3D Data Loading and Visualization

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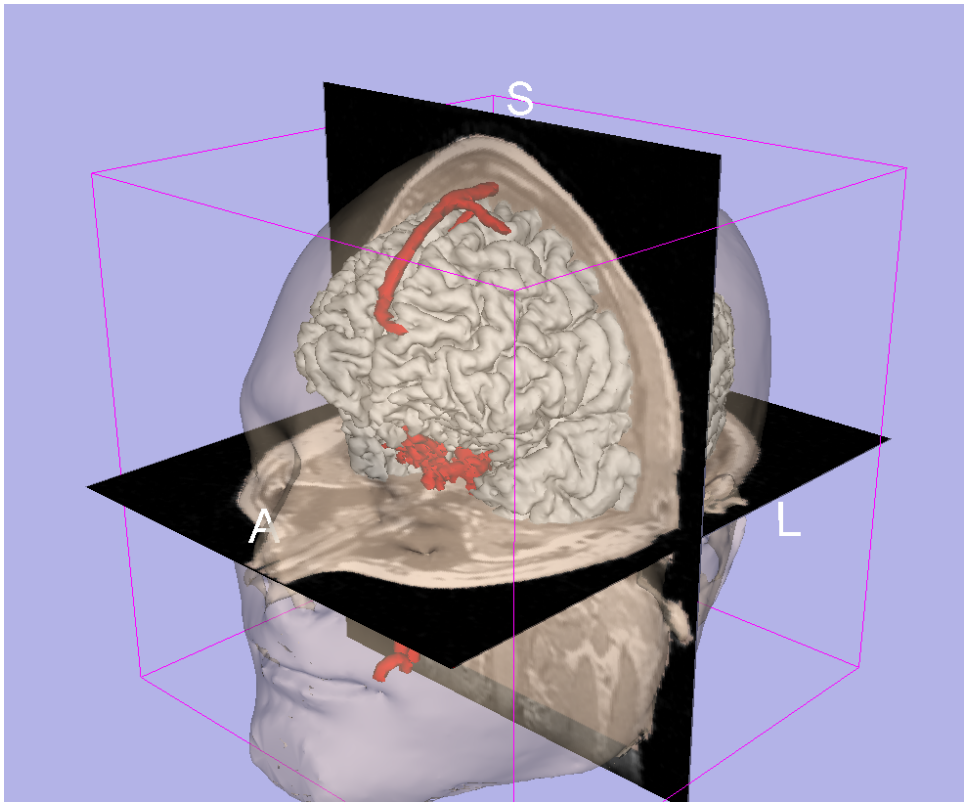
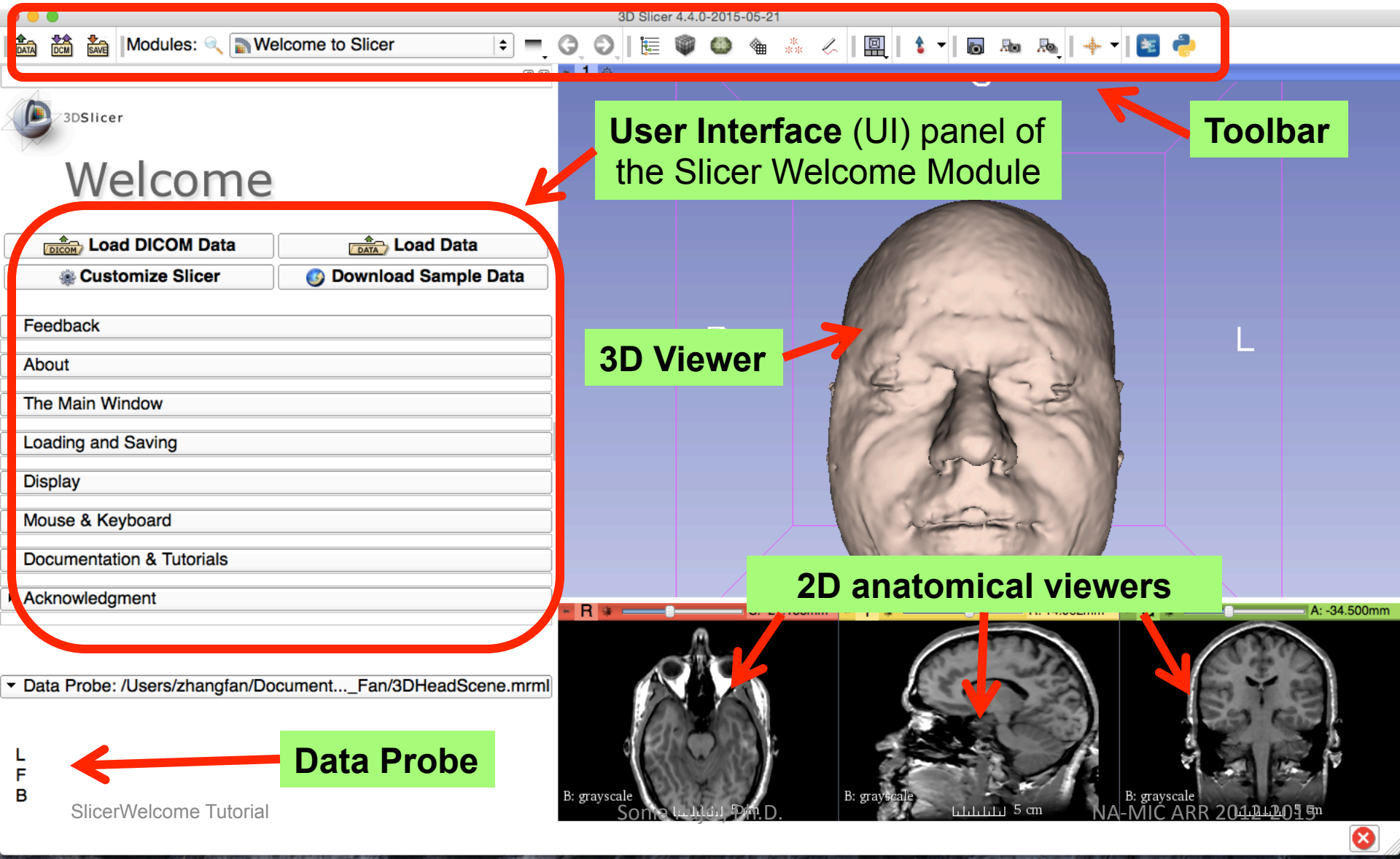
Harvard University

