

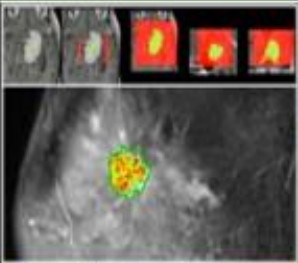
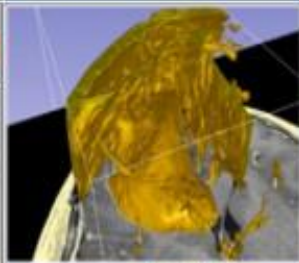
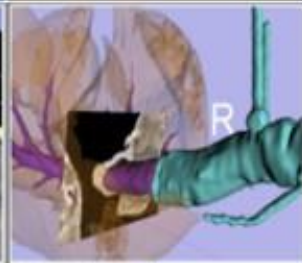
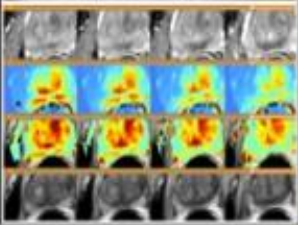
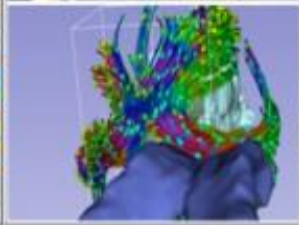
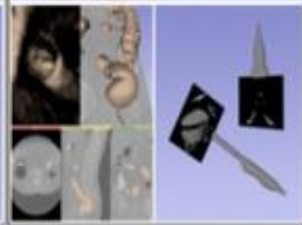



# 3D Data Loading and Visualization

Sonia Pujol, Ph.D.

Surgical Planning Laboratory  
Harvard University

# 3DSlicer

| Powerful processing.   | Streamlined interface.   | Extensible platform.  |
|--|--|---|
|  A collage of medical image processing results, including a brain scan with a highlighted lesion and a series of heatmaps. |  A 3D visualization of a brain model, showing a yellow translucent surface. |  A 3D visualization of a hand model, showing a purple and blue structure.                                |
|  A collage of medical image processing results, including a series of heatmaps and a 3D model of a brain.                  |  A 3D visualization of a brain model, showing a multi-colored structure.    |  A collage of medical image processing results, including a series of heatmaps and a 3D model of a hand. |
|  <b>3D Slicer</b> version 4.0   |  | <a href="http://www.slicer.org">www.slicer.org</a>  |

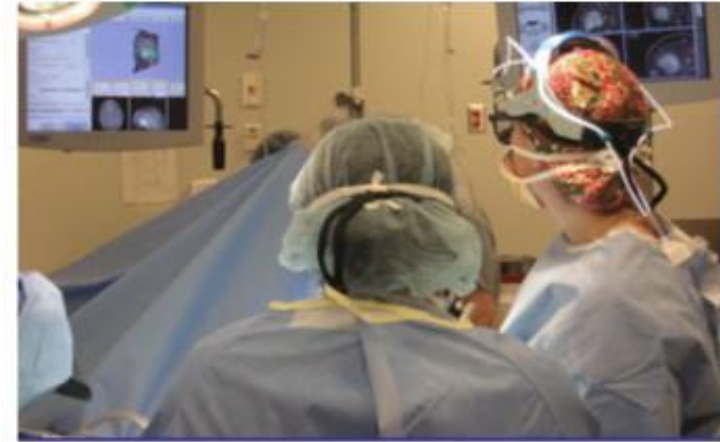
Slicer is a freely available [open-source](#) platform for segmentation, registration and 3D visualization of medical imaging data

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)

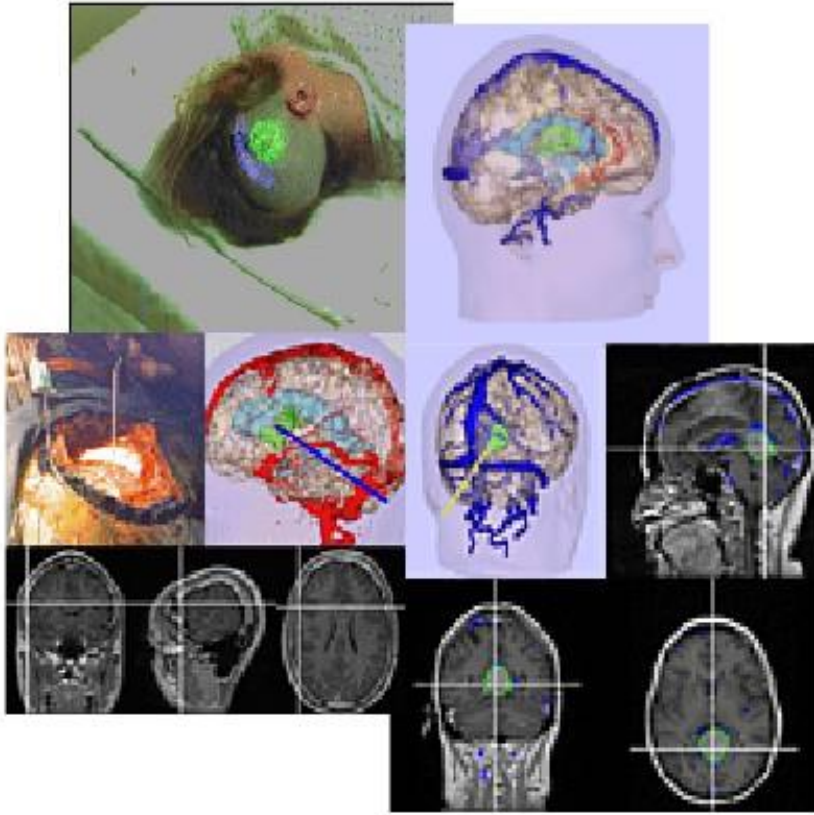
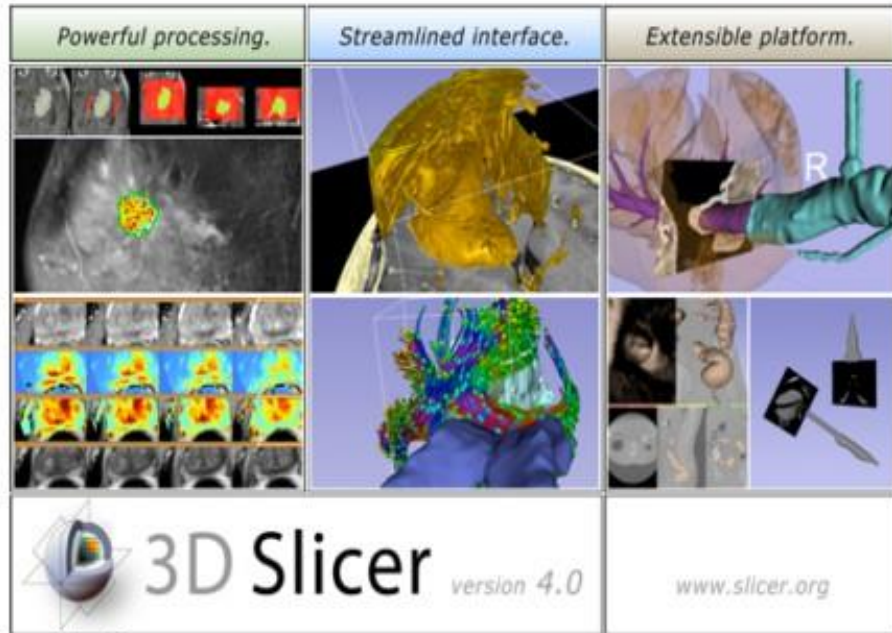


Image Courtesy of the CSAIL, MIT

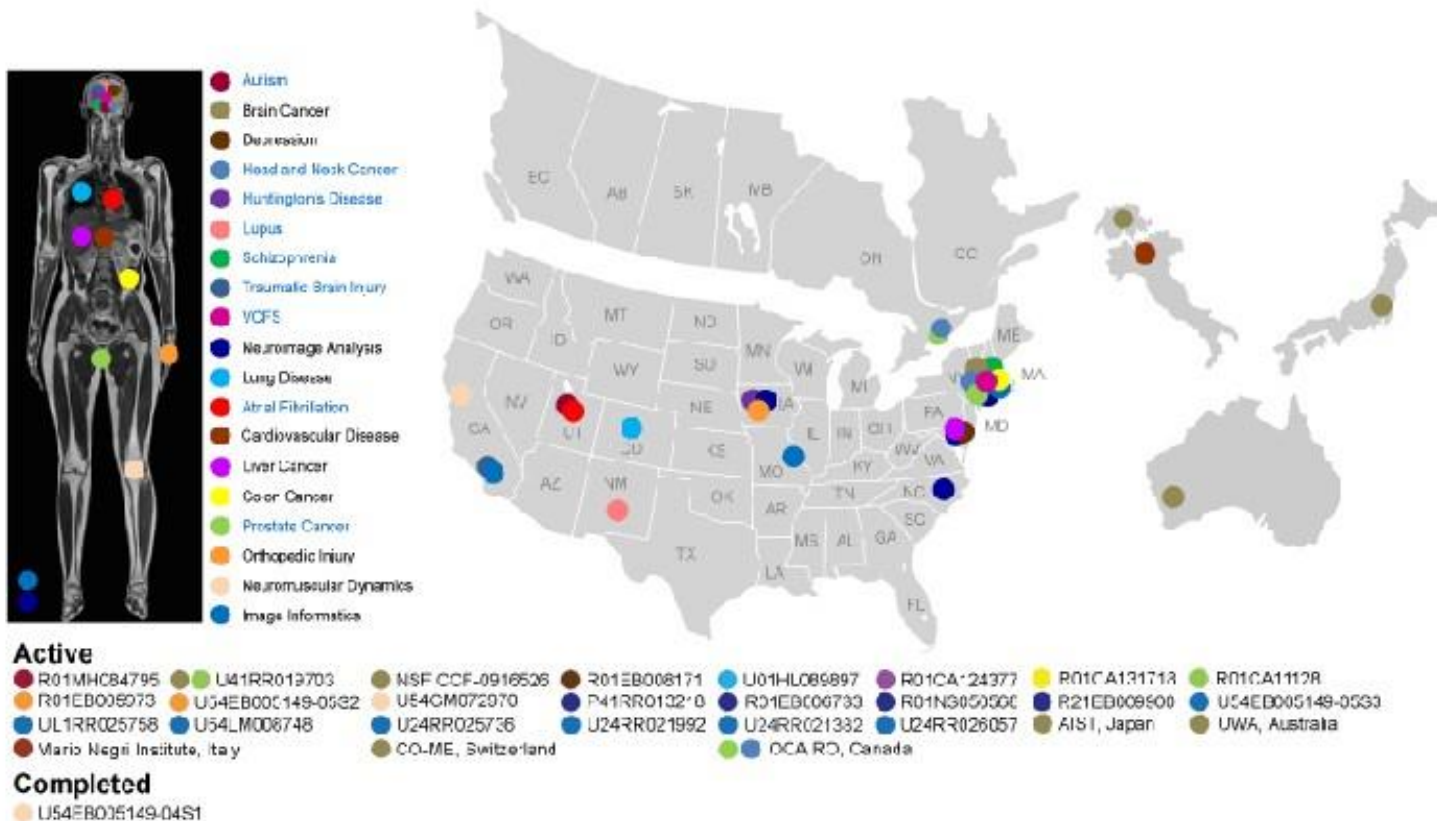
# 3DSlicer History

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

2013: 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



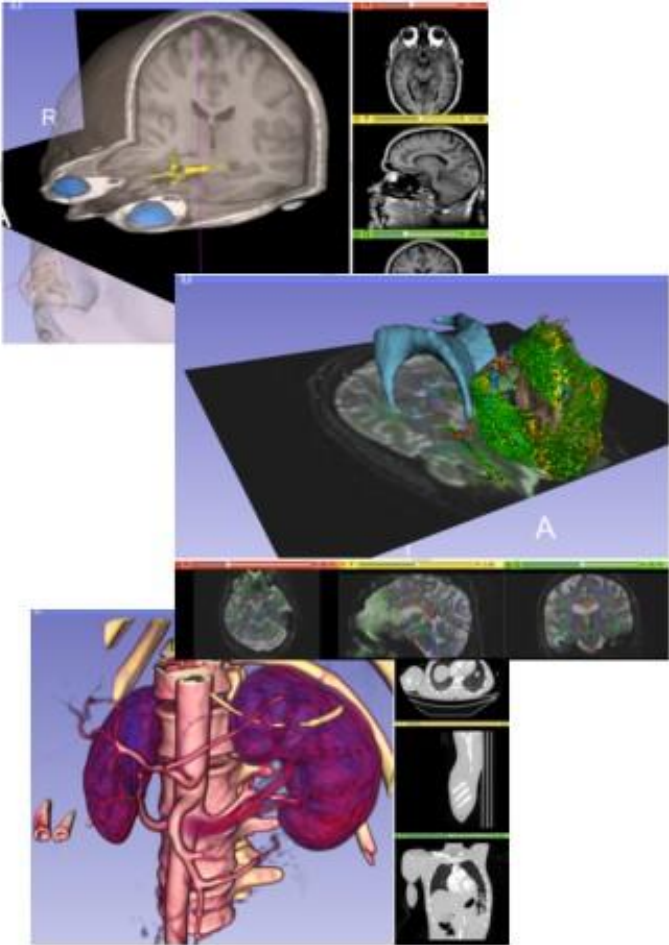
Iowa City, USA 2012



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.2013 Downloads



## Slicer 4 download statistics

Total matching  
downloads:  
**62948**

Date range:

forever

Release type:

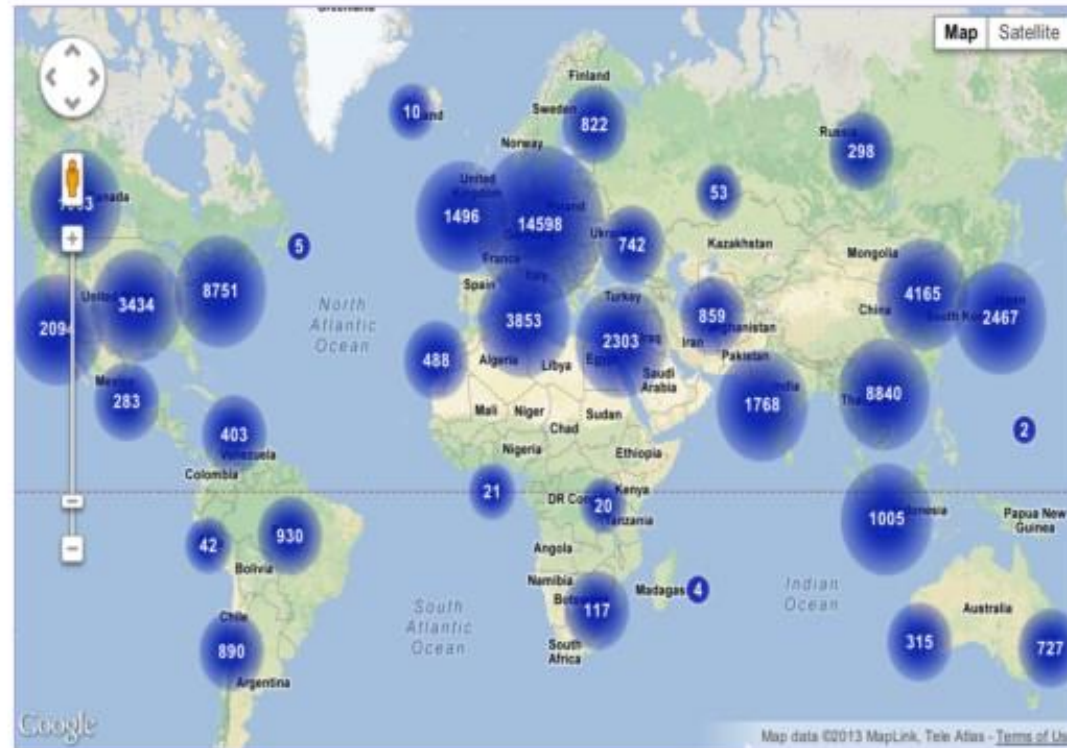
any

Browser type:

desktop

Update

Download location **By Country** By Filename By Month



# 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<br>4.1.0 64 bit installer<br>2013-04-11<br>#19998 (153.8MB)   | 4.1.0 64 bit installer<br>2013-04-11<br>#19998 (236.9MB)   | 4.1.0 64 bit archive<br>2013-04-11<br>#19998 (251.5MB)   |
|                | 32 bit<br>4.1.0 32 bit installer<br>2013-04-11<br>#19998 (153.3MB)   |  |  |
| nightly build  | 64 bit<br>nightly 64 bit installer<br>2013-04-23<br>#19993 (180.4MB) | nightly 64 bit installer<br>2013-04-21<br>#19991 (207.4MB) | nightly 64 bit archive<br>2013-04-23<br>#19993 (212.0MB) |
|                | 32 bit<br>nightly 32 bit installer<br>2013-04-23<br>#19993 (154.0MB) |  |  |

### 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

The screenshot shows the Slicer4 CDash dashboard with a navigation bar (Dashboard, Calendar, Previous, Current, Project) and a warning message: "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".

