3D Data Loading and Visualization

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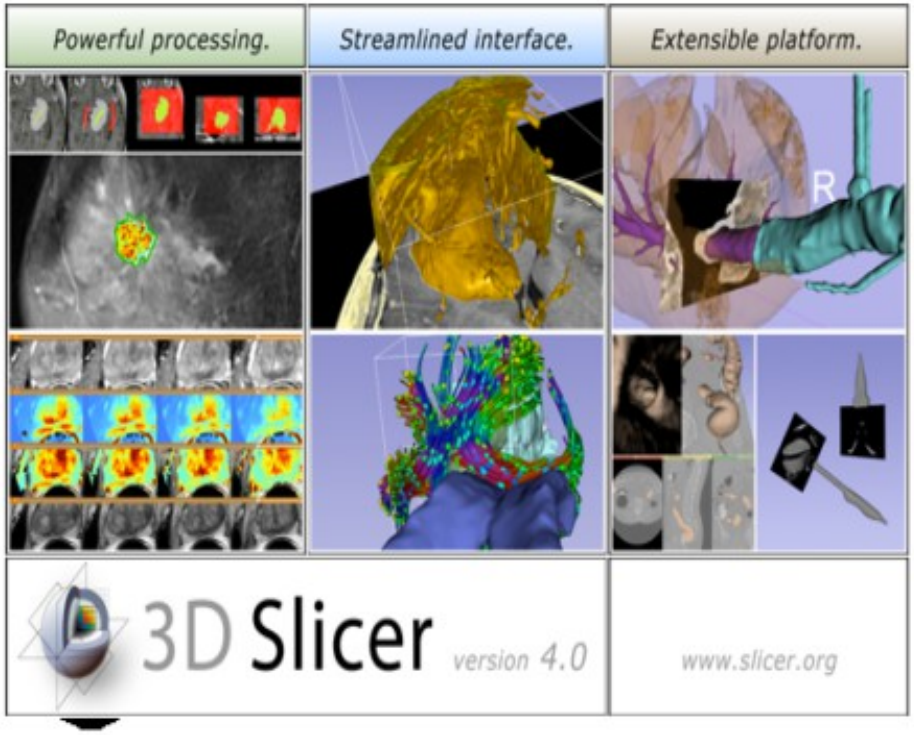
3DSlicer

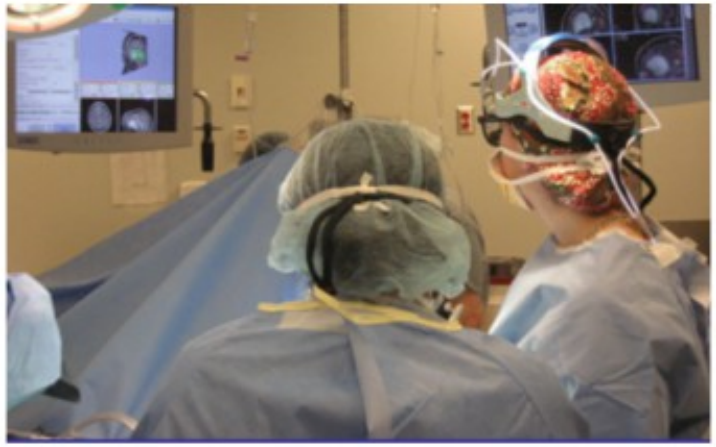


Slicer is a freely available open-source platform for segmentation, registration and 3D visualization of medical imaging data

Slicer is a multi-institutional effort supported by the National Institute of Health.

Translational research

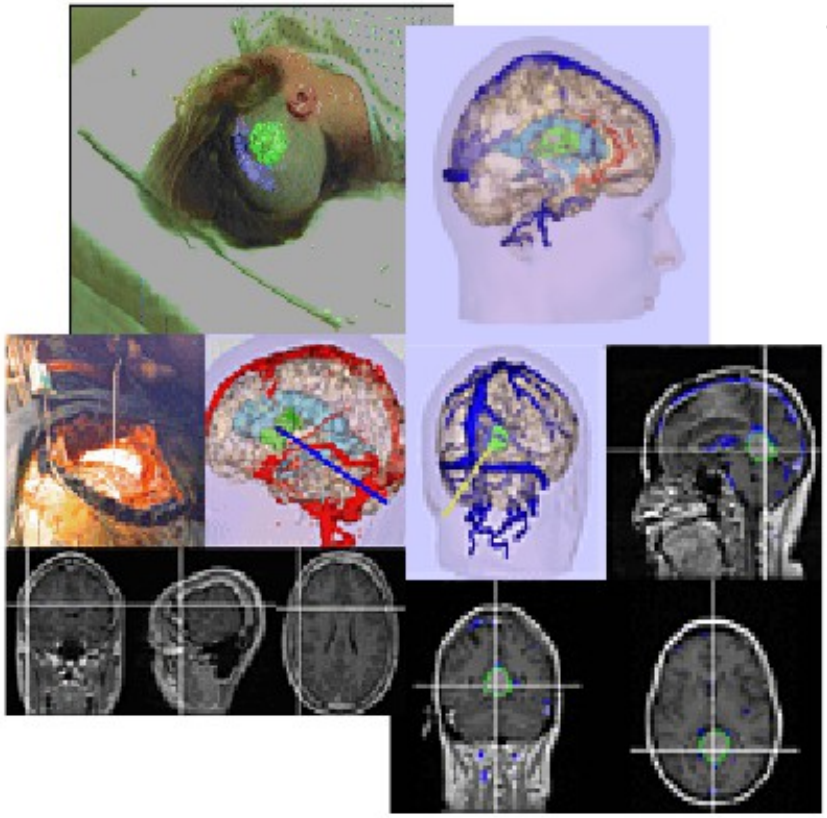
An open-source environment
for software developers



An end-user application
for clinical investigators
and scientists

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

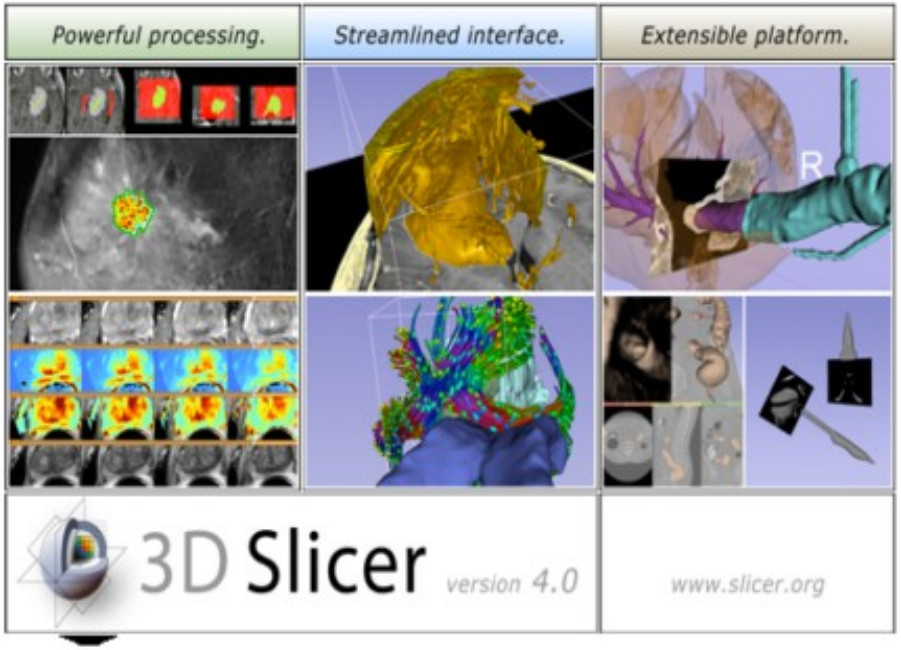
3DSlicer History



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

Image Courtesy of the CSAIL, MIT

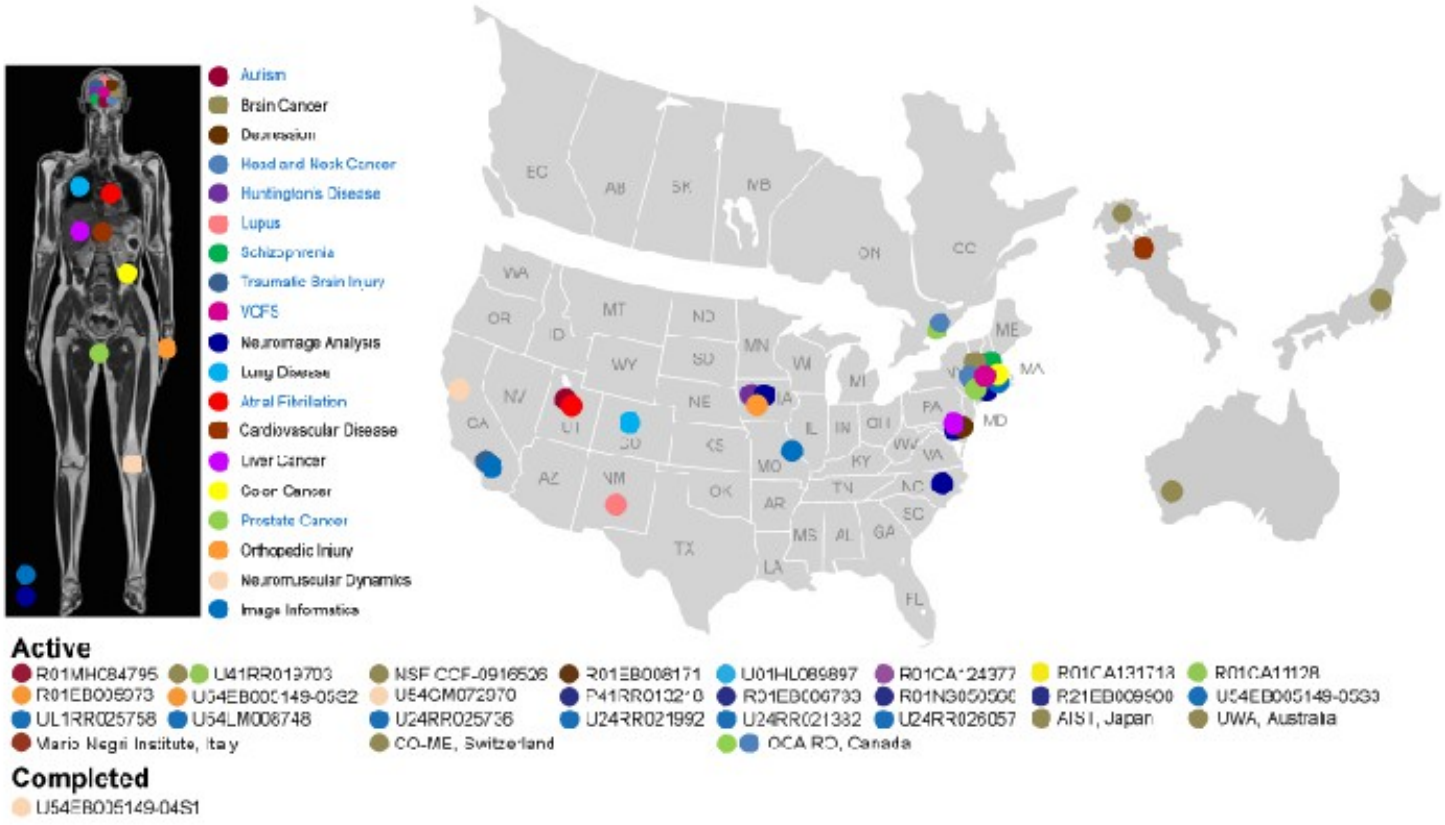
3DSlicer History



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

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

A Multi-institution Effort



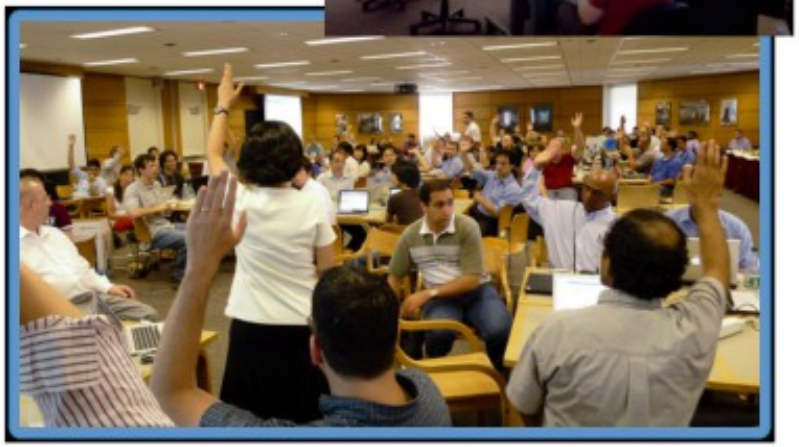
- Infrastructure grants fund the platform
- Collaborative projects (e.g. Canada, Japan, Australia, Italy) fund the application packages

Slicer Is Open

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

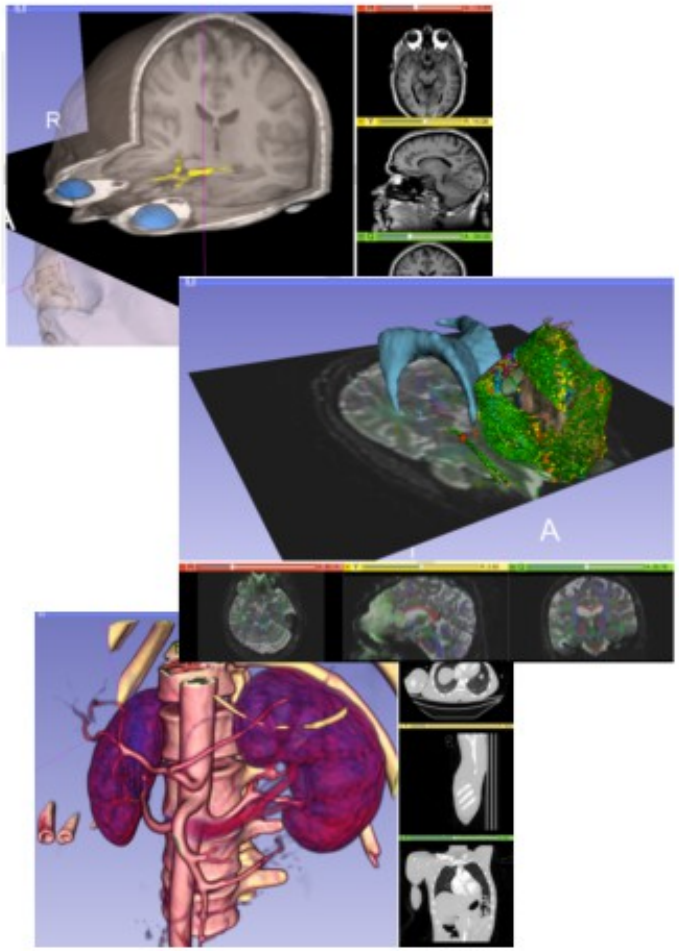
Madrid 2012

Iowa City, USA 2012



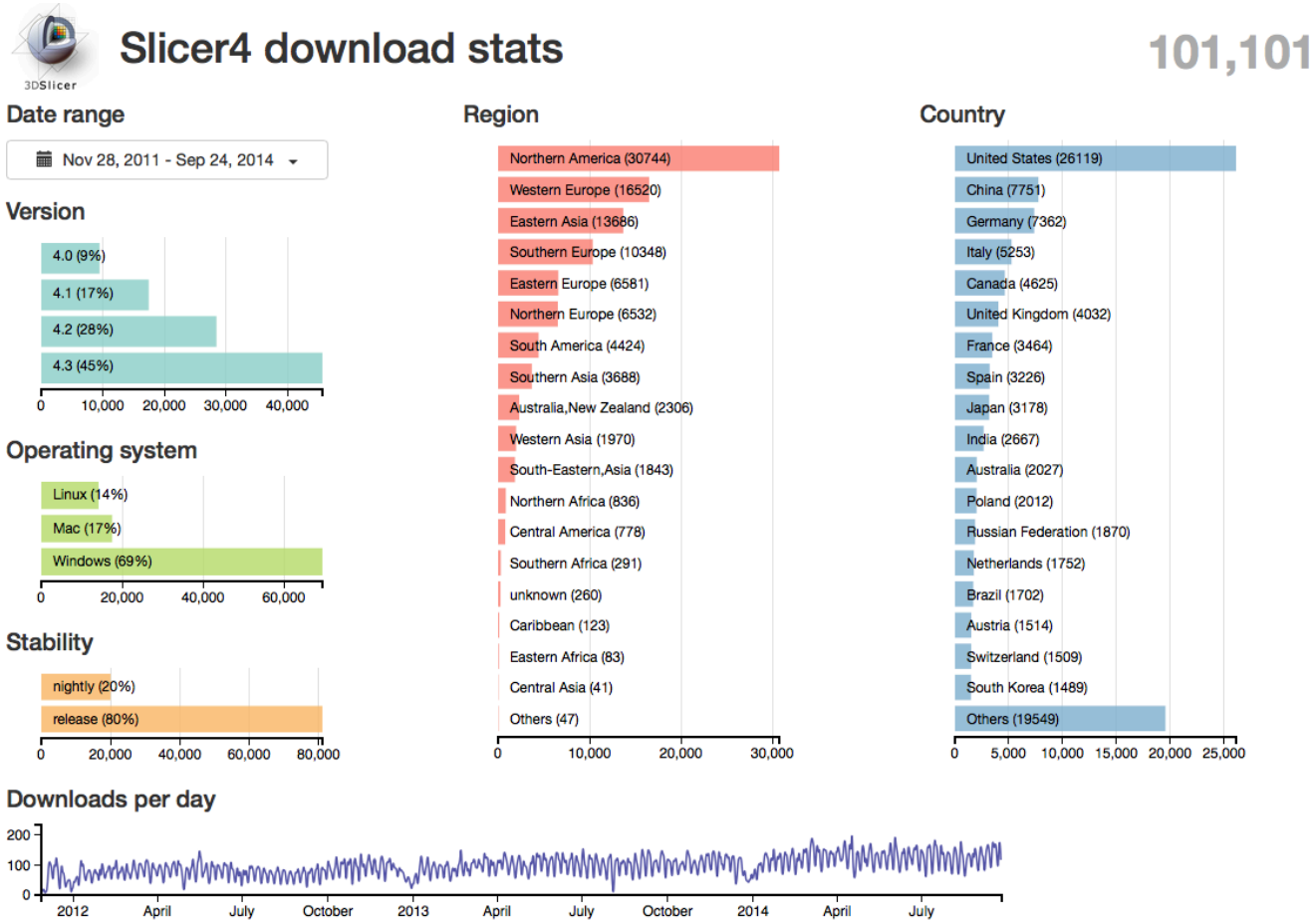
Courtesy R. Kikinis

Slicer Open Community

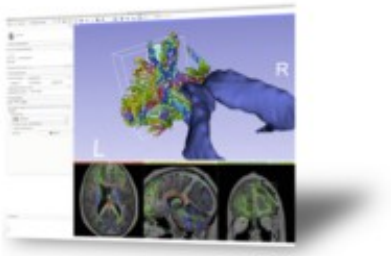


- 80 authorized developers contributing to the source code of Slicer
- Over 700 subscribers on Slicer user and Slicer developer mailing list

Nov.2011-March.2014 Downloads



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 r19886 (159.6MB)	4.1.0 64 bit installer 2012-04-11 r19886 (236.9MB)	4.1.0 64 bit archive 2012-04-11 r19886 (251.5MB)
	32 bit	4.1.0 32 bit installer 2012-04-11 r19886 (153.3MB)		
nightly build	64 bit	nightly 64 bit installer 2012-04-29 r19953 (160.4MB)	nightly 64 bit installer 2012-04-27 r19951 (257.4MB)	nightly 64 bit archive 2012-04-29 r19953 (252.0MB)
	32 bit	nightly 32 bit installer 2012-04-29 r19953 (154.0MB)		

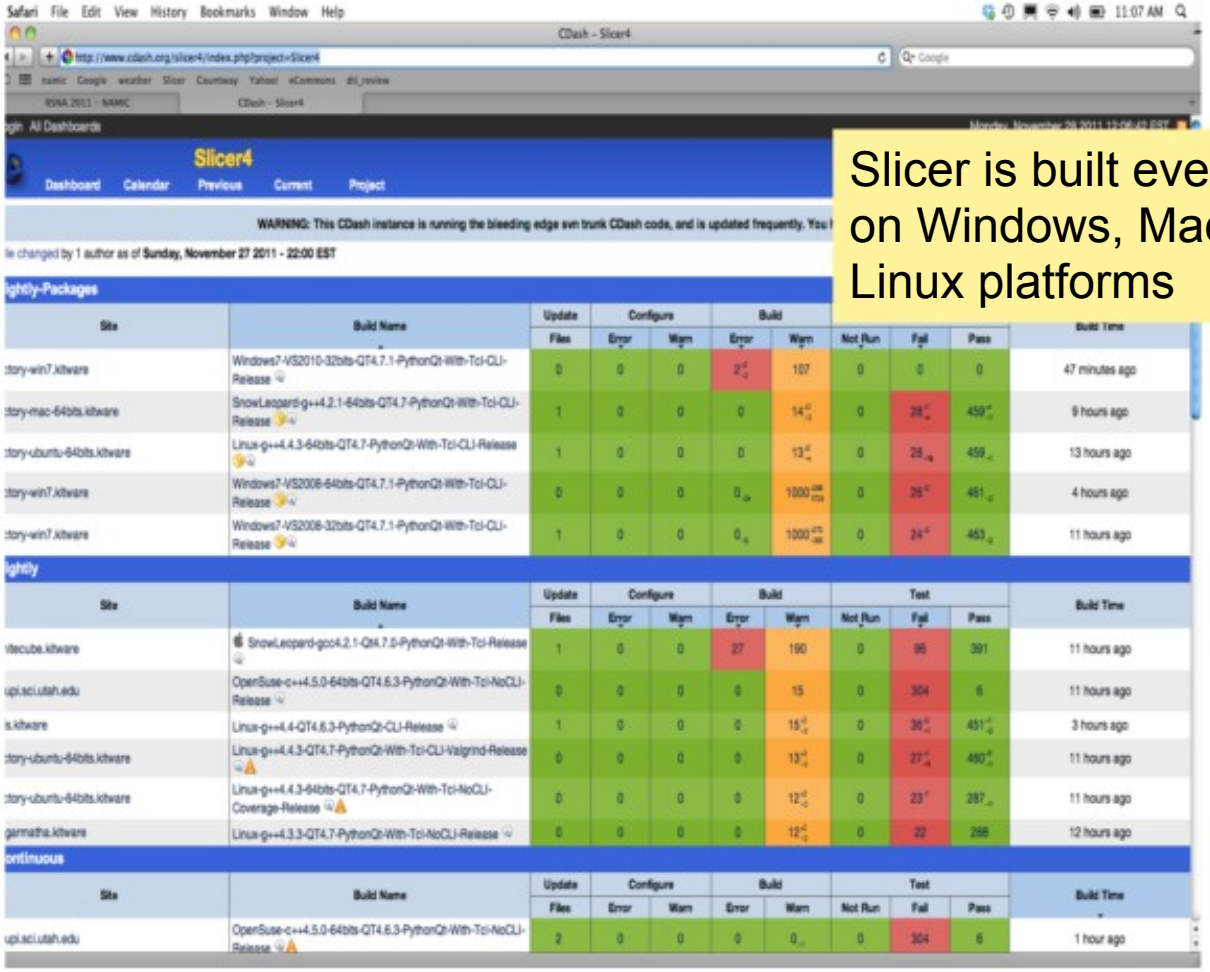
System requirements

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.

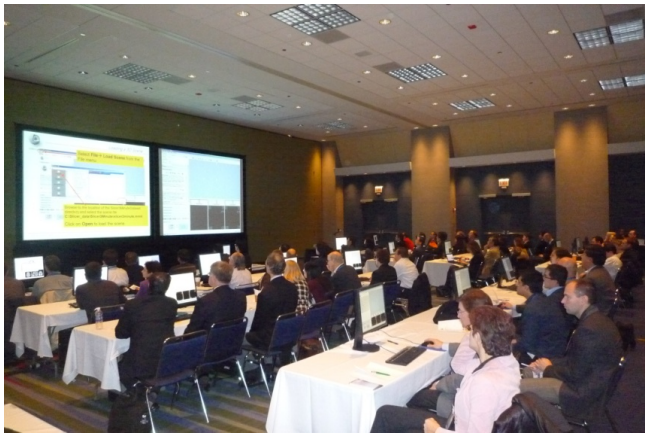
Slicer is built and tested on many hardware and software platforms. 3D Slicer runs on Microsoft Windows XP, Vista, and Windows 7; Mac OS X versions 10.5 (Leopard), 10.6 (Snow Leopard), and 10.7 (Lion); and a variety of Linux distributions.