3D Visualization of the Anatomy

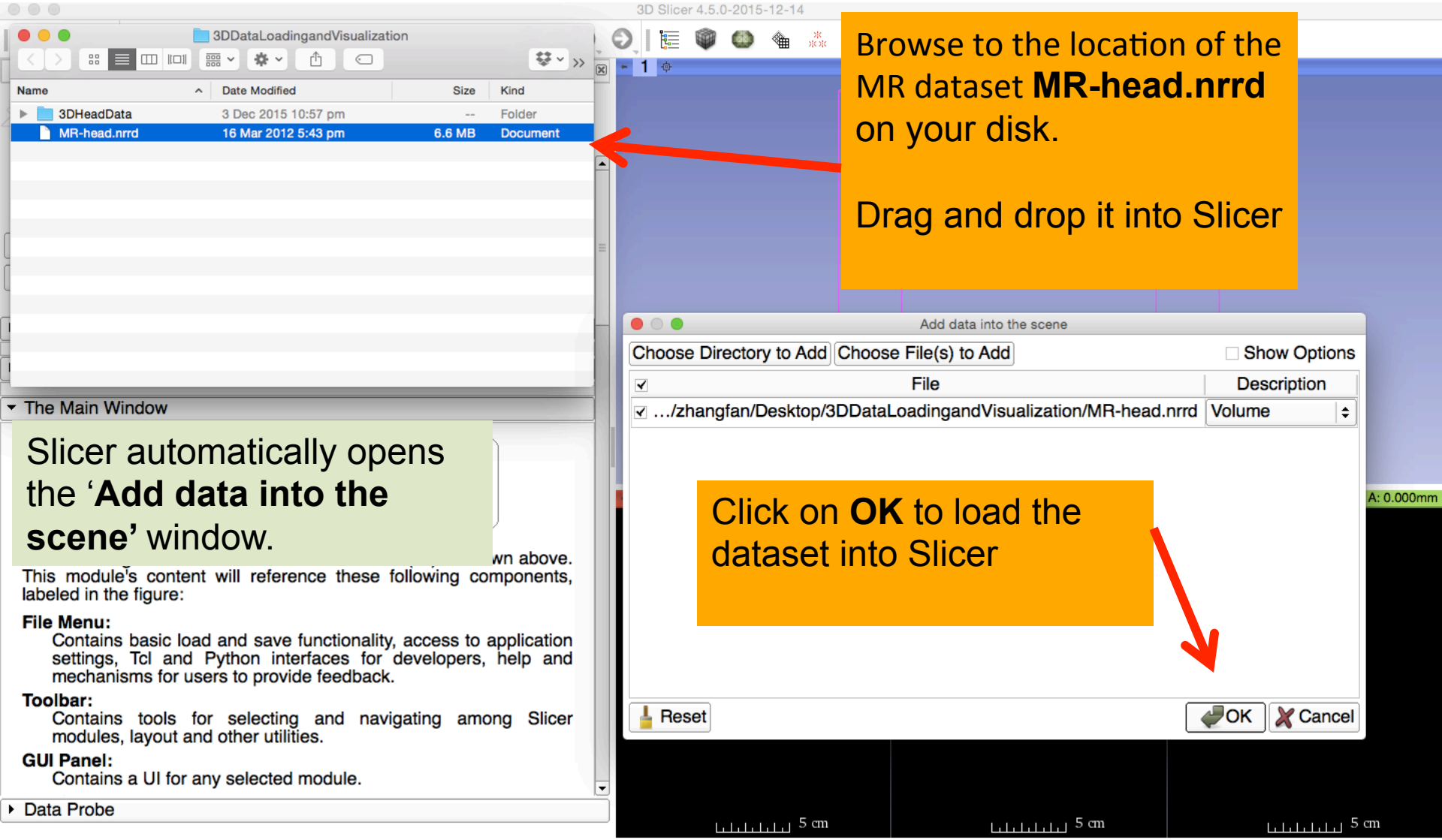
Following this tutorial, you will be able to load and visualize volumes within Slicer4, and to interact in 3D with structural images and models of the anatomy.