There are three main sections of build data:

### ightly-Packages

| Site                        | Build Name   | Update |       |      | Configure |      |         | Build |      |                | Build Time |
|-----------------------------|--|--------|-------|------|-----------|------|---------|-------|------|----------------|------------|
|                             |  | File   | Error | Warn | Error     | Warn | Not Run | Fail  | Pass |                |            |
| stony-win7.kitware          | Windows7-VS2010-32bits-QT4.7.1-PythonQt-With-Tool-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-Tool-Release | 1      | 0     | 0    | 0         | 14   | 0       | 28    | 458  | 9 hours ago    |            |
| stony-ubuntu-64bits.kitware | Linux-g++4.4.3-64bits-QT4.7-PythonQt-With-Tool-Release       | 1      | 0     | 0    | 0         | 13   | 0       | 28    | 458  | 13 hours ago   |            |
| stony-win7.kitware          | Windows7-VS2008-64bits-QT4.7.1-PythonQt-With-Tool-Release    | 0      | 0     | 0    | 0         | 1000 | 0       | 28    | 481  | 4 hours ago    |            |
| stony-win7.kitware          | Windows7-VS2008-32bits-QT4.7.1-PythonQt-With-Tool-Release    | 1      | 0     | 0    | 0         | 1000 | 0       | 28    | 481  | 11 hours ago   |            |

### ightly

| Site                        | Build Name  | Update |       |      | Configure |      |         | Build |      |         | Test |      |              | Build Time |
|-----------------------------|---|--------|-------|------|-----------|------|---------|-------|------|---------|------|------|--------------|------------|
|                             |   | File   | Error | Warn | Error     | Warn | Not Run | Fail  | Pass | Not Run | Fail | Pass |              |            |
| decube.kitware              | SnowLeopard-gcc4.2.1-QT4.7.5-PythonQt-With-Tool-Release                 | 1      | 0     | 0    | 27        | 190  | 0       | 36    | 301  |         |      |      | 11 hours ago |            |
| upl.sci.utah.edu            | OpenSuse-c++4.5.0-64bits-QT4.6.3-PythonQt-With-Tool-Release             | 0      | 0     | 0    | 0         | 15   | 0       | 304   | 8    |         |      |      | 11 hours ago |            |
| s.kitware                   | Linux-g++4.4-QT4.6.3-PythonQt-CLI-Release                               | 1      | 0     | 0    | 0         | 18   | 0       | 36    | 491  |         |      |      | 3 hours ago  |            |
| stony-ubuntu-64bits.kitware | Linux-g++4.4.3-QT4.7-PythonQt-With-Tool-Valgrind-Release                | 0      | 0     | 0    | 0         | 13   | 0       | 27    | 480  |         |      |      | 11 hours ago |            |
| stony-ubuntu-64bits.kitware | Linux-g++4.4.3-64bits-QT4.7-PythonQt-With-Tool-Release-Coverage-Release | 0      | 0     | 0    | 0         | 12   | 0       | 23    | 257  |         |      |      | 11 hours ago |            |
| garmth.kitware              | Linux-g++4.3.3-QT4.7-PythonQt-With-Tool-Release                         | 0      | 0     | 0    | 0         | 13   | 0       | 20    | 308  |         |      |      | 12 hours ago |            |

### ontinuous

| Site             | Build Name  | Update |       |      | Configure |      |         | Build |      |         | Test |      |            | Build Time |
|------------------|---|--------|-------|------|-----------|------|---------|-------|------|---------|------|------|------------|------------|
|                  |   | File   | 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-Tool-Release | 0      | 0     | 0    | 0         | 0    | 0       | 304   | 8    |         |      |      | 1 hour ago |            |

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

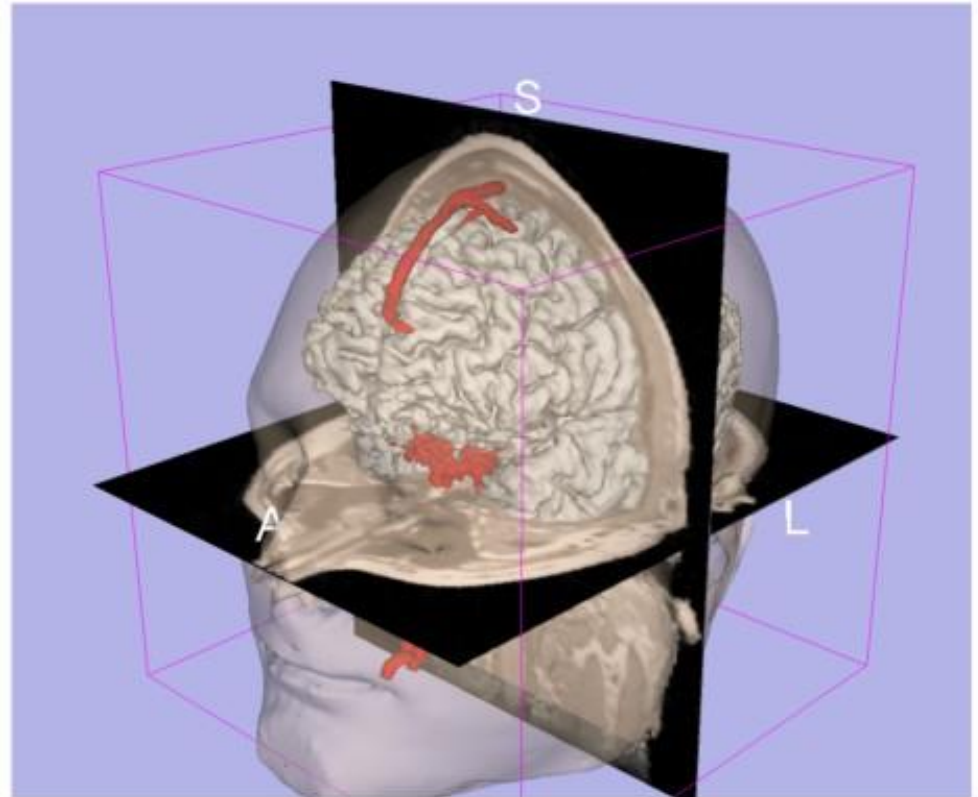
# Slicer Training



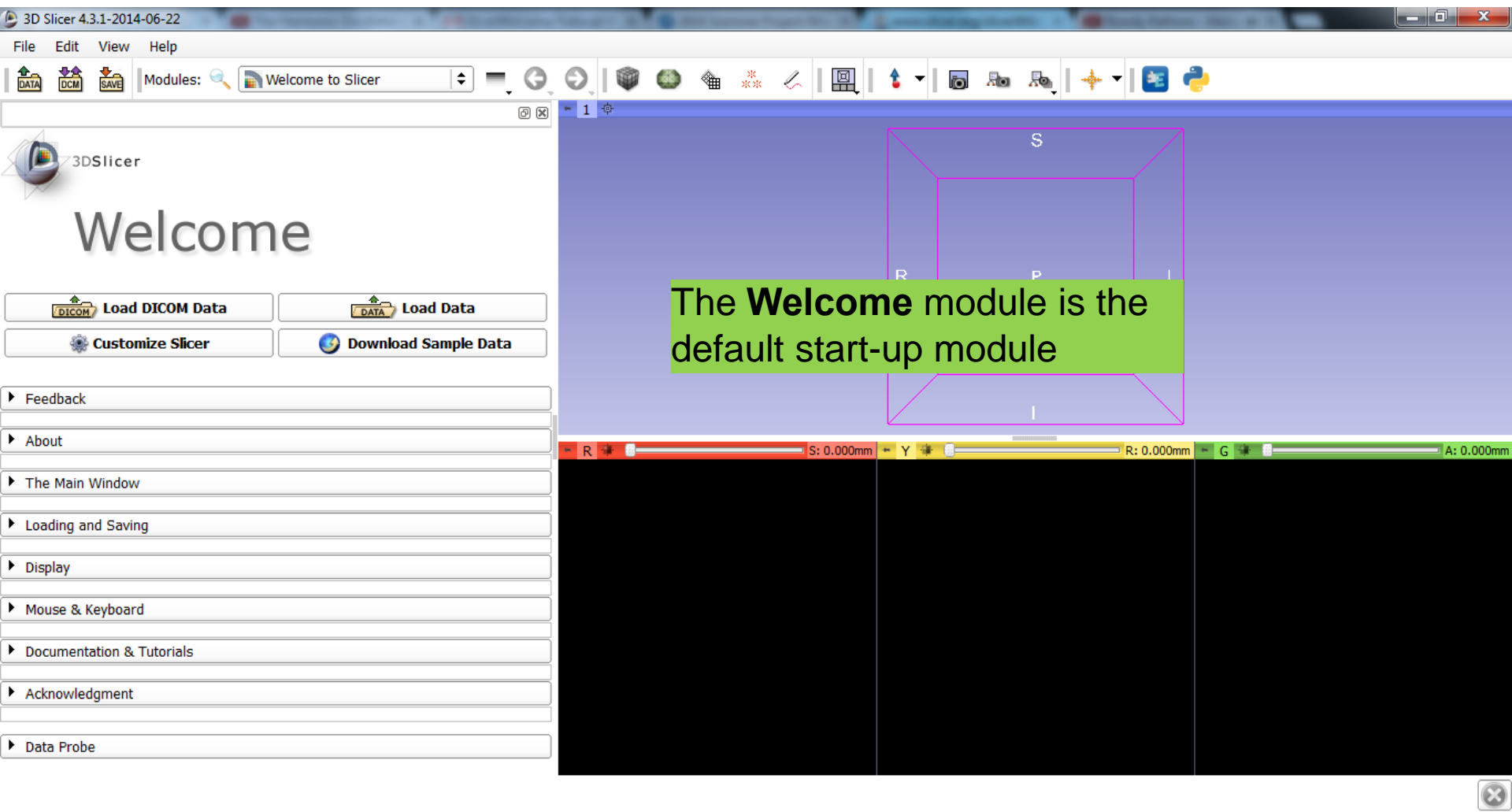
- Hands-on training workshops at national and international venues
- >2,300 clinicians, clinical researchers and scientists trained since 2005

# 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

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

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

# 3D Slicer Version4

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Welcome to Slicer

3DSlicer

Load DICOM Data Load Data

Customize Slicer Download Sample Data

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About

The Main Window

File Menu GUI Panel Data Probe

Toolbar 3D Viewer

Slice Viewers Message Bar

The basic organization of Slicer's user interface (UI) is shown above. This module's content will reference these following components, labeled in the figure:

**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

S

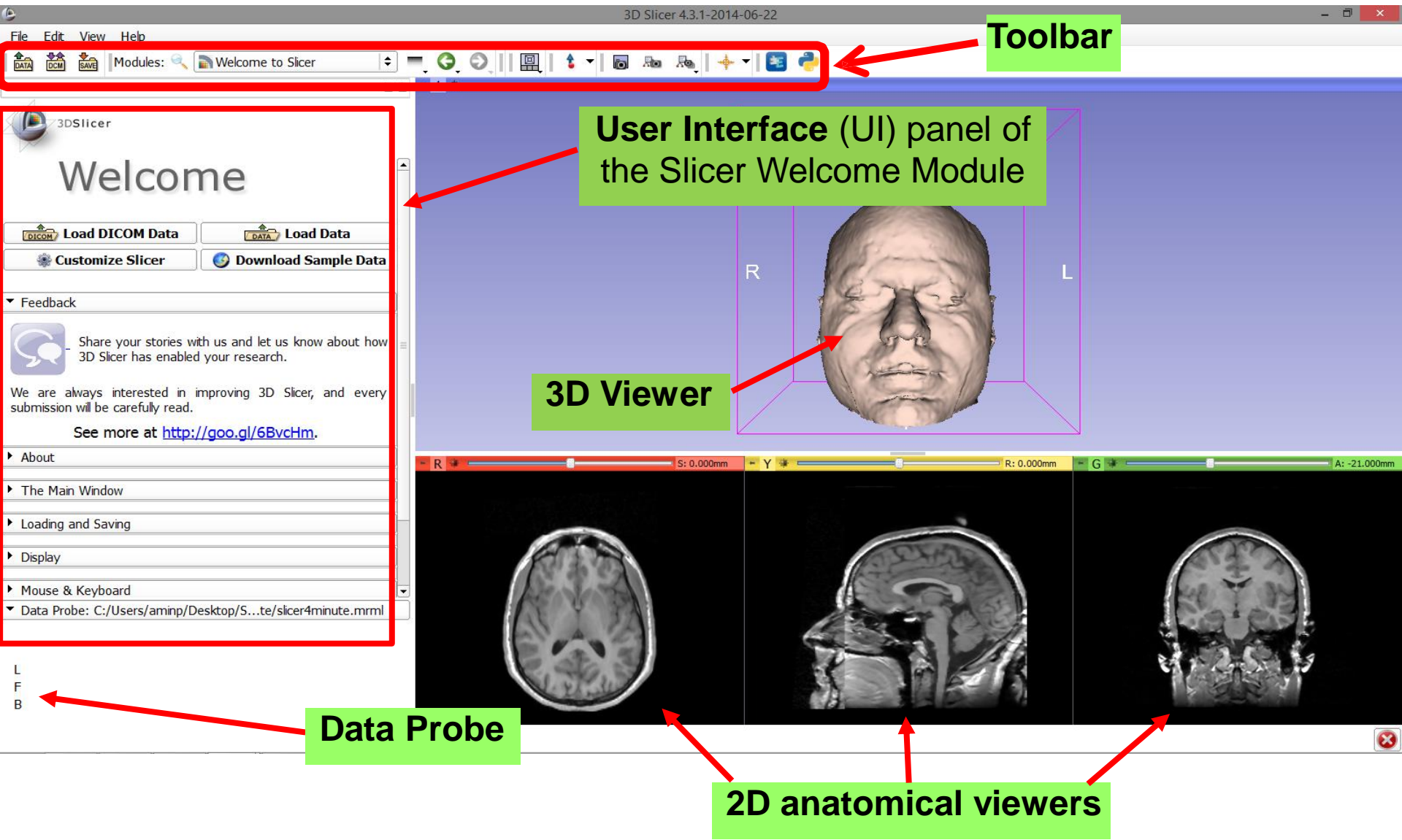
The Main Window tab contains information on the basic organization of Slicer's user interface

Scroll down to see all the contents

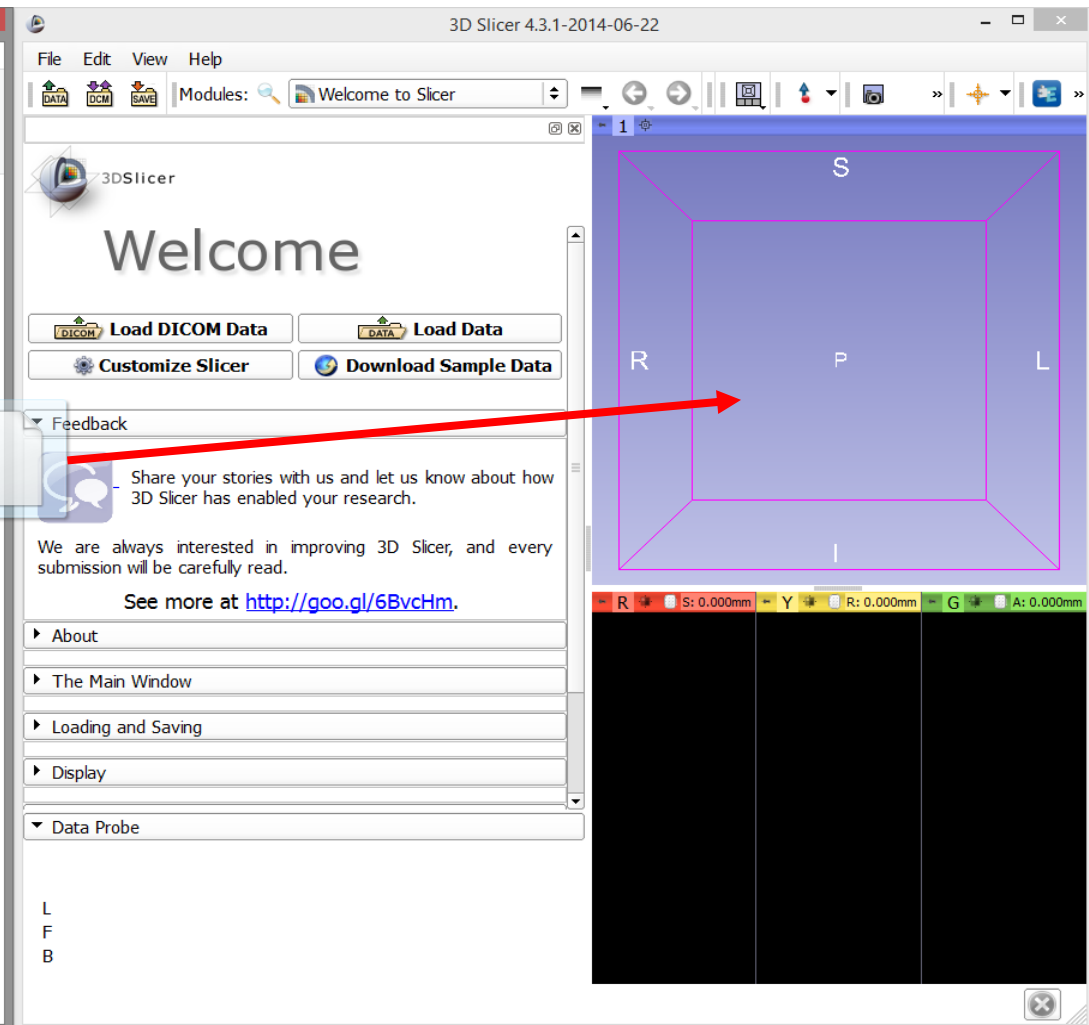
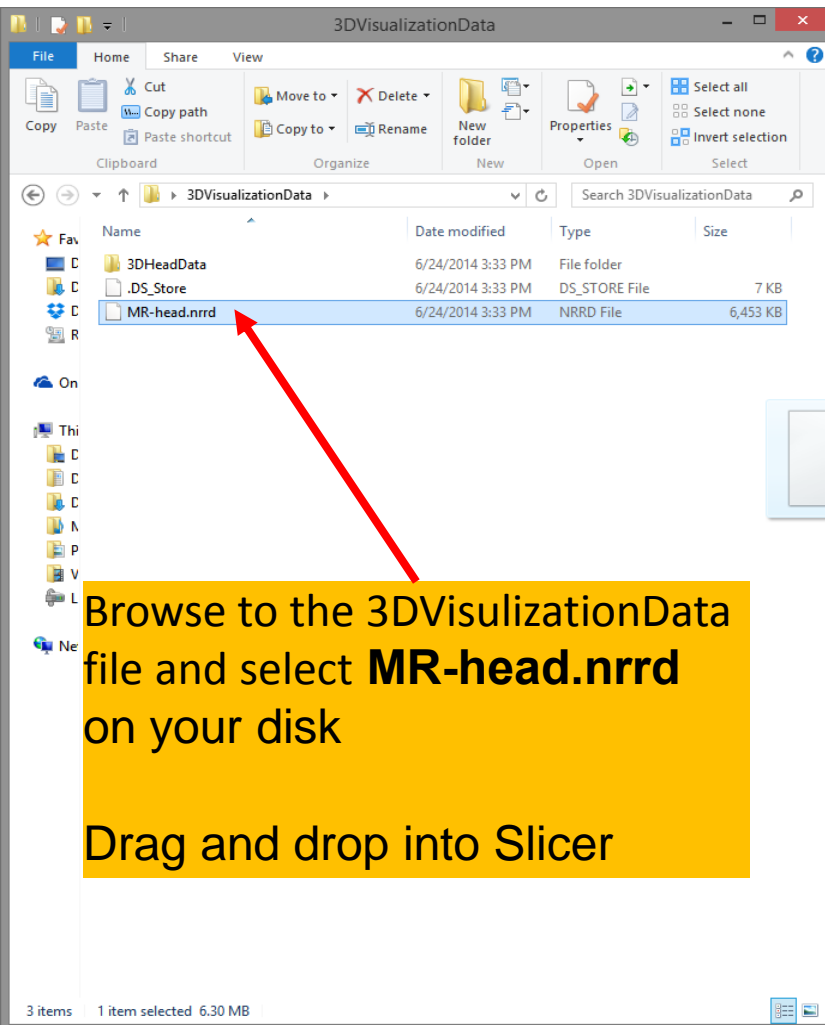
R: 0.000mm Y: 0.000mm G: 0.000mm A: 0.000mm