- 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



Slicer Training

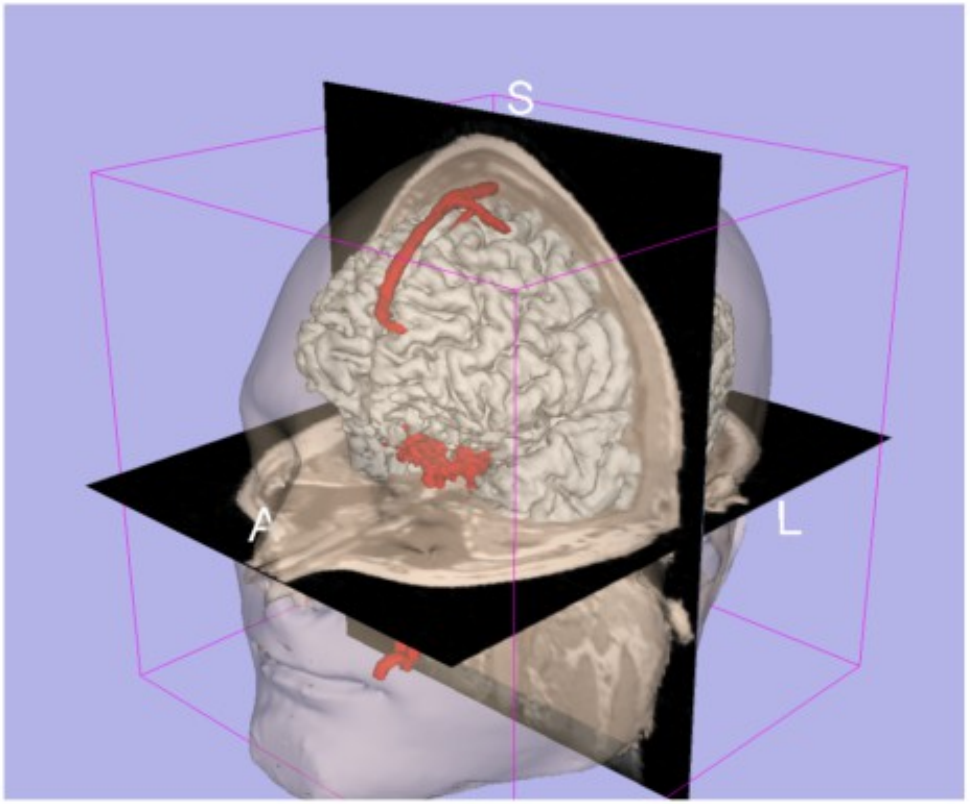


- Hands-on training workshops at national and international venues

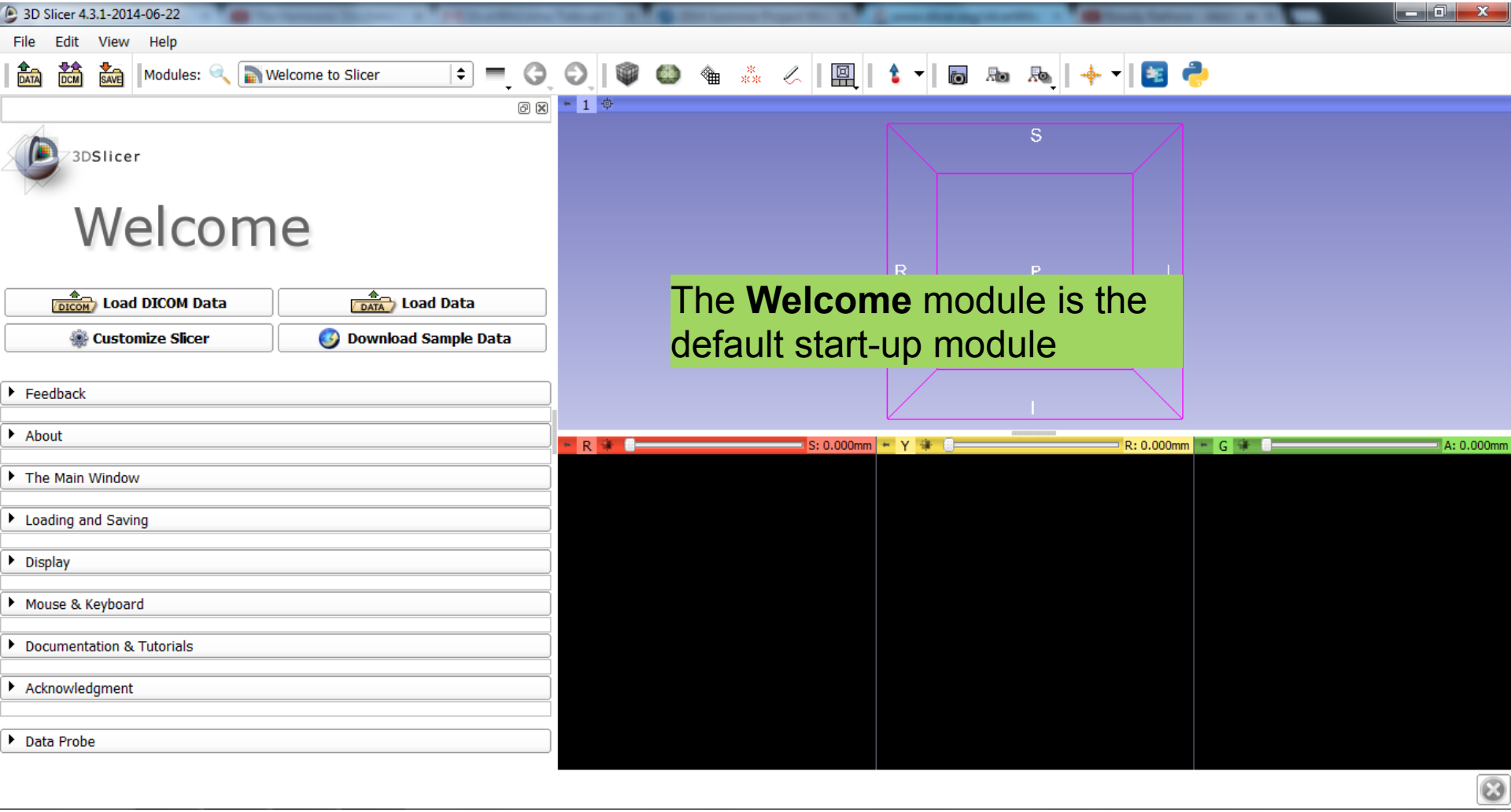
- >3,000 clinicians, clinical researchers and scientists trained since 2005

3D Visualization of the Anatomy

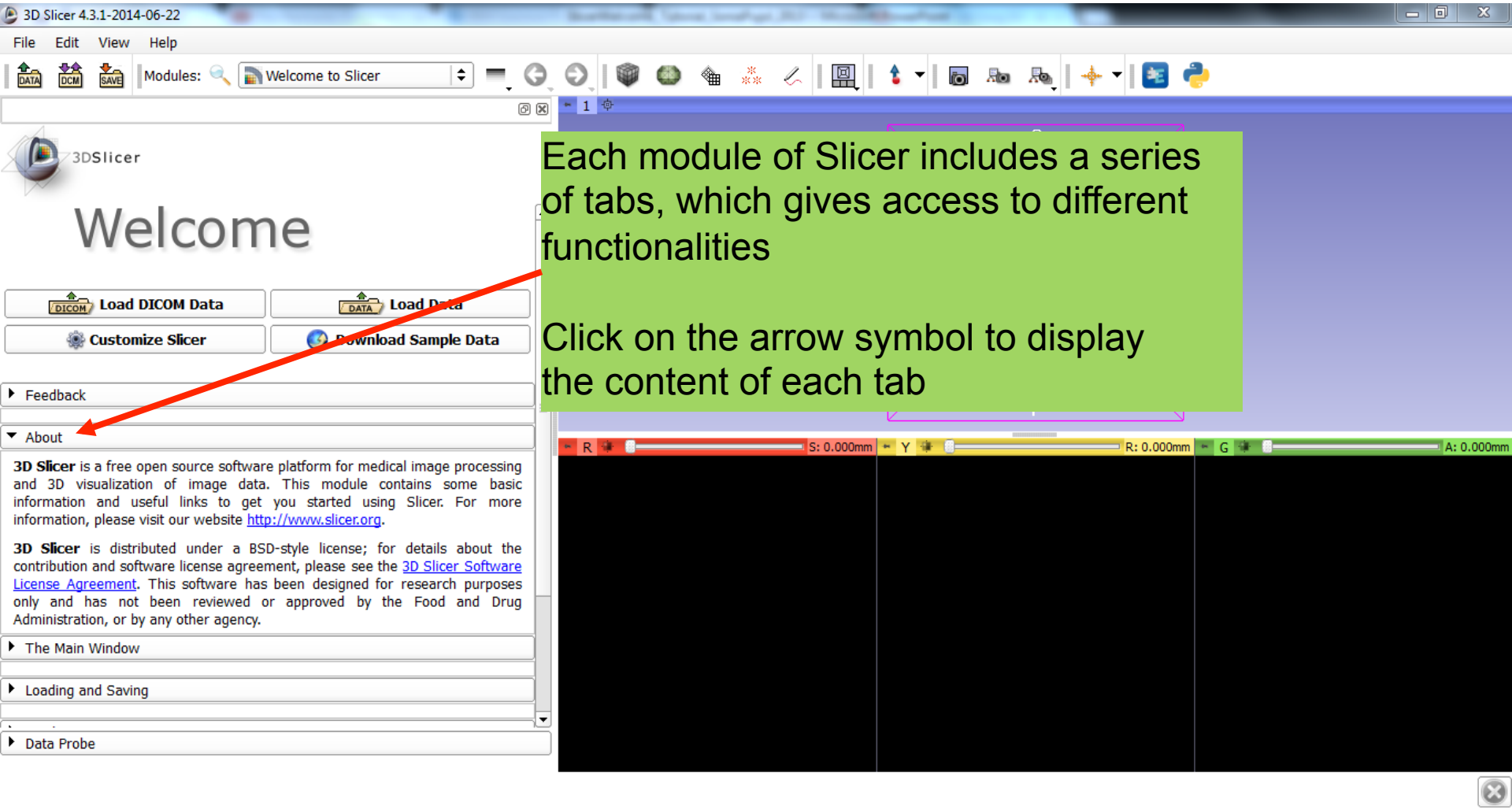
Following this tutorial, you will be able to load and visualize volumes within Slicer4, and to interact in 3D with structural images and models of the anatomy.



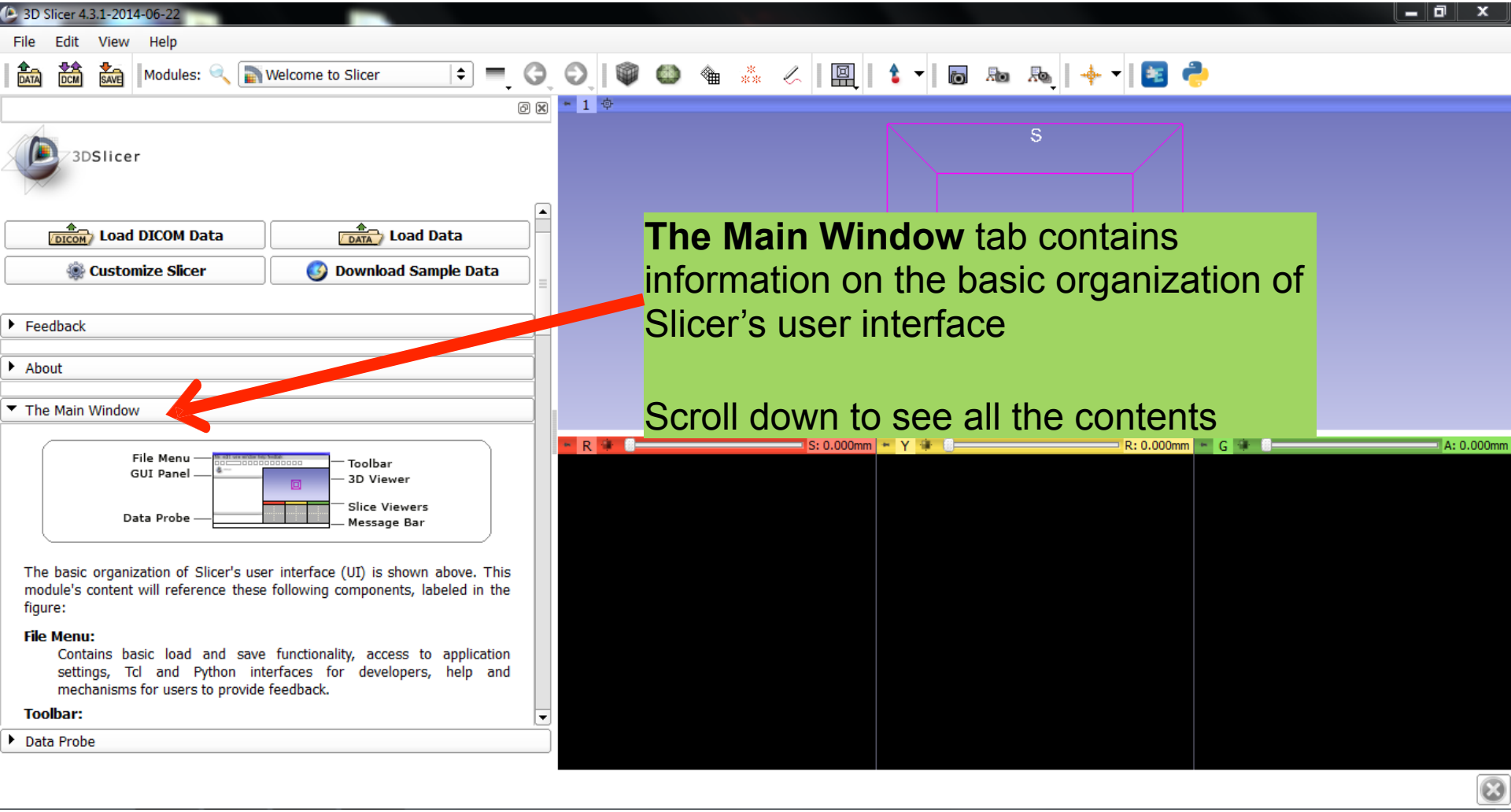
3D Slicer Version4



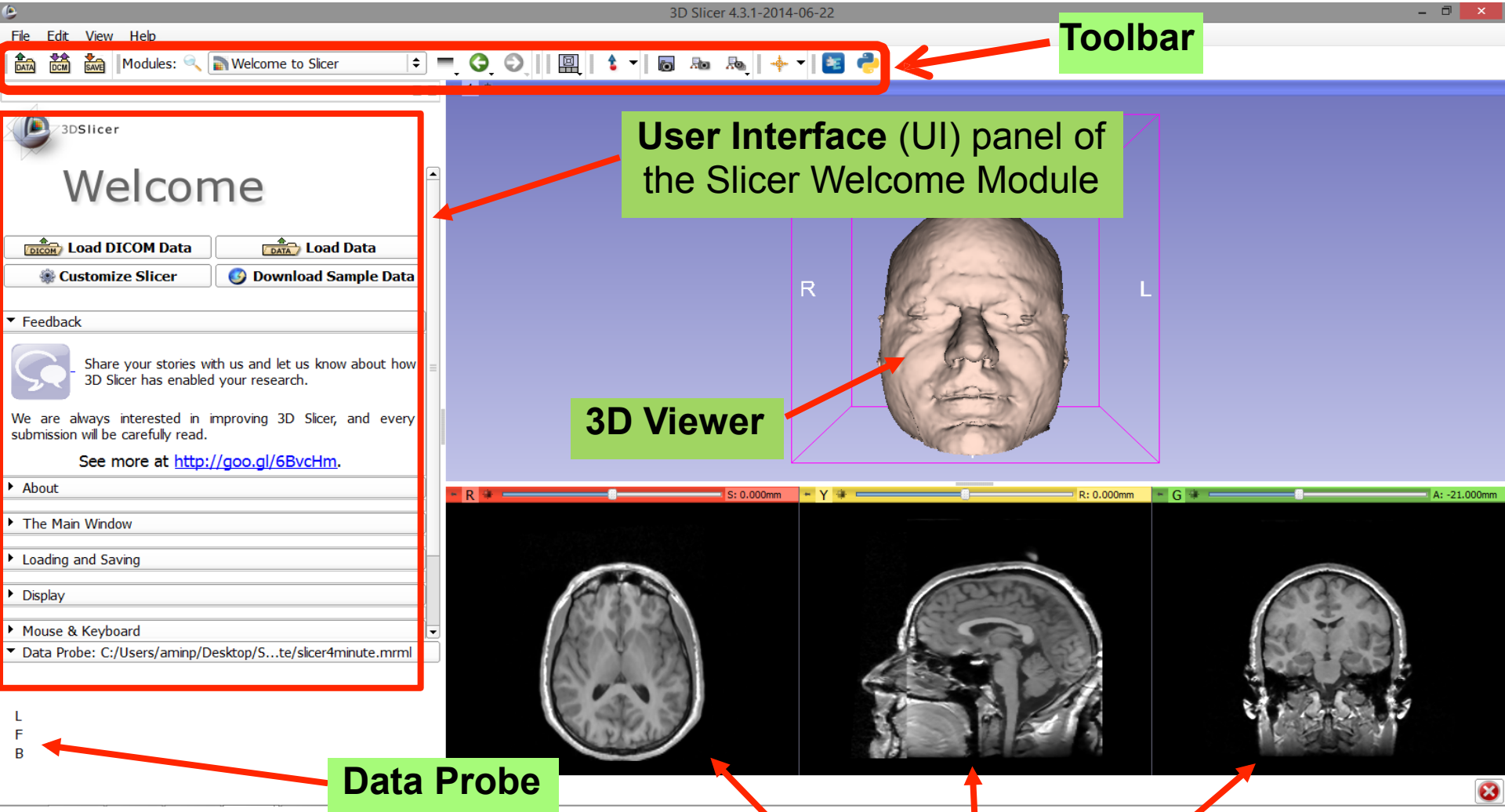
3D Slicer Version4



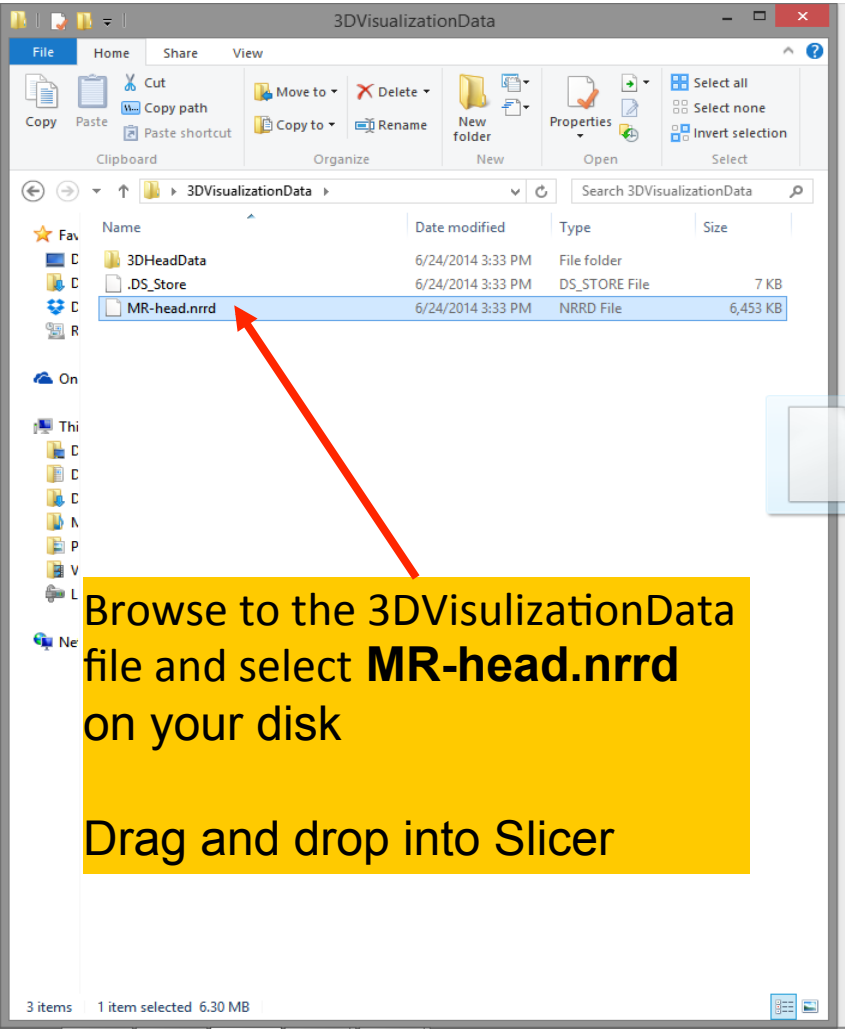
3D Slicer Version4

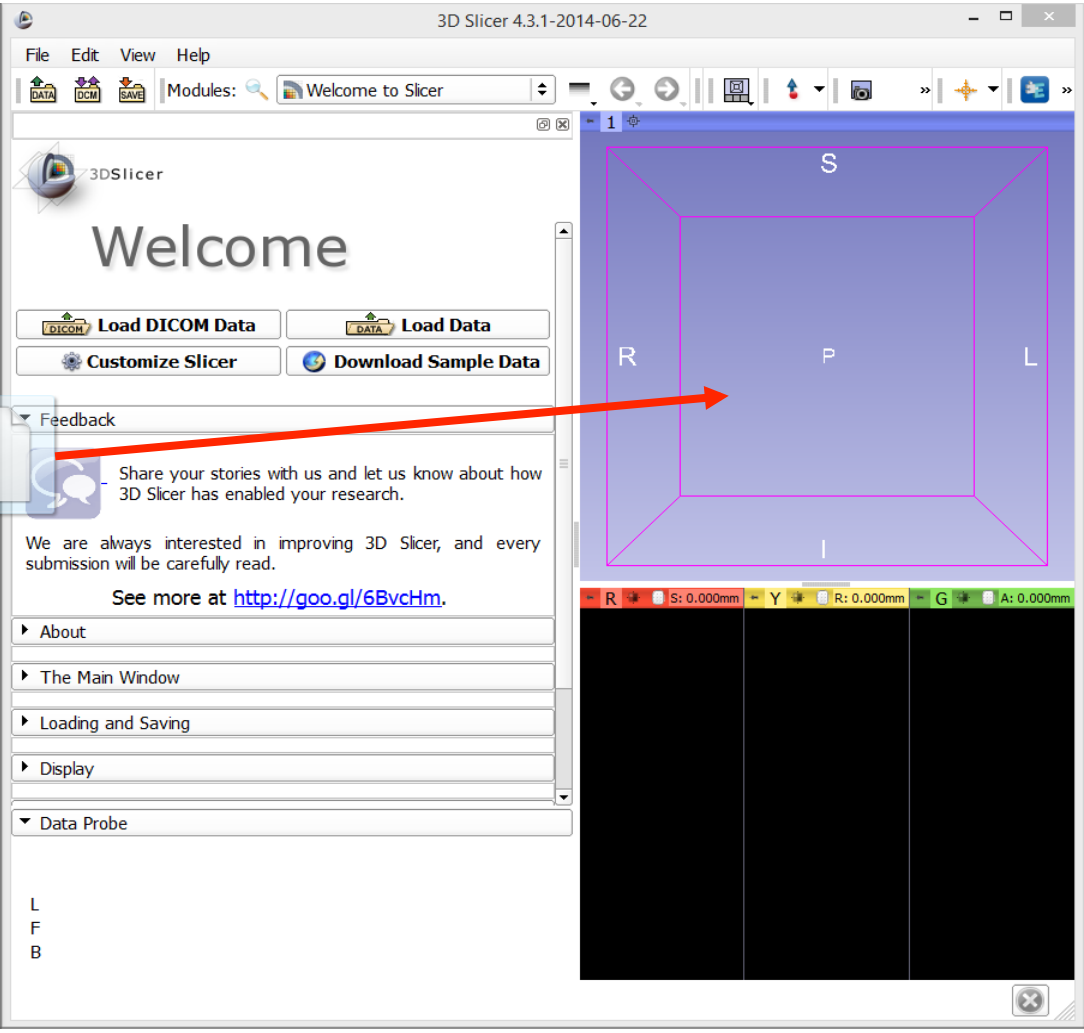


Slicer User Interface



Slicer4

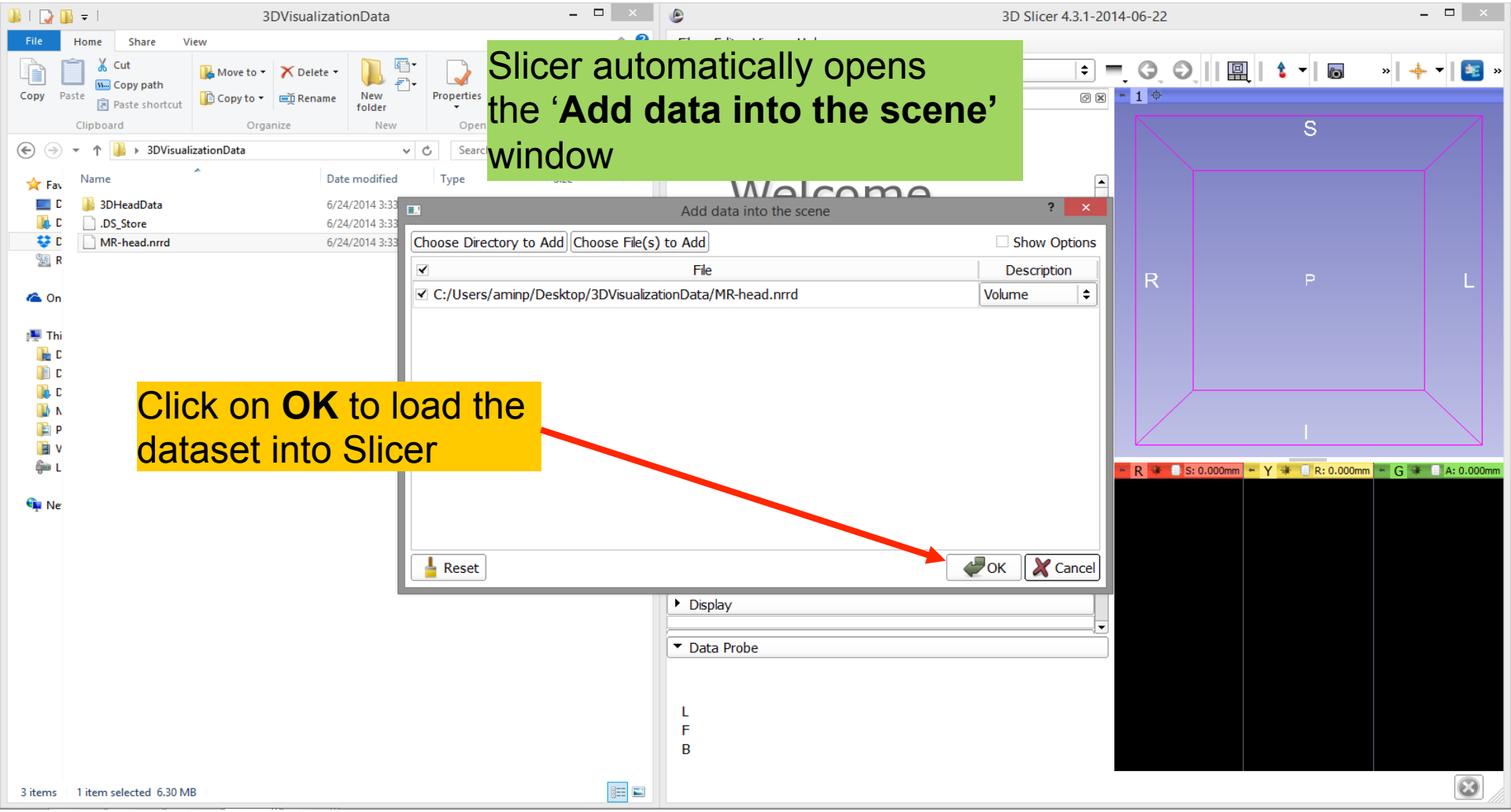




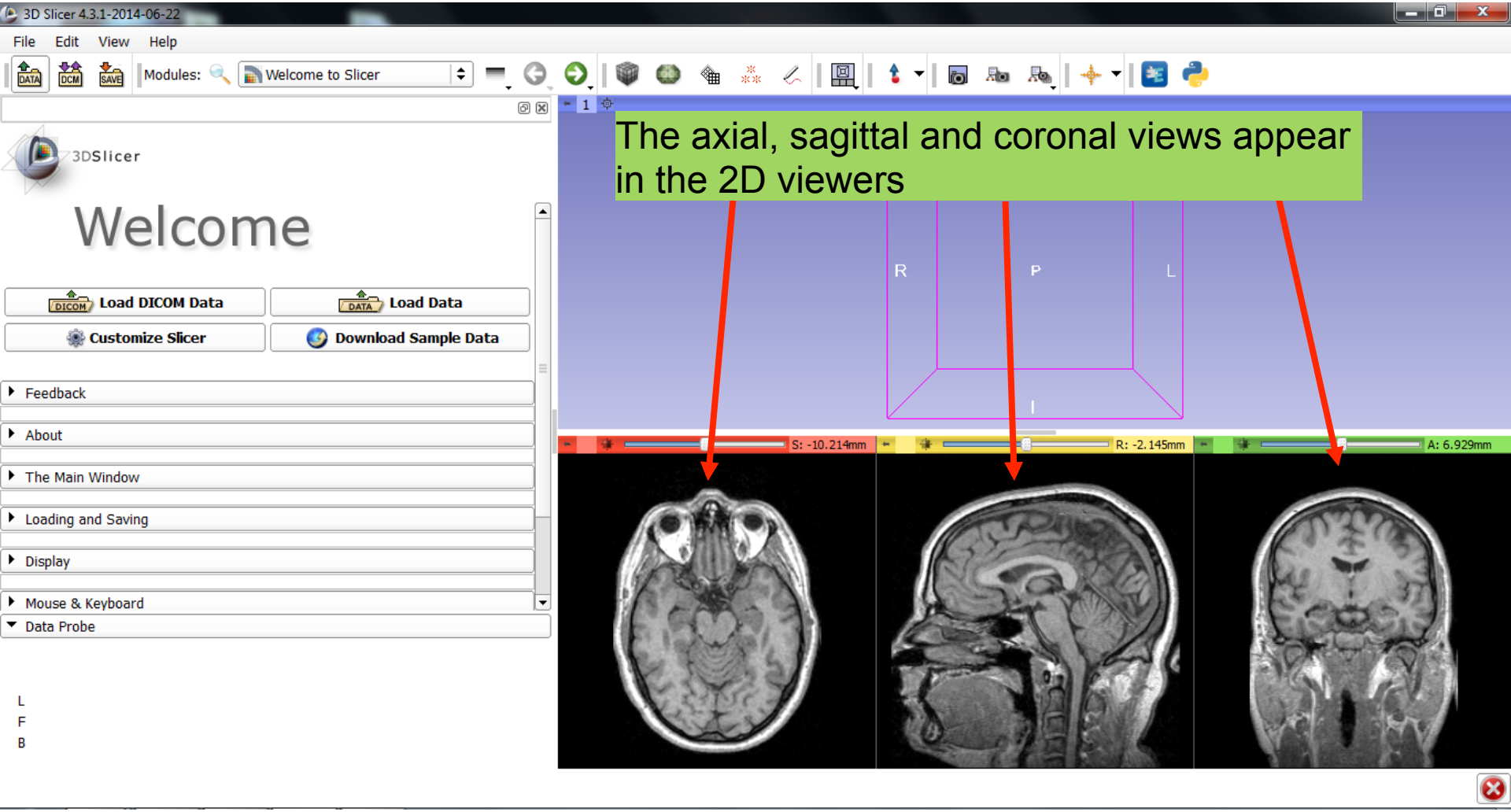
Browse to the 3DVisulizationData file and select **MR-head.nrrd** on your disk