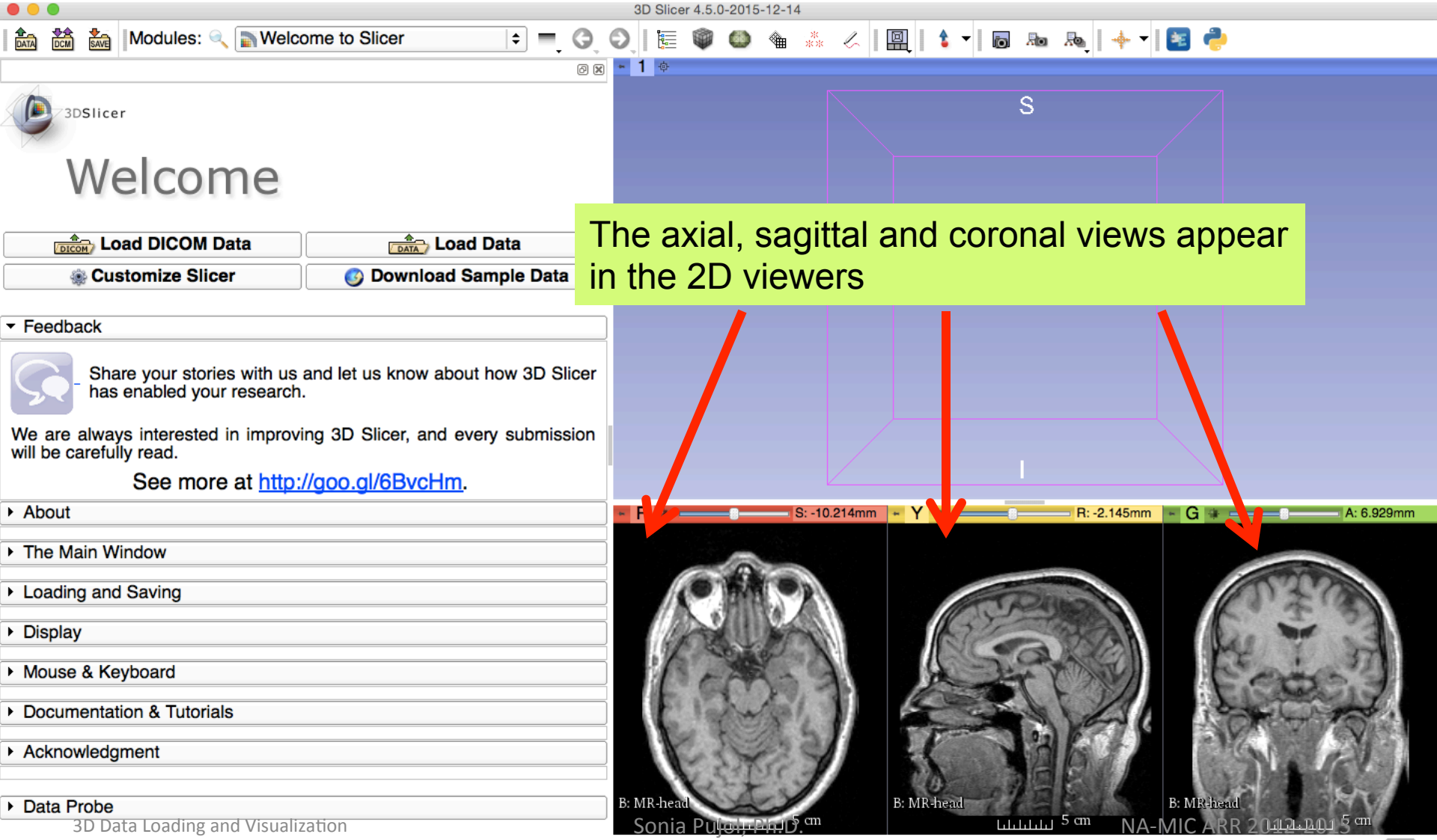
Slicer User Interface



Slicer4

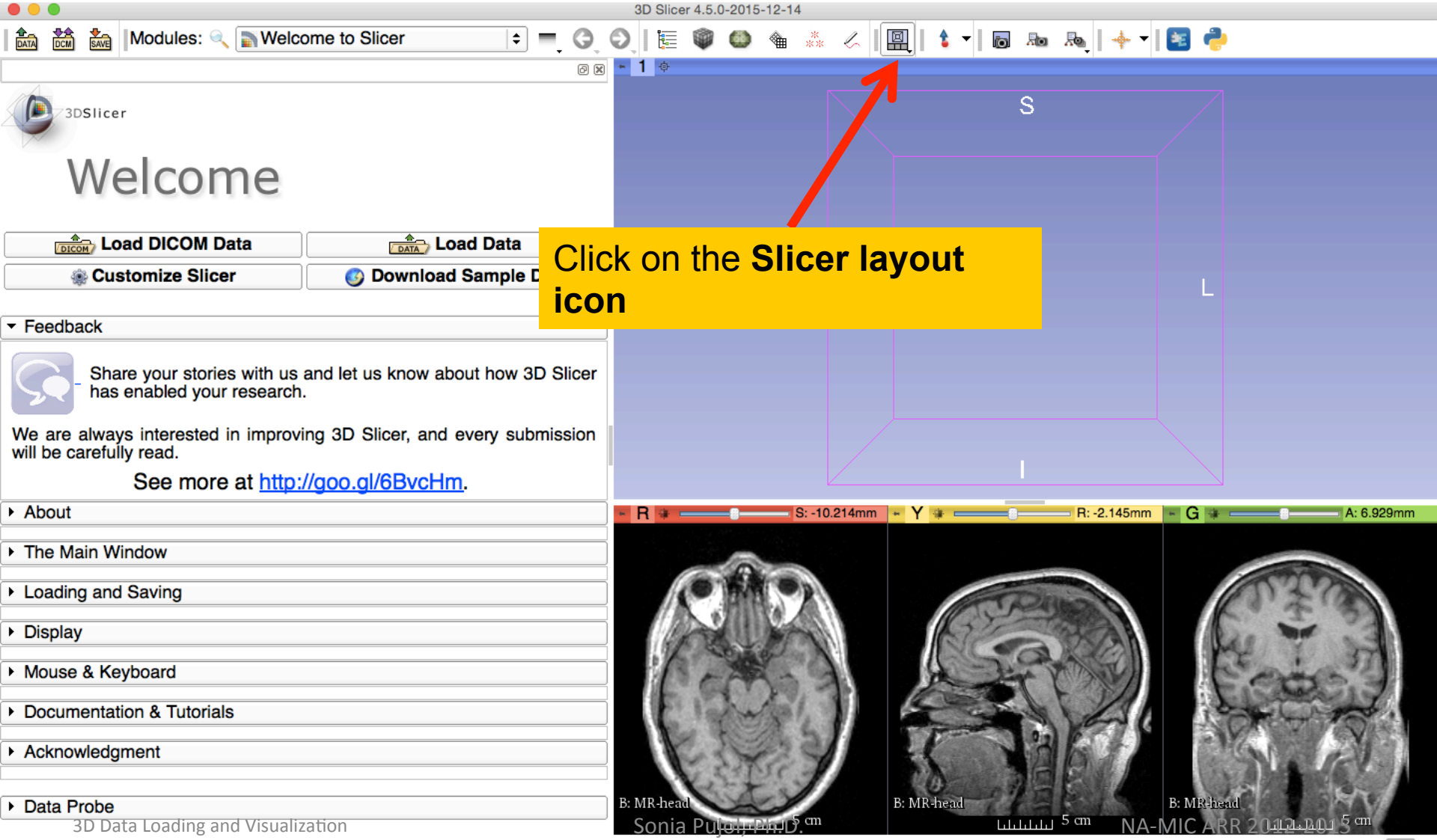

3D Slicer 4.5.0-2015-12-14
3DDataLoadingandVisualization
Name
Date Modified
Size
Kind
3DHeadData
3 Dec 2015 10:57 pm
Folder
MR-head.nrrd
16 Mar 2012 5:43 pm
6.6 MB
Document
Browse to the location of the MR dataset **MR-head.nrrd** on your disk.
Drag and drop it into Slicer
The Main Window
Slicer automatically opens the '**Add data into the scene**' window.
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:
Contains tools for selecting and navigating among Slicer modules, layout and other utilities.
GUI Panel:
Contains a UI for any selected module.
Data Probe
Add data into the scene
Choose Directory to Add
Choose File(s) to Add
Show Options
File
Description
.../zhangfan/Desktop/3DDataLoadingandVisualization/MR-head.nrrd
Volume
Click on **OK** to load the dataset into Slicer
Reset
OK
Cancel
A: 0.000mm
5 cm
5 cm
5 cm