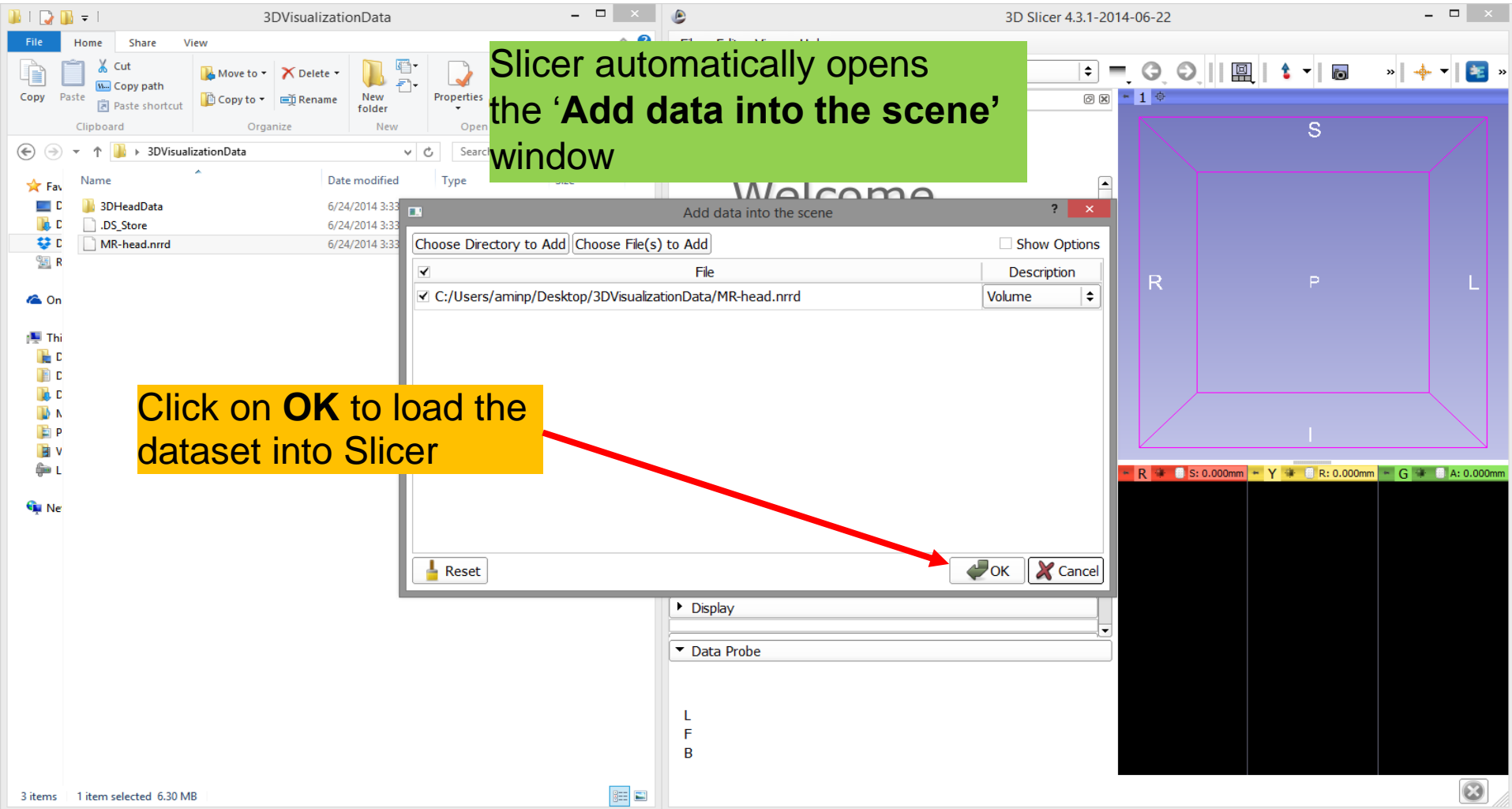
# Slicer User Interface



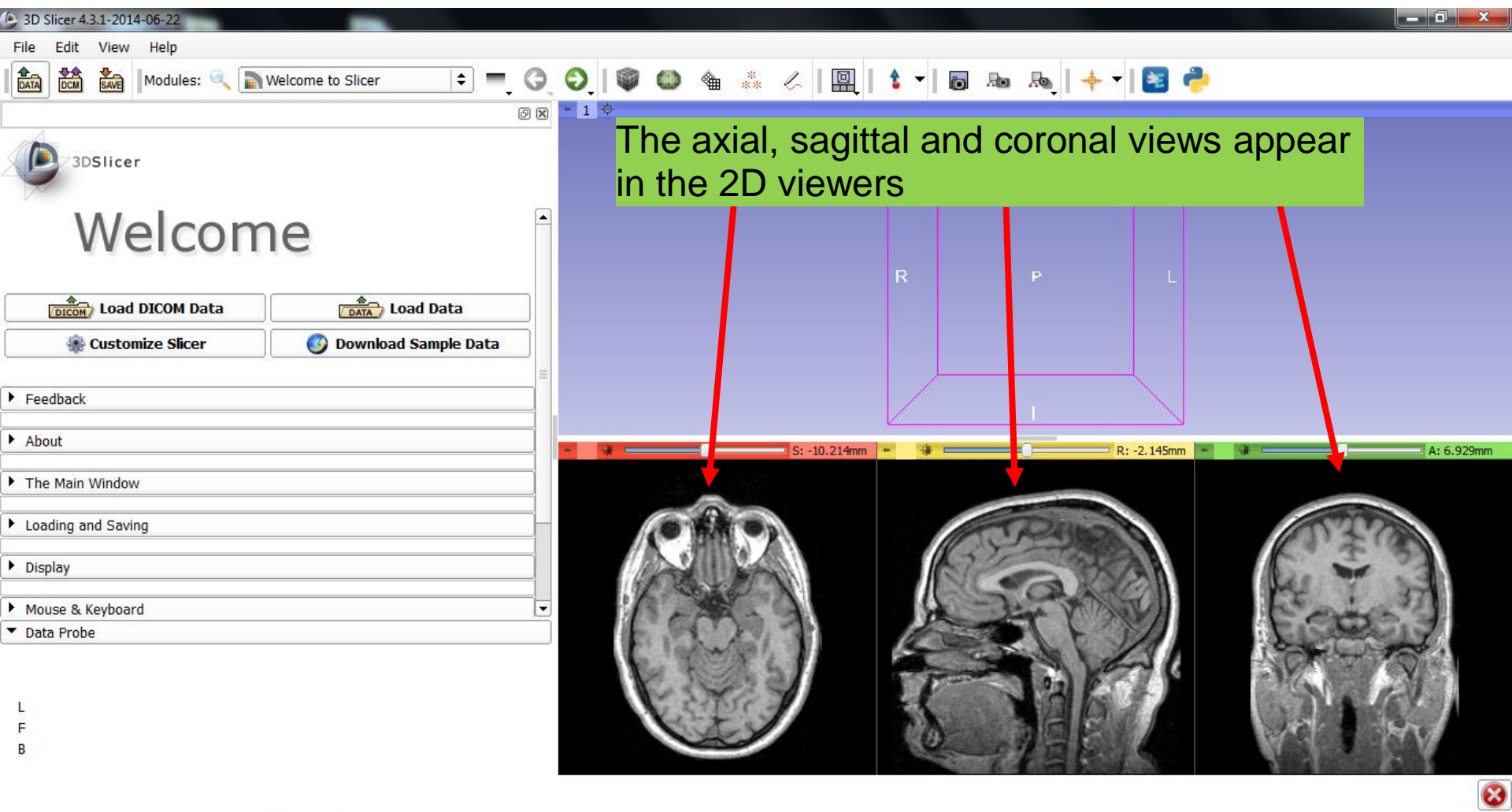
# Slicer4



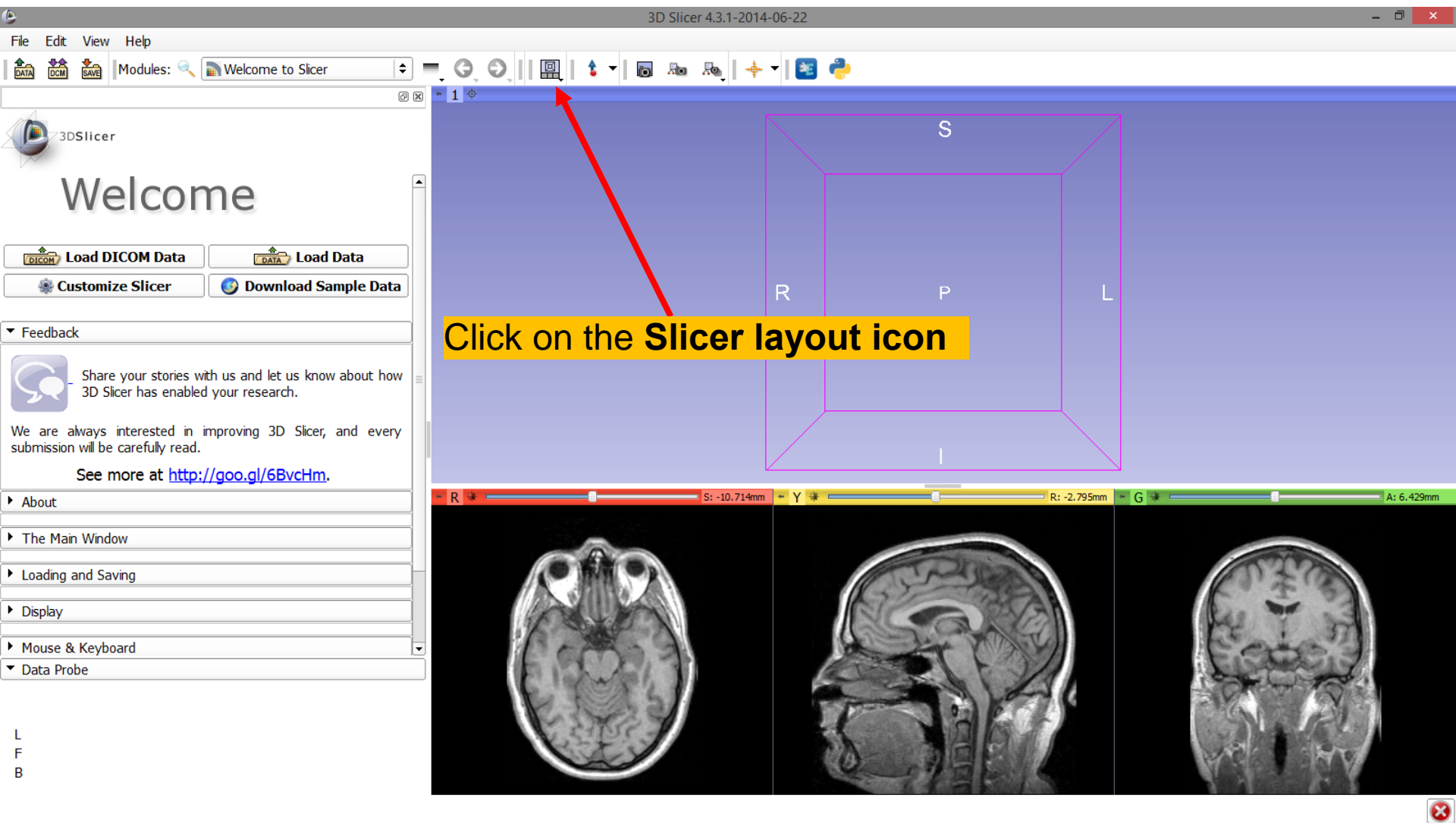
# Slicer4



# Loading a volume



# 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

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

About

The Main Window

Loading and Saving

Display

Mouse & Keyboard

Data

- 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

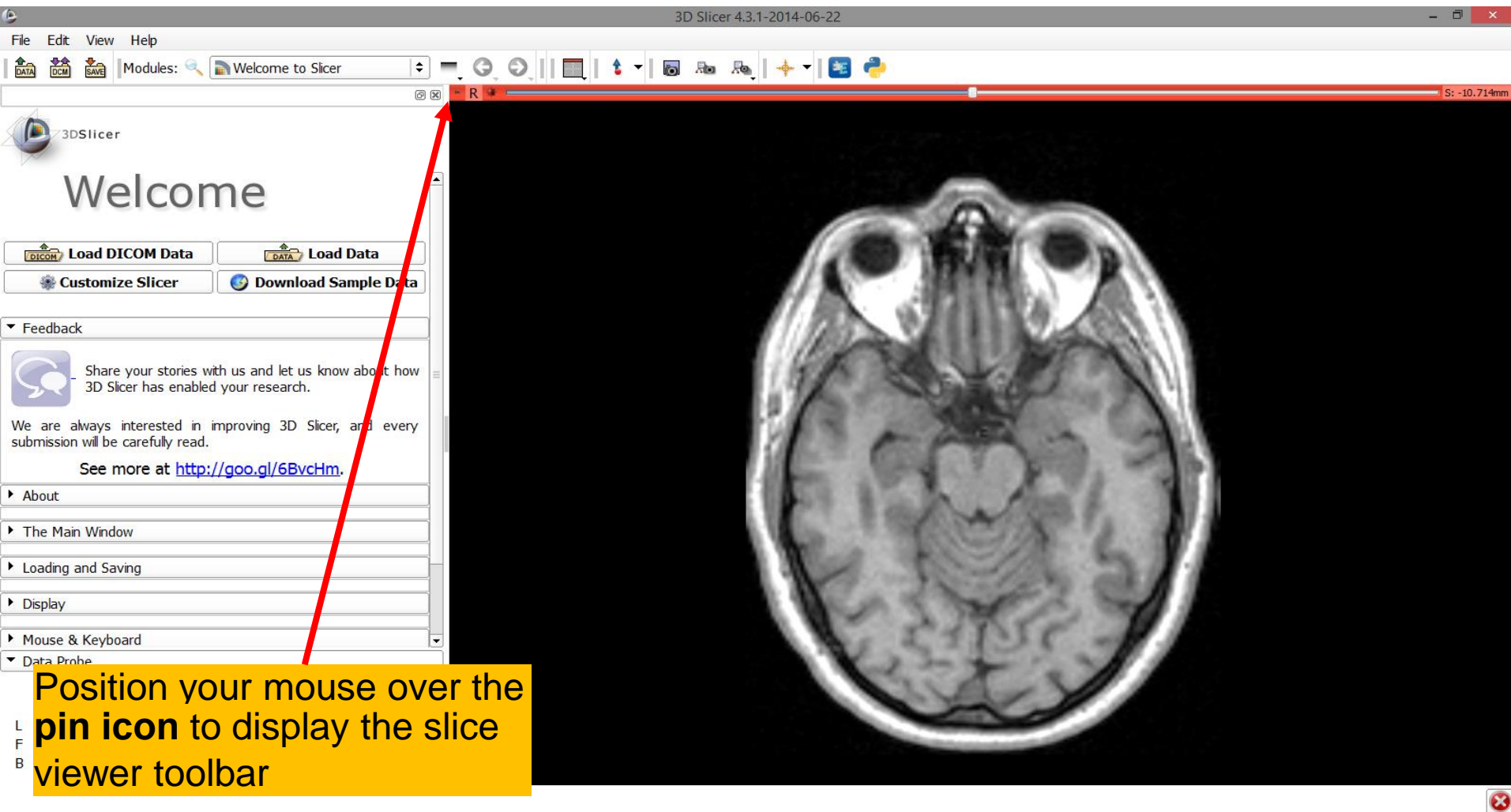
R L S I

R: -2.795mm G: A: 6.429mm

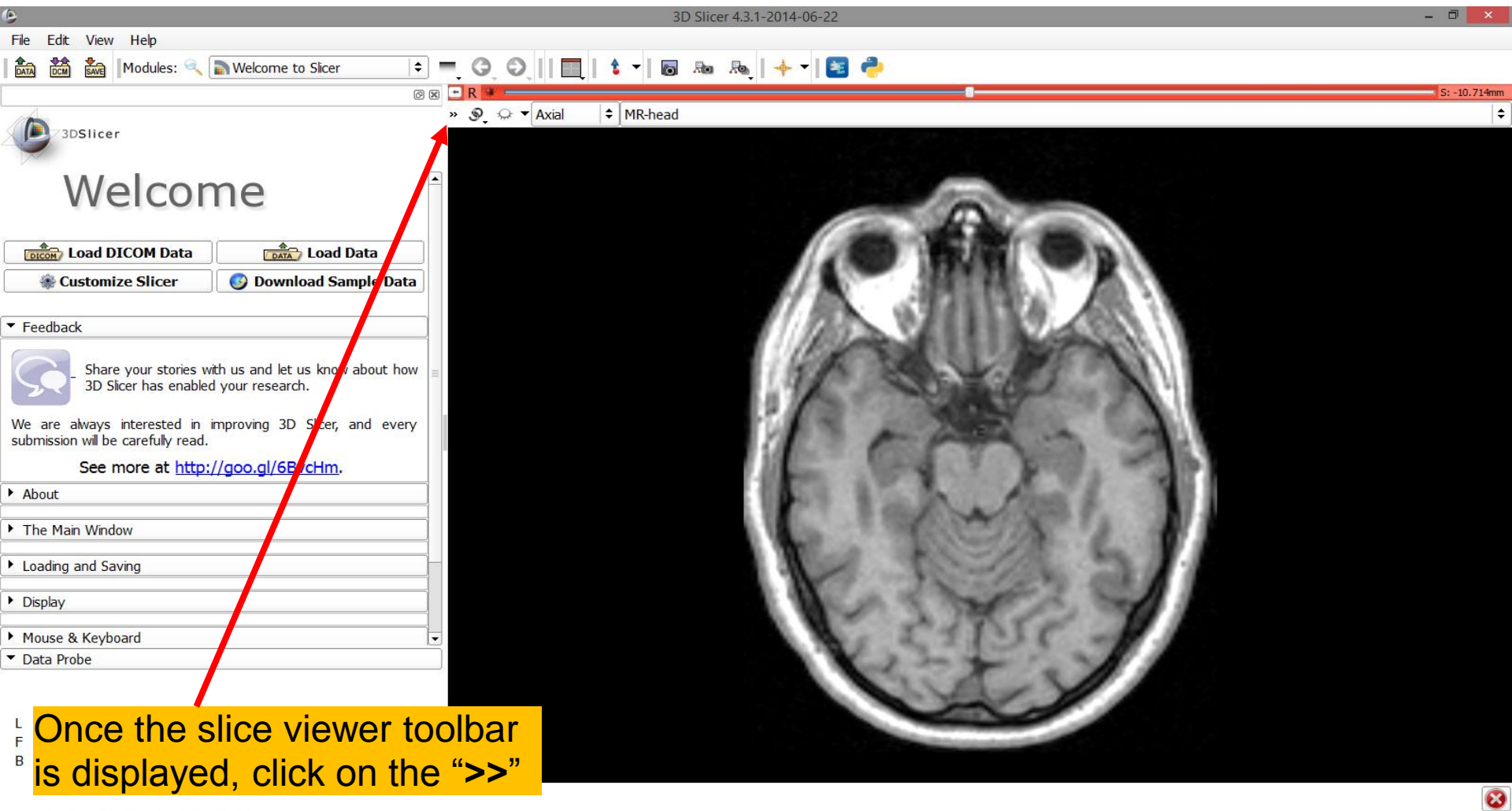
L F B

**Click on the Red slice only option**

# Loading a volume

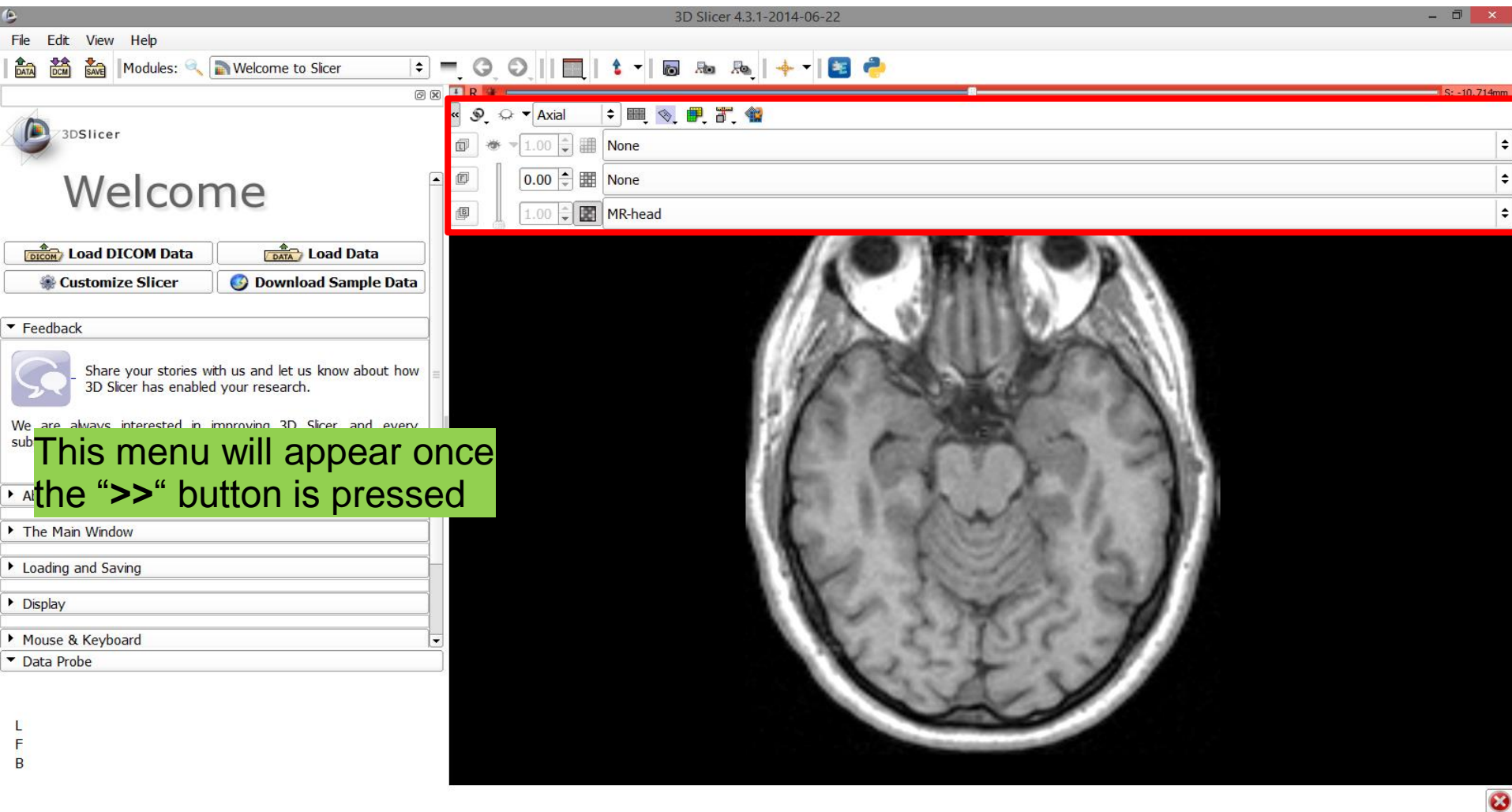


# Loading a volume

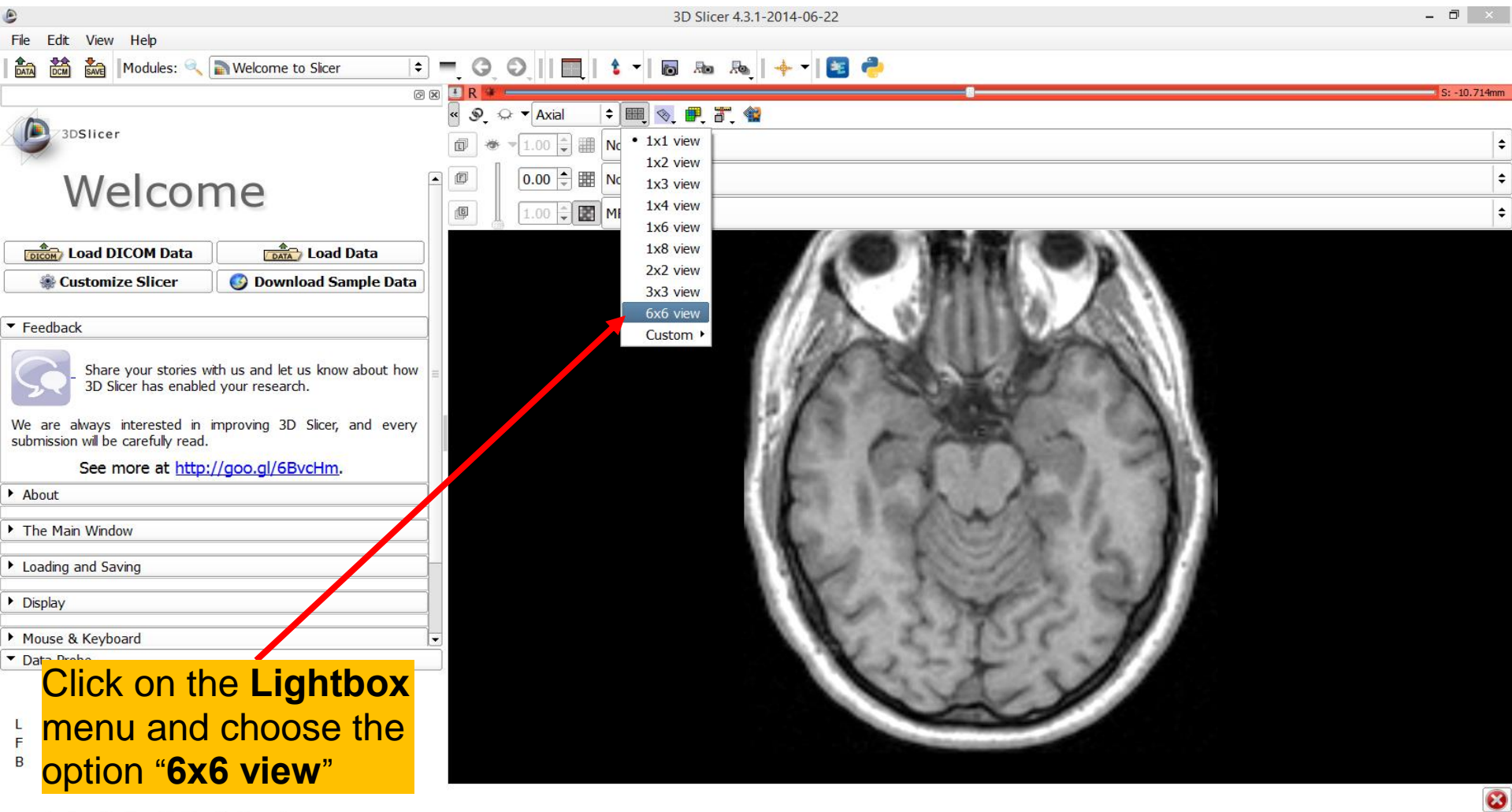




# Loading a volume



# Loading a volume



3D Slicer 4.3.1-2014-06-22

File Edit View Help

DATA DCM SAVE Modules: Welcome to Slicer

3DSlicer

## Welcome

Load DICOM Data Load Data

Customize Slicer Download Sample Data

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About

The Main Window

Loading and Saving

Display

Mouse & Keyboard

Data Probe

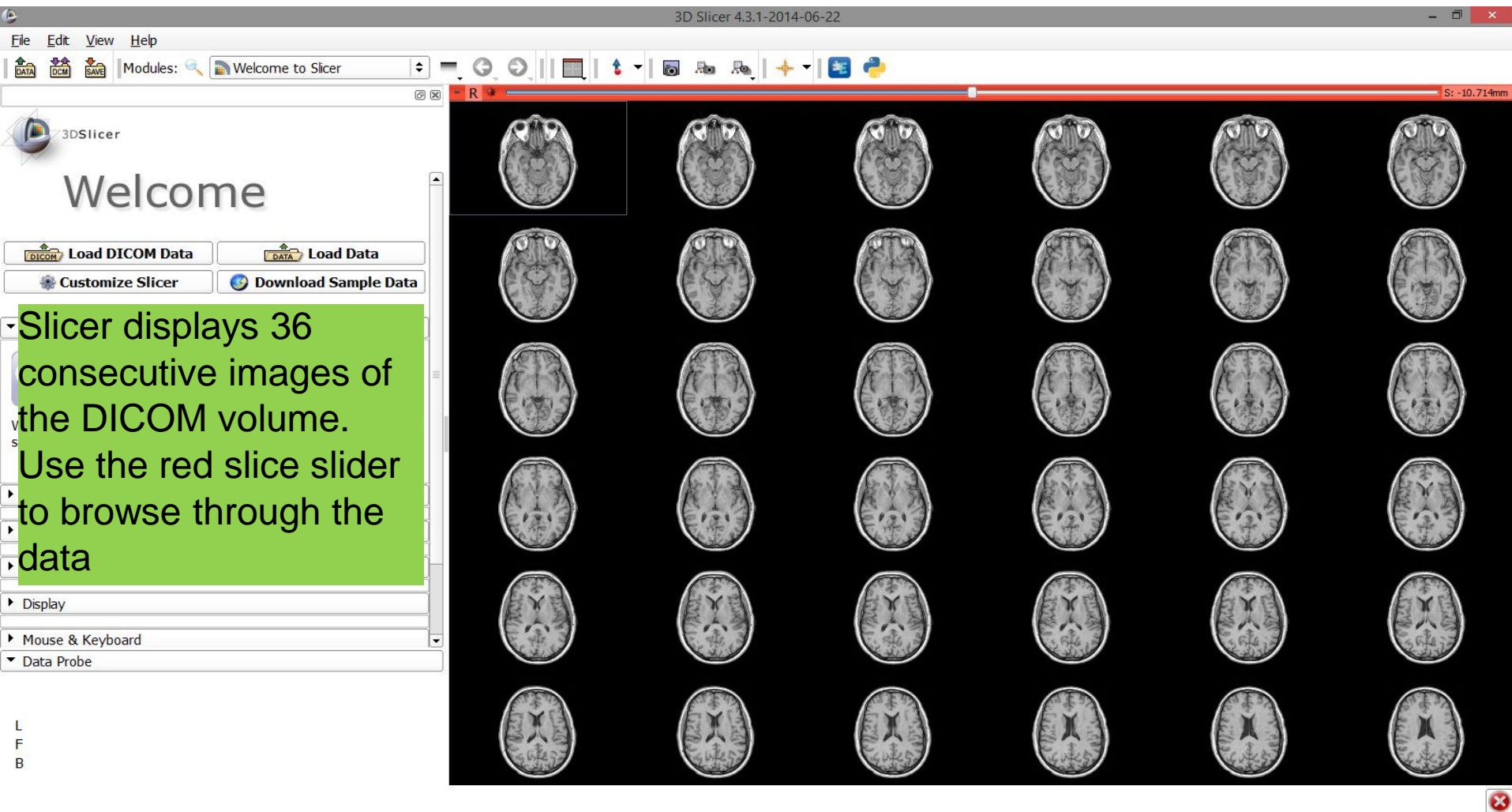
Lightbox

- 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 'Conventional' layout menu is open, displaying various viewing options. A red arrow points from a yellow callout box to the 'Conventional' menu item. The main window displays a grid of brain slices in the 'Conventional' layout.

**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 list of view configurations. The '1x1 view' option is selected, indicated by a red arrow. A yellow text box with a red arrow pointing to the '1x1 view' option contains the following text:

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

The 'Lightbox' menu options are:

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

The interface also shows a sidebar with a 'Data Probe' section and a bottom status bar with coordinates: S: -10.714mm, R: -2.795mm, A: 6.429mm.

# 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>.

3DSlicer

File Edit View Help

Modules: Welcome to Slicer

1

S R P L I

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

Axial

1.00 None

0.00 None

1.00 MR-head

L F B

# Loading a volume

3D Slicer 4.3.1-2014-06-22

File Edit View Help

DATA DCM SAVE Modules: Welcome to Slicer

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>.