Drag and drop into Slicer

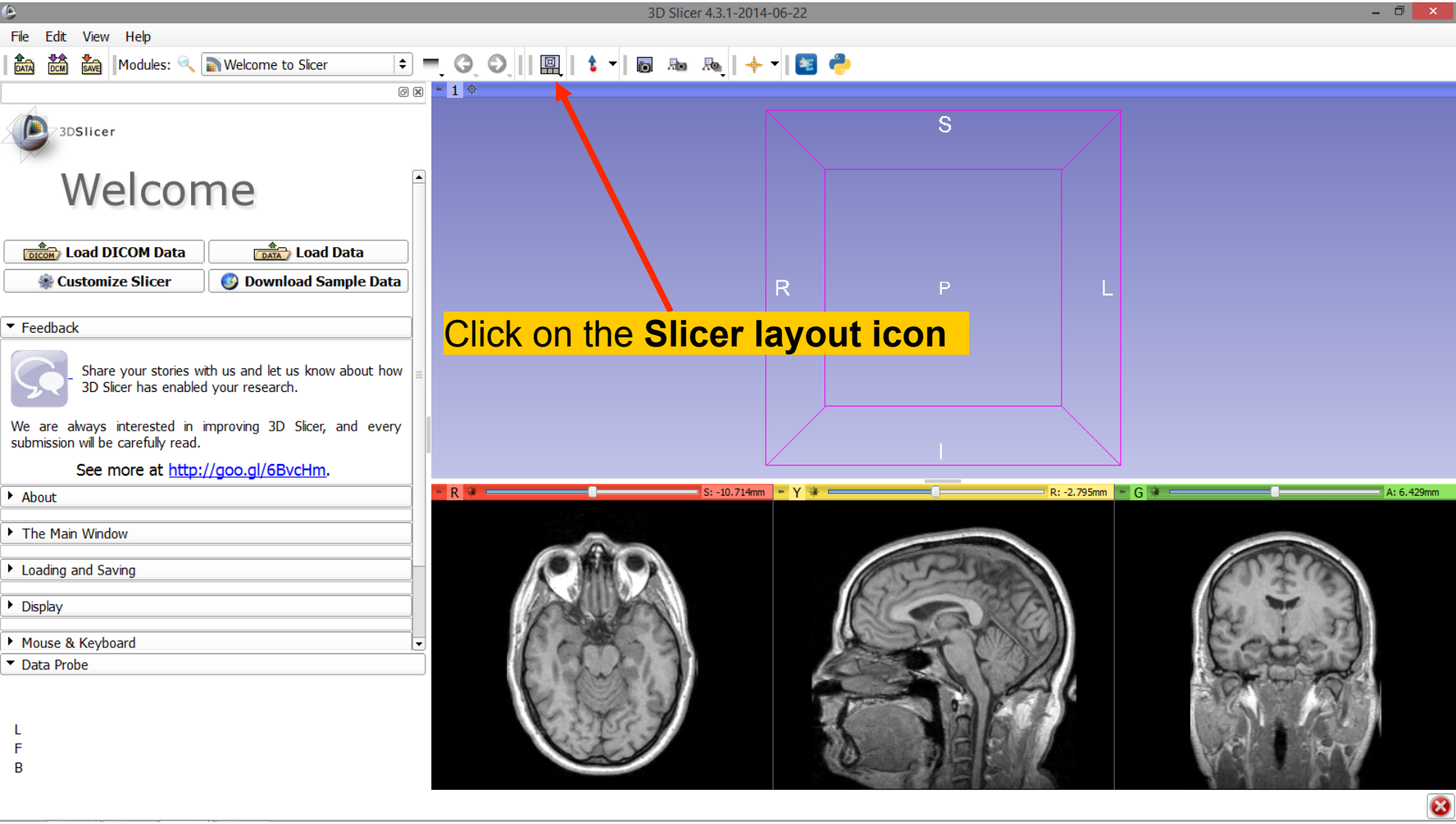
Slicer4


Slicer automatically opens the ‘Add data into the scene’ window
Click on OK to load the dataset into Slicer
3DVisualizationData
3D Slicer 4.3.1-2014-06-22
Add data into the scene
Choose Directory to Add
Choose File(s) to Add
Show Options
File
Description
C:/Users/aminp/Desktop/3DVisualizationData/MR-head.nrrd
Volume
Reset
OK
Cancel
Display
Data Probe

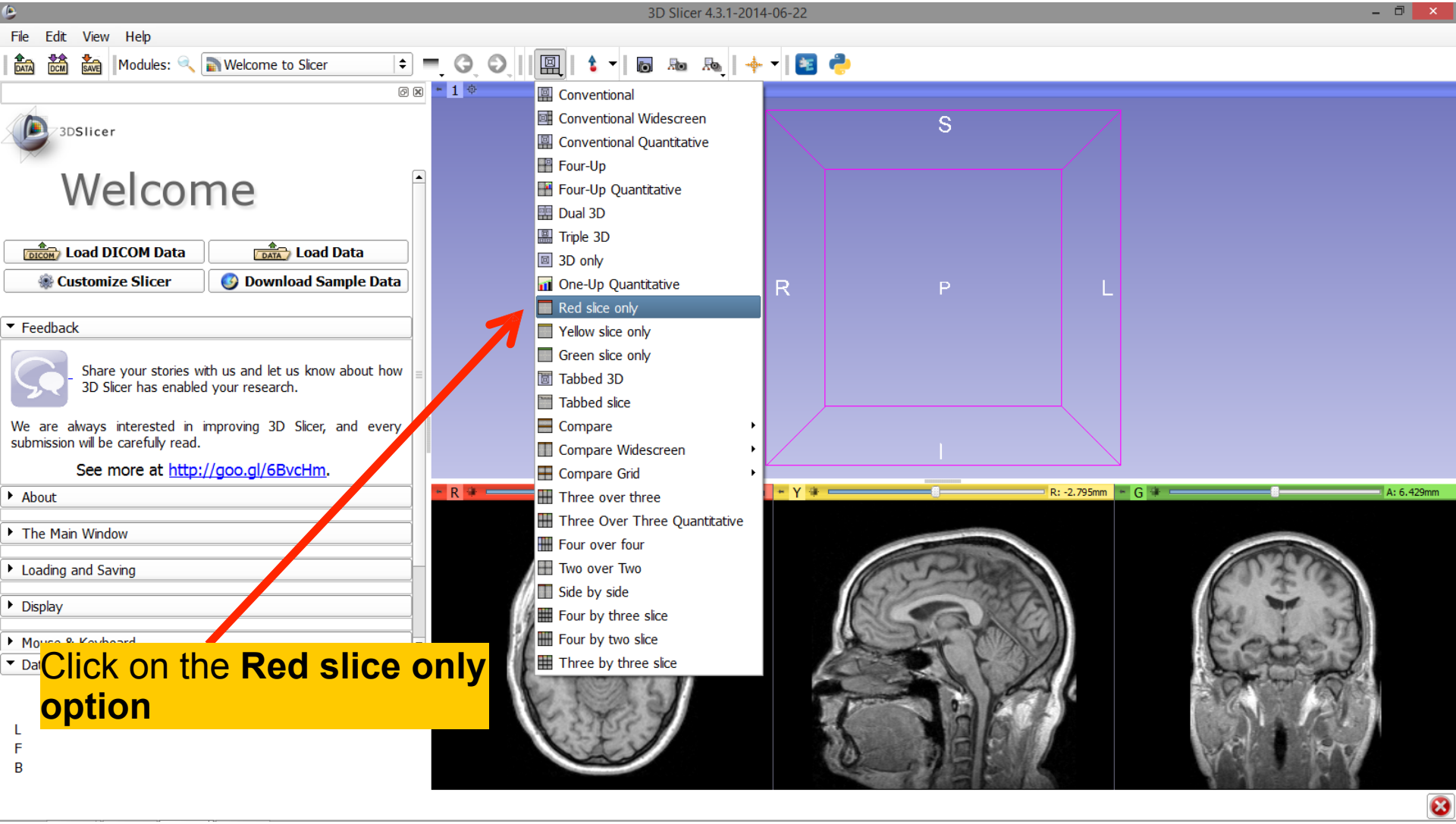
Loading a volume



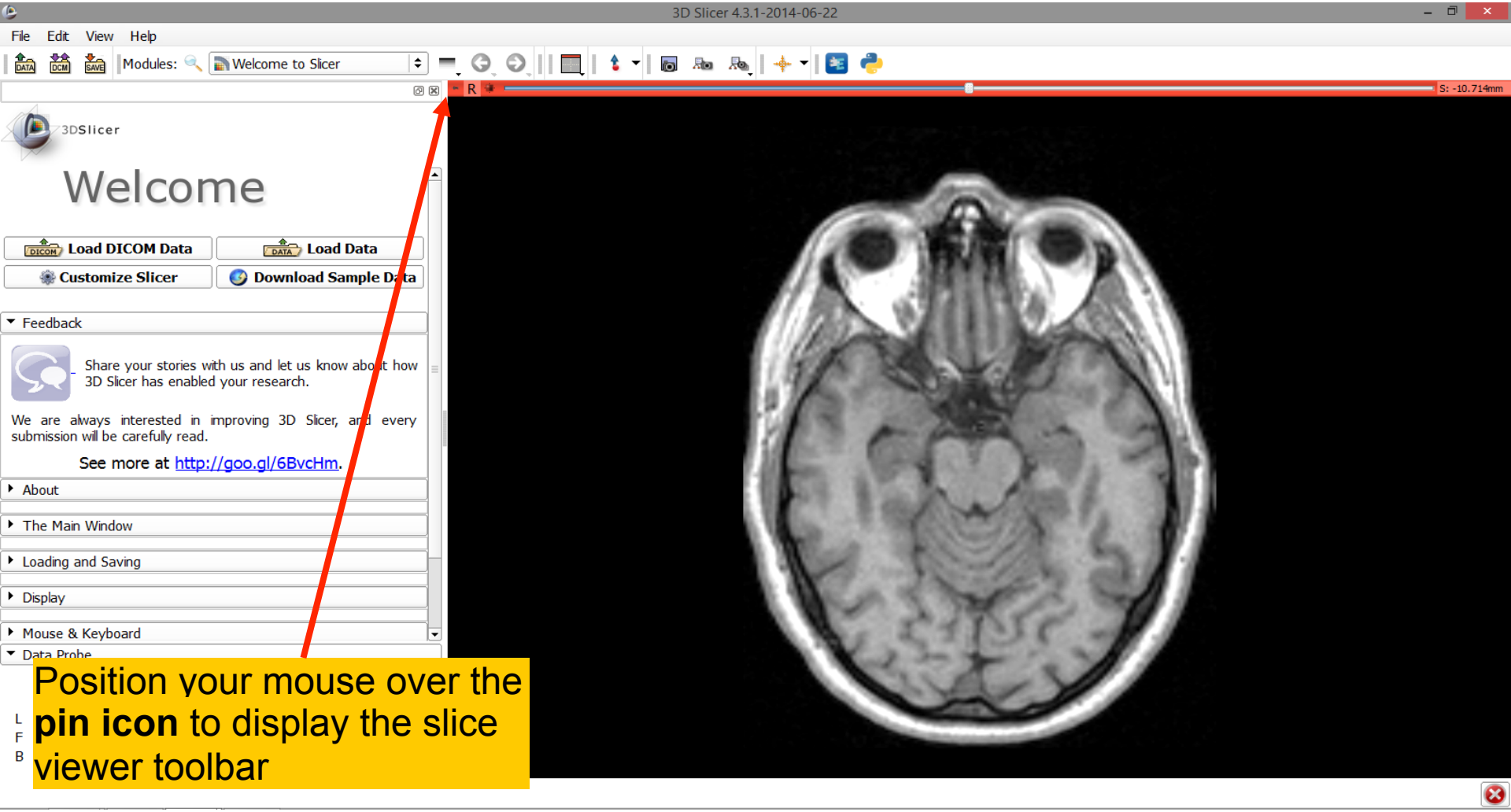
Loading a volume



Loading a volume



Loading a volume



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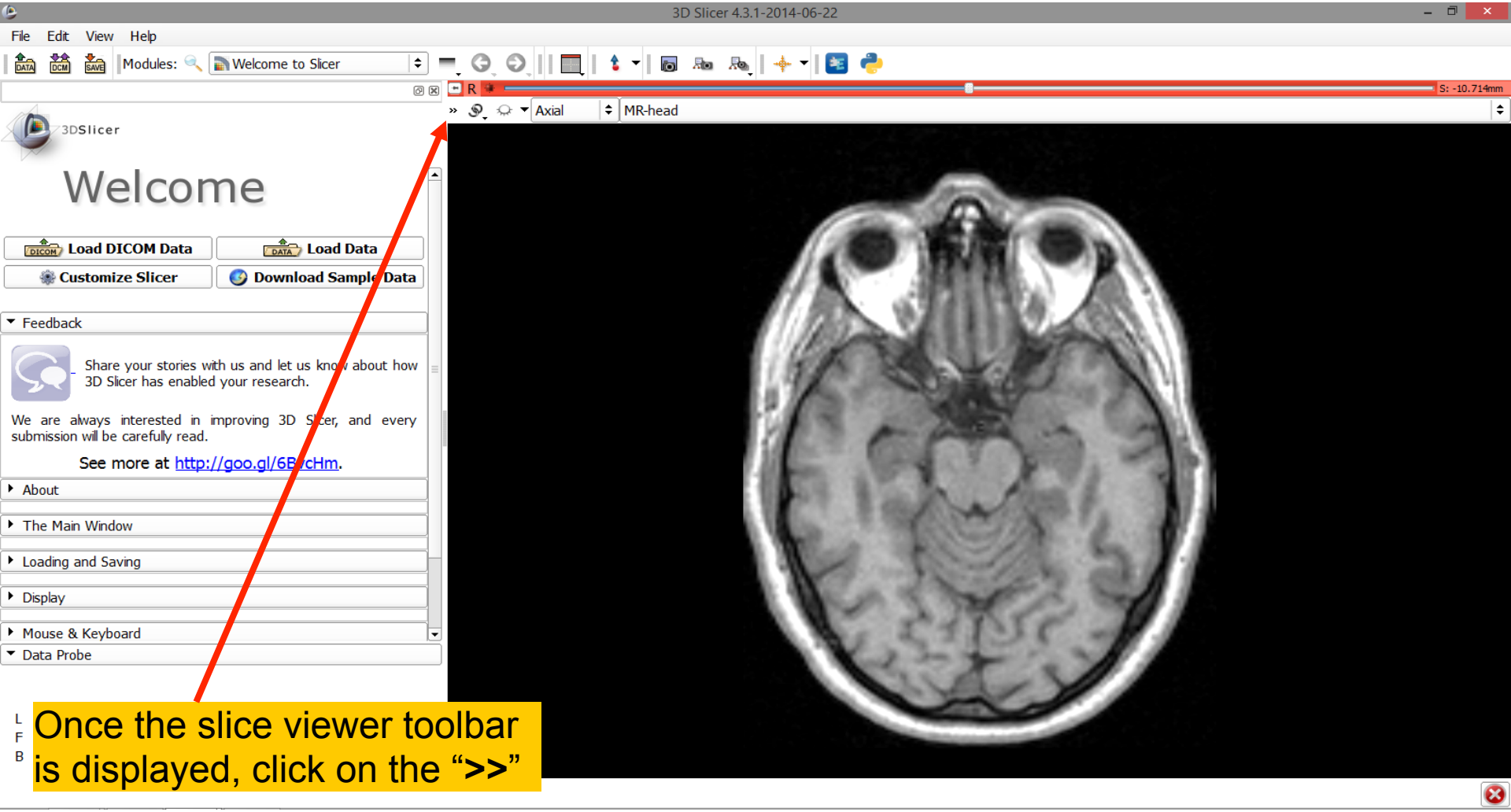
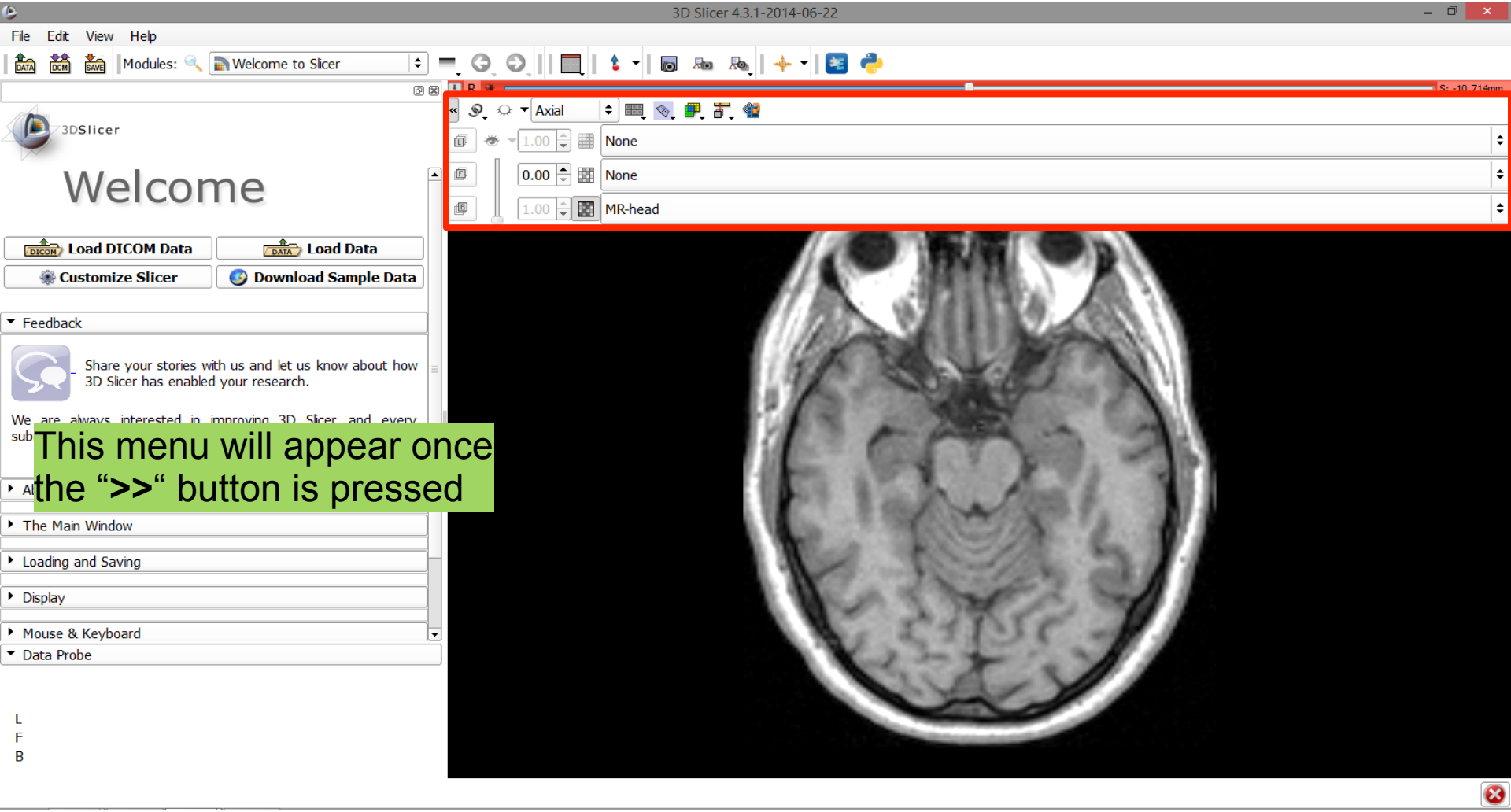
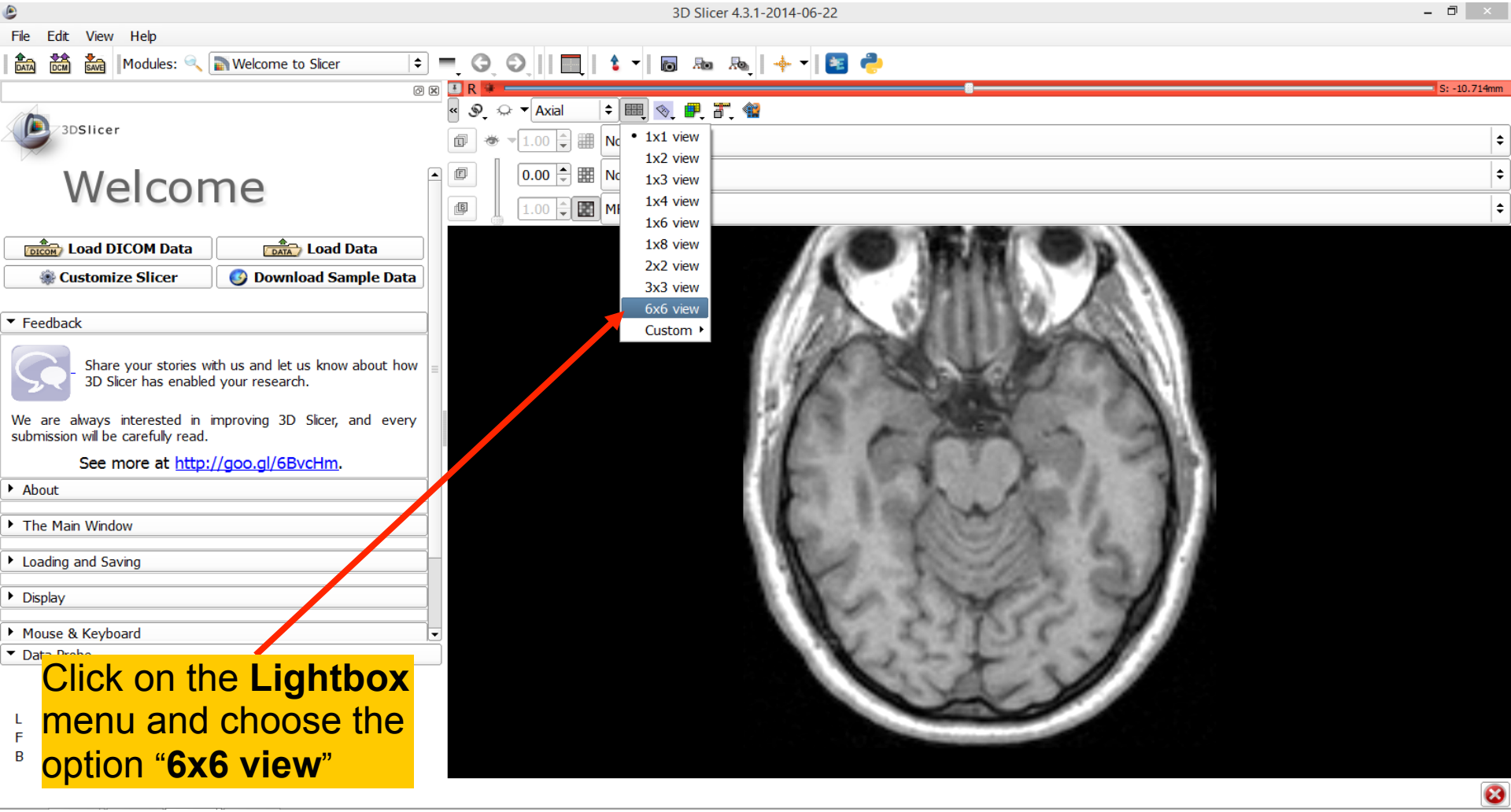