Loading a volume



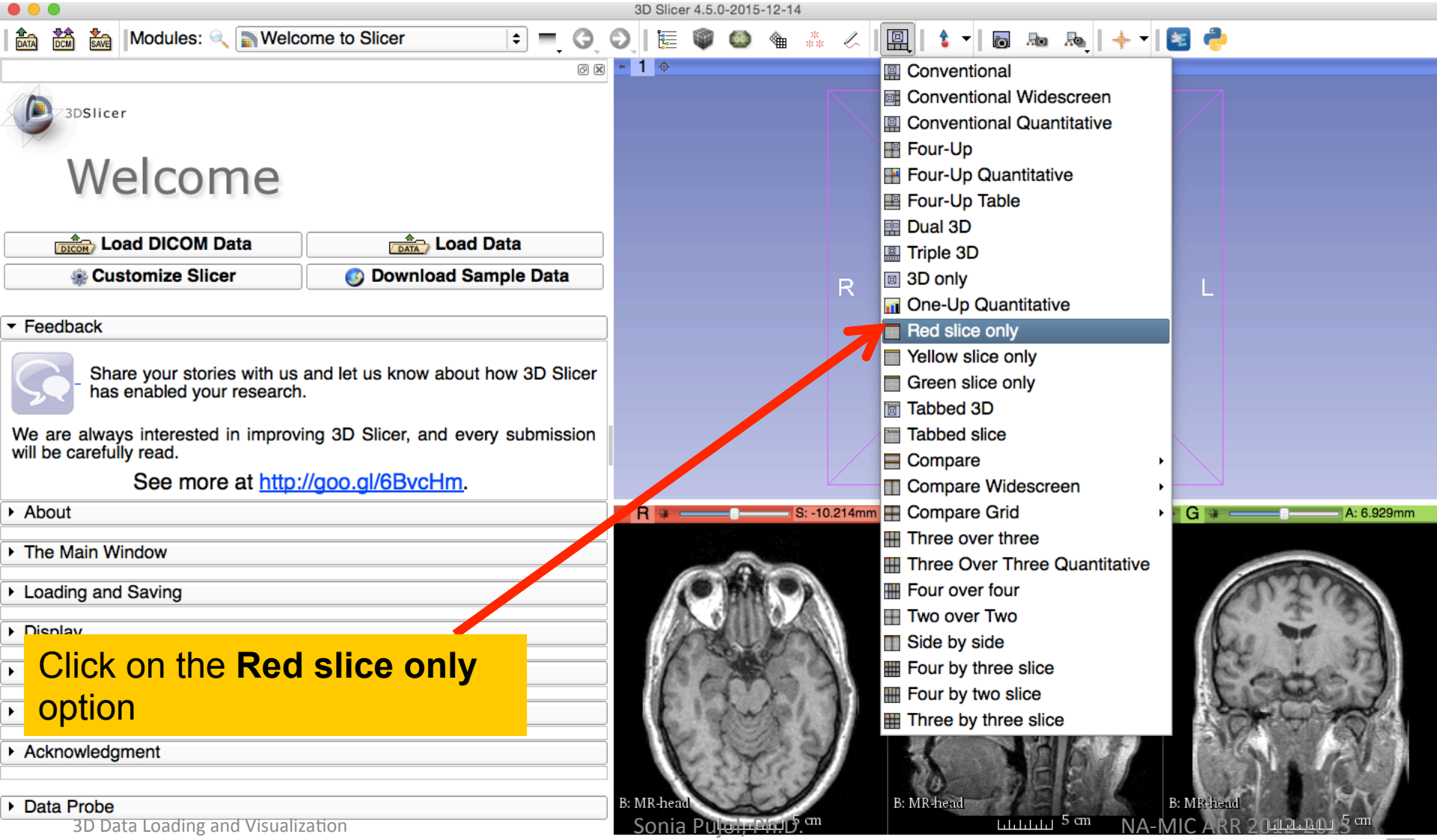
The axial, sagittal and coronal views appear in the 2D viewers