Axial

1.00 None

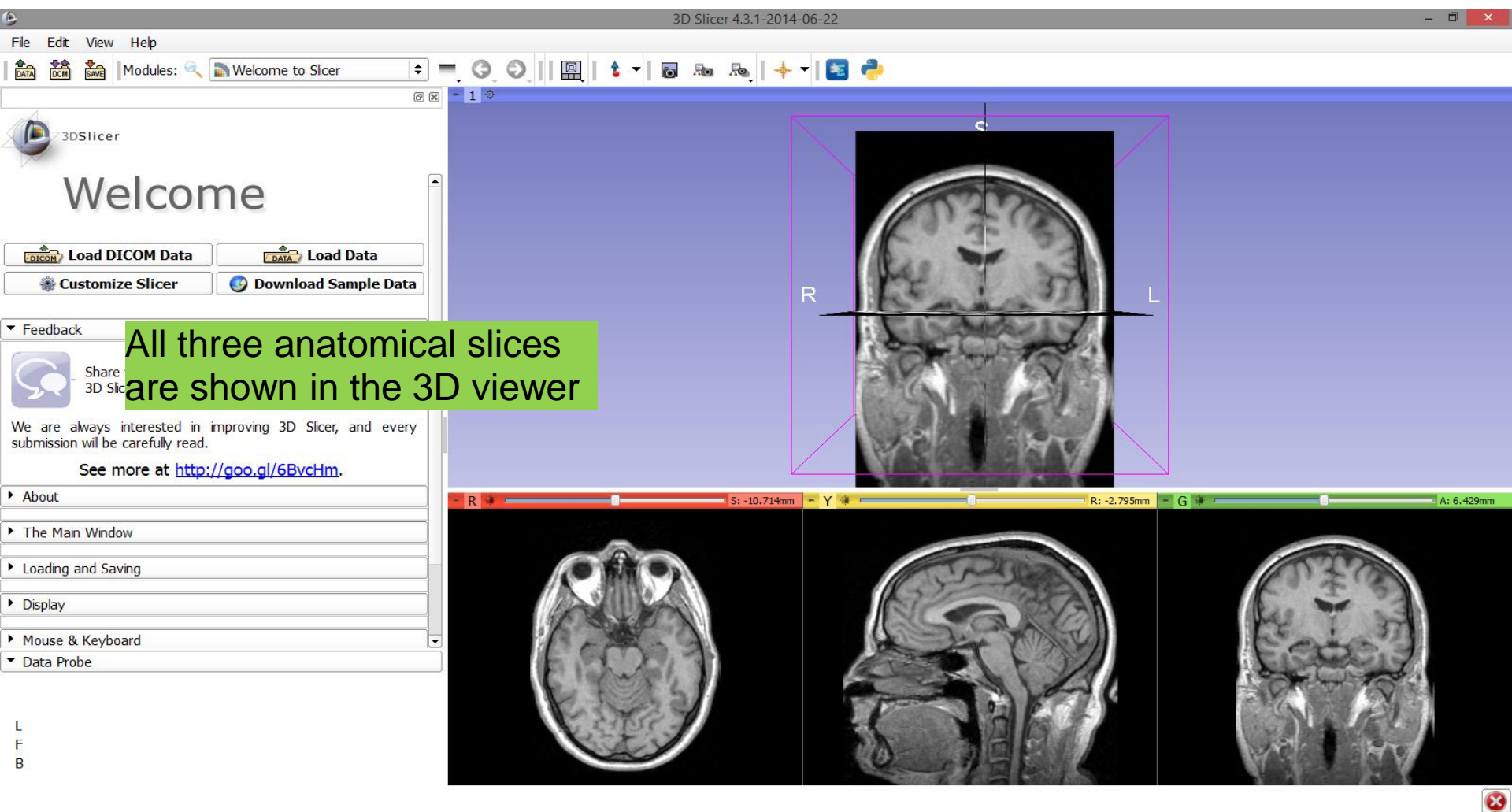
0.00 None

1.00 MR-head

L F B

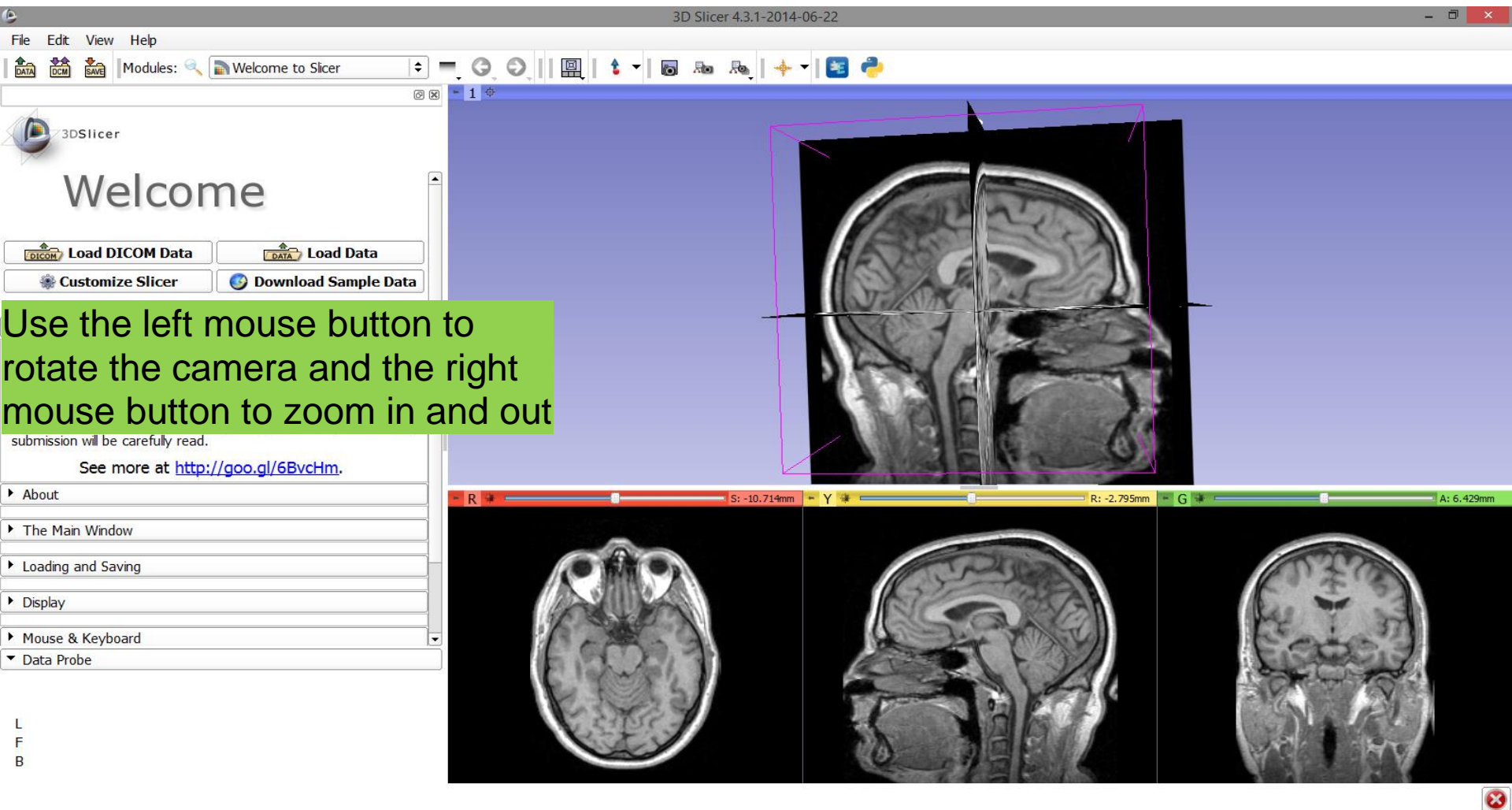
S: -10.714mm Y: -2.795mm R: -2.795mm G: 6.429mm A: 6.429mm

# Loading a volume

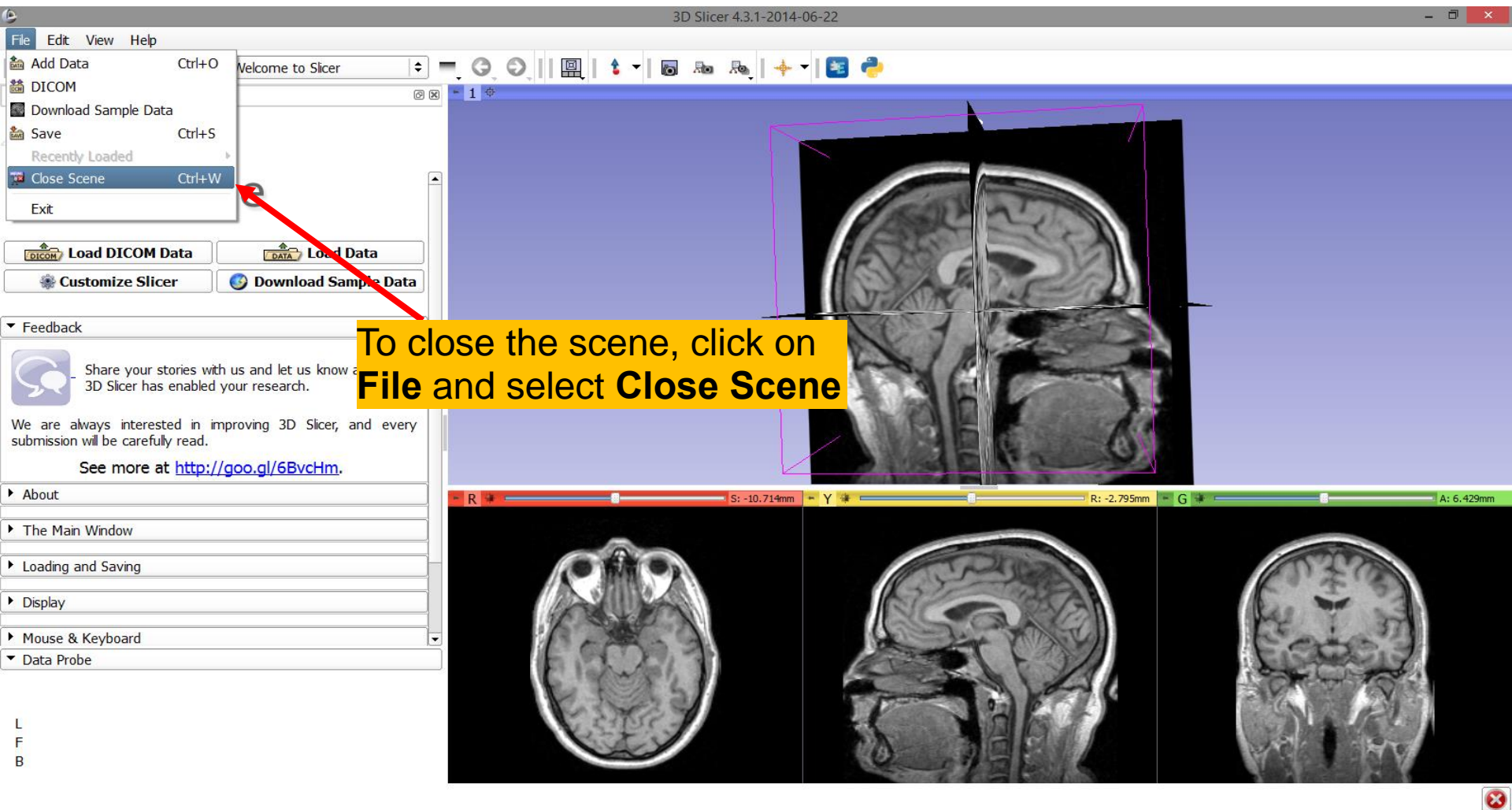




# Loading a volume

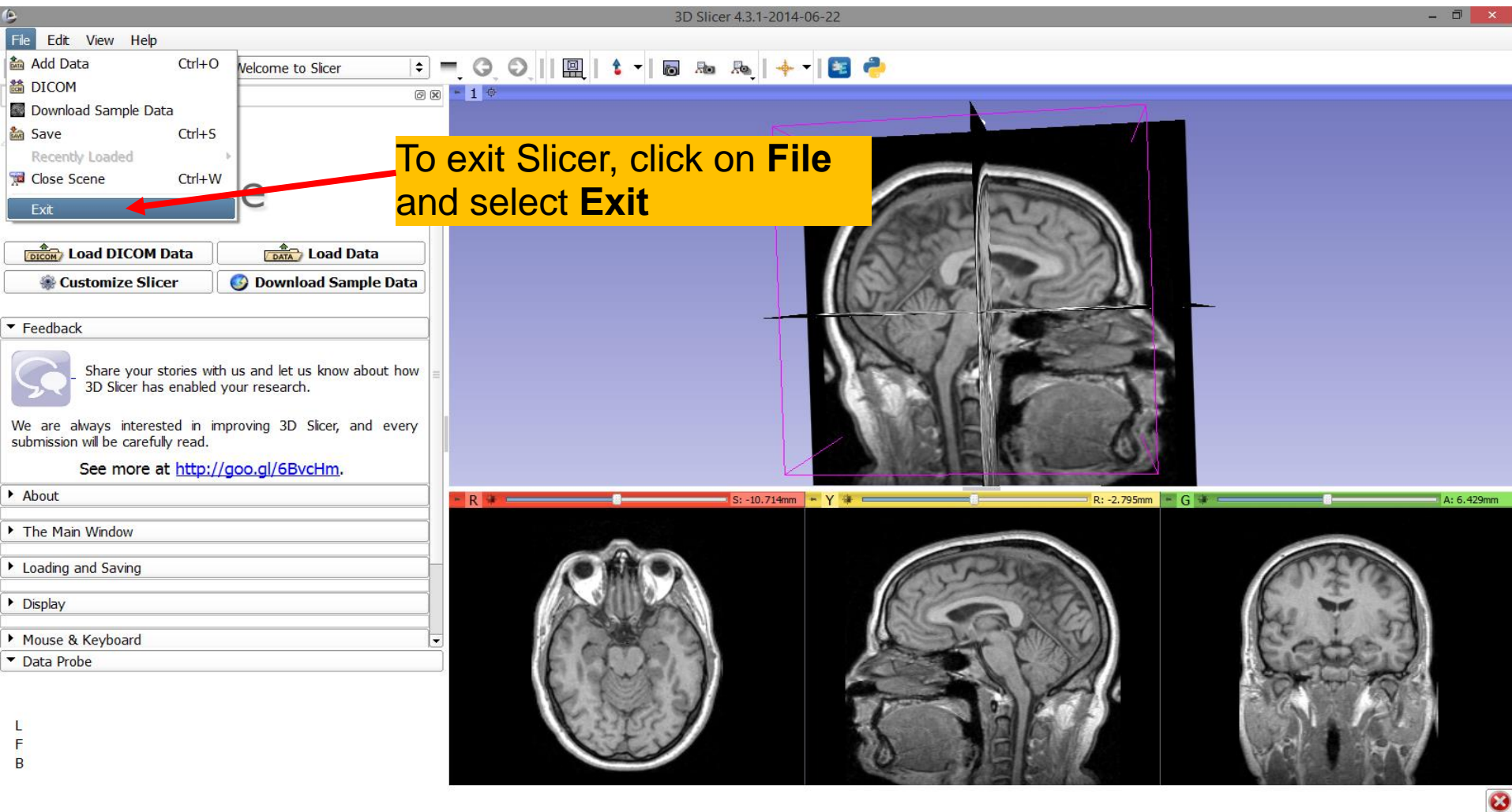


# Close the scene

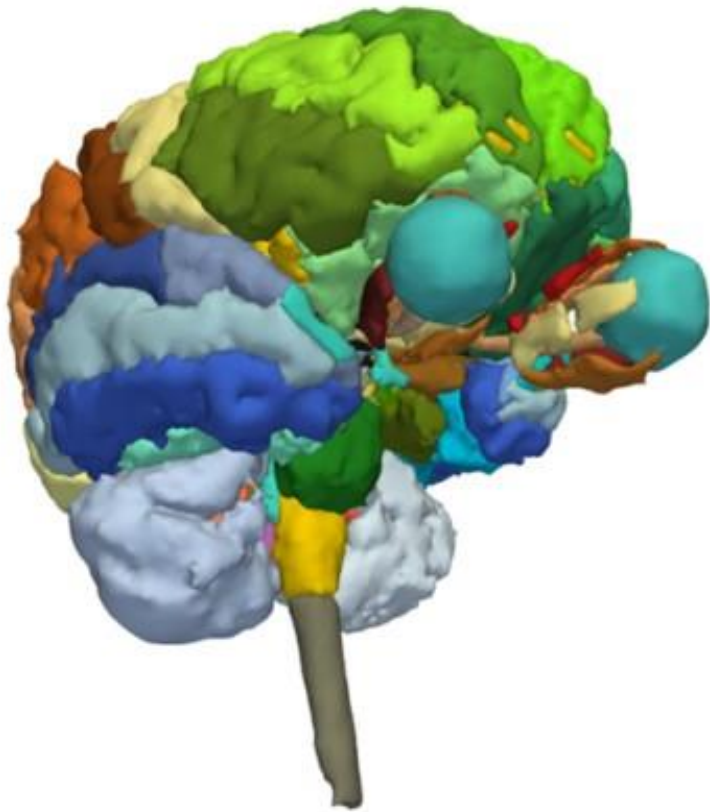


To close the scene, click on File and select Close Scene

# 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 File Explorer window titled '3DHeadData'. The file list is as follows:

| 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  |

A red arrow points from the '3DHeadScene' file to the 'Load Data' button in the 3D Slicer window. A yellow text box at the bottom left contains the text: 'Drag and drop the file '3DHeadScene.mrml' into Slicer'. The 3D Slicer window is titled '3D Slicer 4.3.1-2014-06-22' and shows a 'Welcome' screen with buttons for 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. A red arrow also points from the 'Load Data' button to the 3D view area, which shows a purple rectangular box with axes labeled S, R, P, L, and I.

# Loading a Scene

3DHeadData

3D Slicer 4.3.1-2014-06-22

Add data into the scene

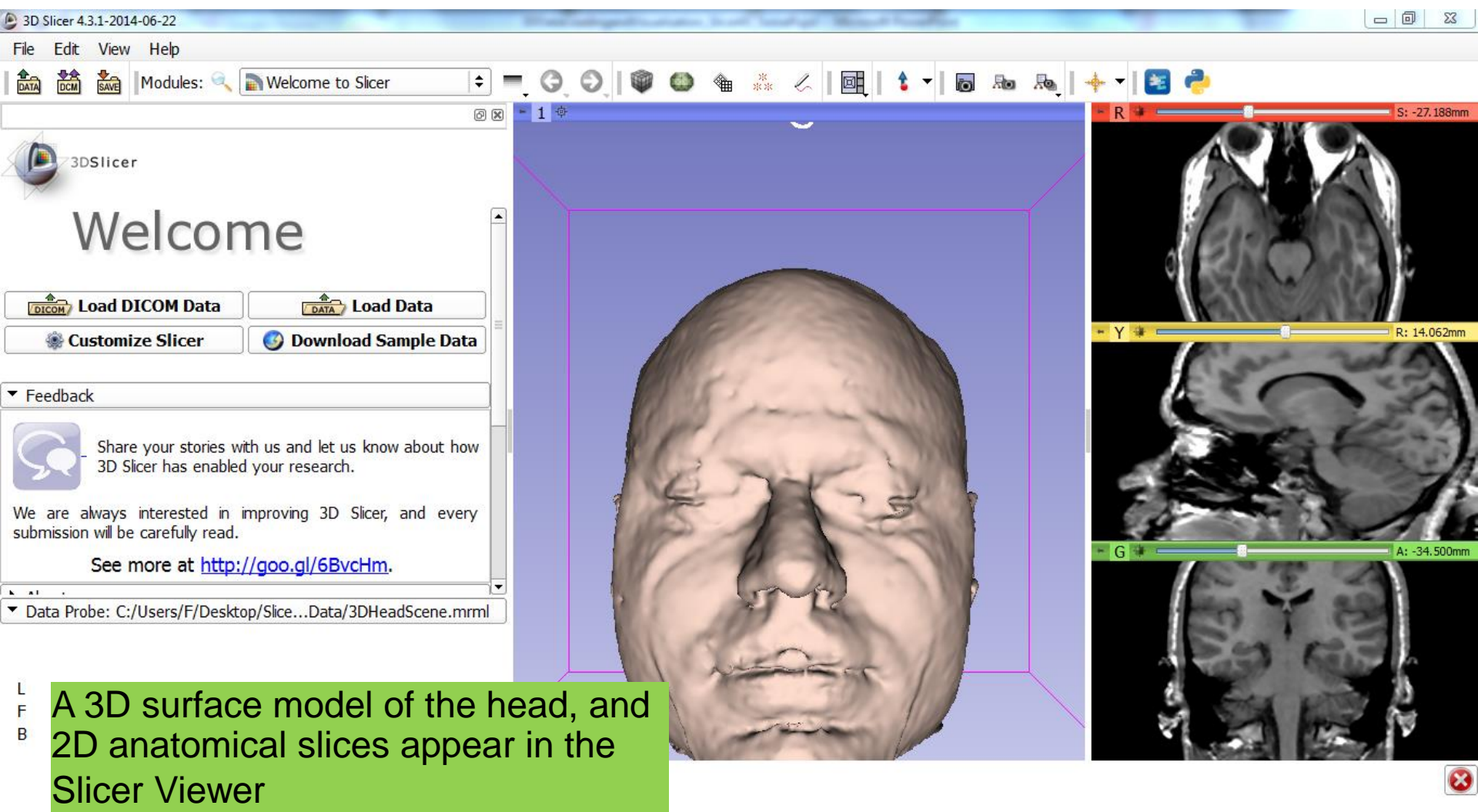
Choose Directory to Add | Choose File(s) to Add