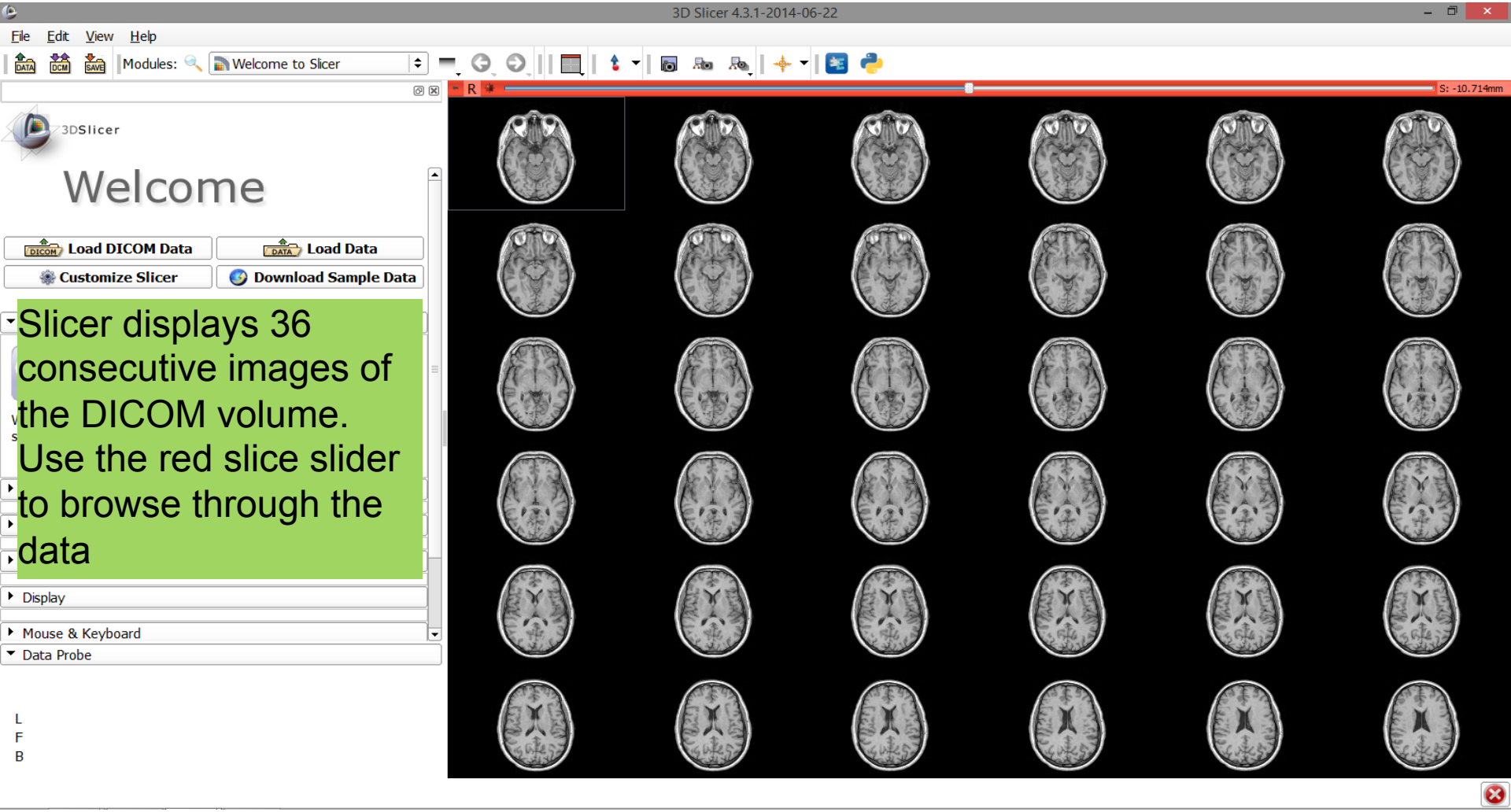
Loading a volume



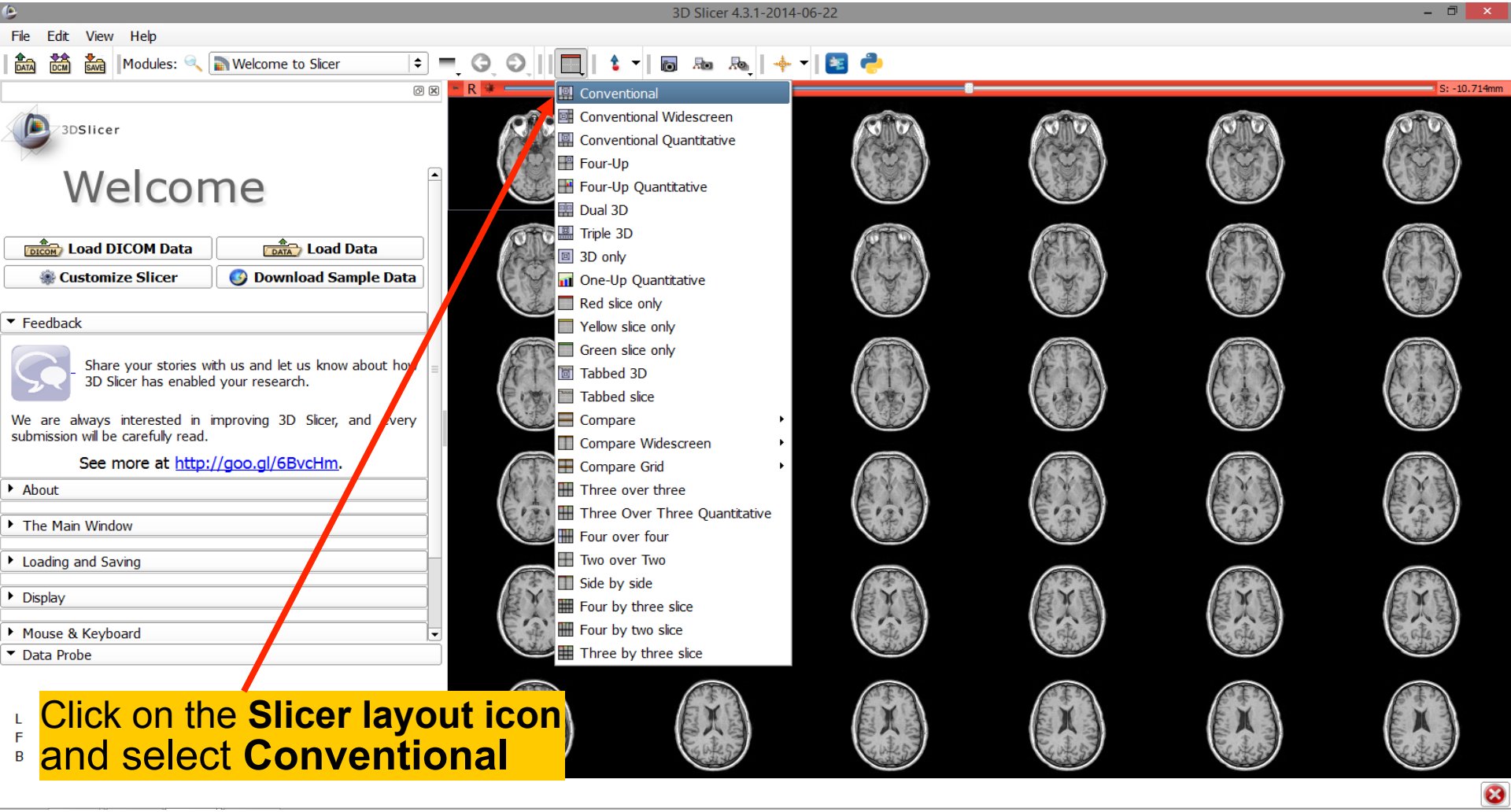
Loading a volume



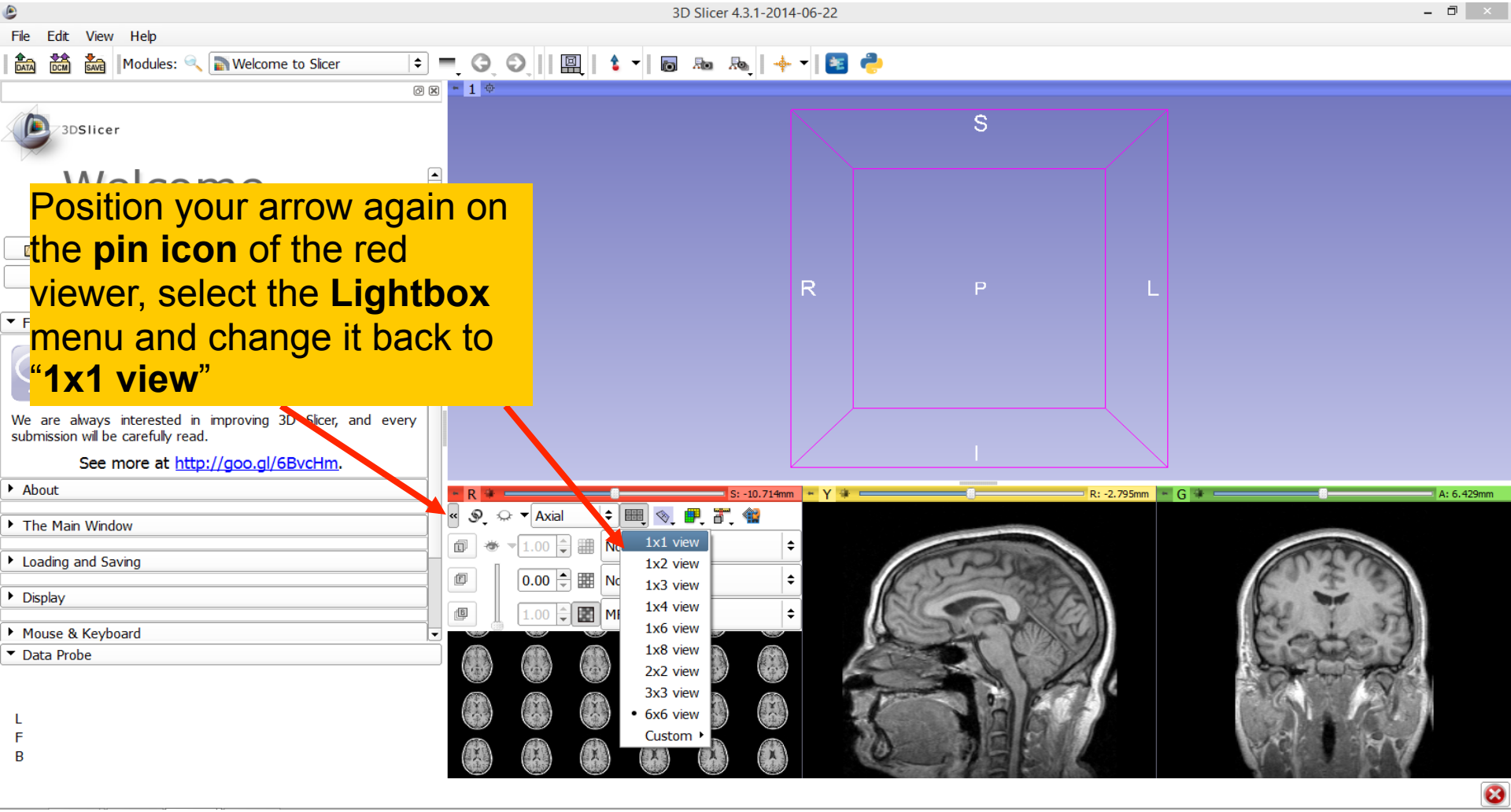
Loading a volume



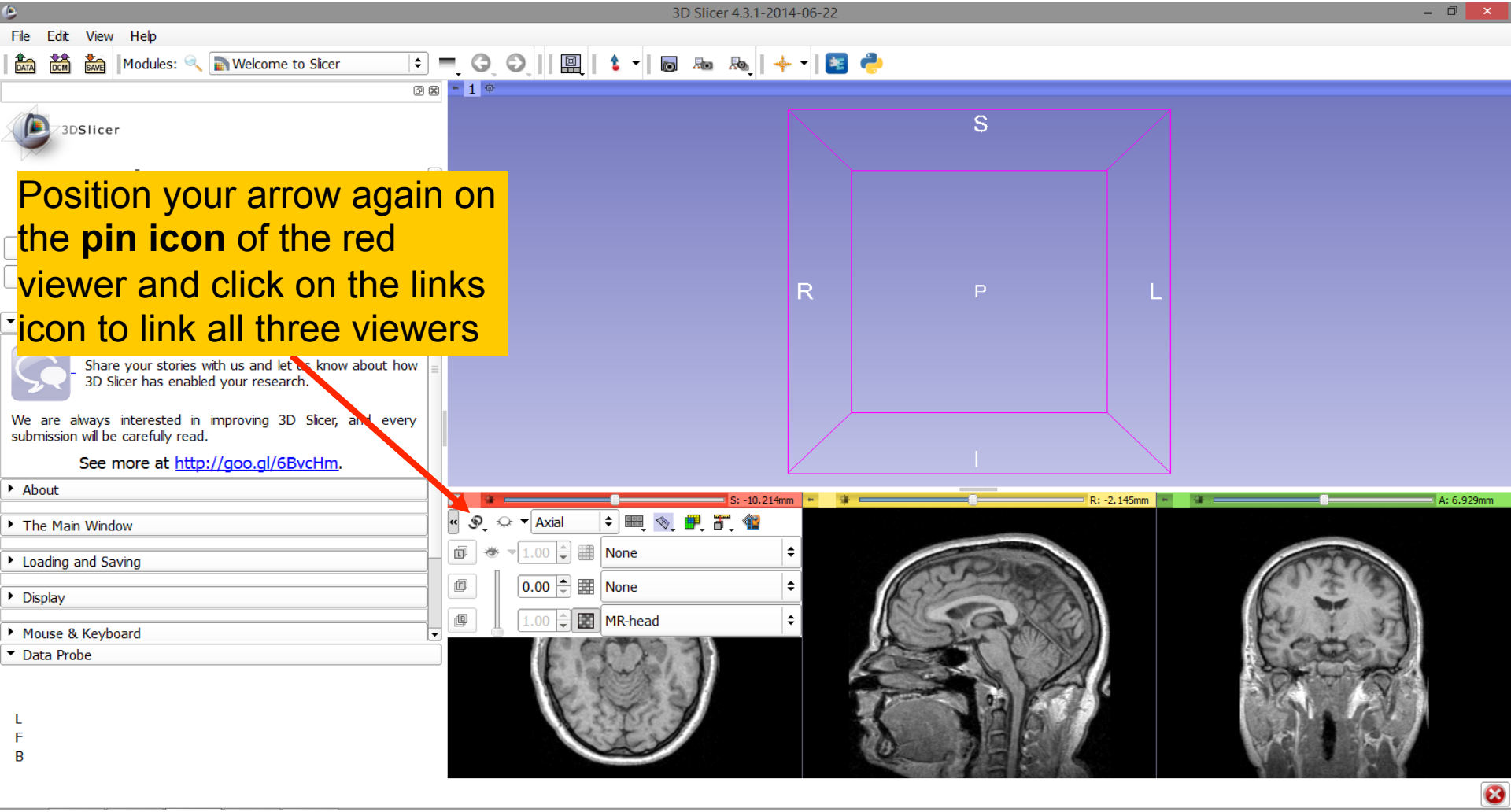
Loading a volume



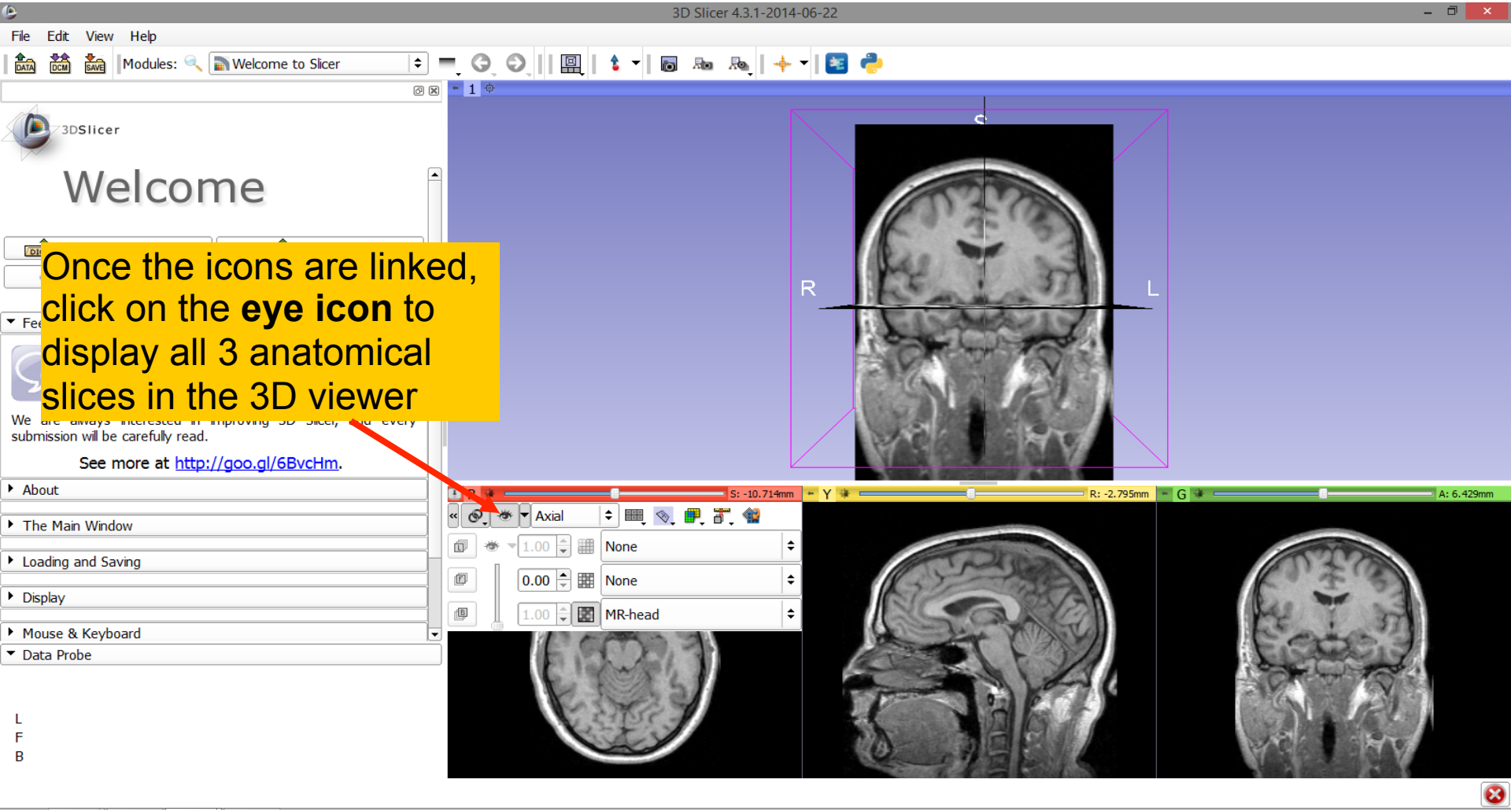
Loading a volume



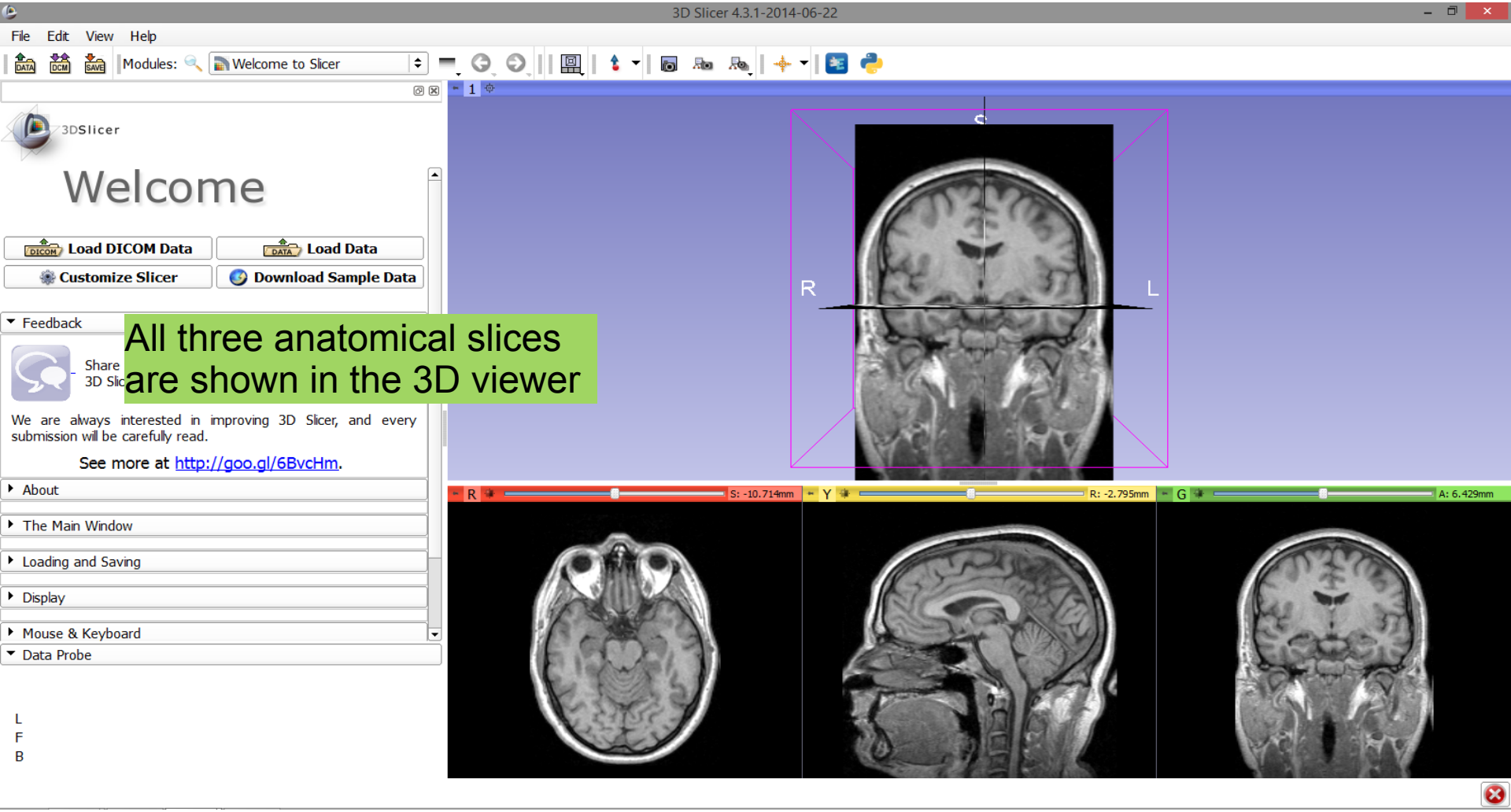
Loading a volume



Loading a volume

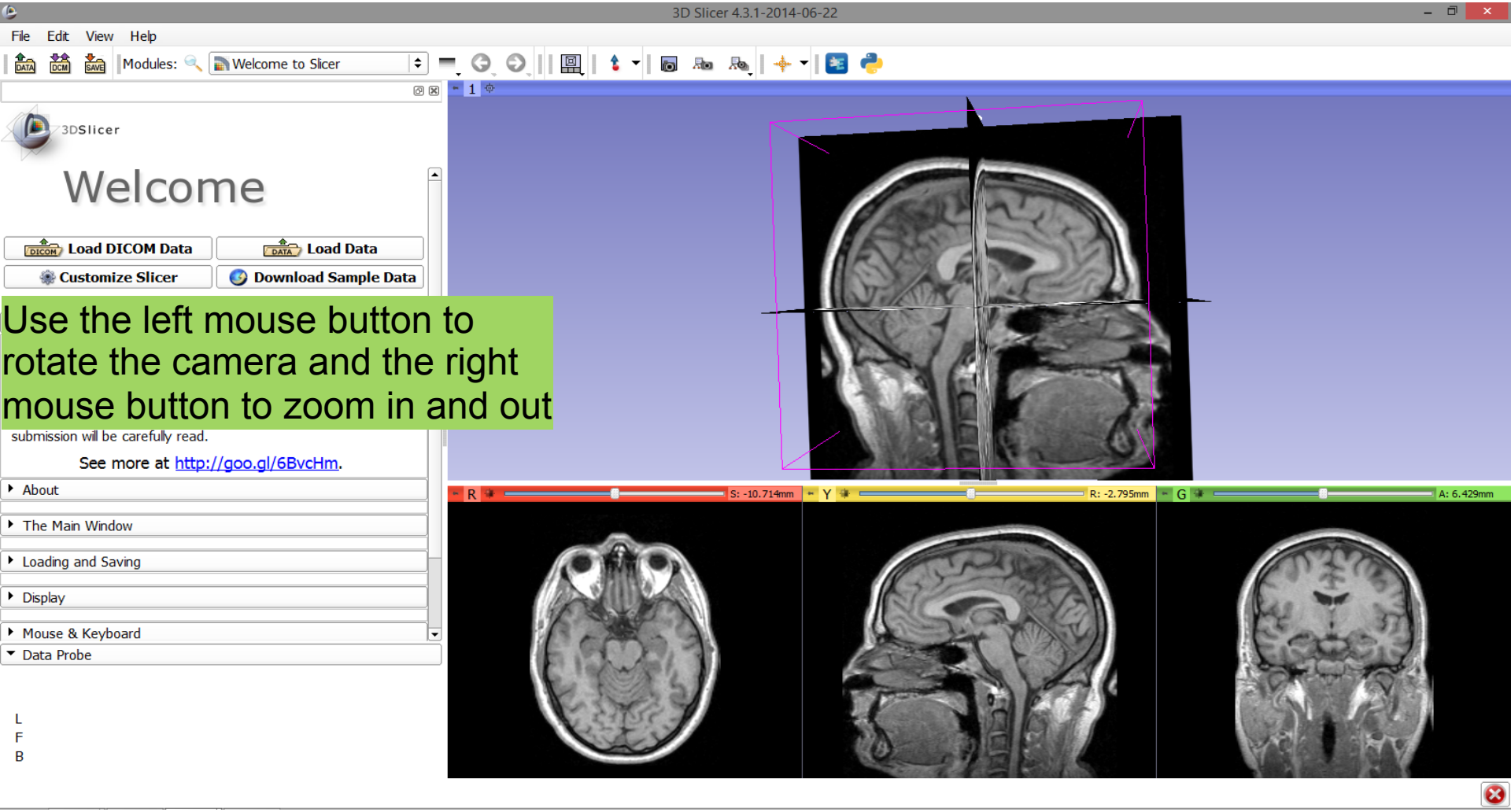


Loading a volume

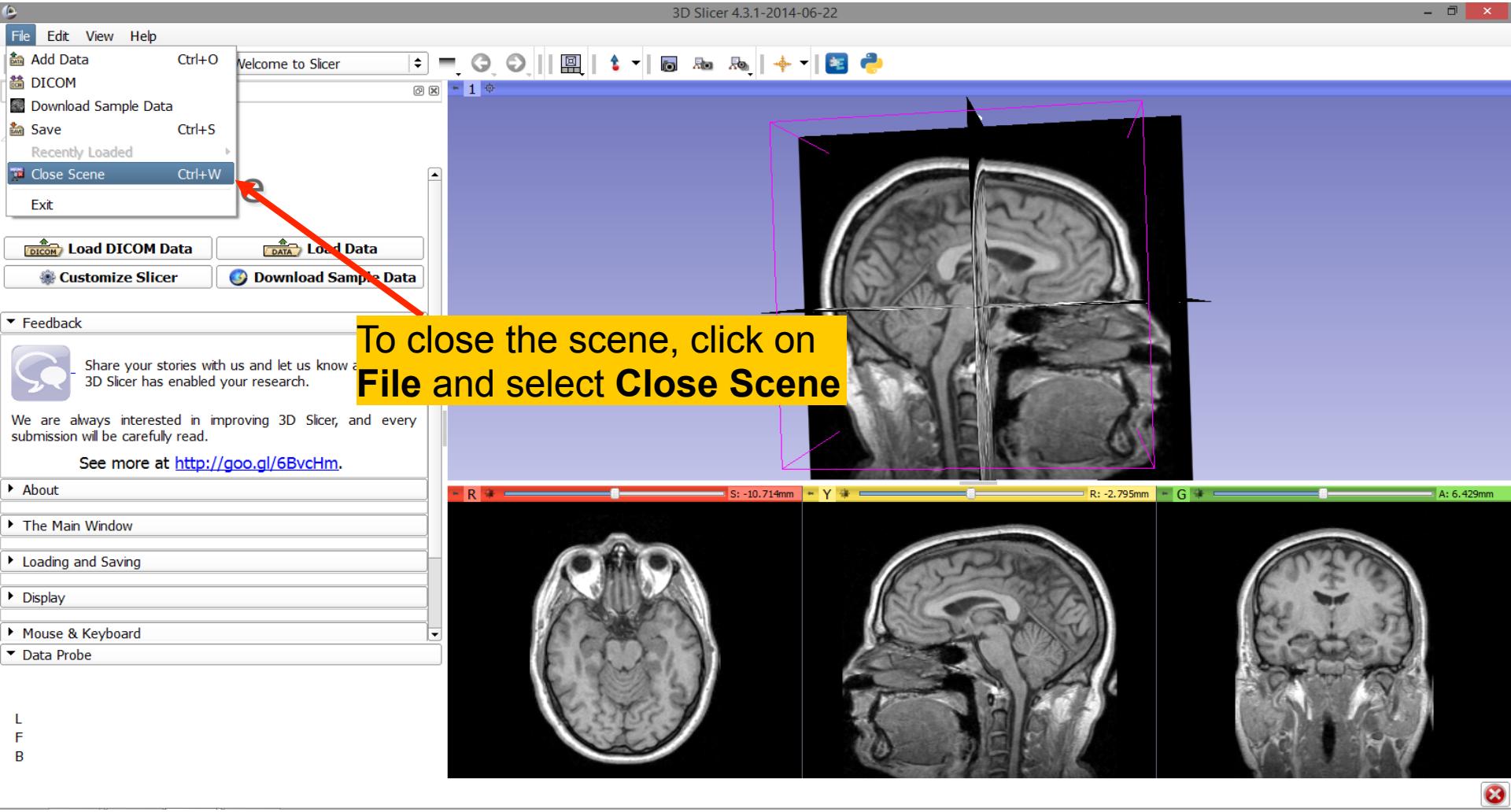


All three anatomical slices are shown in the 3D viewer

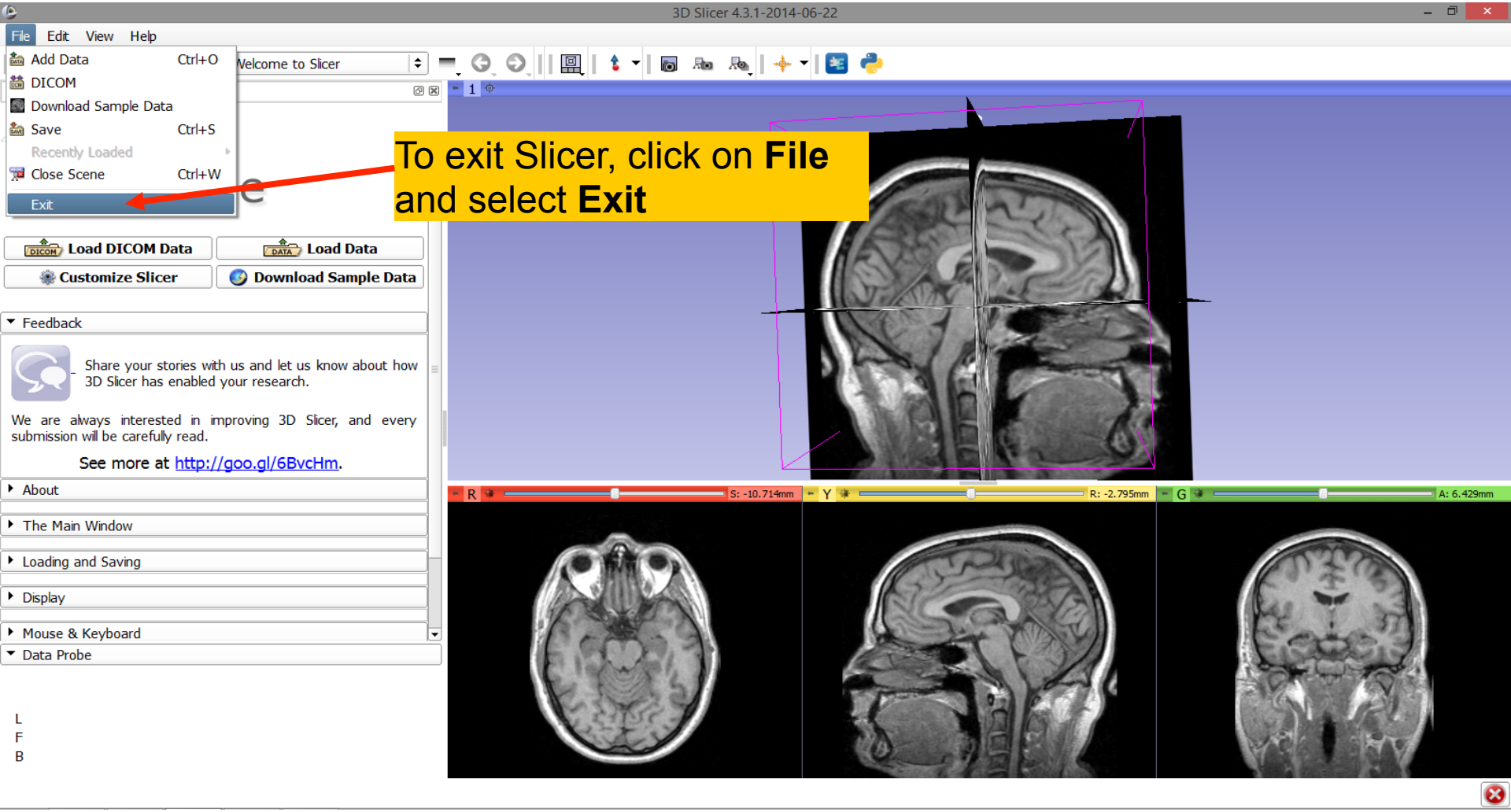
Loading a volume



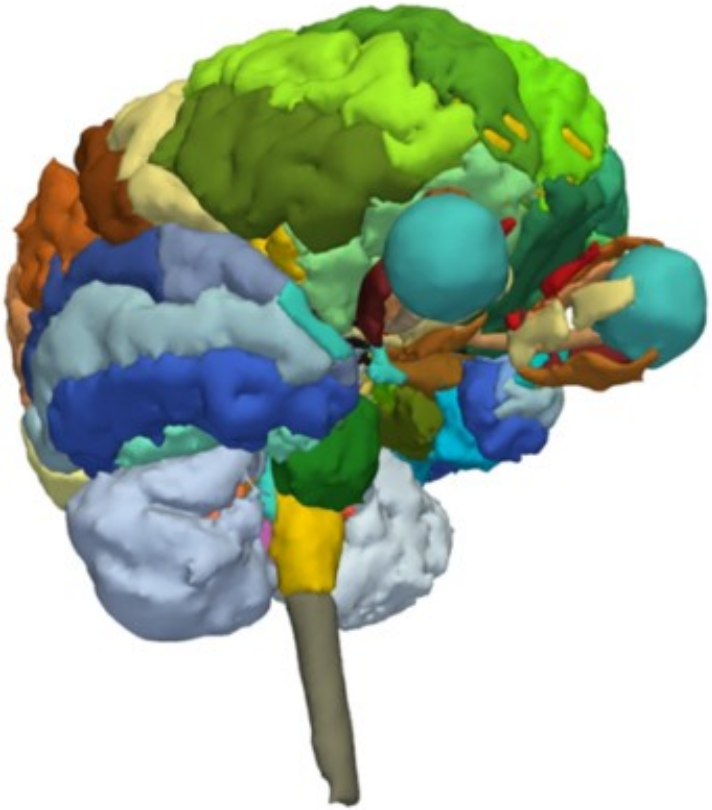
Close the scene



Exit Slicer

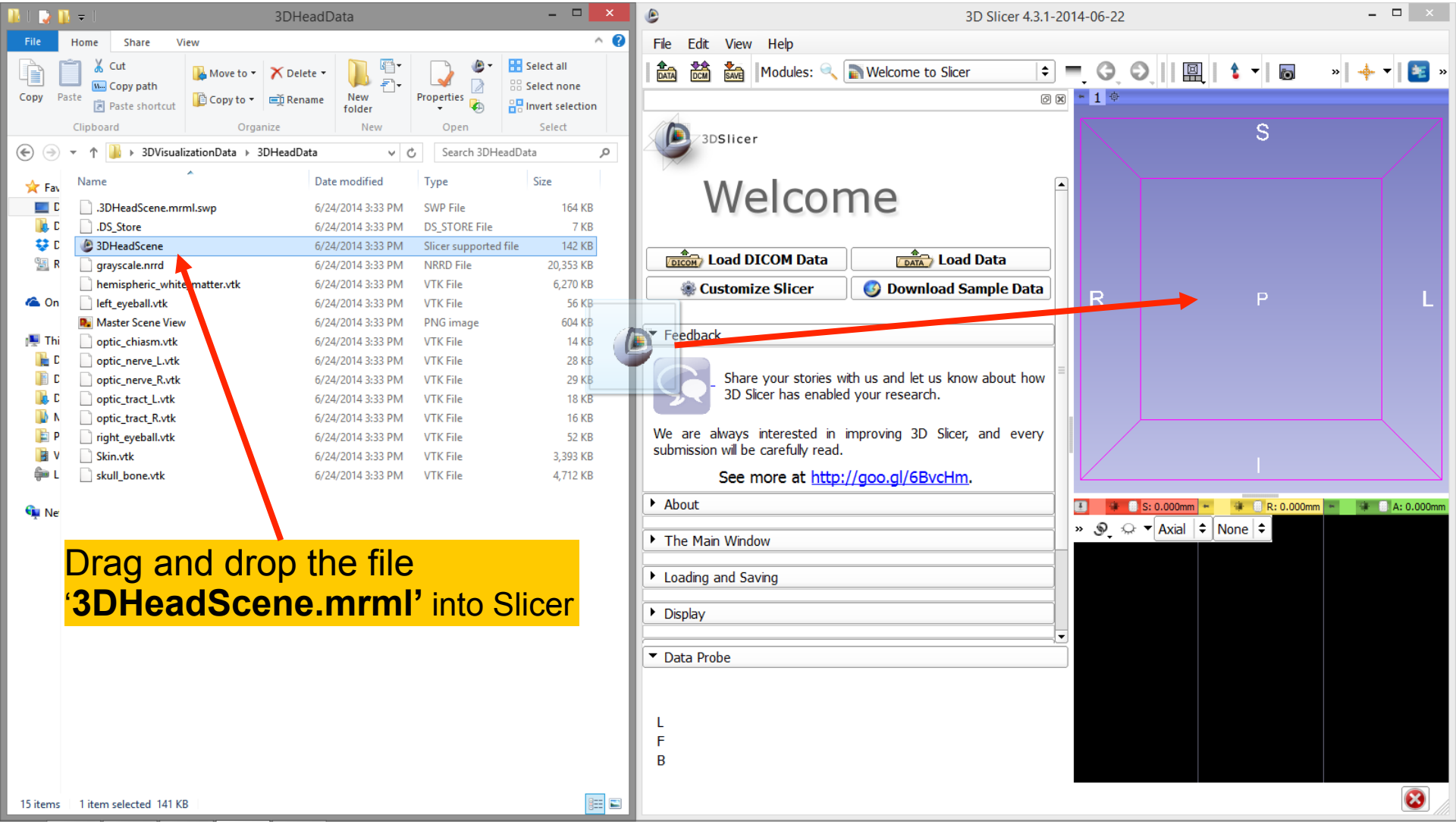

3D Slicer 4.3.1-2014-06-22
File
Edit
View
Help
Add Data Ctrl+O