Loading a volume



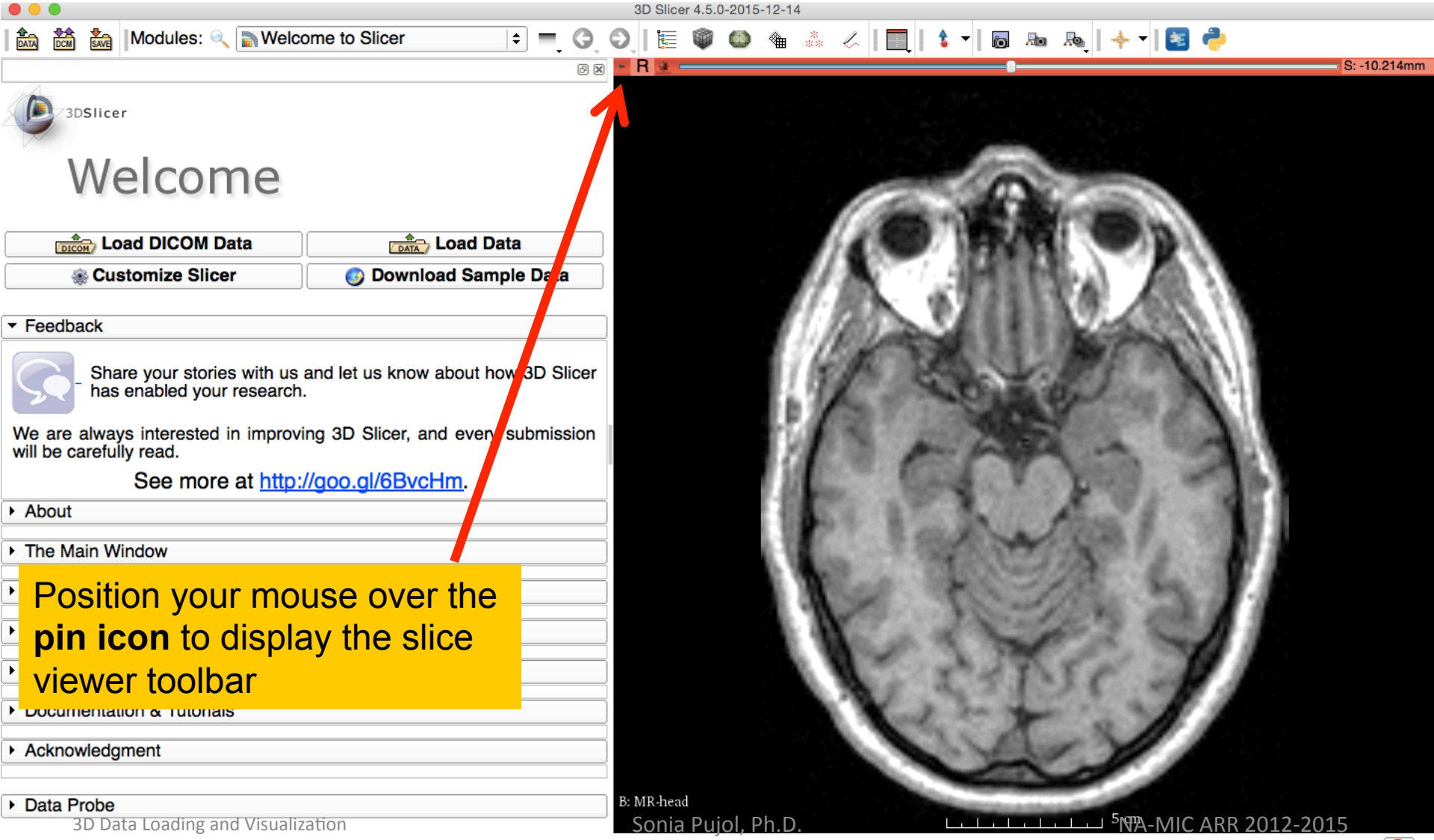
Click on the **Slicer layout icon**

Loading a volume



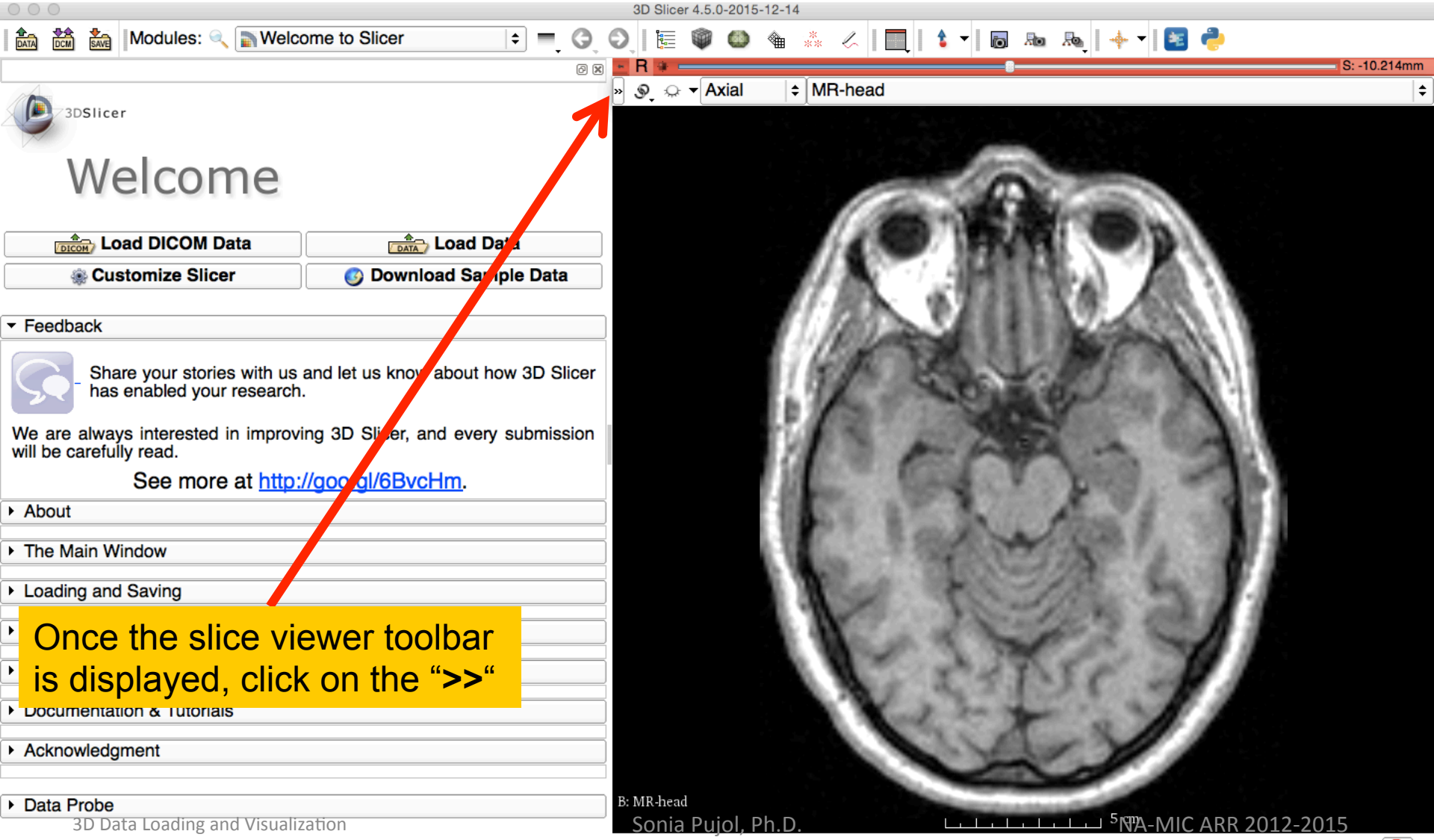
Click on the **Red slice only** option

Loading a volume



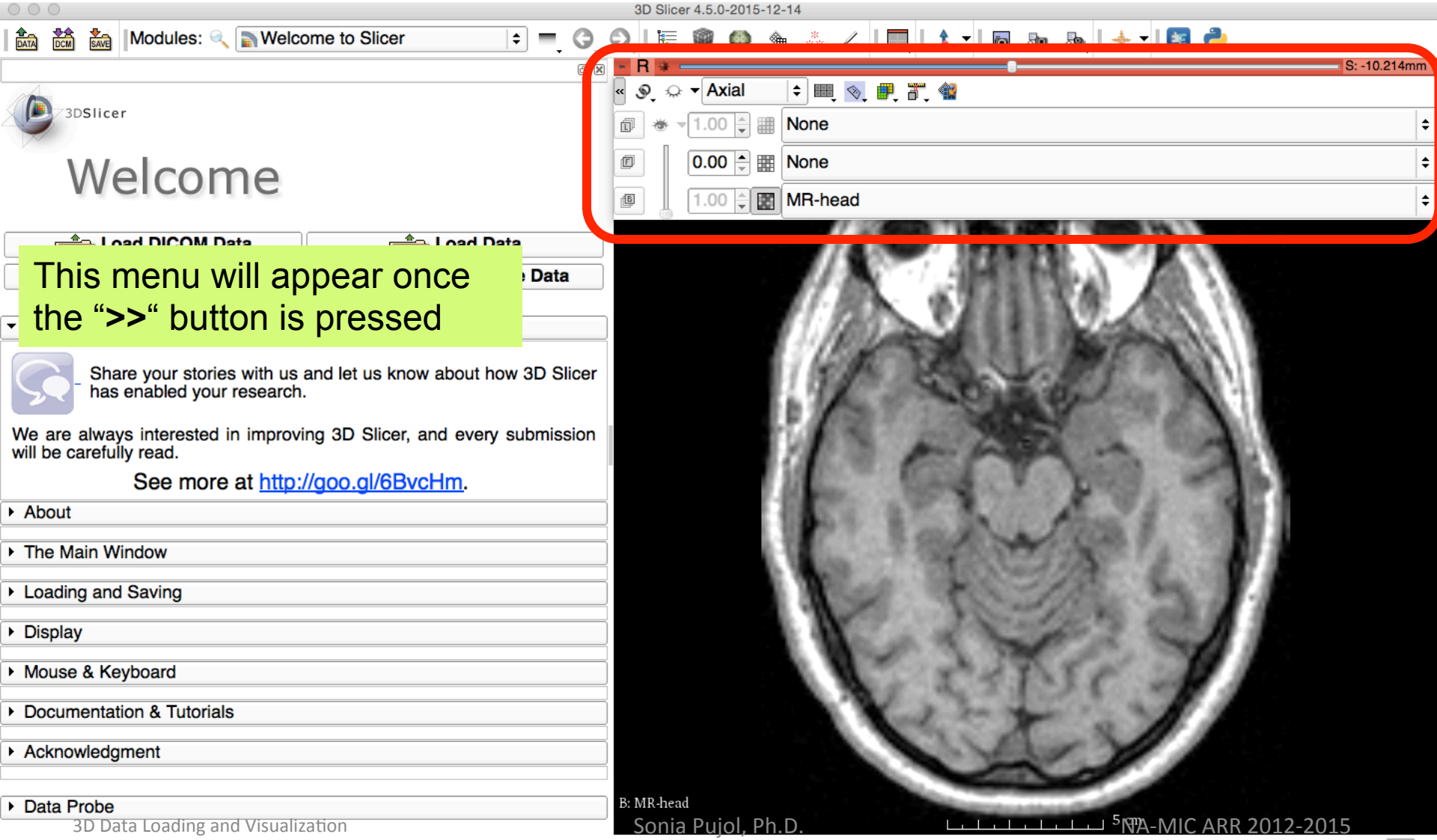
Position your mouse over the **pin icon** to display the slice viewer toolbar