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

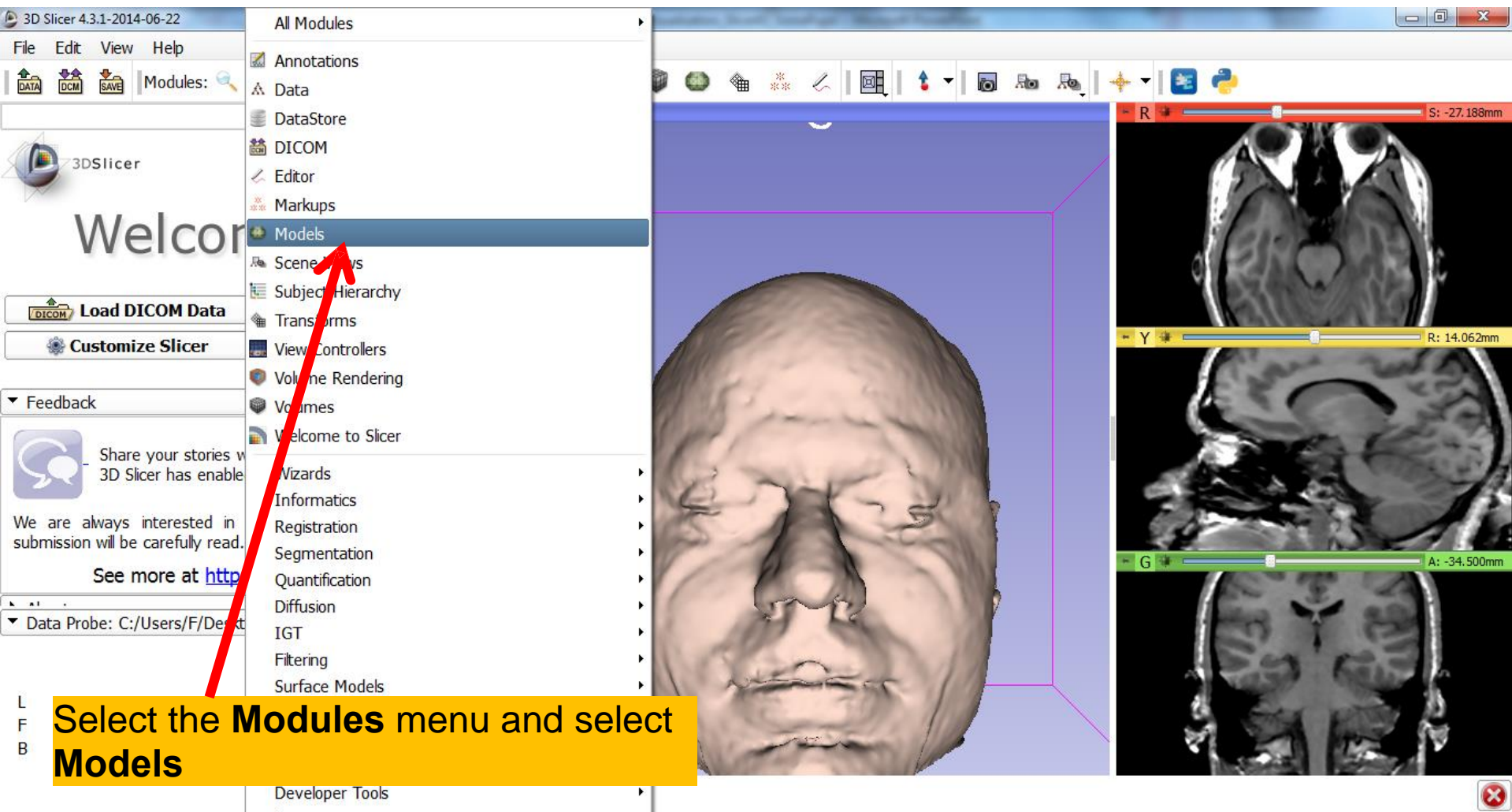
Reset OK Cancel

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

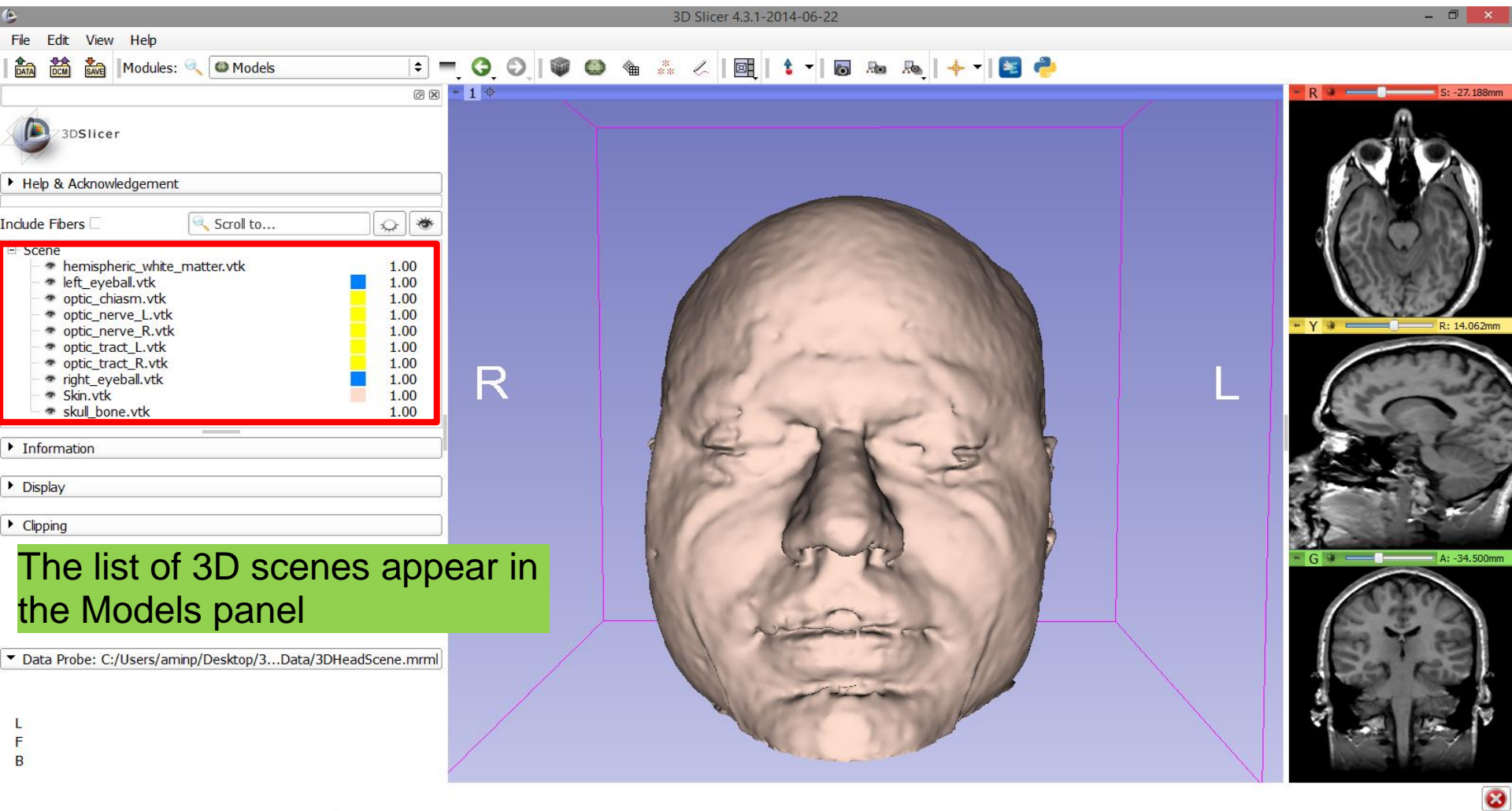


The screenshot displays the 3D Slicer 4.3.1 interface. On the left, the 'Modules' menu is open, with 'Models' highlighted. A red arrow points from the 'Models' menu item to a yellow callout box. The main window shows a 3D model of a human face and three orthogonal MRI slices (axial, sagittal, and coronal). The status bar at the bottom indicates the current slice position: R: -27.188mm, Y: 14.062mm, G: -34.500mm.

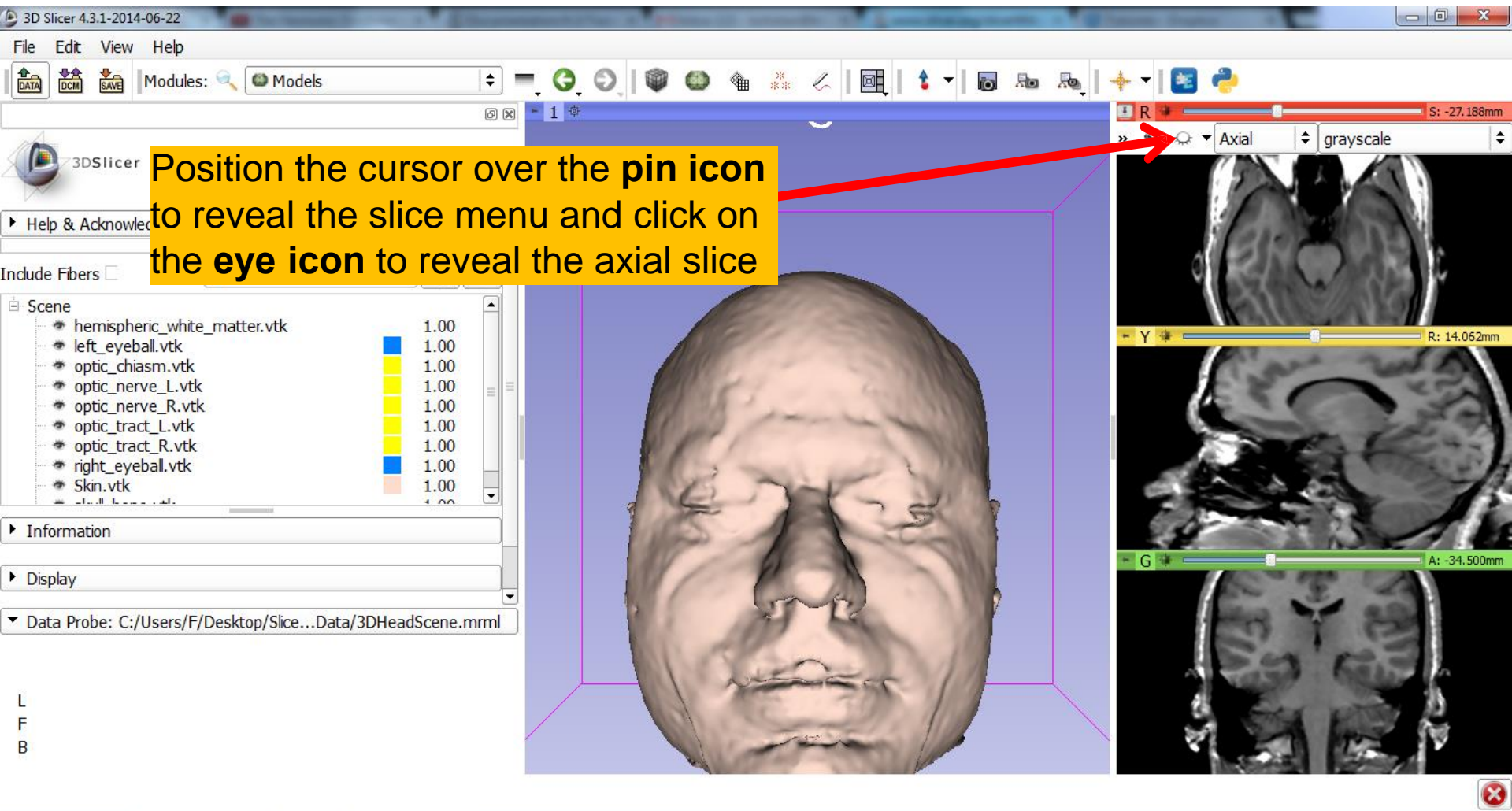
**Select the **Modules** menu and select **Models****



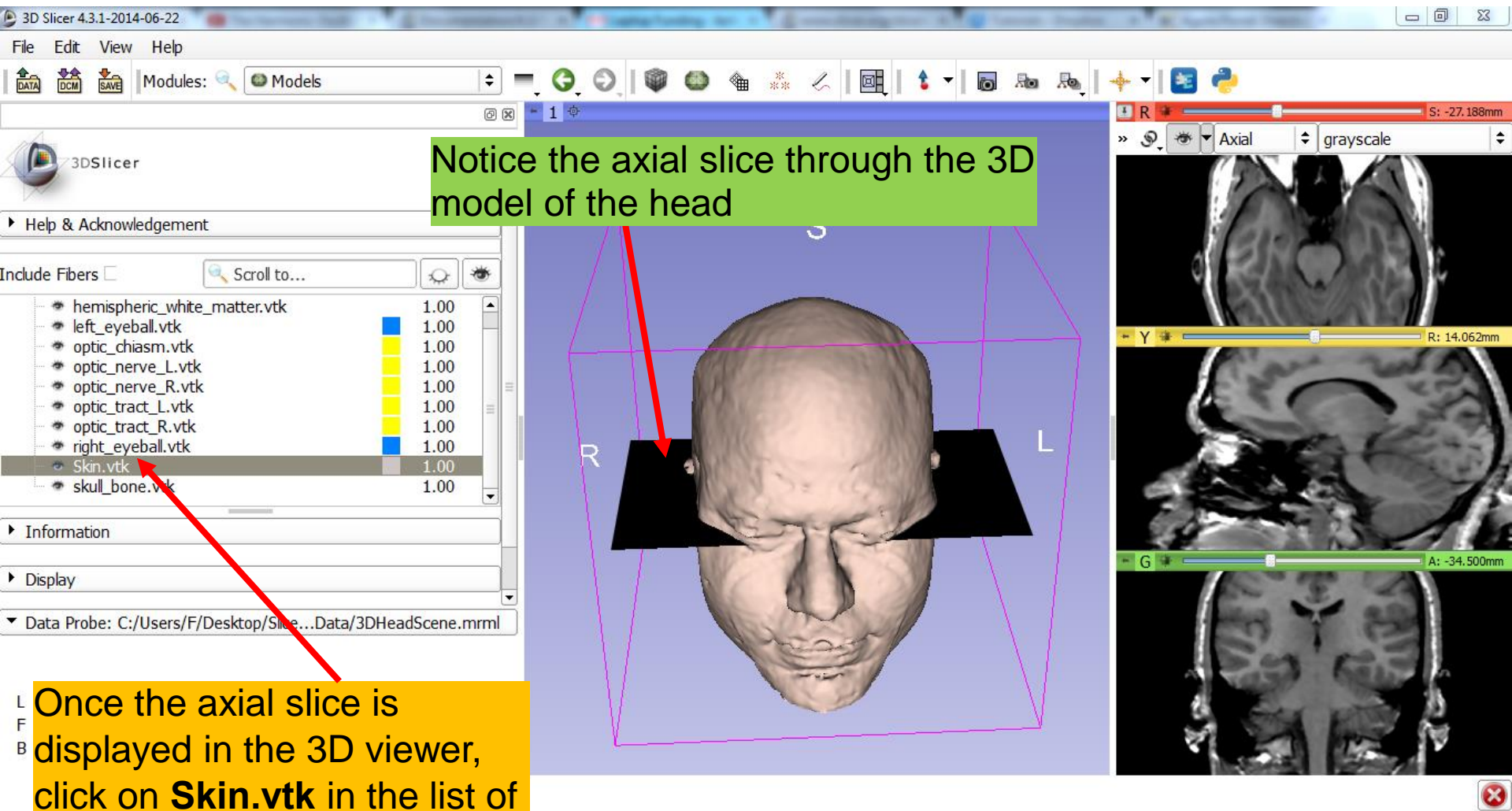
# Models Module



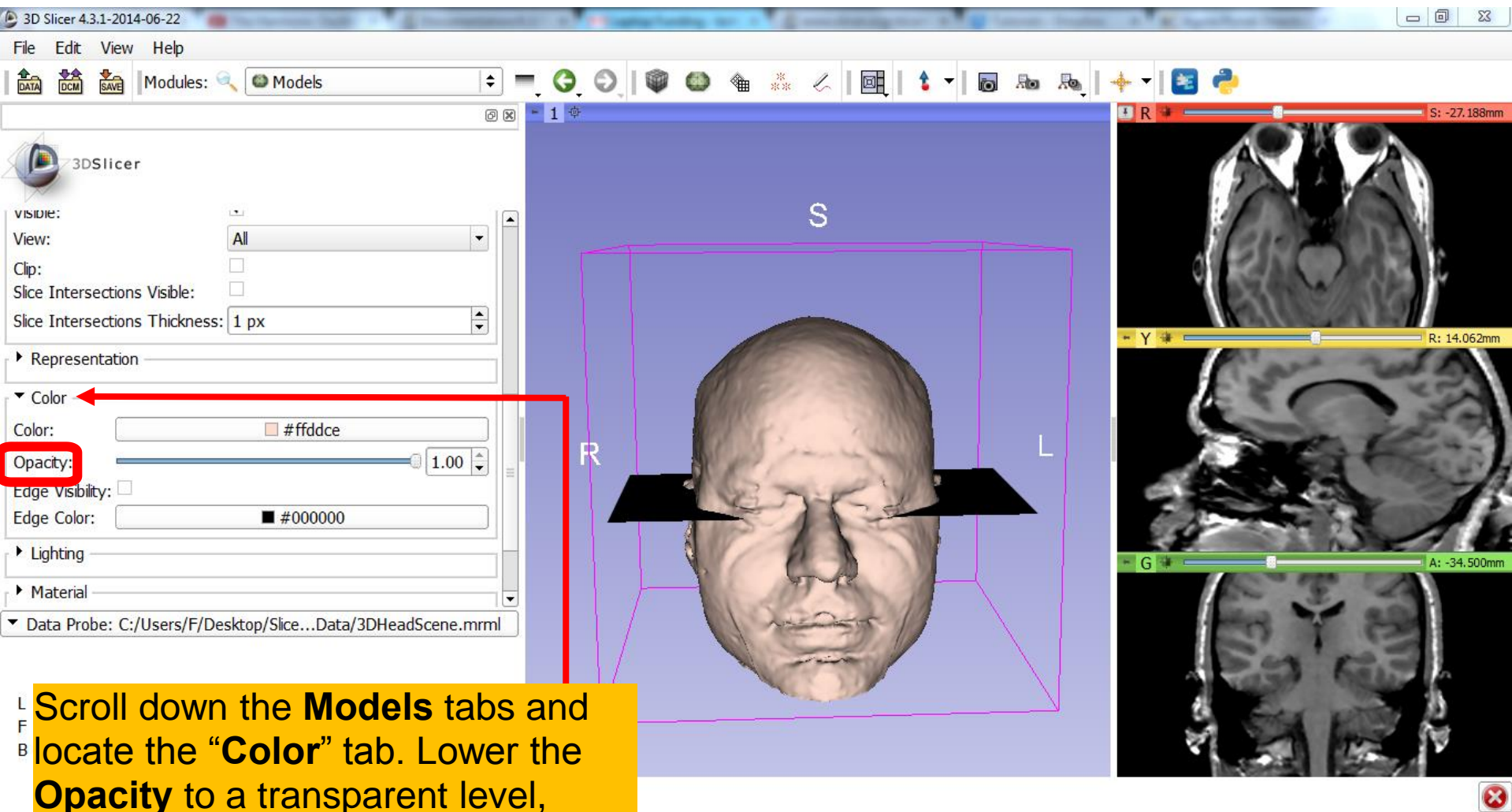
# 3D Visualization



# 3D Visualization



# 3D Visualization



3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Models

3DSlicer

visible: All

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color  #ffddce

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Material

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

S

R

L

R: -27.188mm

Y

R: 14.062mm

G

A: -34.500mm

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

# 3D Visualization

3D Slicer 4.3.1-2014-06-22

File Edit View Help

DATA DCM SAVE Modules: Models

3DSlicer

- optic\_tract\_R.vtk 1.00
- right\_eyeball.vtk 1.00
- Skull.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: #ffddce