DICOM
Download Sample Data
Save Ctrl+S
Recently Loaded
Close Scene Ctrl+W
Exit
Welcome to Slicer
To exit Slicer, click on File and select Exit
Load DICOM Data
Load Data
Customize Slicer
Download Sample Data
Feedback
Share your stories with 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
L
F
B
S: -10.714mm
R: -2.795mm
A: 6.429mm

Part 2

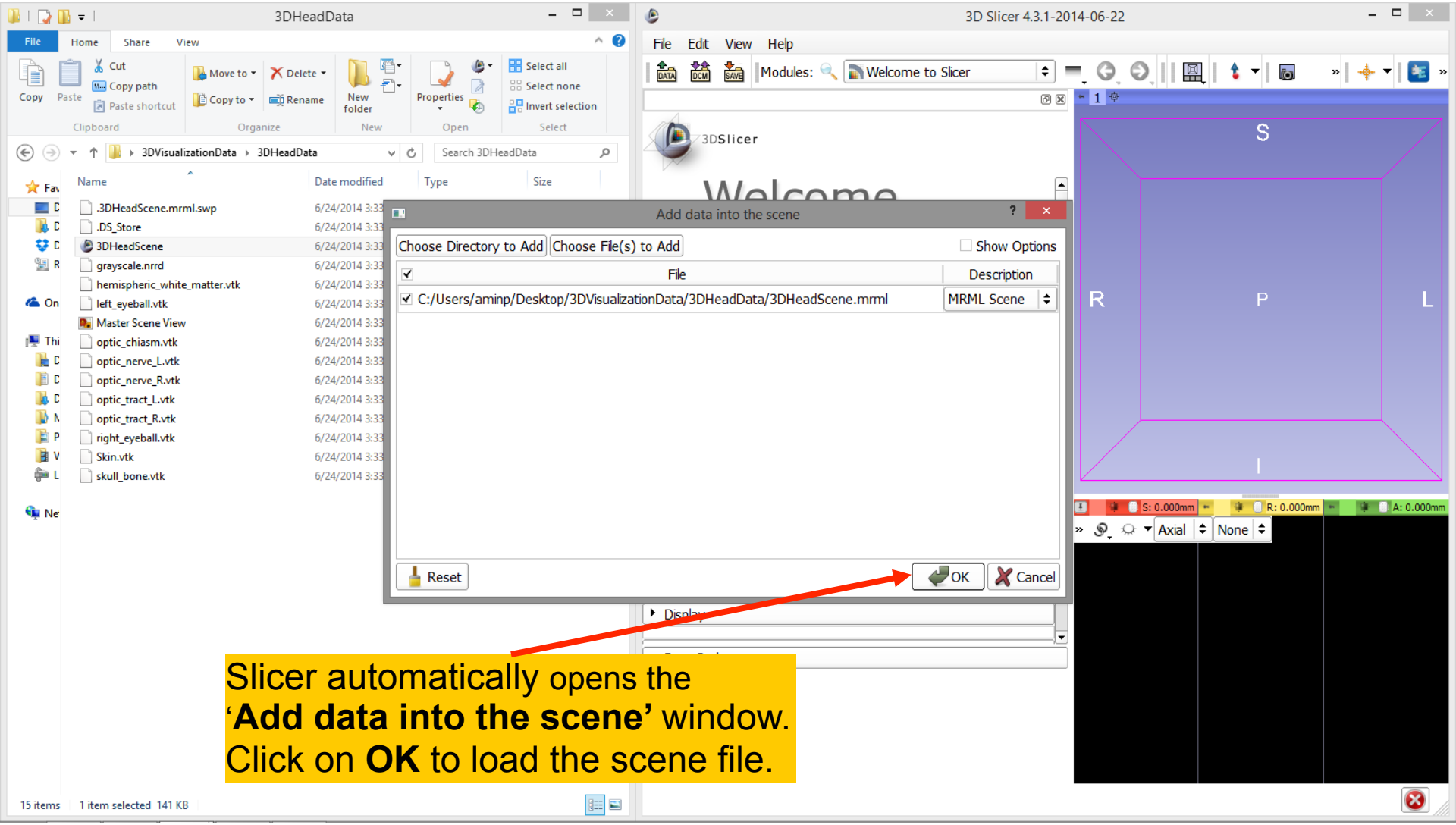


3D Visualization of Surface Models of the Brain

Loading a Scene

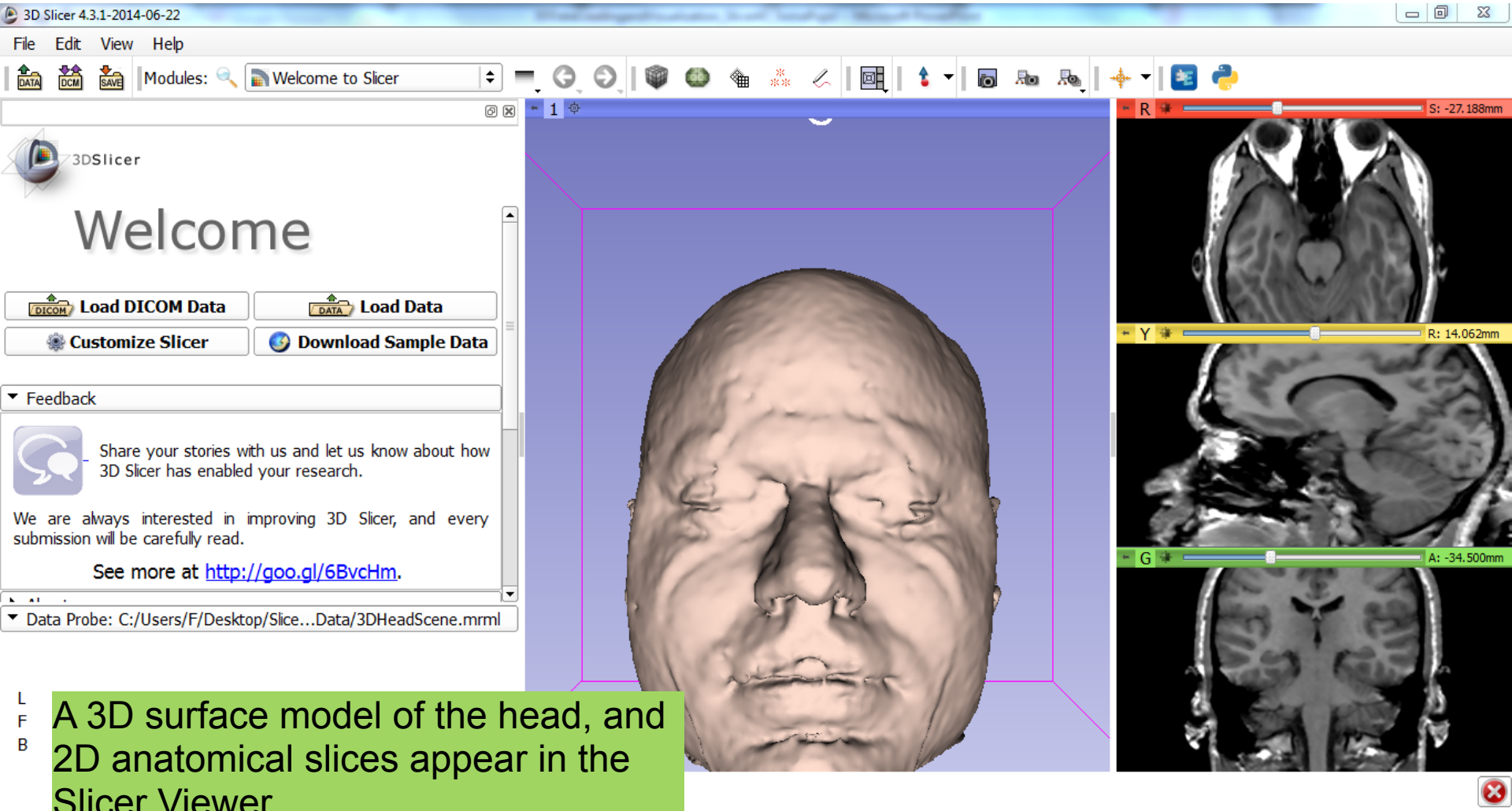


Loading a Scene



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

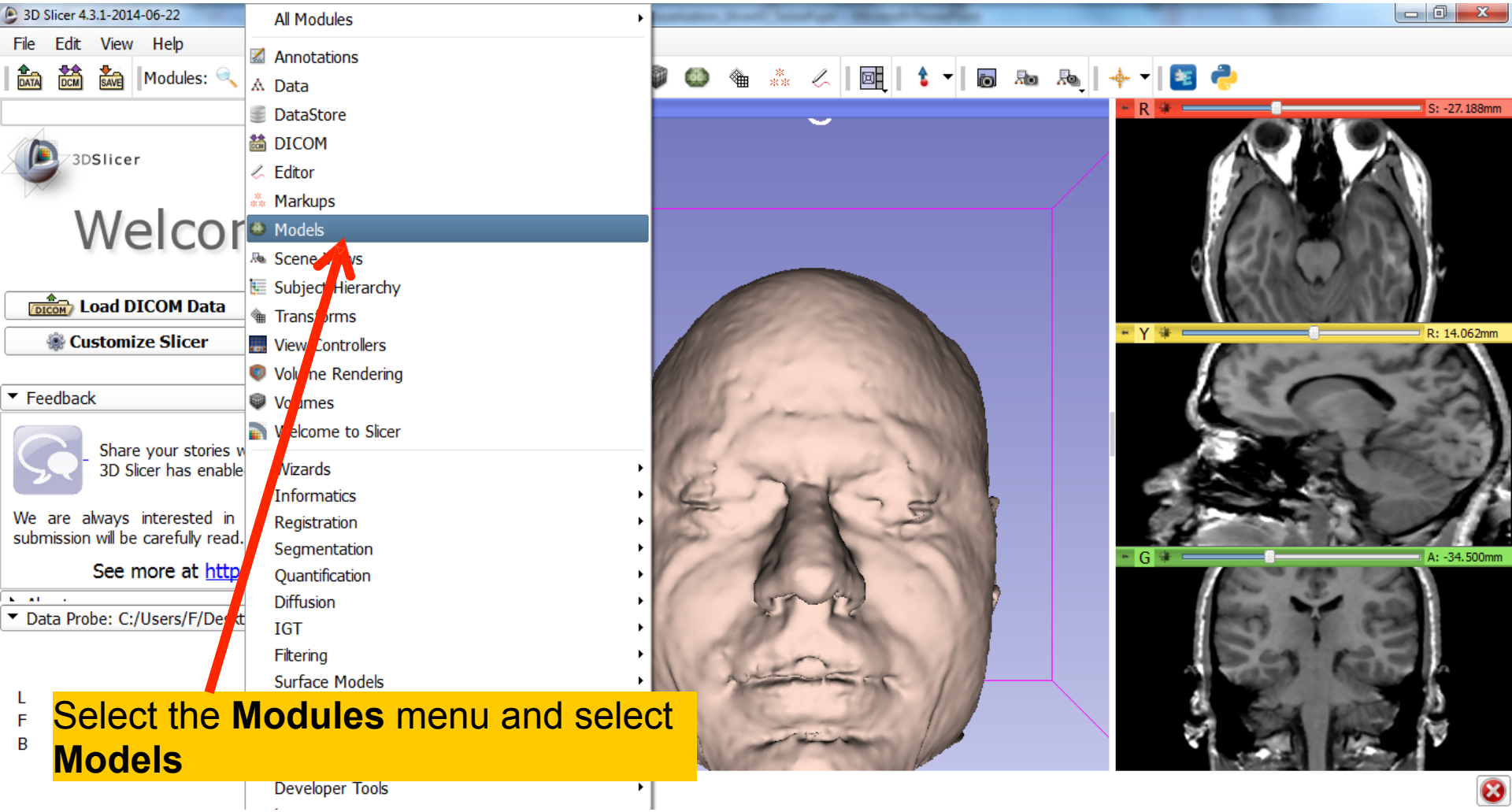
Loading the Slicer Scene



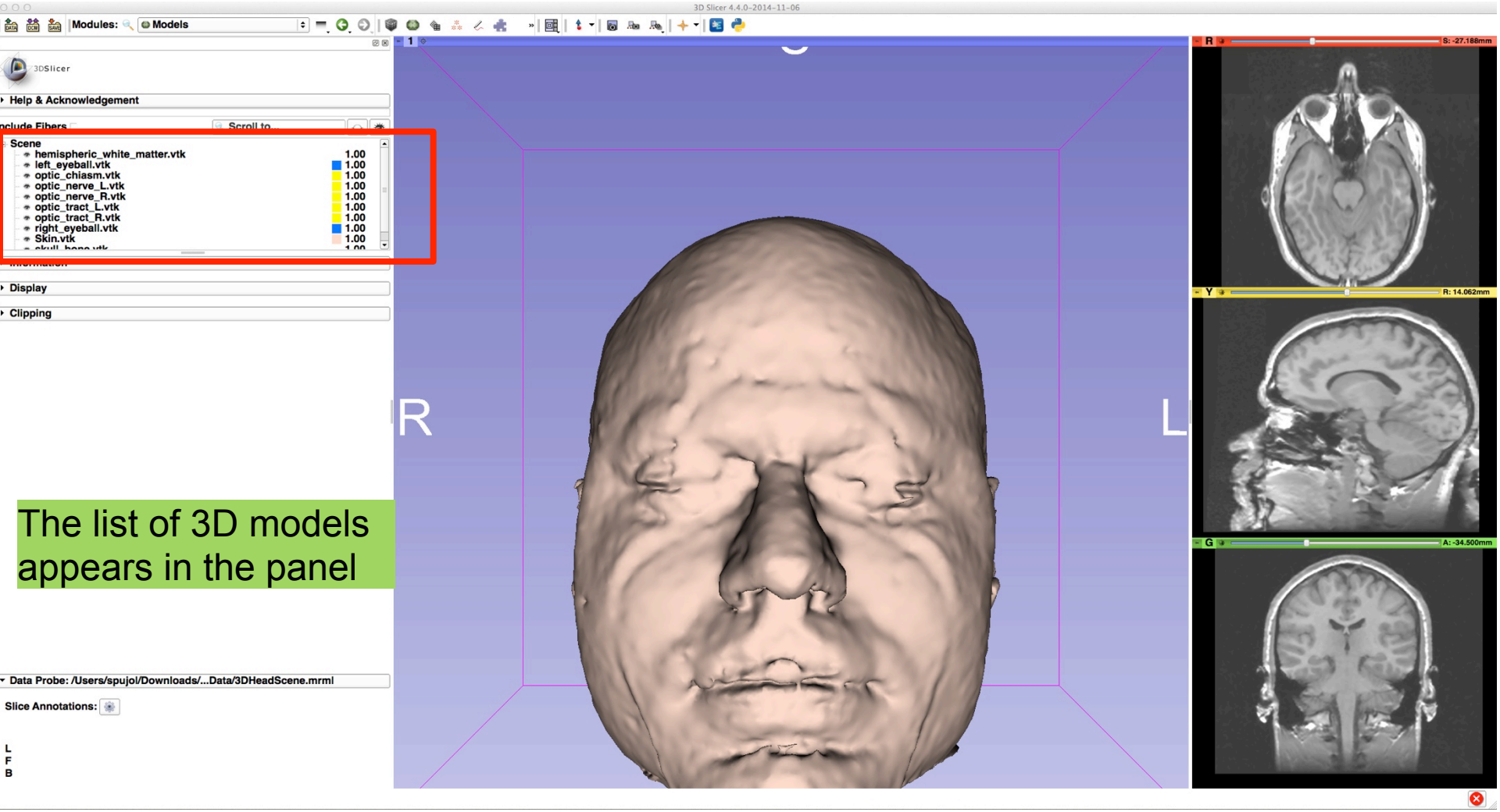
L
F
B

A 3D surface model of the head, and 2D anatomical slices appear in the Slicer Viewer