Loading a volume



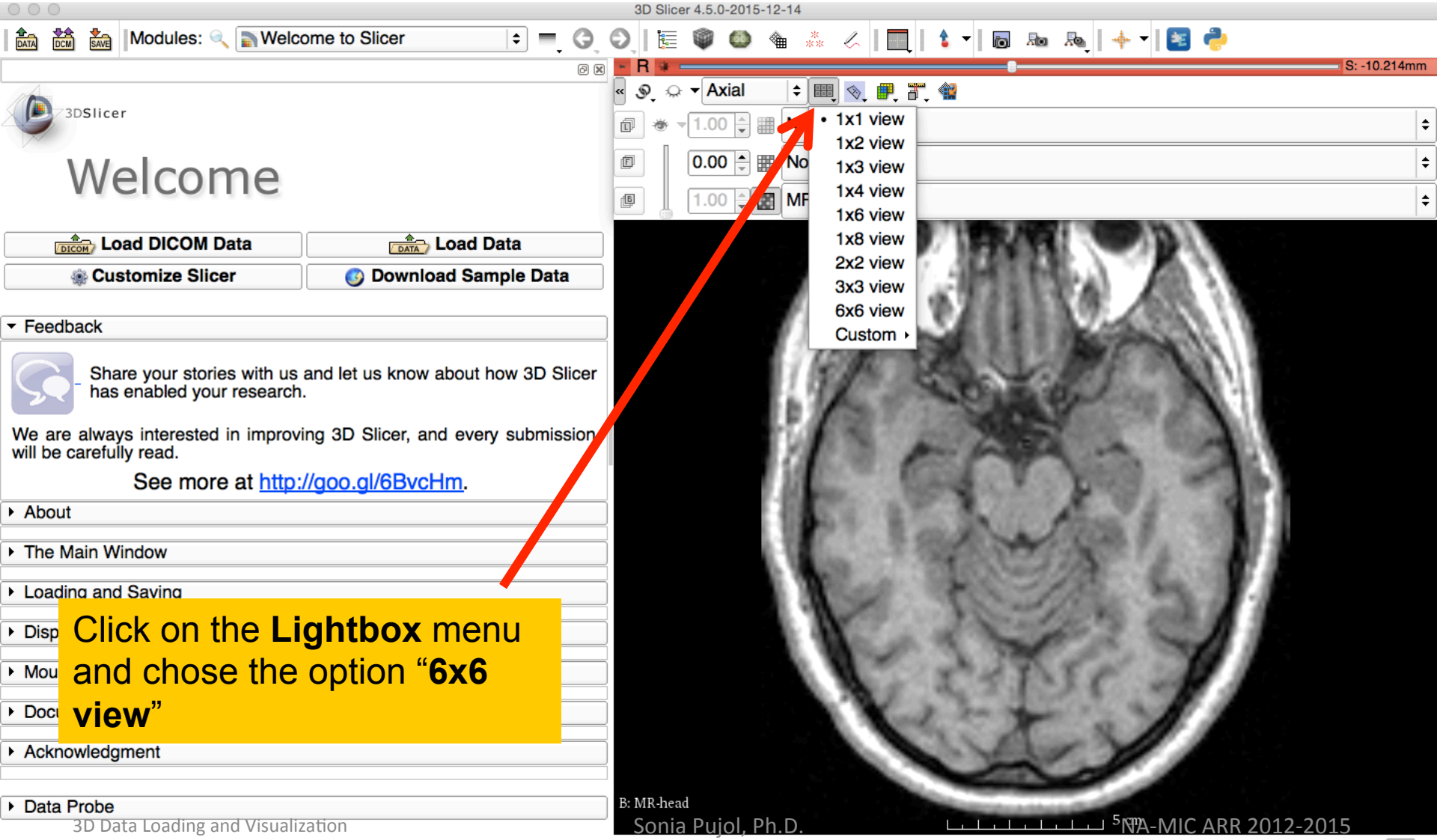
Once the slice viewer toolbar is displayed, click on the “>>“

Loading a volume



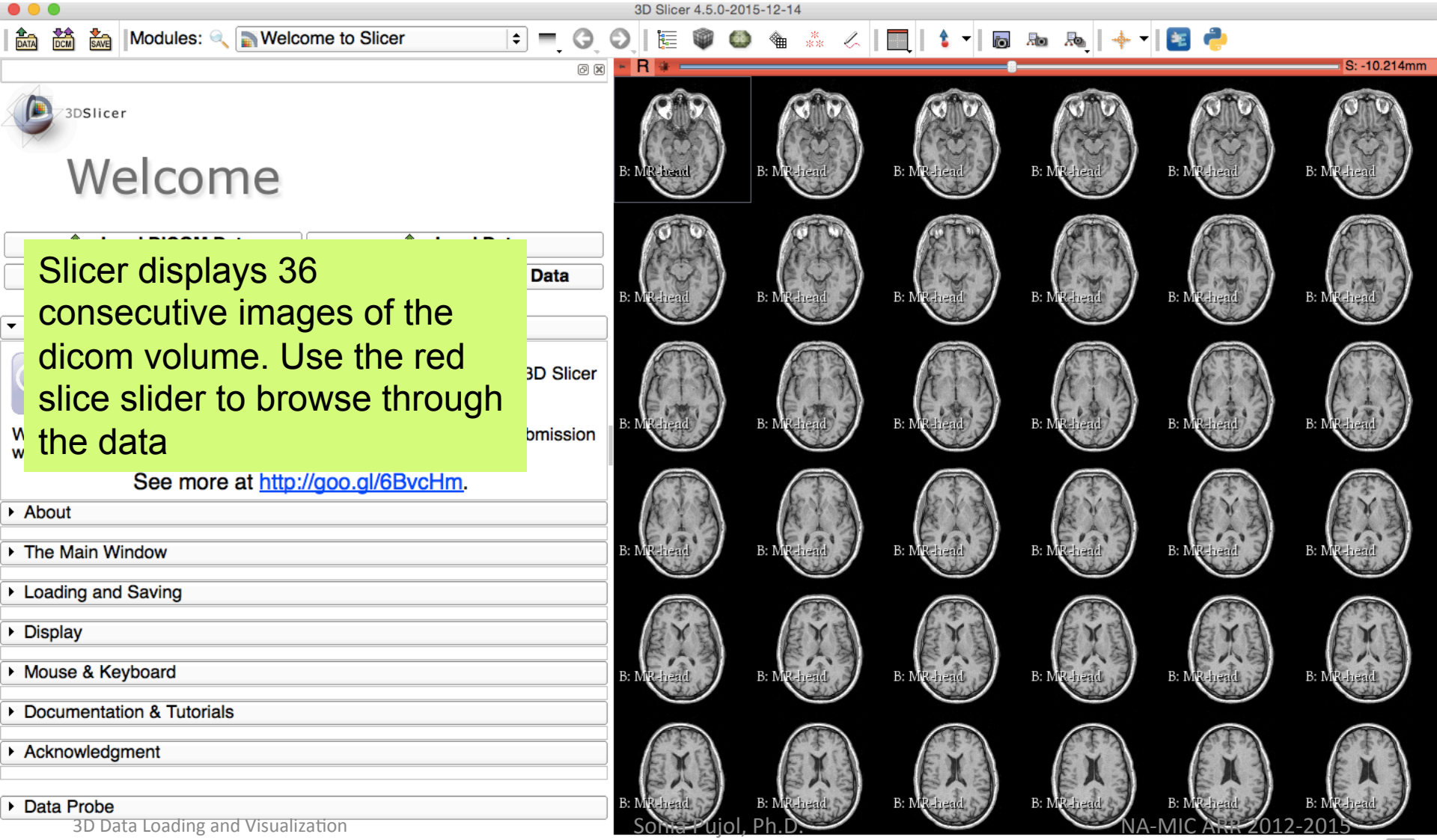
This menu will appear once the "**>>**" button is pressed

