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/>	optic_nerve_L.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/>	optic_nerve_R.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/>	optic_tract_L.vtk	Poly Data (.vtk)	/Users/spujol/workshop/
<input type="checkbox"/>	optic_tract_R.vtk	Poly Data (.vtk)	/Users/spujol/workshop/

Change directory for selected files

Save Cancel

Check 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 interface shows a 'Welcome' screen with buttons for 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. A red arrow points from the 'MyNewScene.mrml' file in the Explorer to the 'Load Data' button in Slicer. A yellow text box at the top right of the Slicer window contains the instruction: 'Drag and drop the MyNewScene.mrml file that's in the 3DHeadData folder into the Slicer window'. The Slicer interface also shows a 'Feedback' section and a 'Data Probe' section at the bottom.

3DHeadData

File Edit View Help

File Edit View Help

3D Slicer 4.3.1-2014-06-22

File Edit View Help

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

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

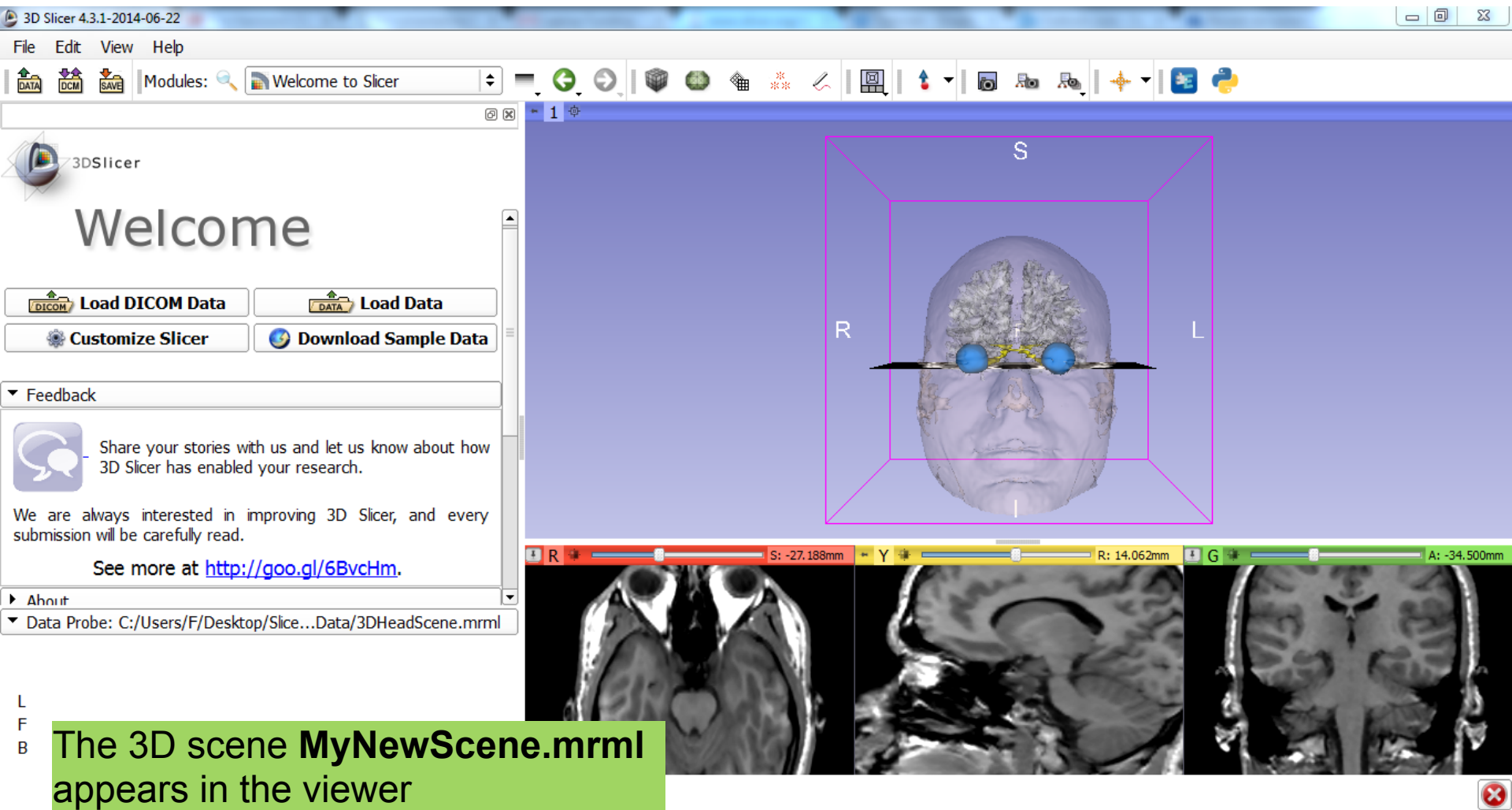
# Scene Restore

The screenshot shows the 3D Slicer interface with a file selection dialog open. The dialog is titled "Add data into the scene" and contains the following table:

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

At the bottom of the dialog, there are buttons for "Reset", "OK", and "Cancel". A red arrow points to the "OK" button, which is highlighted with a yellow box and the text "Click OK".

# Slicer4





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