Opacity: 0.30

Edge Visibility:

Edge Color: #000000

Lighting

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

R L

Notice the skin has become almost fully transparent

L F B

R S: -27.188mm

Y R: 14.062mm

G A: -34.500mm

# 3D Visualization

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Models

3DSlicer

Include Fibers  Scroll to...

| File Name                    | Value |
|------------------------------|-------|
| 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

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

S

R L

R: -27.188mm

Y

R: 14.062mm

G

A: -34.500mm

L  
F  
B

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

# 3D Visualization

3D Slicer 4.3.1-2014-06-22

File Edit View Help

DATA DCIM SAVE Modules: Models

3DSlicer

- optic\_tract\_R.vtk 1.00
- right\_eyeball.vtk 1.00
- Skin.vtk 0.30
- skull\_bone.vtk 1.00

Information

Display

Visibility

Visible:  All

View: [Dropdown]

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffffff

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting

Data

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

R L

S: -27.188mm

Y R: 14.062mm

G A: -34.500mm

L F B

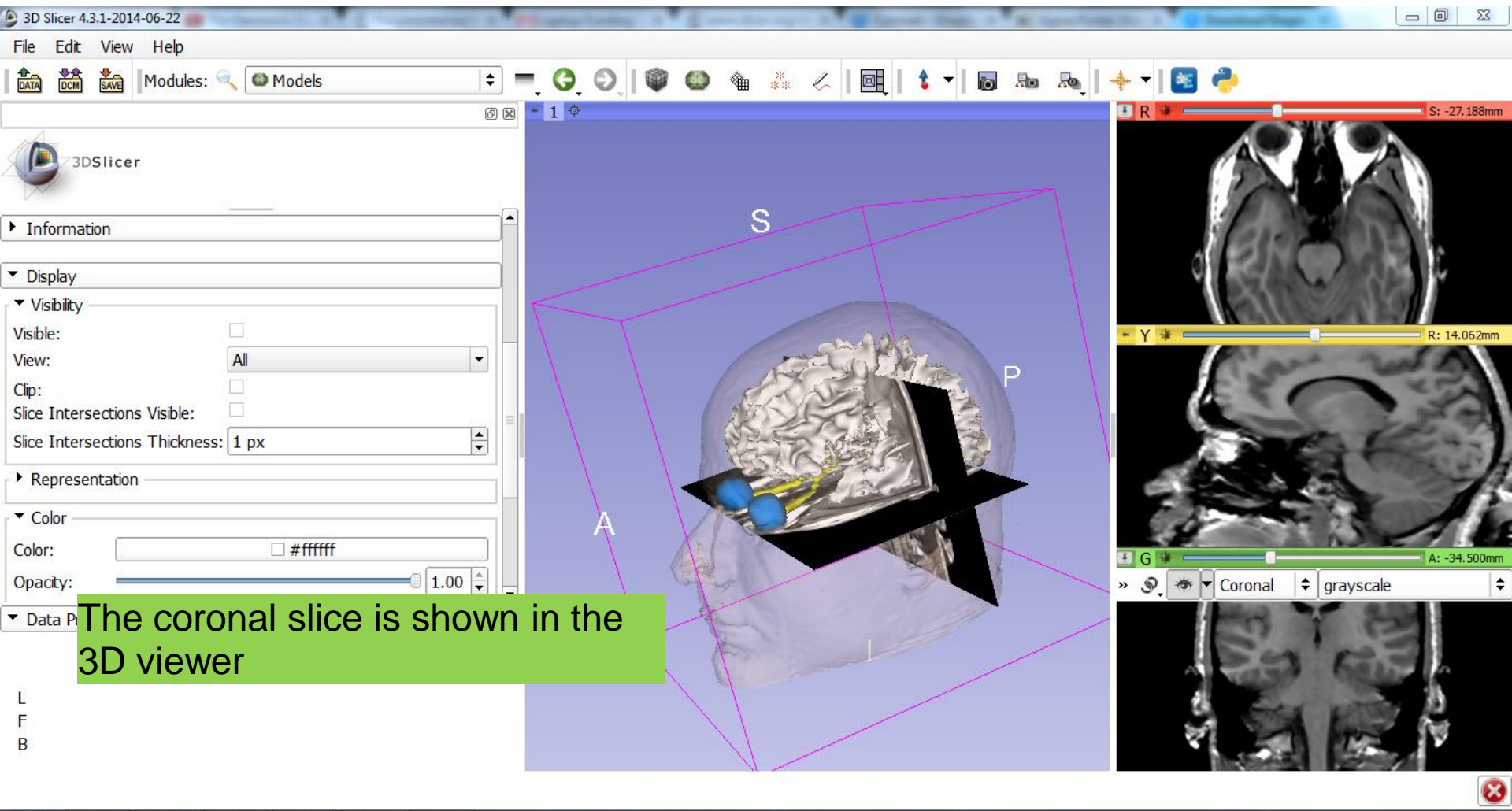
# 3D Visualization

The screenshot displays the 3D Slicer interface. The main 3D view shows a semi-transparent head model with a 3D brain reconstruction inside. A pink wireframe box is overlaid on the head. The 3D view is labeled with 'S' at the top, 'R' on the left, and 'L' on the right. A horizontal slice is visible through the brain. The right side of the interface shows three 2D slice views: a coronal slice (top), a sagittal slice (middle), and an axial slice (bottom). The coronal slice view has a red arrow pointing to a pin icon in its toolbar. The toolbar also shows a sun icon and the text 'Coronal' and 'grayscale'. The left sidebar contains the 'Display' panel with 'Visibility' and 'Representation' sections. The 'Data Probe' at the bottom left shows the file path: 'C:/Users/F/Desktop/Slice...Data/3DHeadScene.mrml'.

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

3D Slicer 4.3.1-2014-06-22

File Edit View Help

Modules: Models

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

Information

Display

Visibility

Visible:

View: All

Clip:

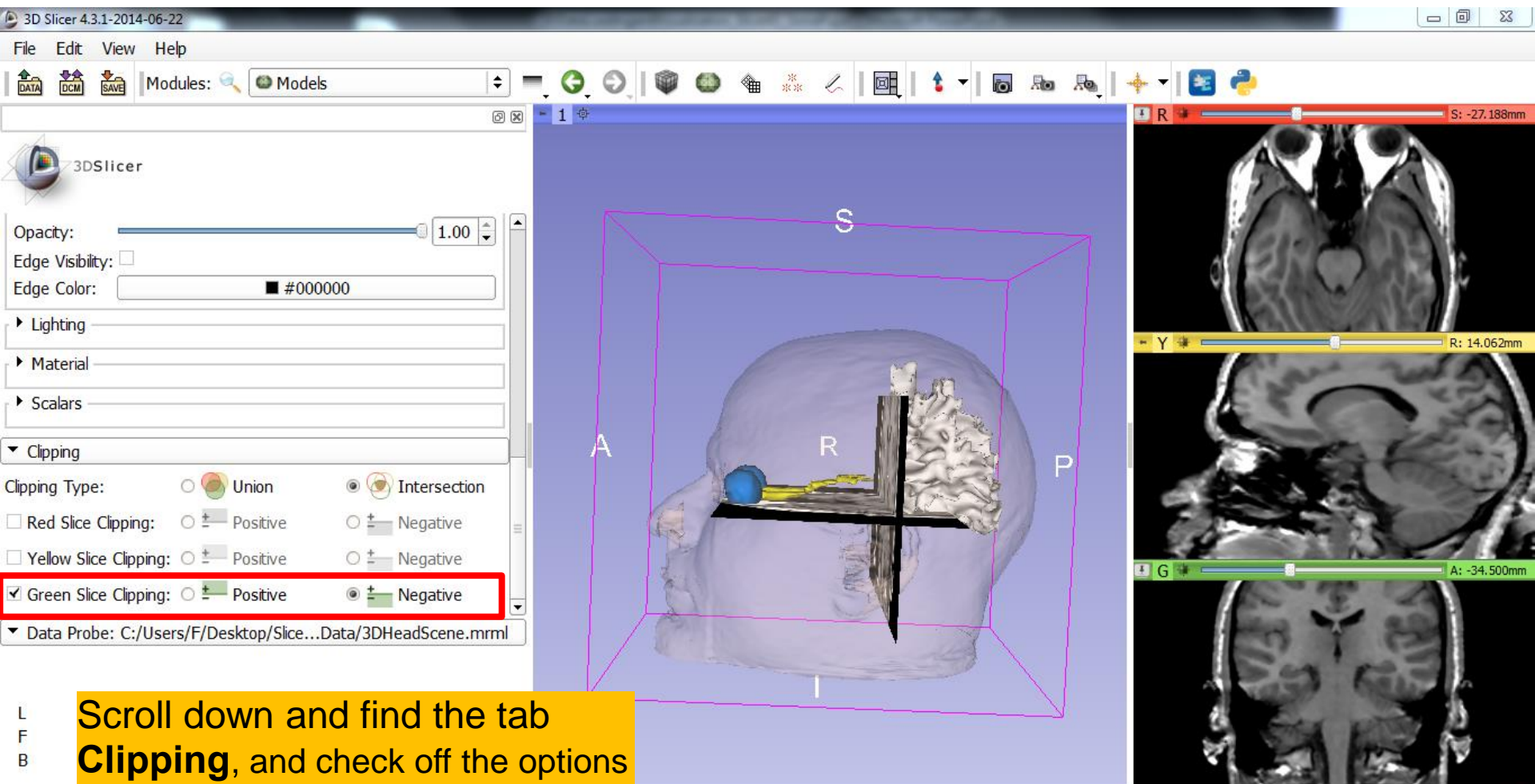
Slice Intersections Visible:

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

L  
F  
B

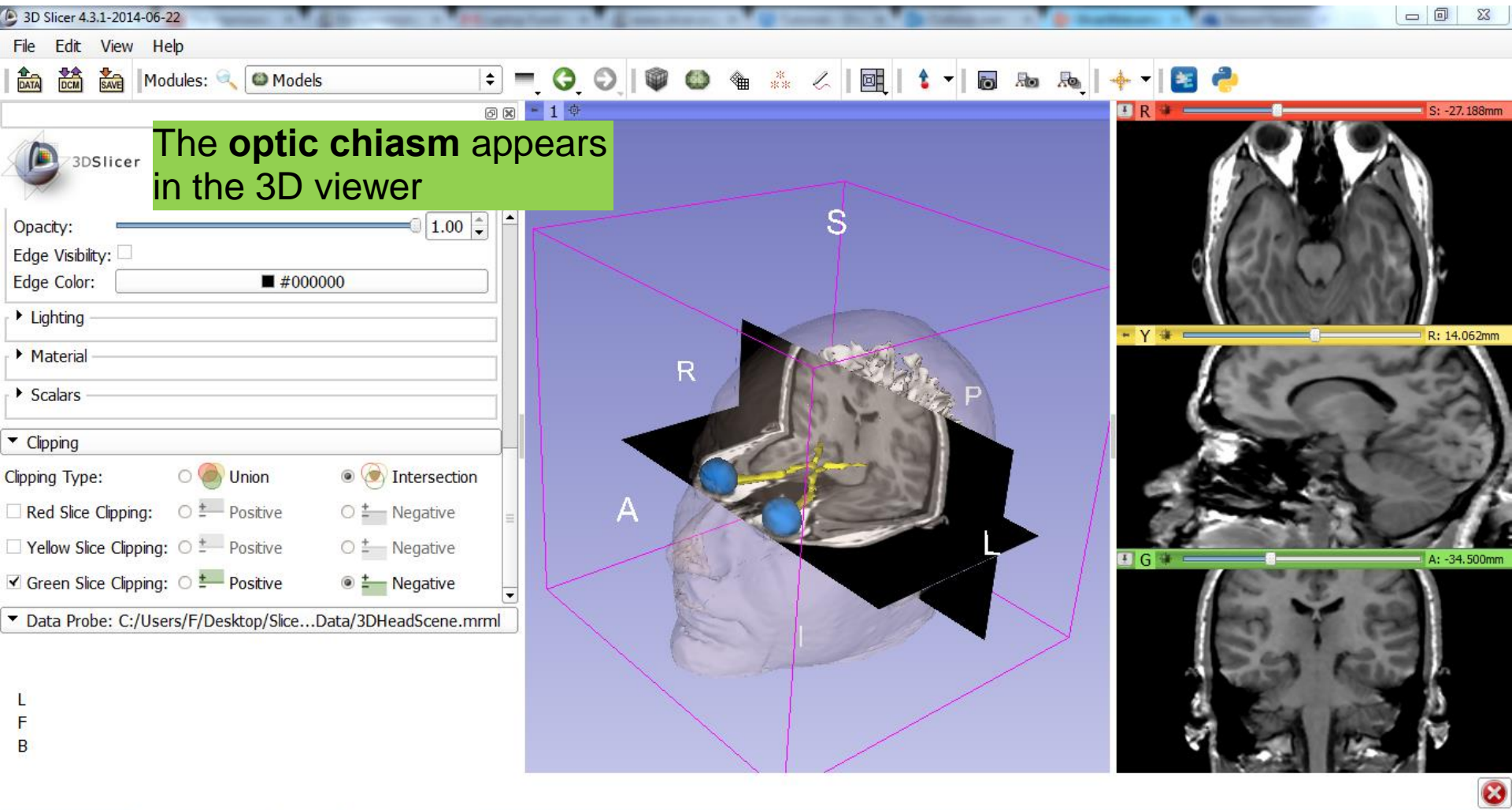
Scroll up and select the 3D scene **hemispheric\_white\_matter.vtk**, then check off the option for **Clip** under the **Visibility** tab

# 3D Visualization

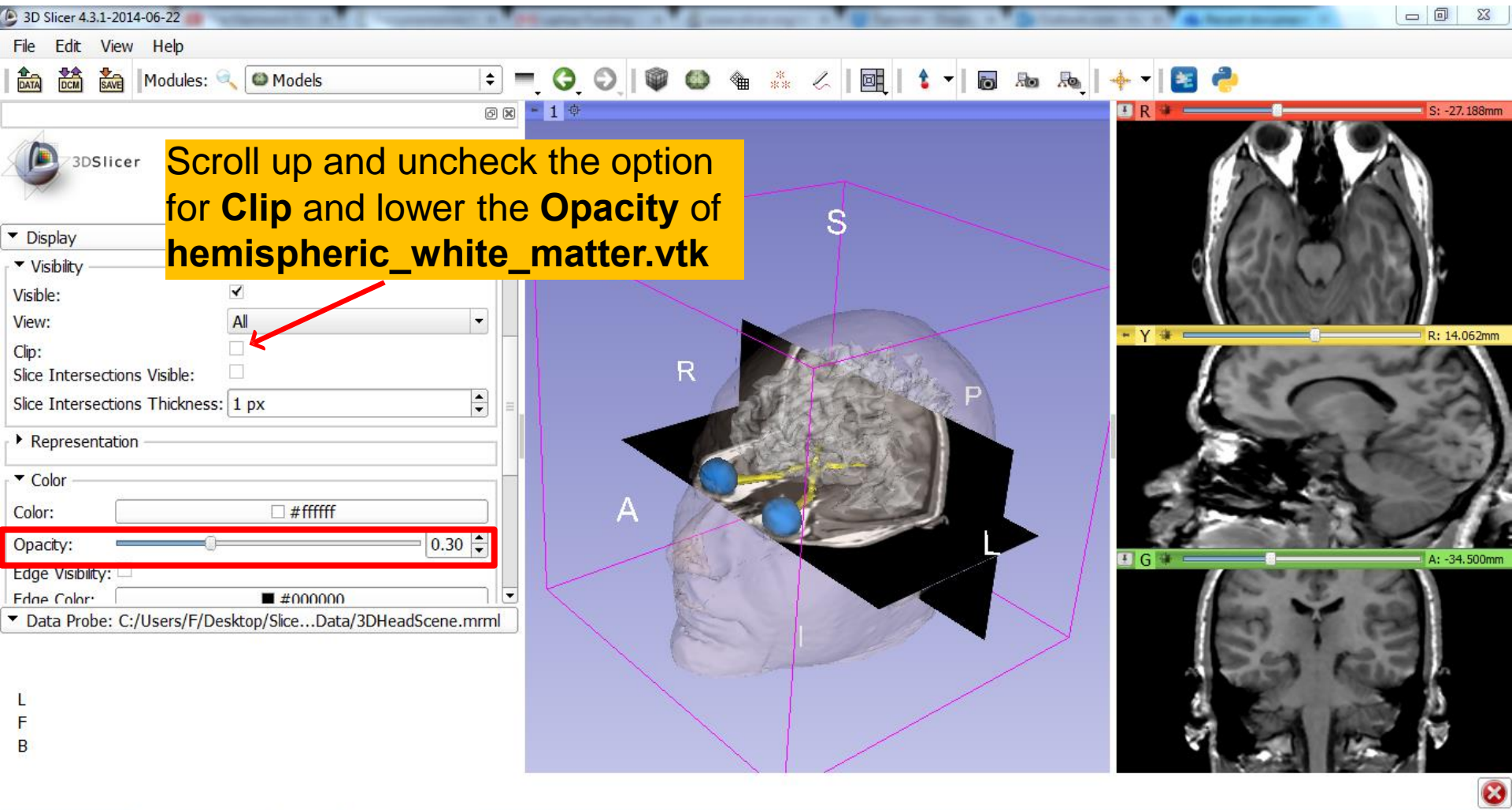


LF B  
Scroll down and find the tab **Clipping**, and check off the options for **Green Slice Clipping** and **Negative Space**