Loading a volume



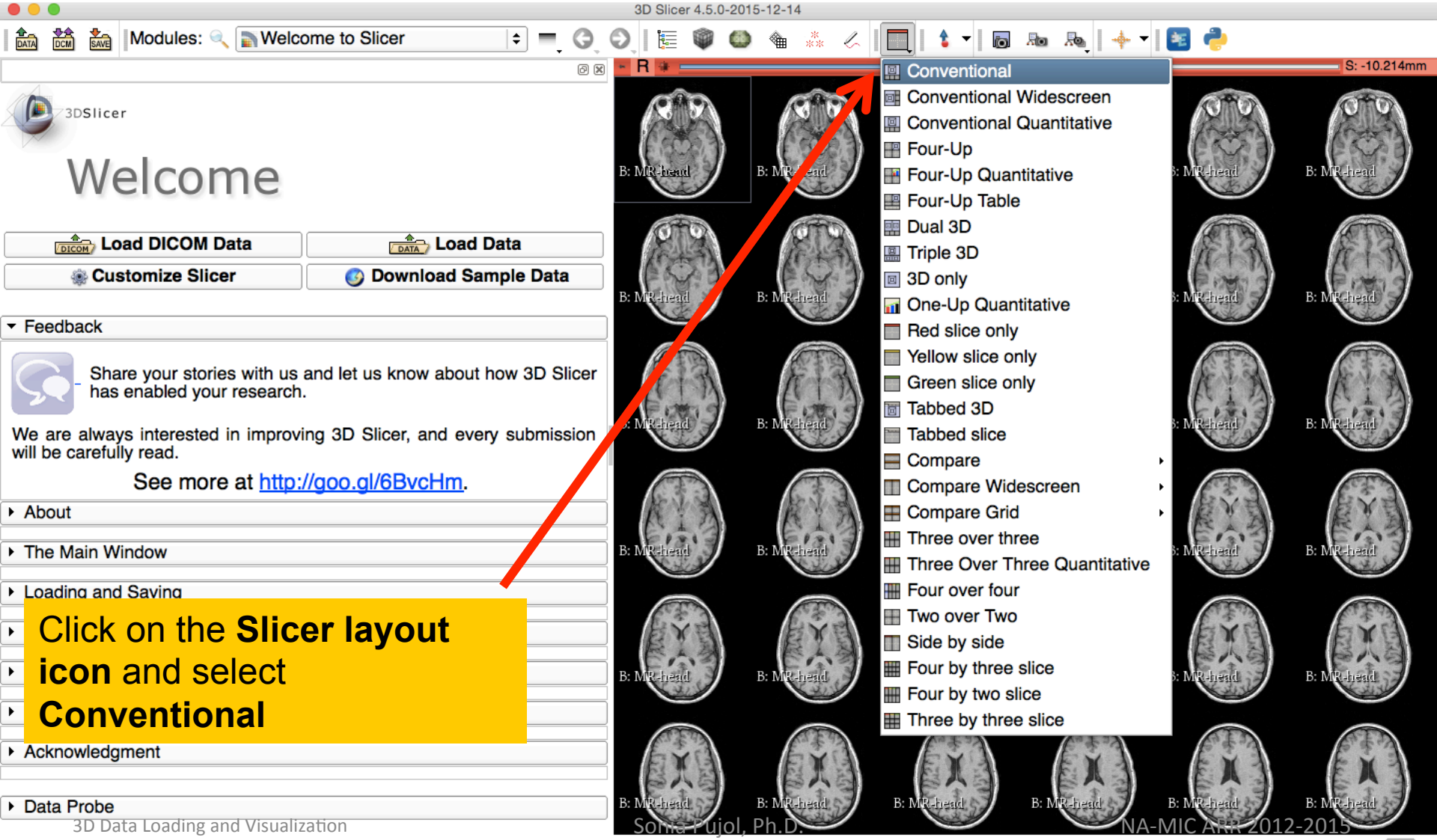
Click on the **Lightbox** menu and chose the option "**6x6 view**"