Loading the Slicer Scene

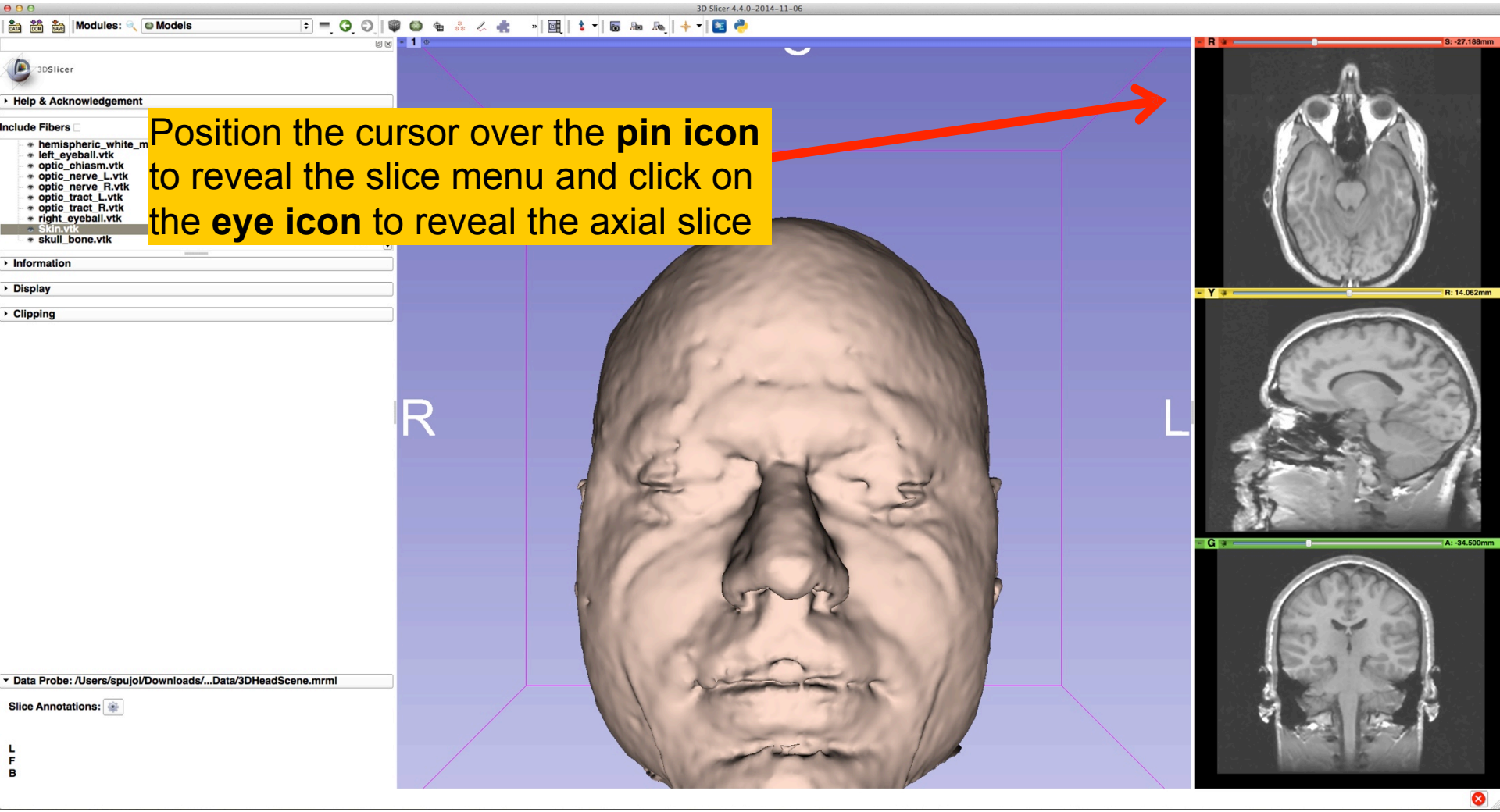


Models Module

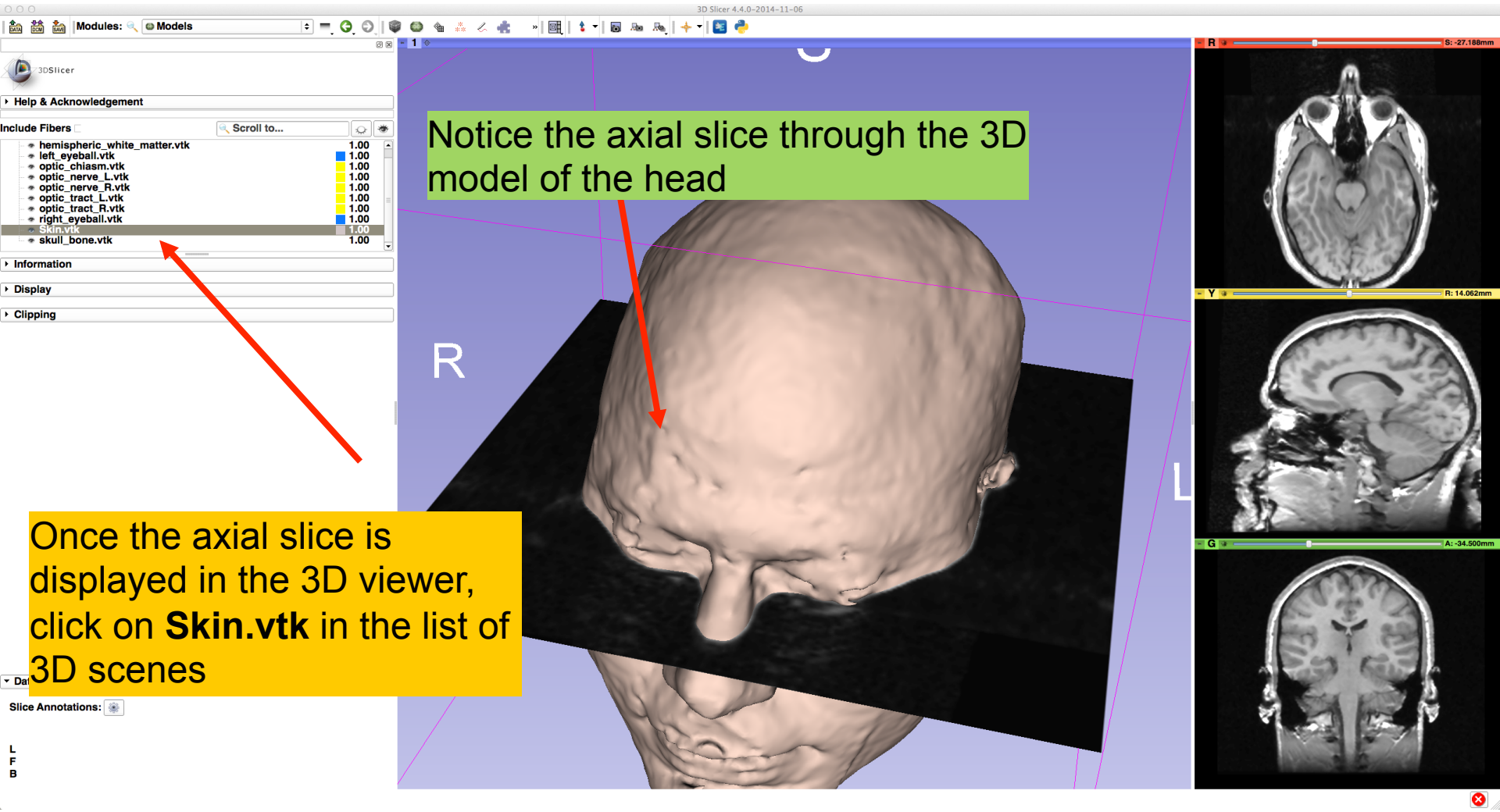


The list of 3D models appears in the panel

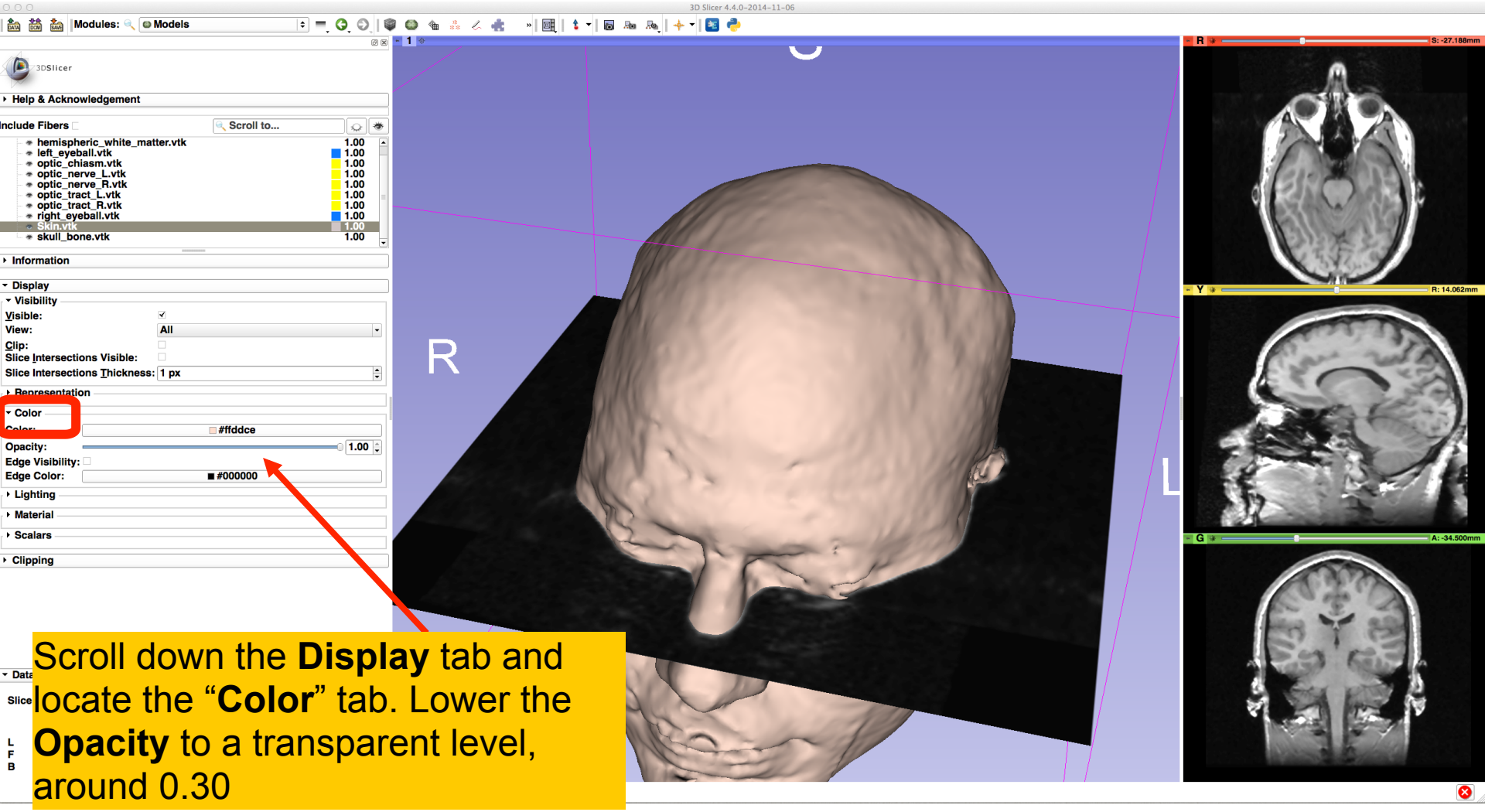
3D Visualization



3D Visualization

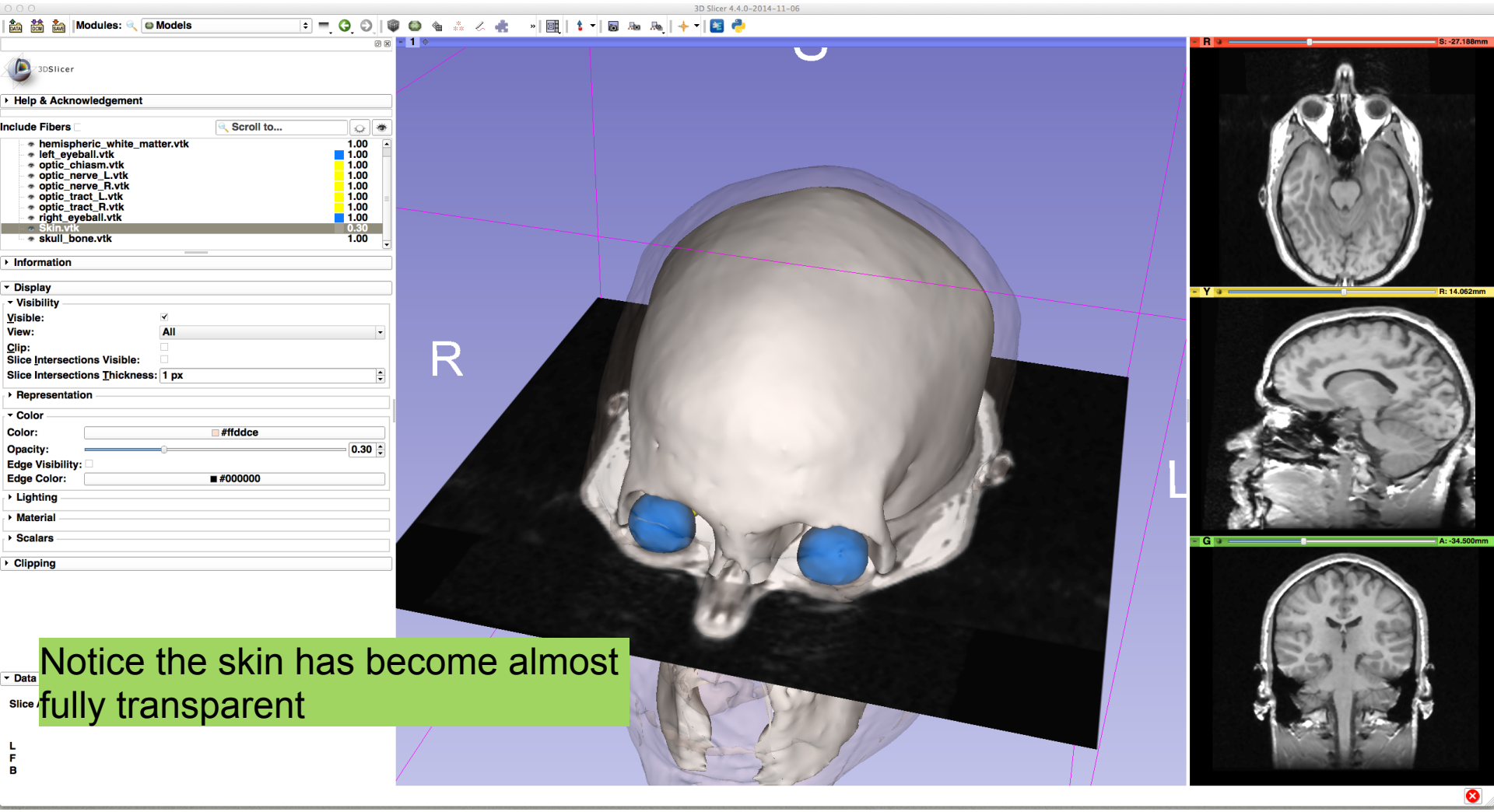


3D Visualization



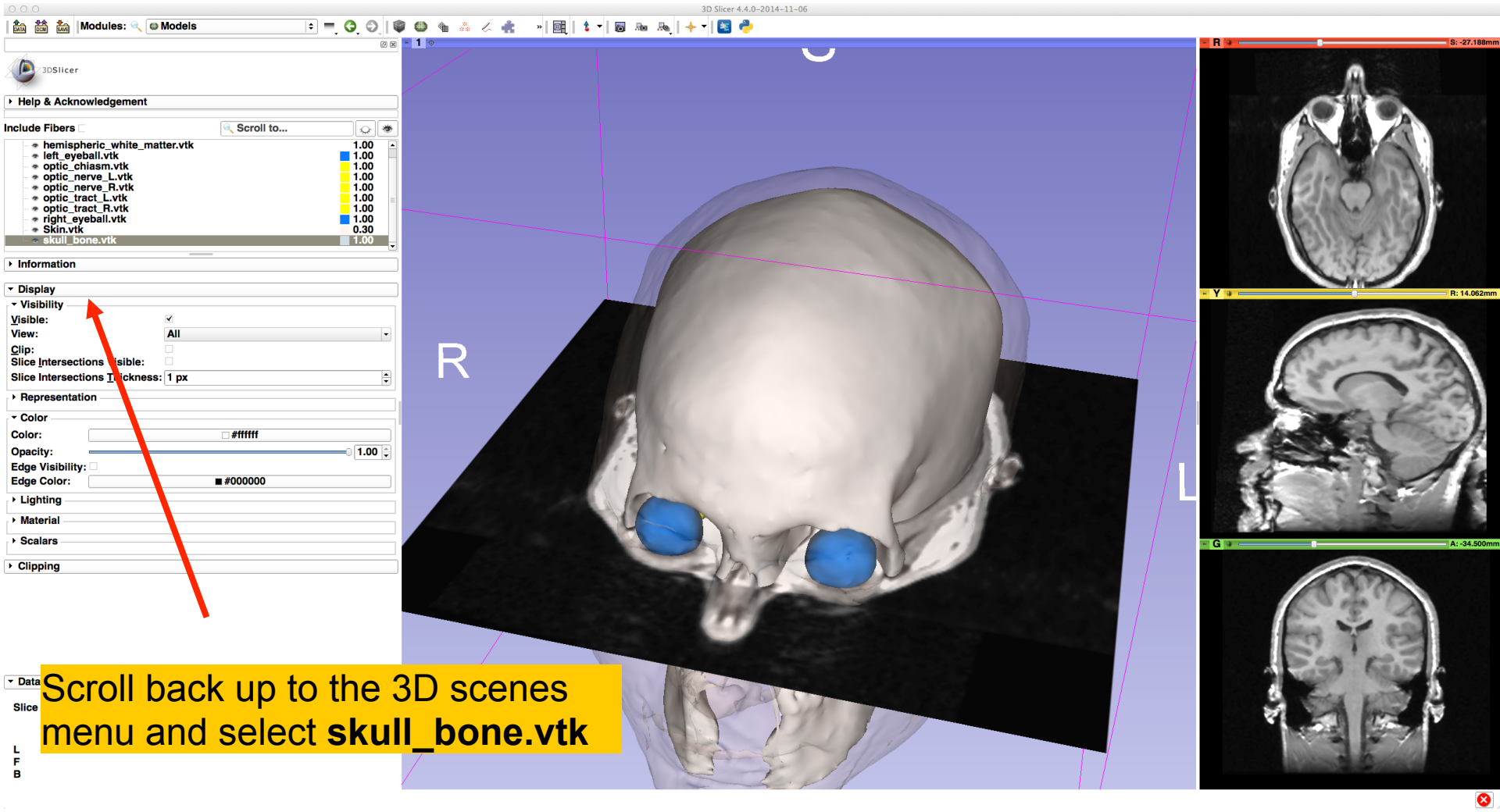
Scroll down the **Display** tab and locate the "**Color**" tab. Lower the **Opacity** to a transparent level, around 0.30

3D Visualization



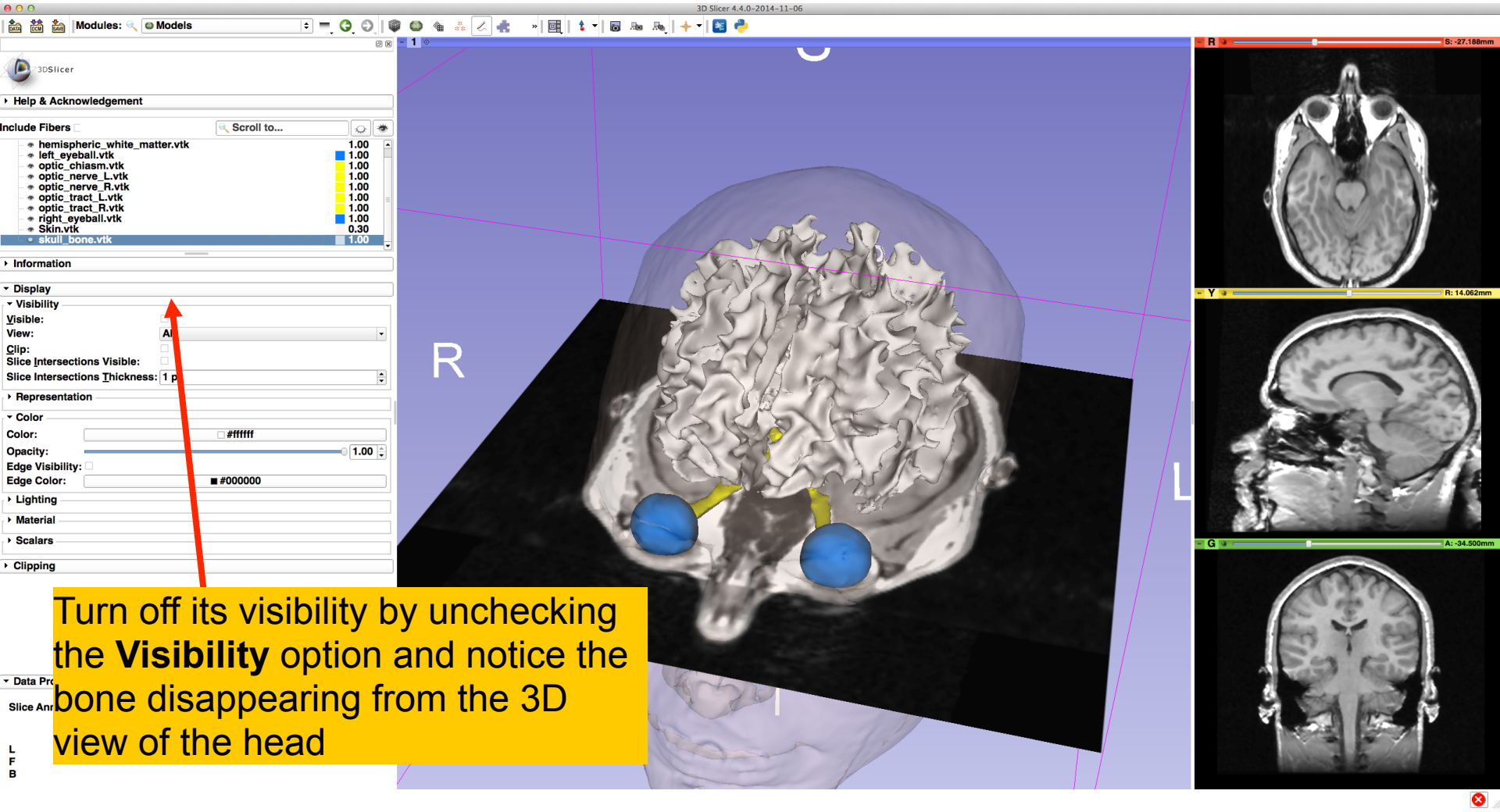
Notice the skin has become almost fully transparent

3D Visualization

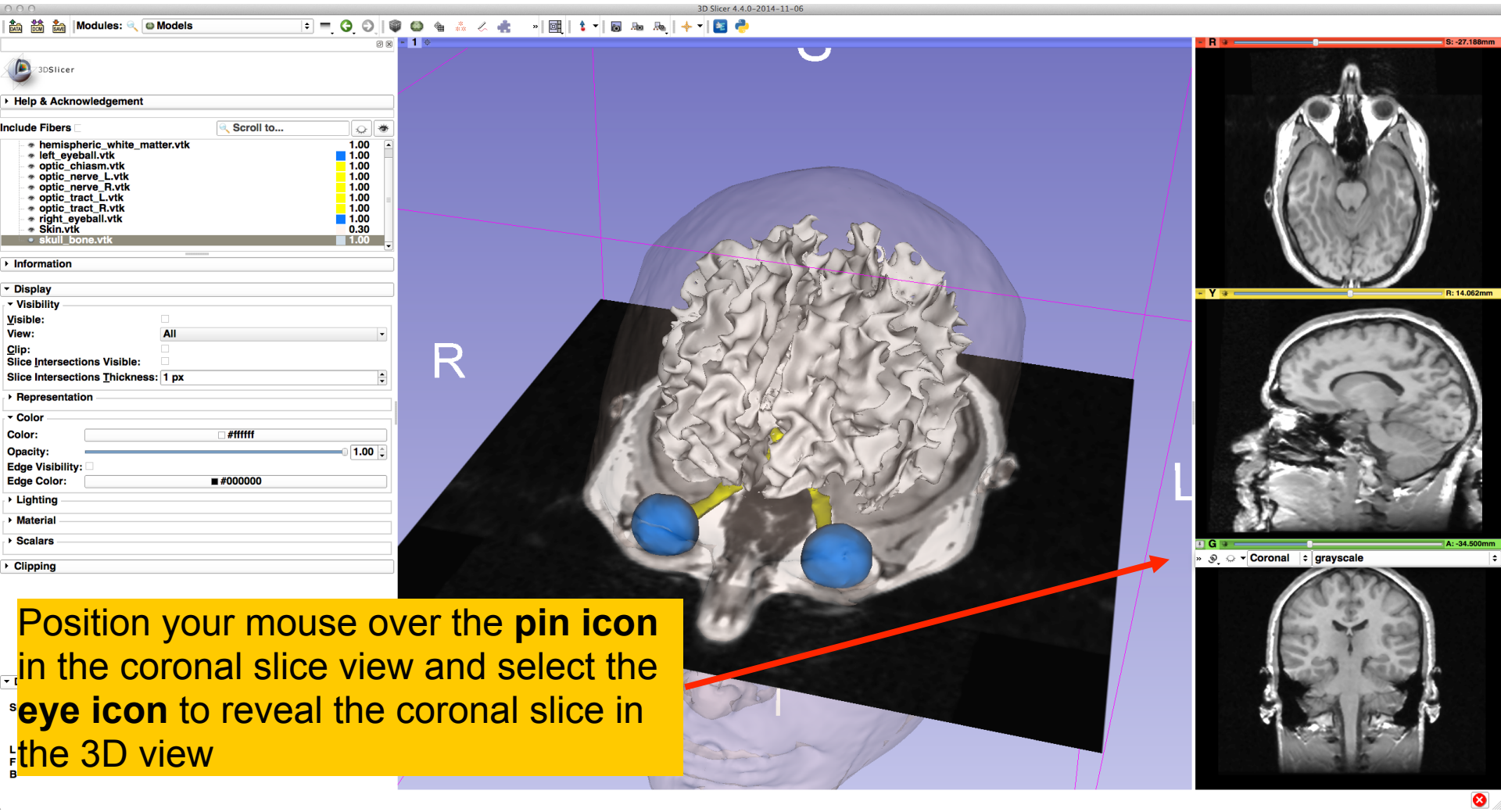


Scroll back up to the 3D scenes menu and select **skull_bone.vtk**

3D Visualization

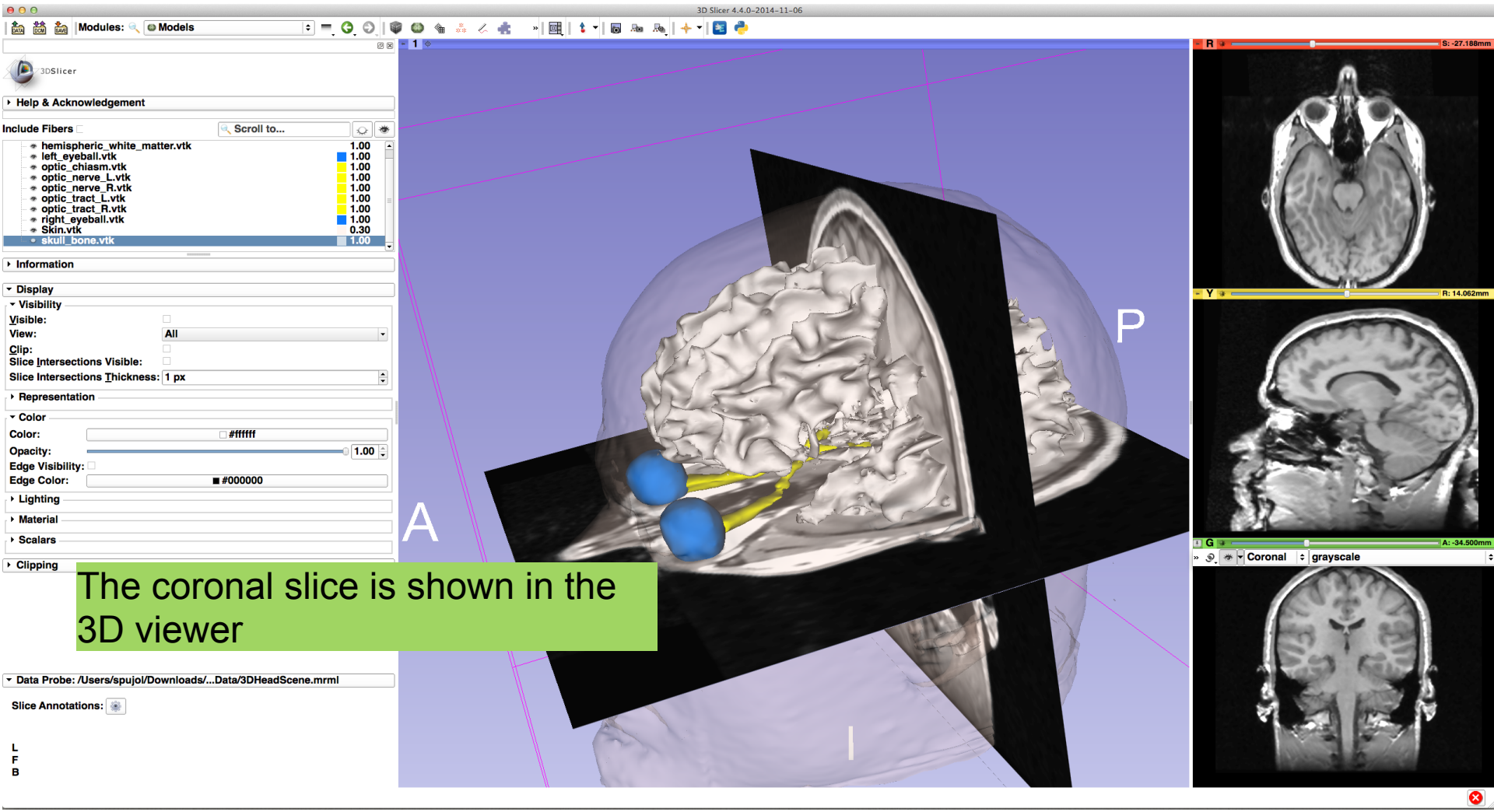


3D Visualization



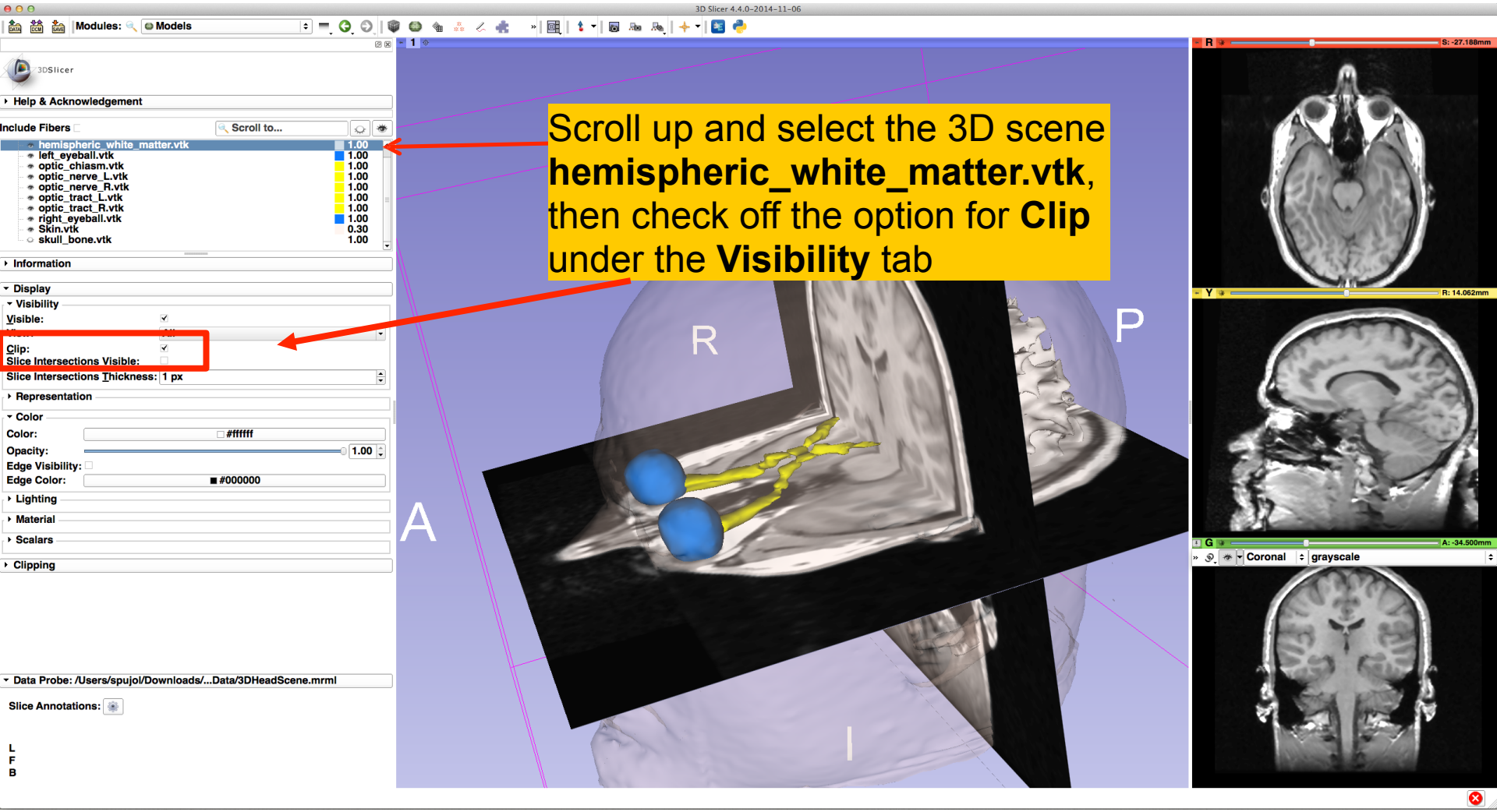
Position your mouse over the **pin icon** in the coronal slice view and select the **eye icon** to reveal the coronal slice in the 3D view