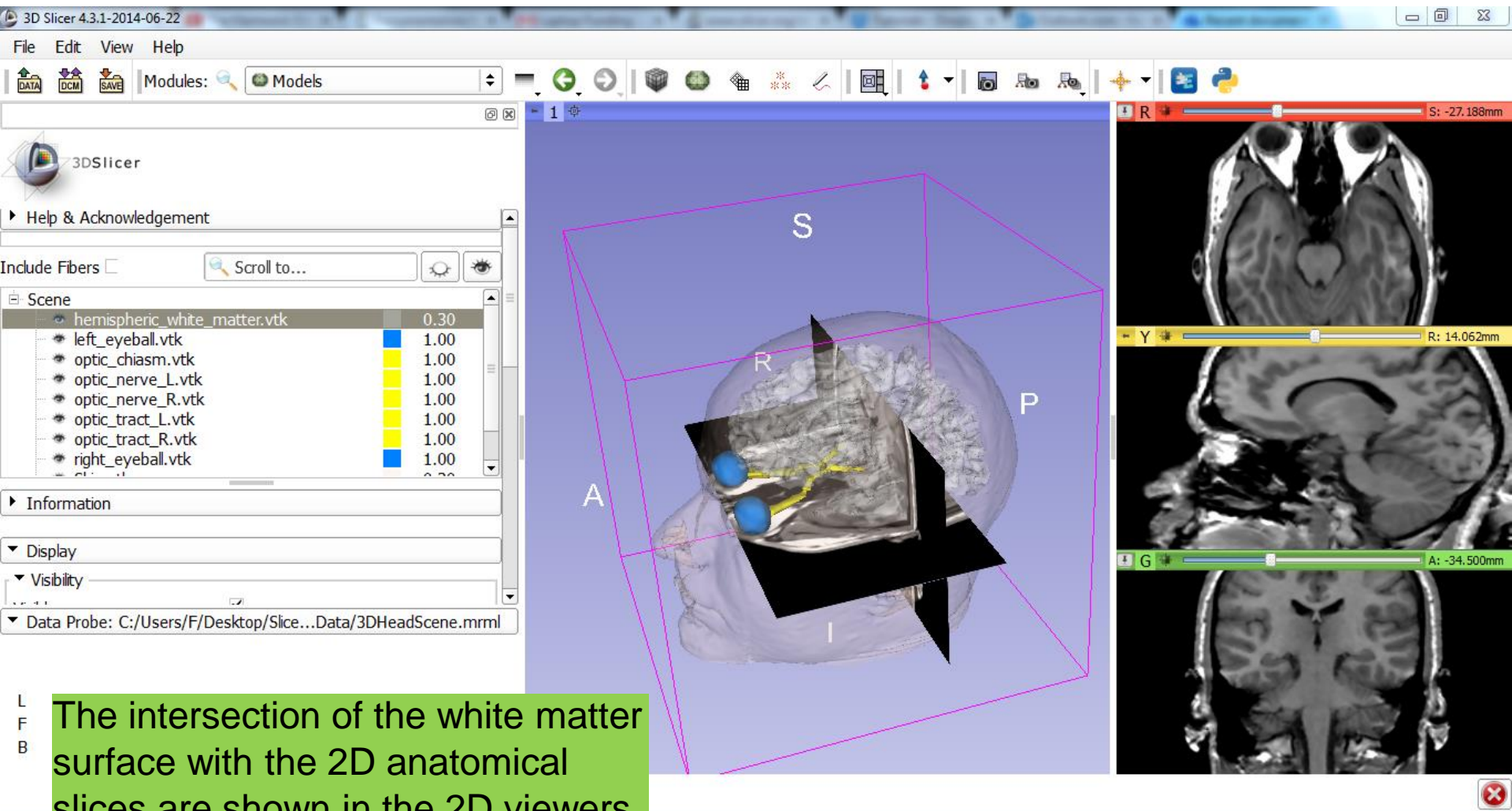
# 3D Visualization



# 3D Visualization



# 3D Visualization



The intersection of the white matter surface with the 2D anatomical slices are shown in the 2D viewers

# 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

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

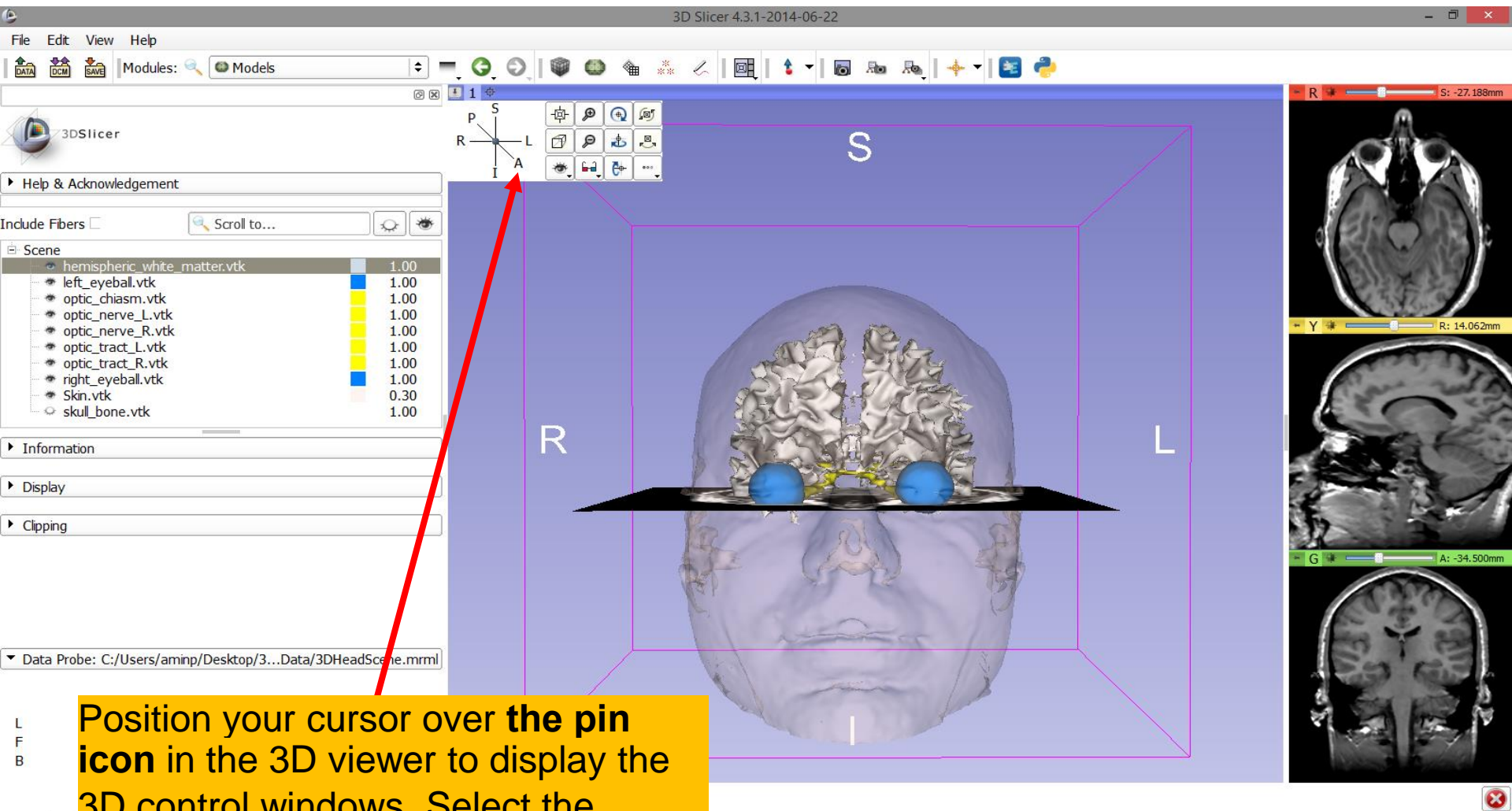
Y R: 14.062mm

G A: -34.500mm

Coronal grayscale



# 3D Visualization



Position your cursor over the **pin icon** in the 3D viewer to display the 3D control windows. Select the **A (Anterior) view** of the 3D models



## Part 3:

# Saving a scene

# Saving a Scene

The screenshot shows the 3D Slicer interface. The 'File' menu is open, and the 'Save' option is highlighted in blue. A red arrow points from the 'Save' option to a yellow callout box at the bottom left. The callout box contains the text: 'Click on **File** and select **Save** or press **Ctrl+S**'. 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 path: 'C:/Users/aminp/Desktop/3...Data/3DHeadScene.mrml'. The right side of the interface shows three orthogonal views: Axial, Sagittal, and Coronal.

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

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

| File Name   | File Format        | Directory  |
|---|--------------------|--|
| <input type="checkbox"/> 3DHeadScene.mrml                 | MRML Scene (.mrml) | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> hemispheric_white_matter.vtk.vtk | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> left_eyeball.vtk.vtk             | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> optic_chiasm.vtk.vtk             | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> optic_nerve_L.vtk.vtk            | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |

Change directory for selected files

Save Cancel

Show options

# 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

Show options

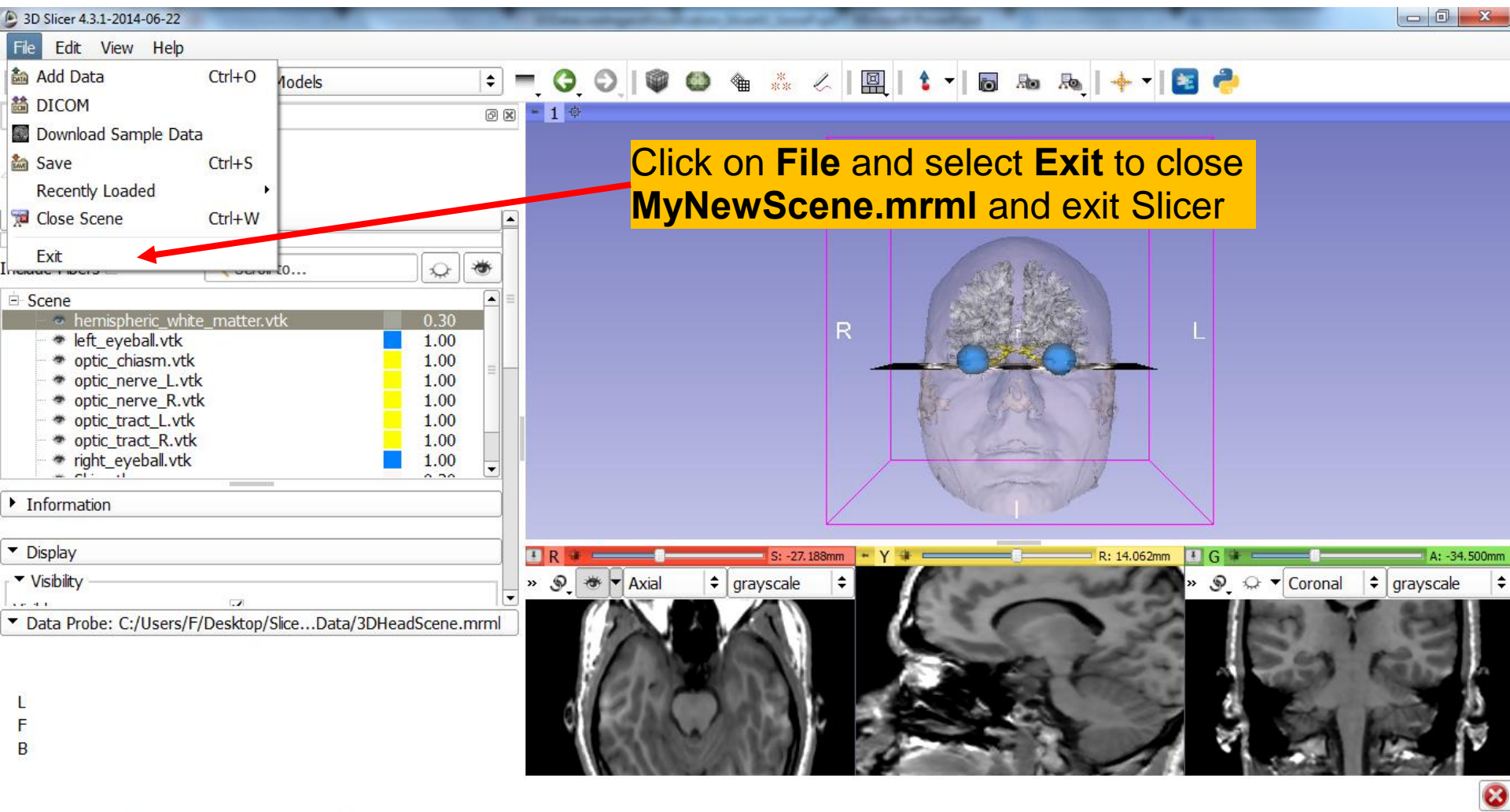
| File Name   | File Format        | Directory  |
|---|--------------------|--|
| <input checked="" type="checkbox"/> MyNewScene.mrml       | MRML Scene (.mrml) | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> hemispheric_white_matter.vtk.vtk | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> left_eyeball.vtk.vtk             | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> optic_chiasm.vtk.vtk             | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |
| <input type="checkbox"/> optic_nerve_L.vtk.vtk            | Poly Data (.vtk)   | C:/Users/aminp/Desktop/3DVisualizationData/3DHeadDat |

Change directory for selected files

Save Cancel

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

3DHeadData

File Edit View Help

Modules: Welcome to Slicer

## 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

| 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  |

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

# 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 '3DHeadData' folder, listing various files including 'MyNewScene.mrml'. A red arrow points from this file to the 'Load Data' button in the Slicer interface. A yellow text box contains the instruction: 'Drag and drop the MyNewScene.mrml file that's in the 3DHeadData folder into the Slicer window'. The Slicer interface shows a 'Welcome' screen with buttons for 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. A feedback section is also visible.

**Drag and drop the MyNewScene.mrml file that's in the 3DHeadData folder into the Slicer window**

| 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  |

3D Slicer 4.3.1-2014-06-22

Welcome

Load DICOM Data Load Data

Customize Slicer Download Sample Data

Feedback

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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

S: 0.000mm R: 0.000mm

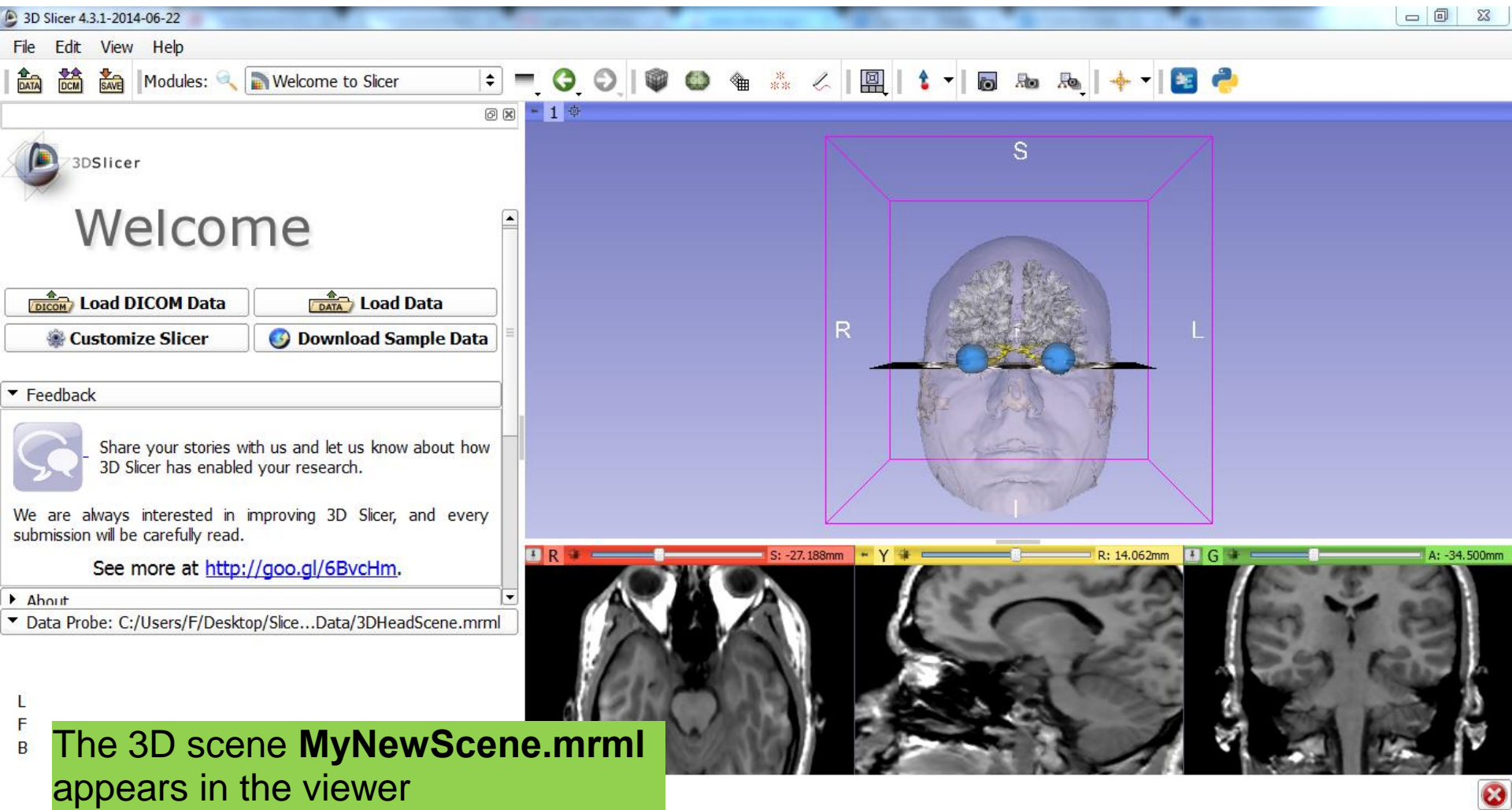


# Scene Restore

The screenshot displays the 3D Slicer 4.3.1-2014-06-22 interface. A file selection dialog titled "Add data into the scene" is open, showing a table of files to be added to the scene. The table has two columns: "File" and "Description". One file is selected: "C:/Users/aminp/Desktop/3DVisualizationData/3DHeadData/MyNewScene.mrml" with a description of "MRML Scene". A red arrow points to the "OK" button, which is highlighted with a yellow box and the text "Click OK". The background shows the 3D Slicer interface with a 3D view of a head model and a file explorer window.

| 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)  
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NIH P41RR013218



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