3D Visualization

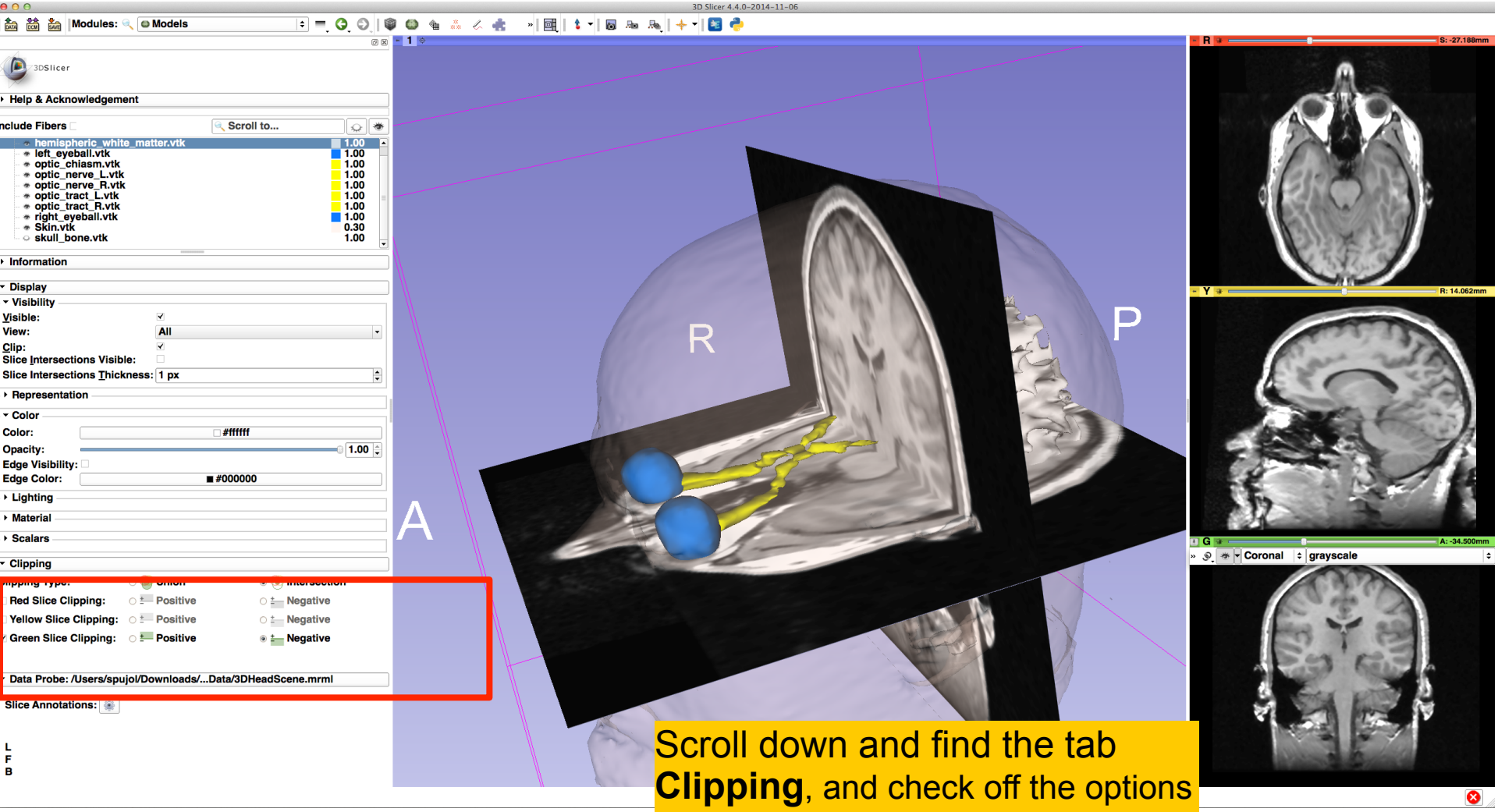


The coronal slice is shown in the 3D viewer

3D Visualization

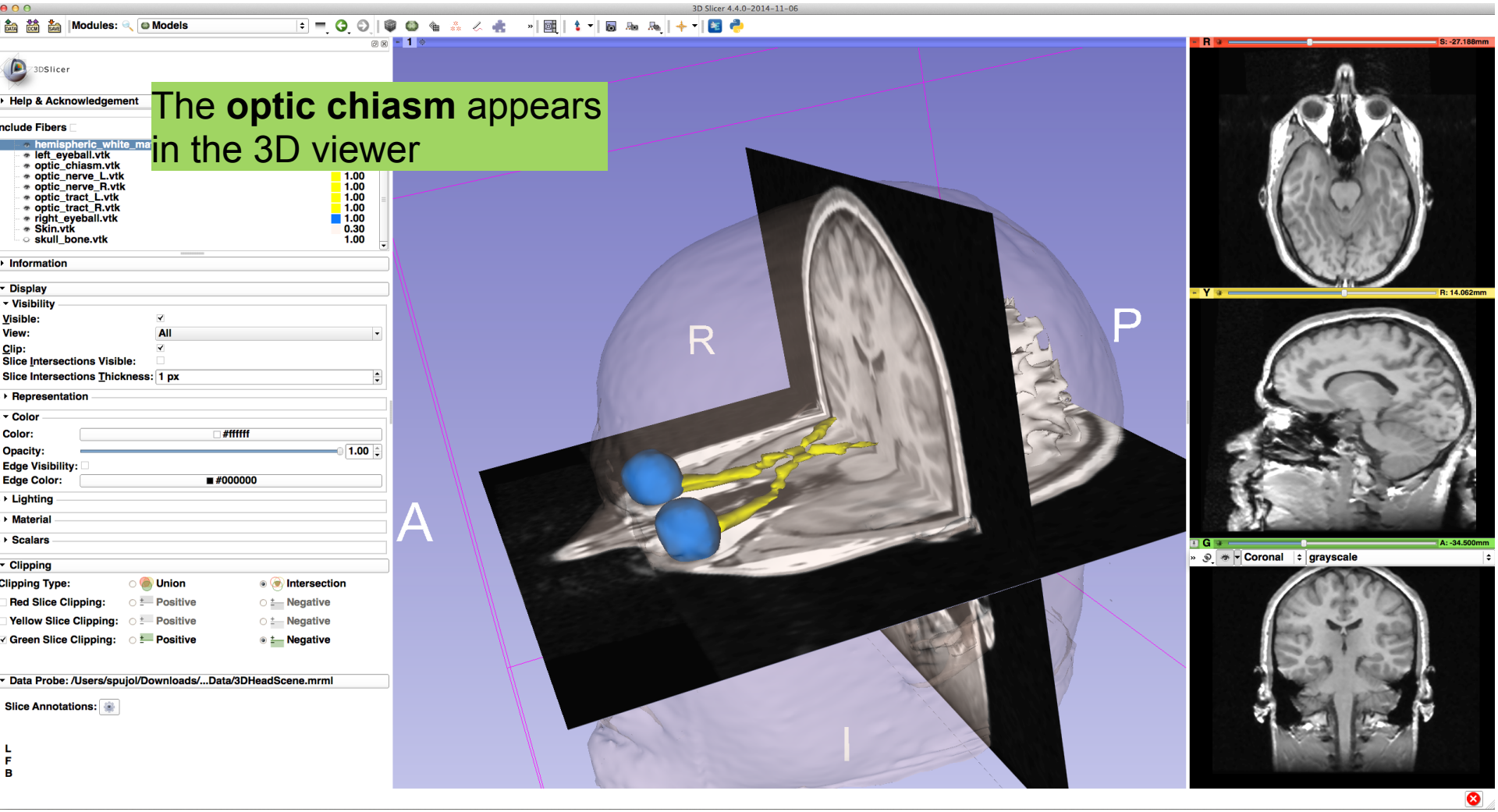


3D Visualization

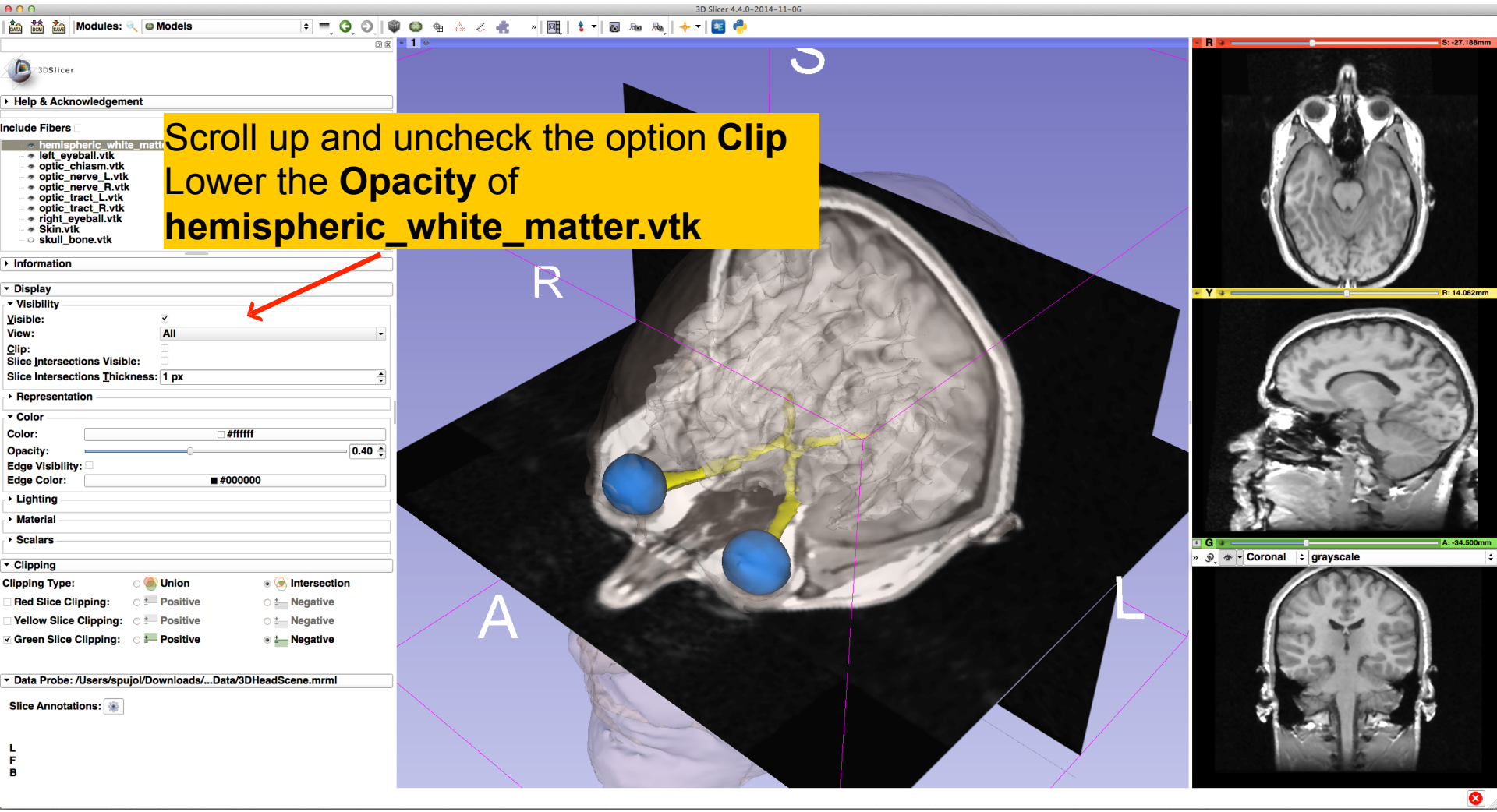


Scroll down and find the tab **Clipping**, and check off the options for **Green Slice Clipping** and **Negative Space**

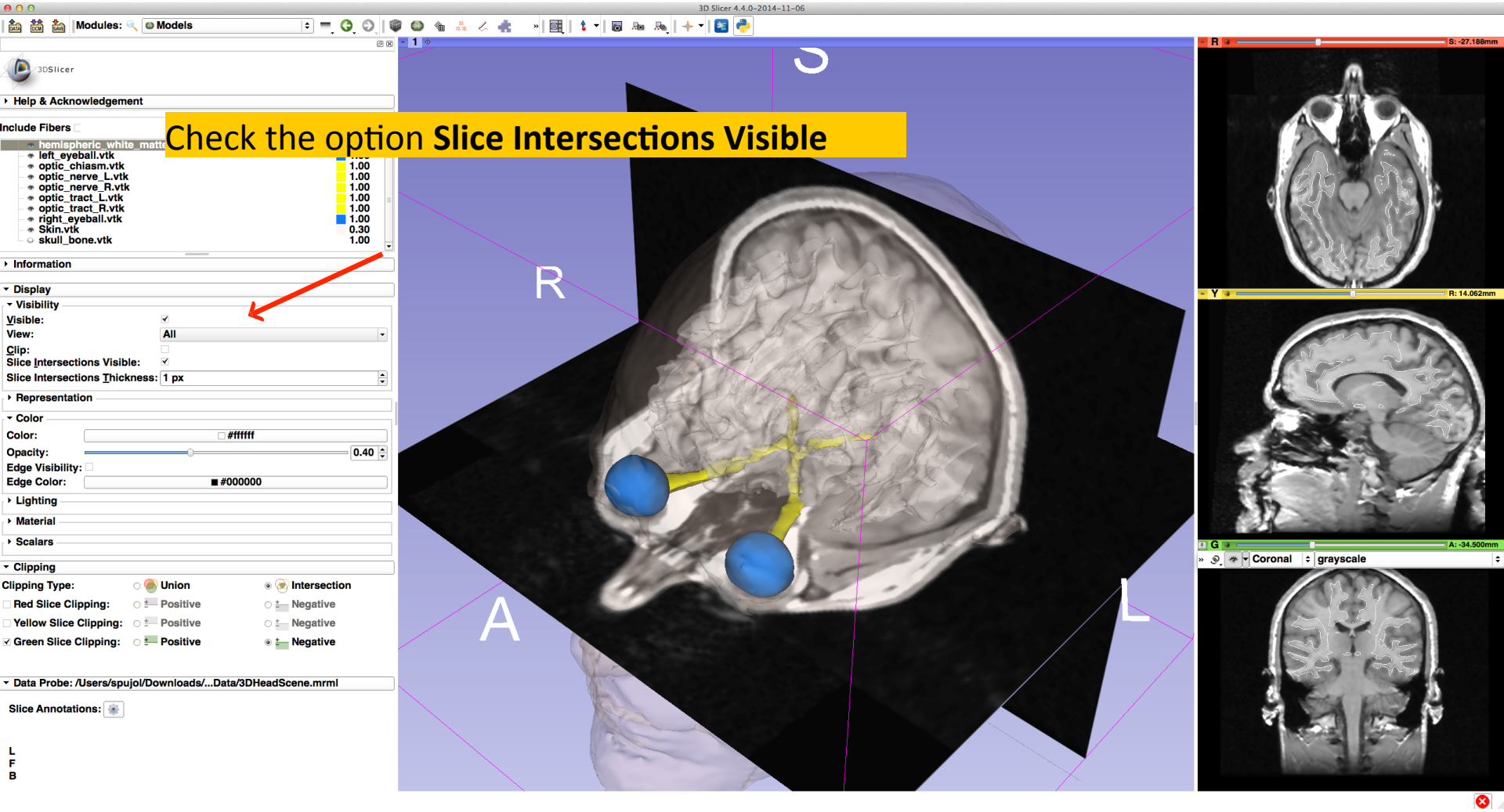
3D Visualization



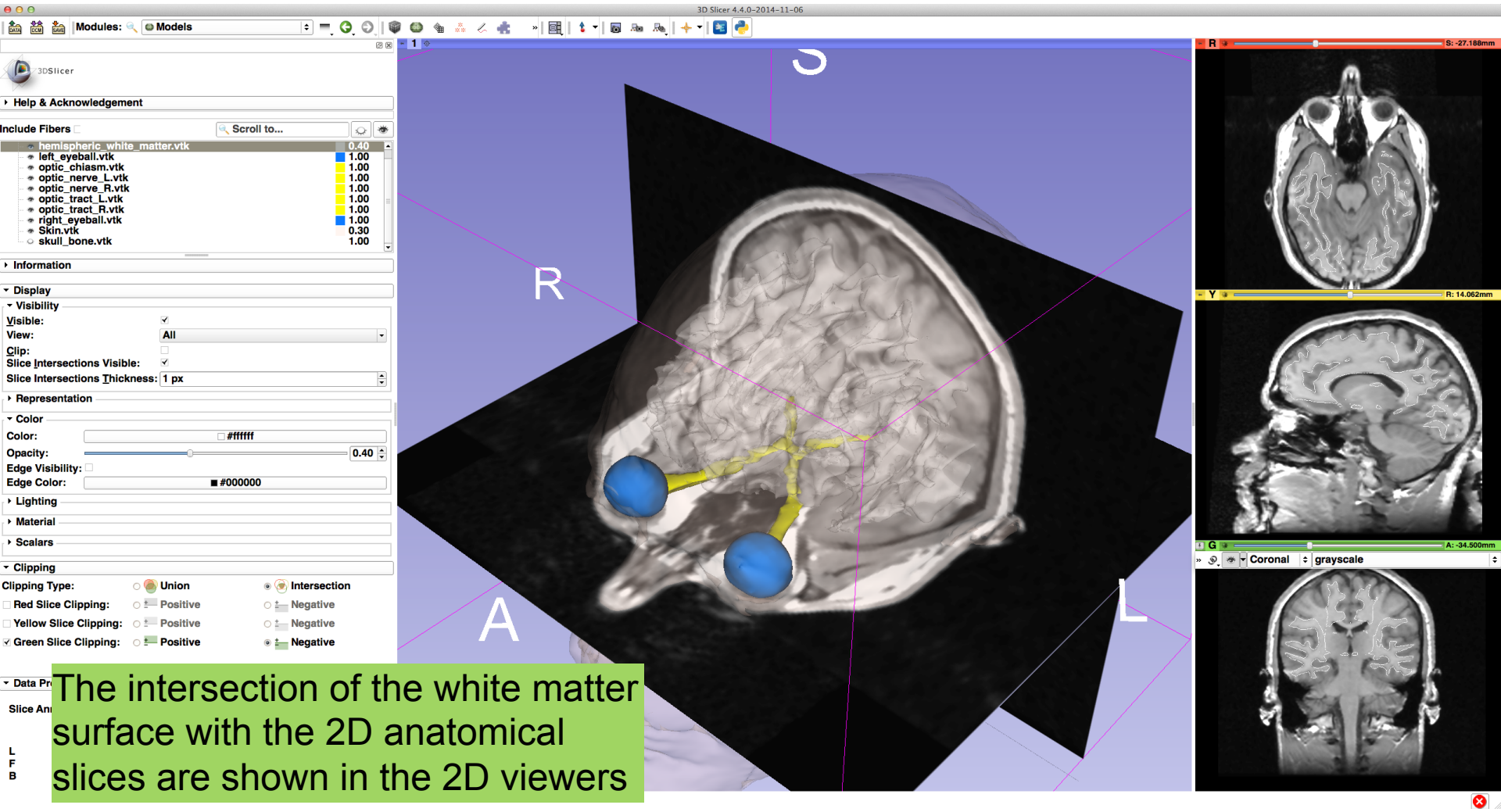
3D Visualization



3D Visualization

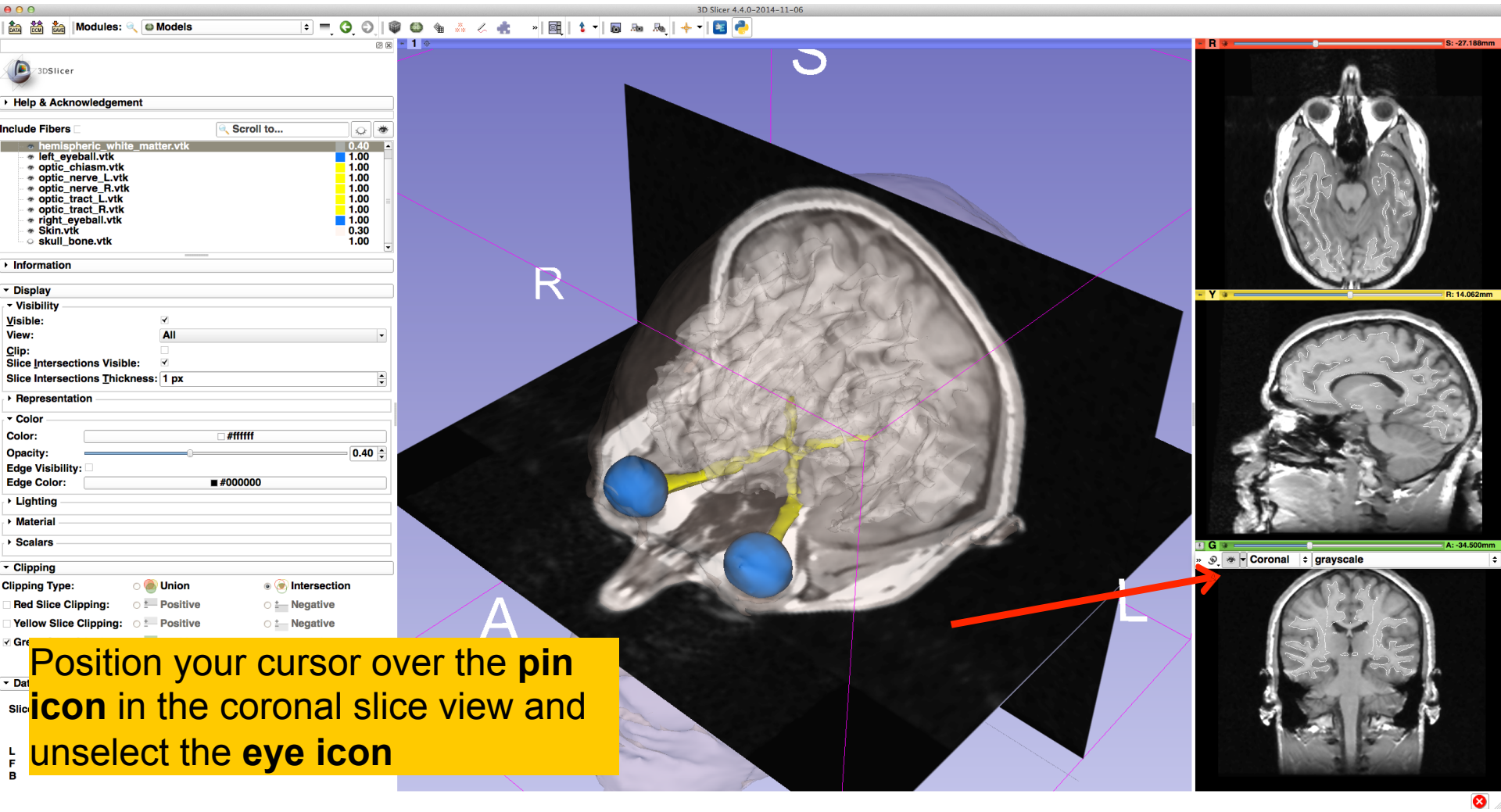


3D Visualization

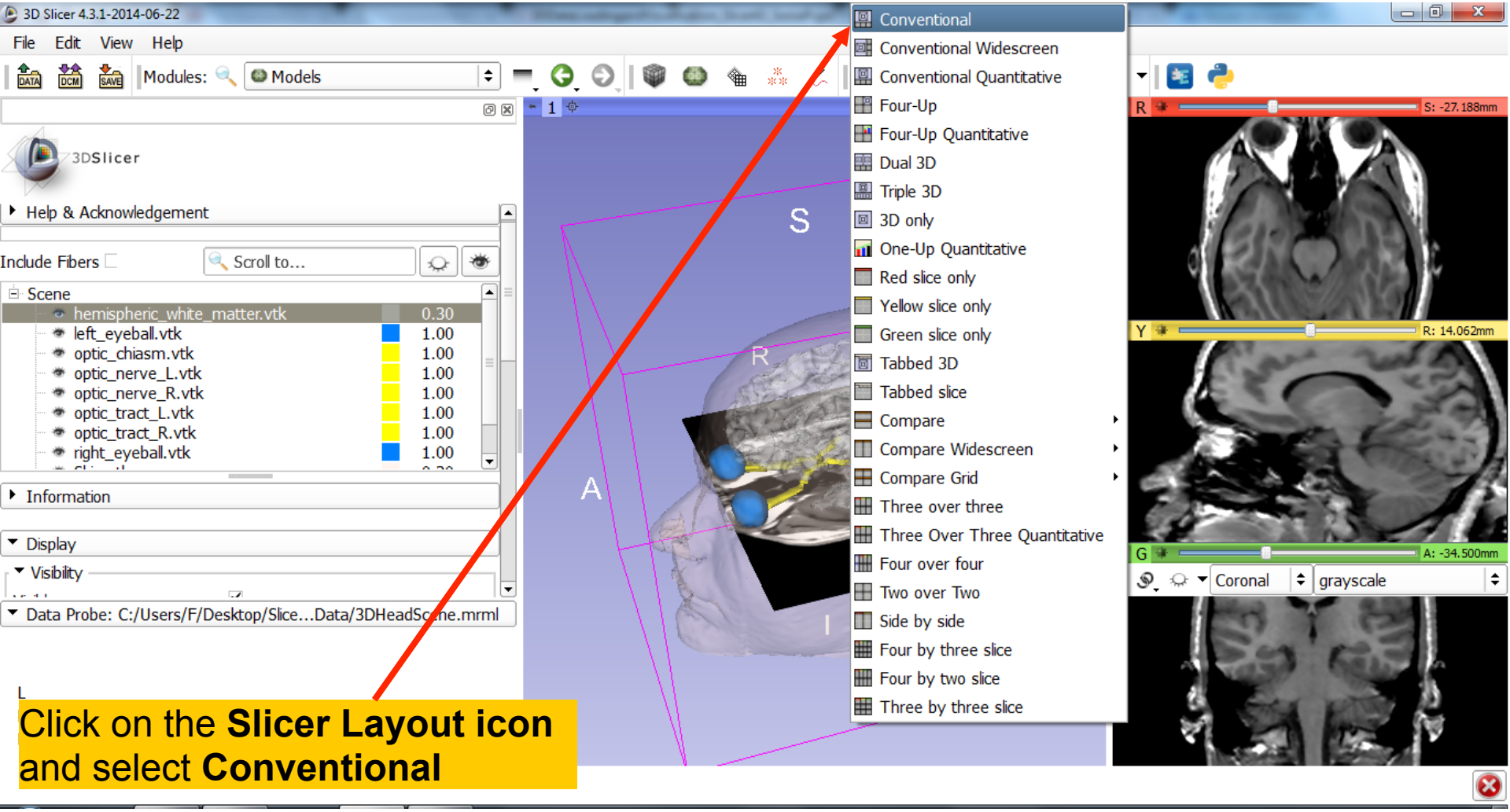


The intersection of the white matter surface with the 2D anatomical slices are shown in the 2D viewers

3D Visualization

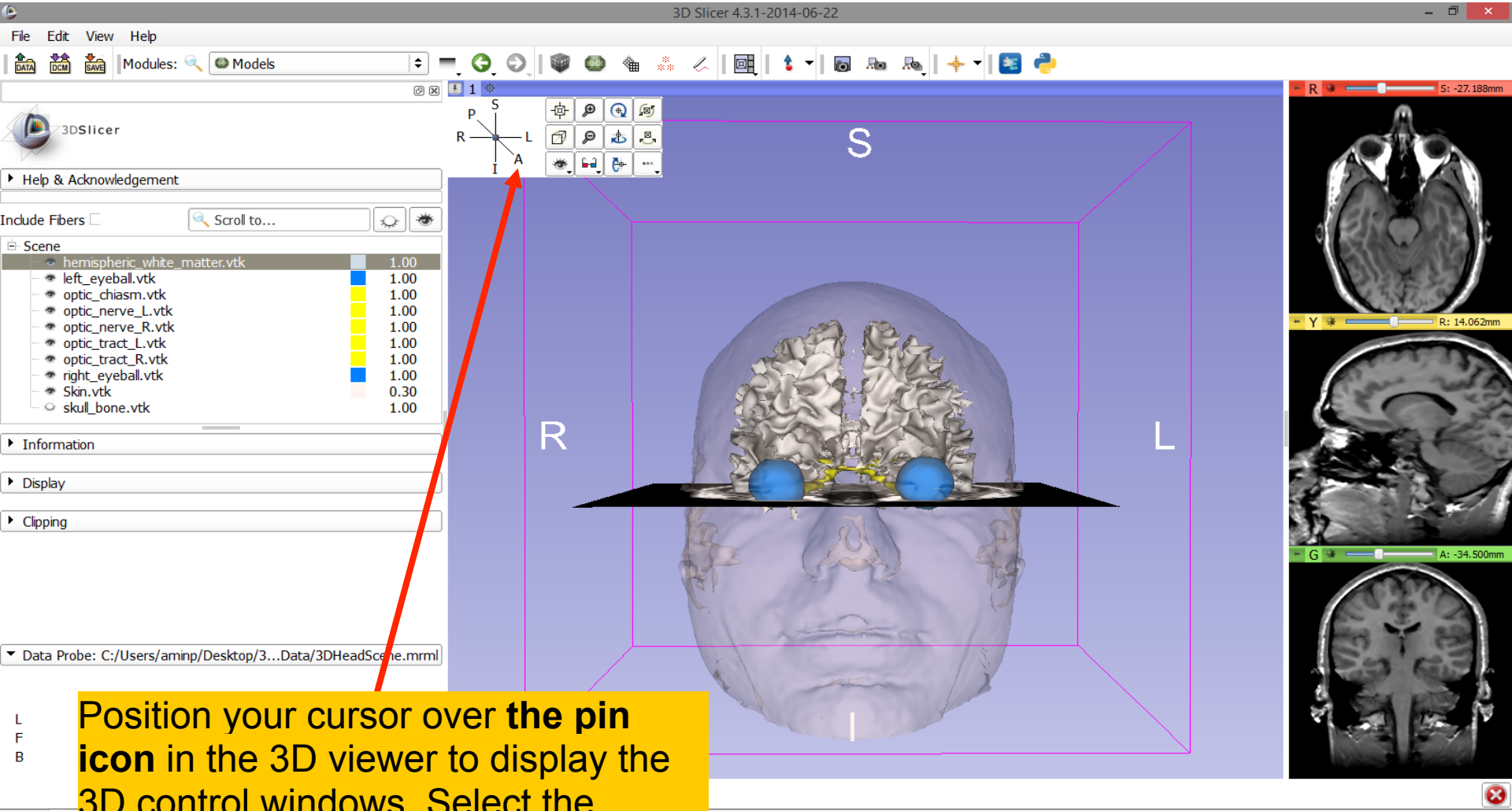


3D Visualization



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

3D Visualization

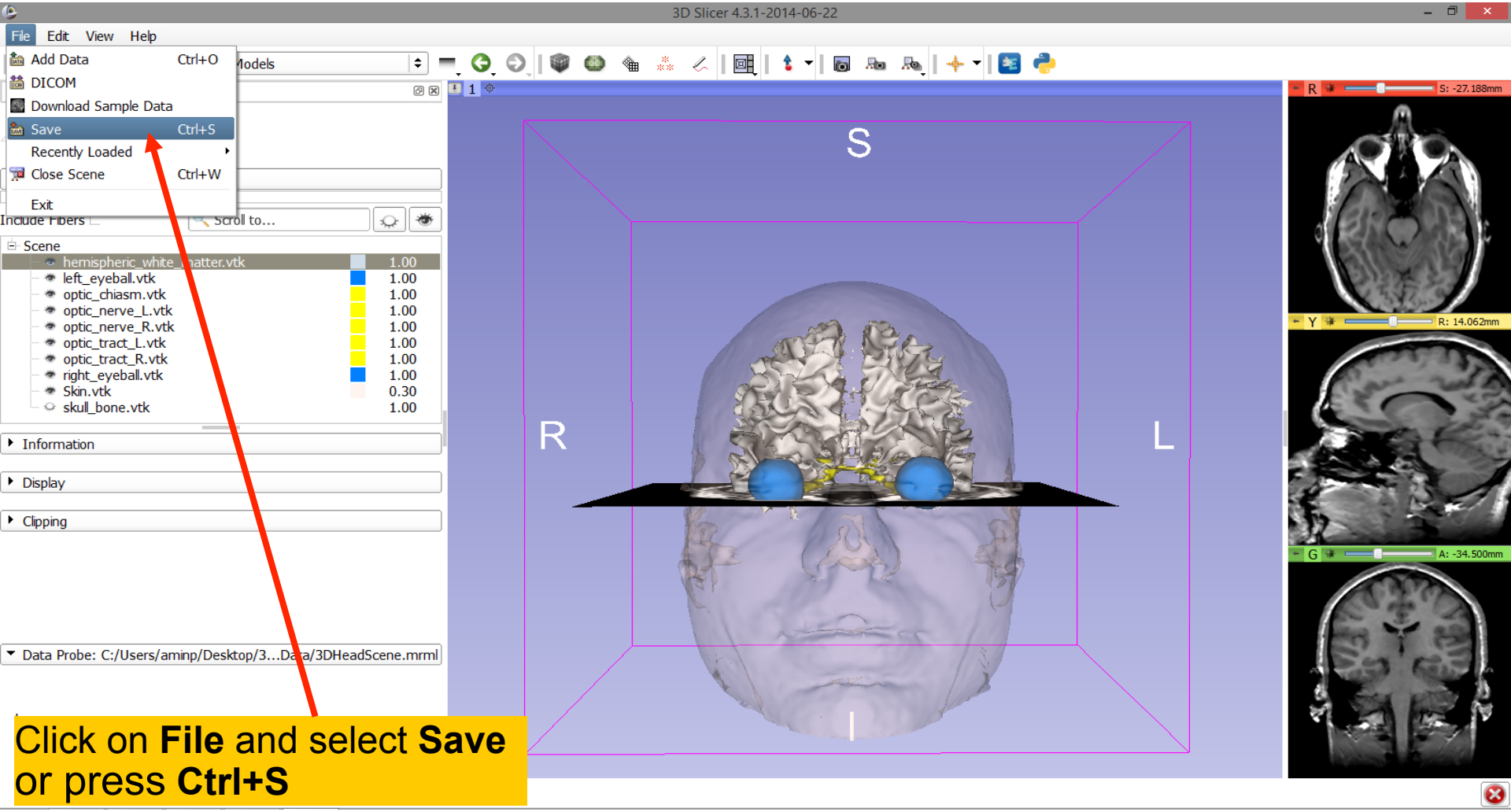


Position your cursor over **the pin icon** in the 3D viewer to display the 3D control windows. Select the **A (Anterior) view** of the 3D models

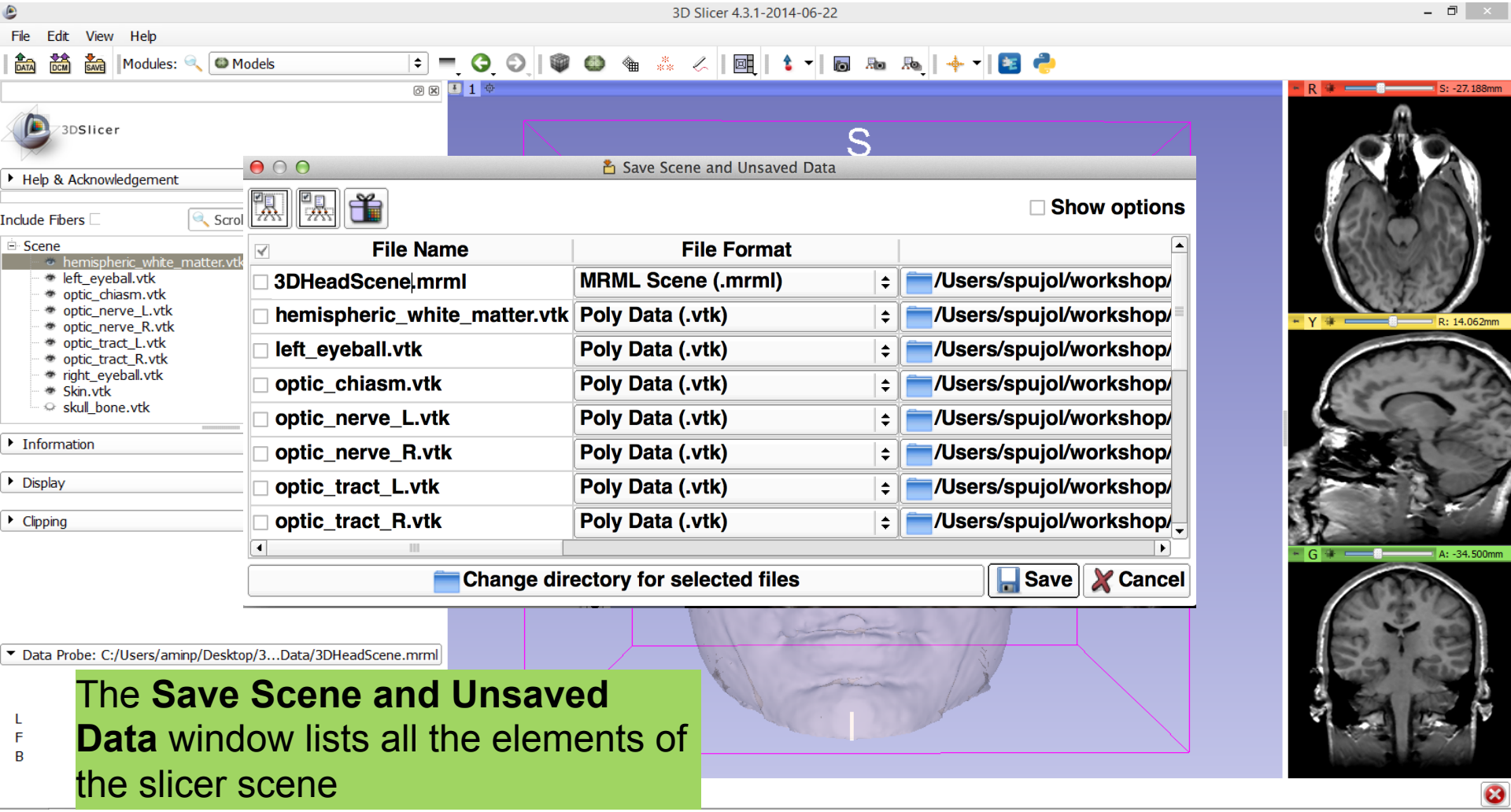
Part 3:

Saving a scene

Saving a Scene

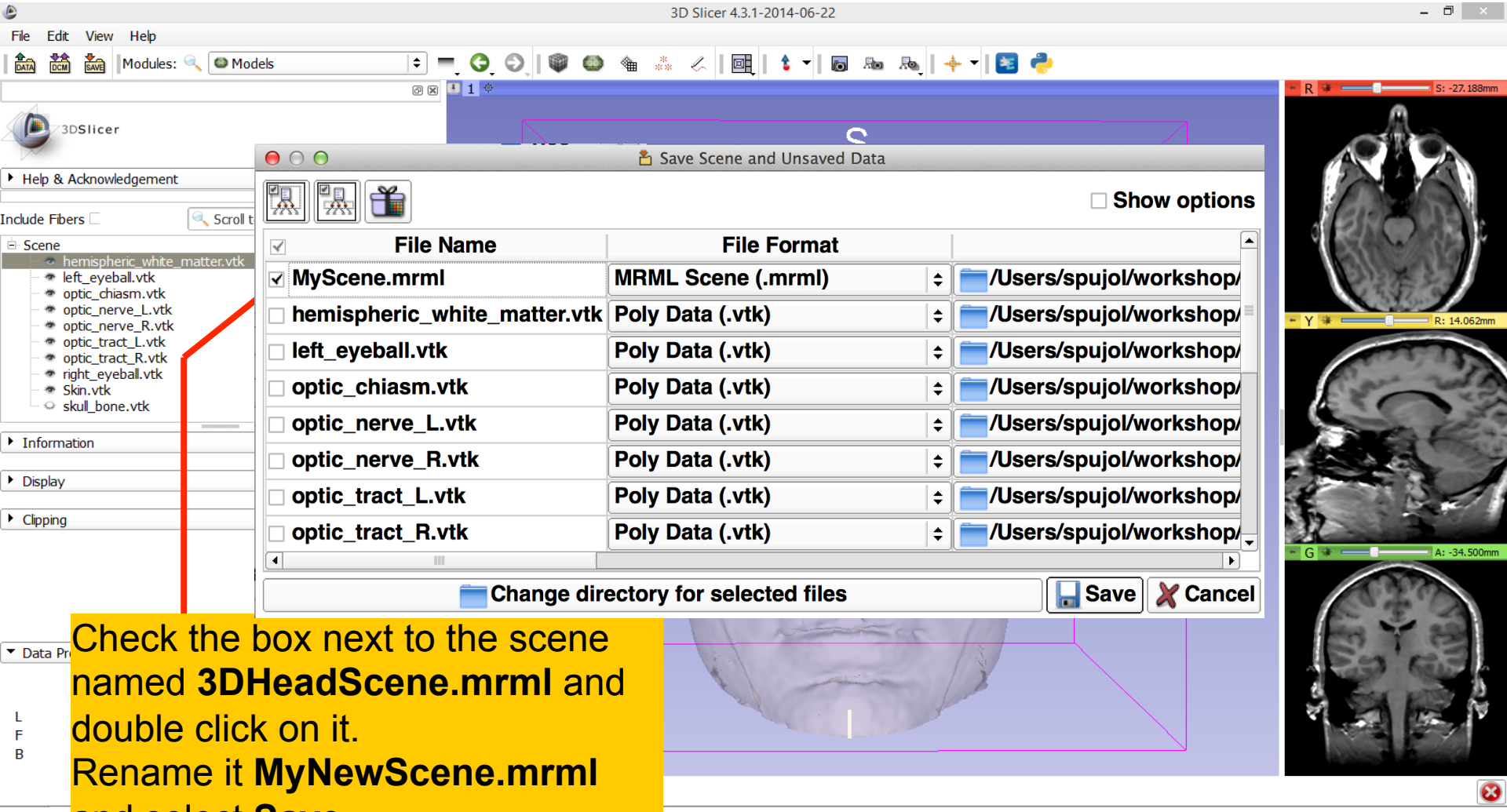


Saving a Scene



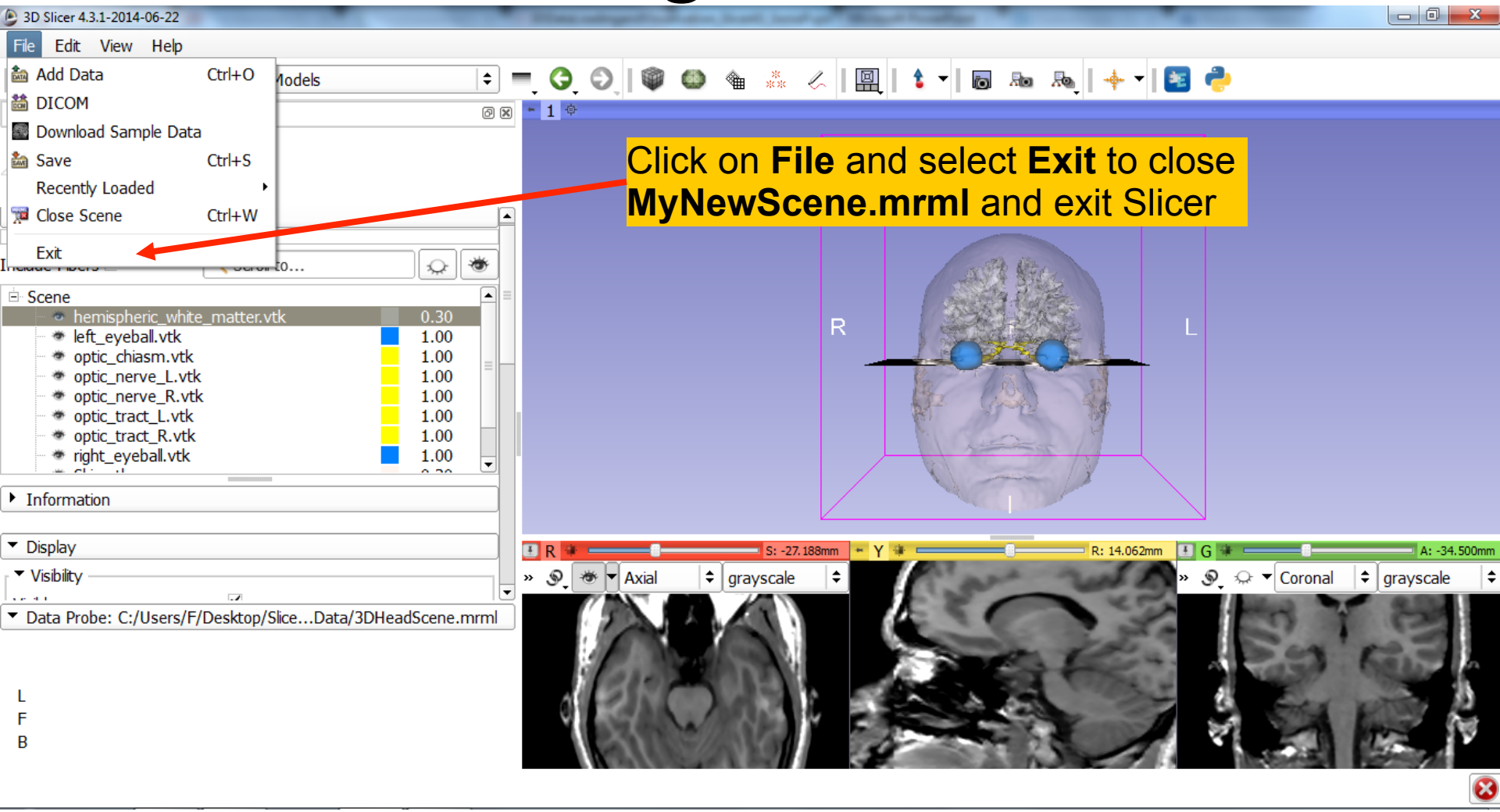
The **Save Scene and Unsaved Data** window lists all the elements of the slicer scene

Saving a Scene

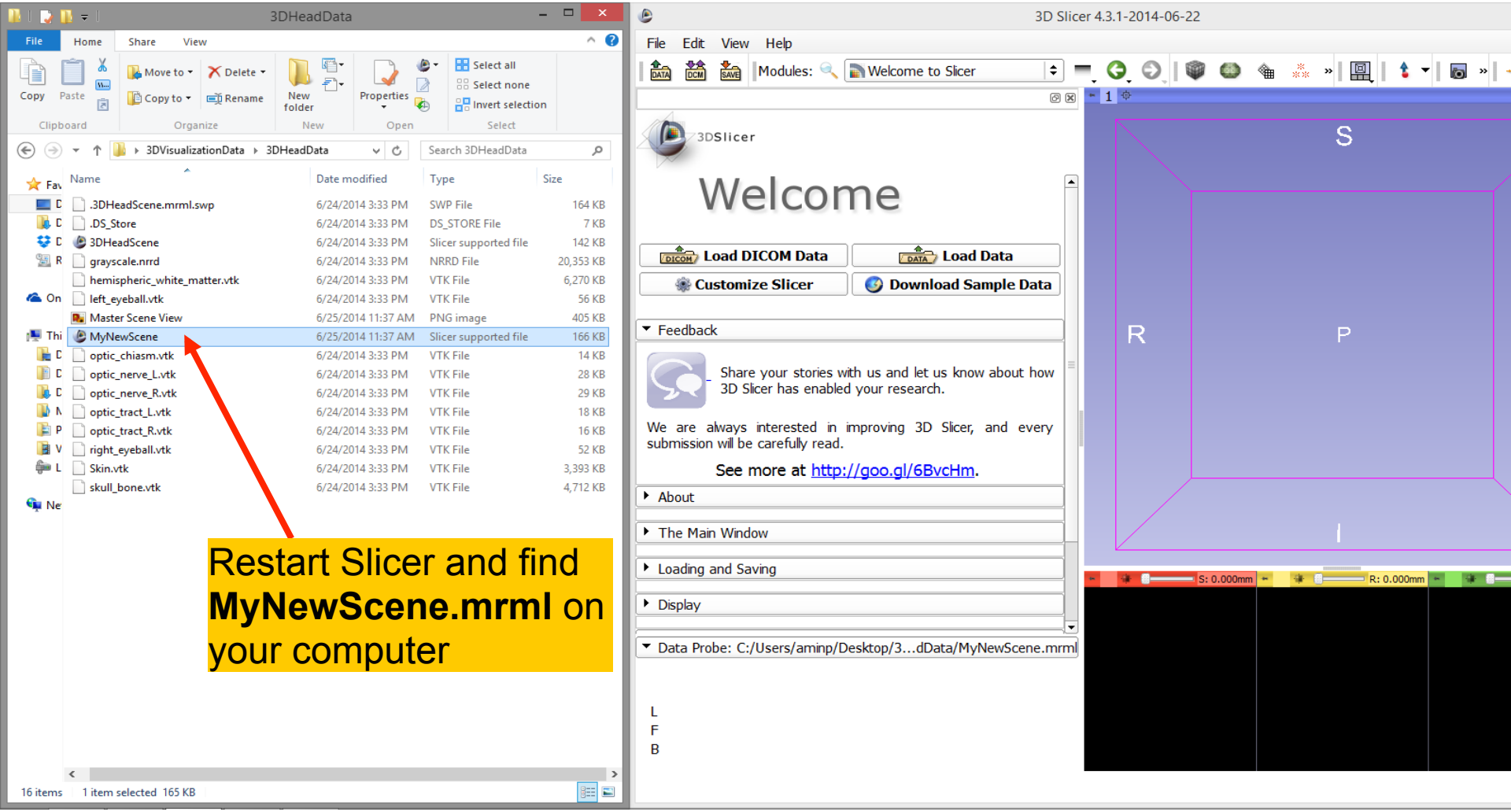


Check the box next to the scene named **3DHeadScene.mrml** and double click on it.
Rename it **MyNewScene.mrml** and select **Save**

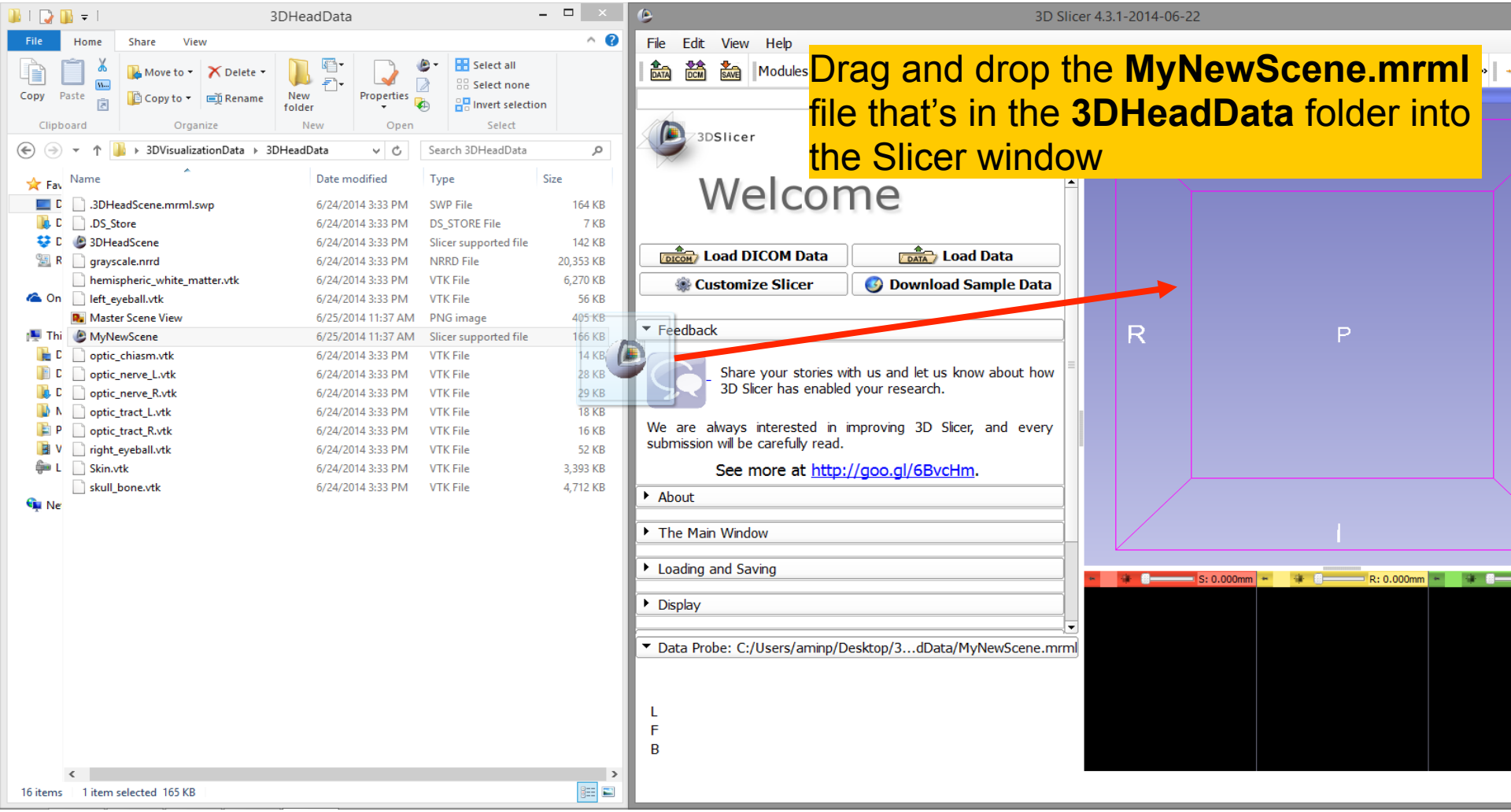
Saving a Scene



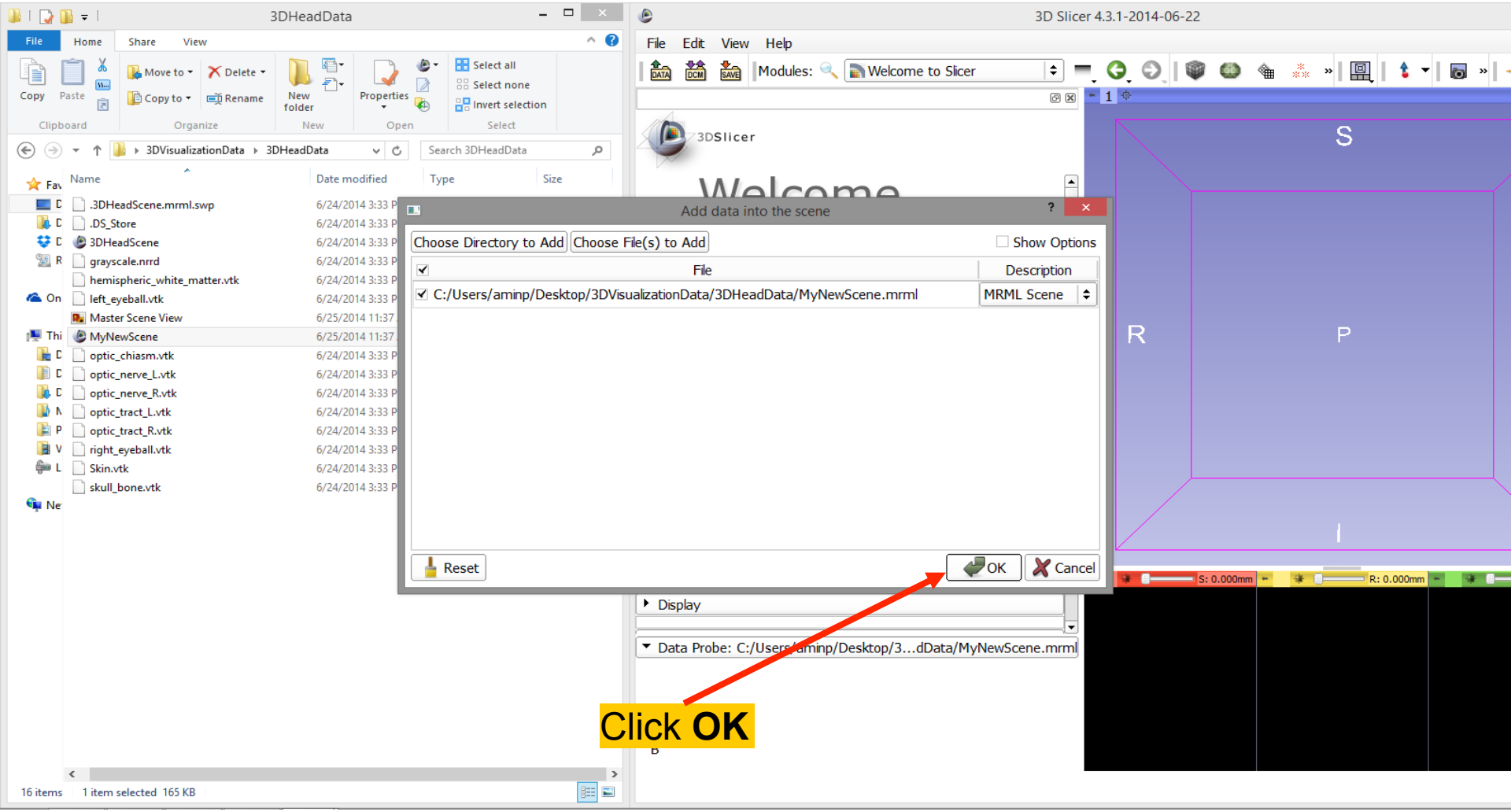
Scene Restore



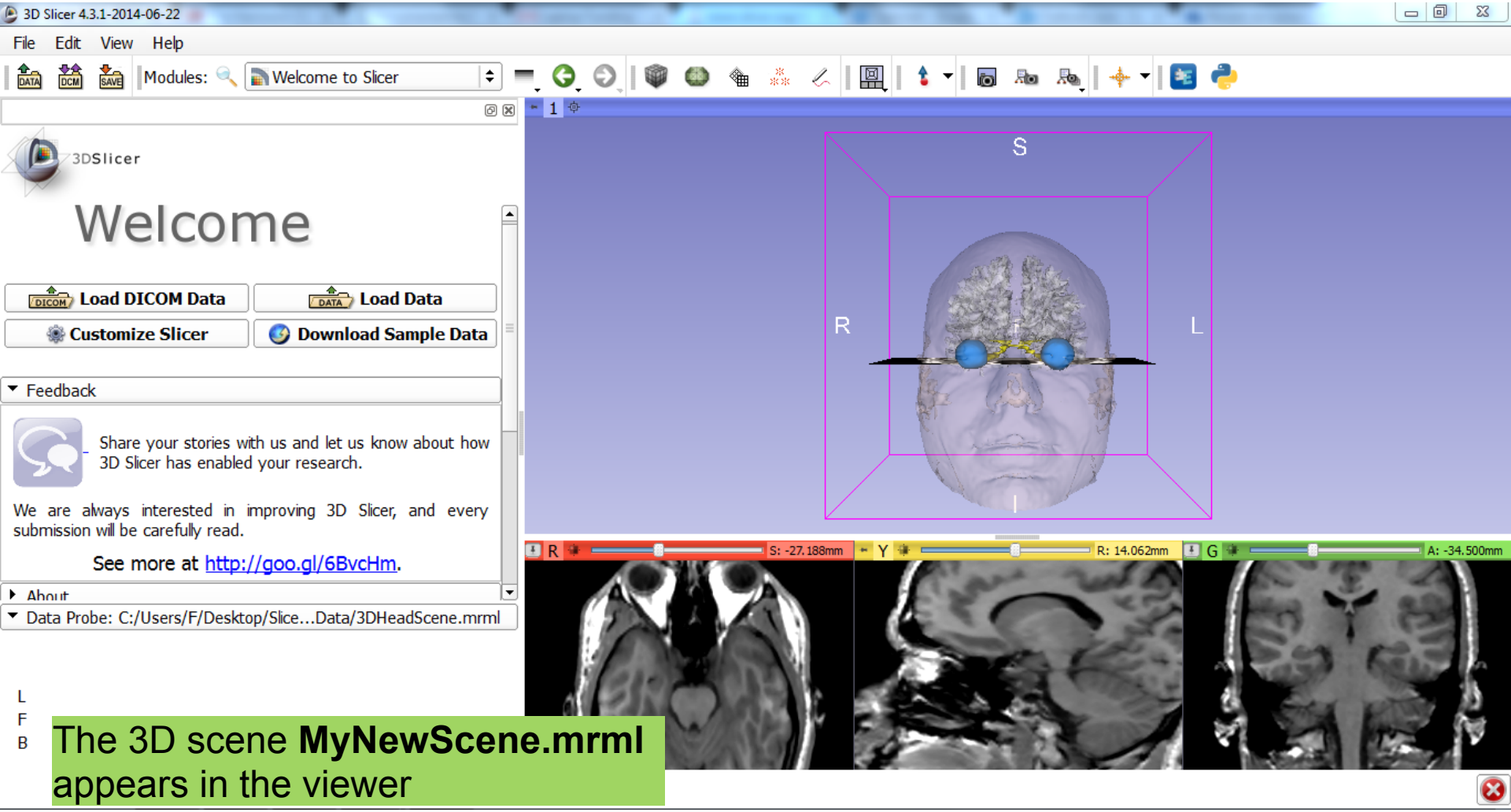
Scene Restore



Scene Restore



Slicer4



The 3D scene **MyNewScene.mrml** appears in the viewer

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