Loading a volume



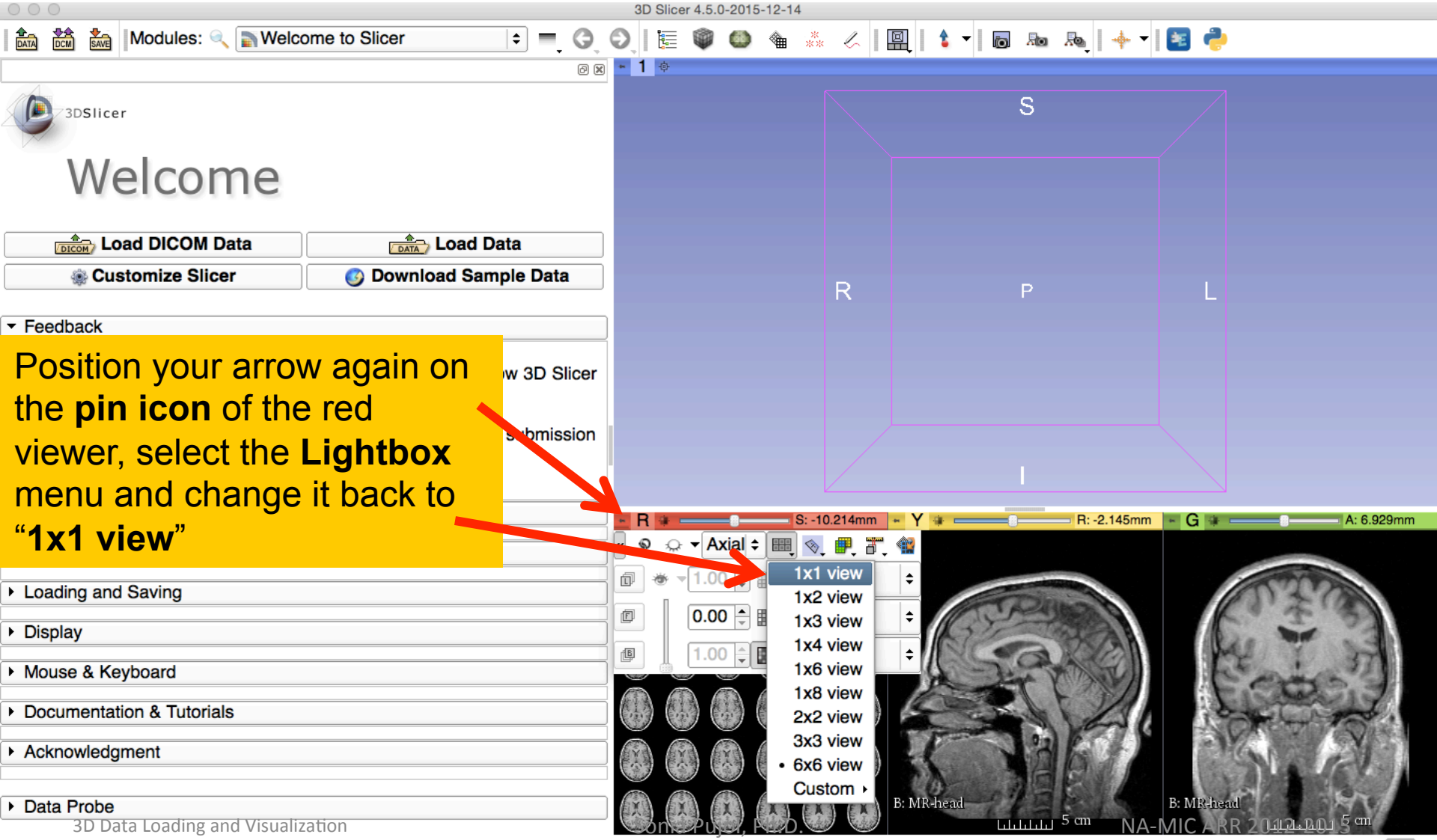
Slicer displays 36 consecutive images of the dicom volume. Use the red slice slider to browse through the data

Loading a volume



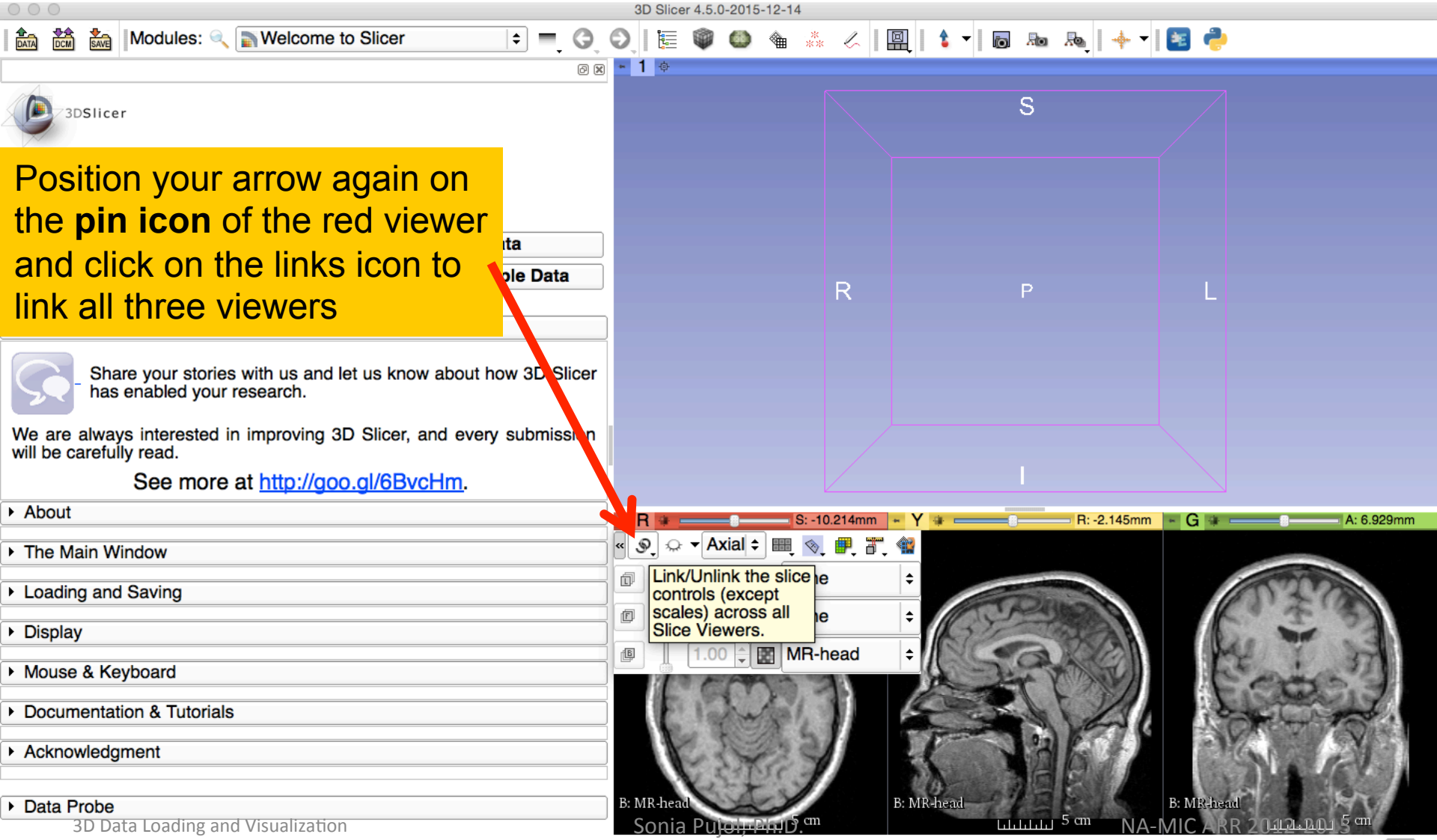
Click on the **Slicer layout icon** and select **Conventional**

Loading a volume



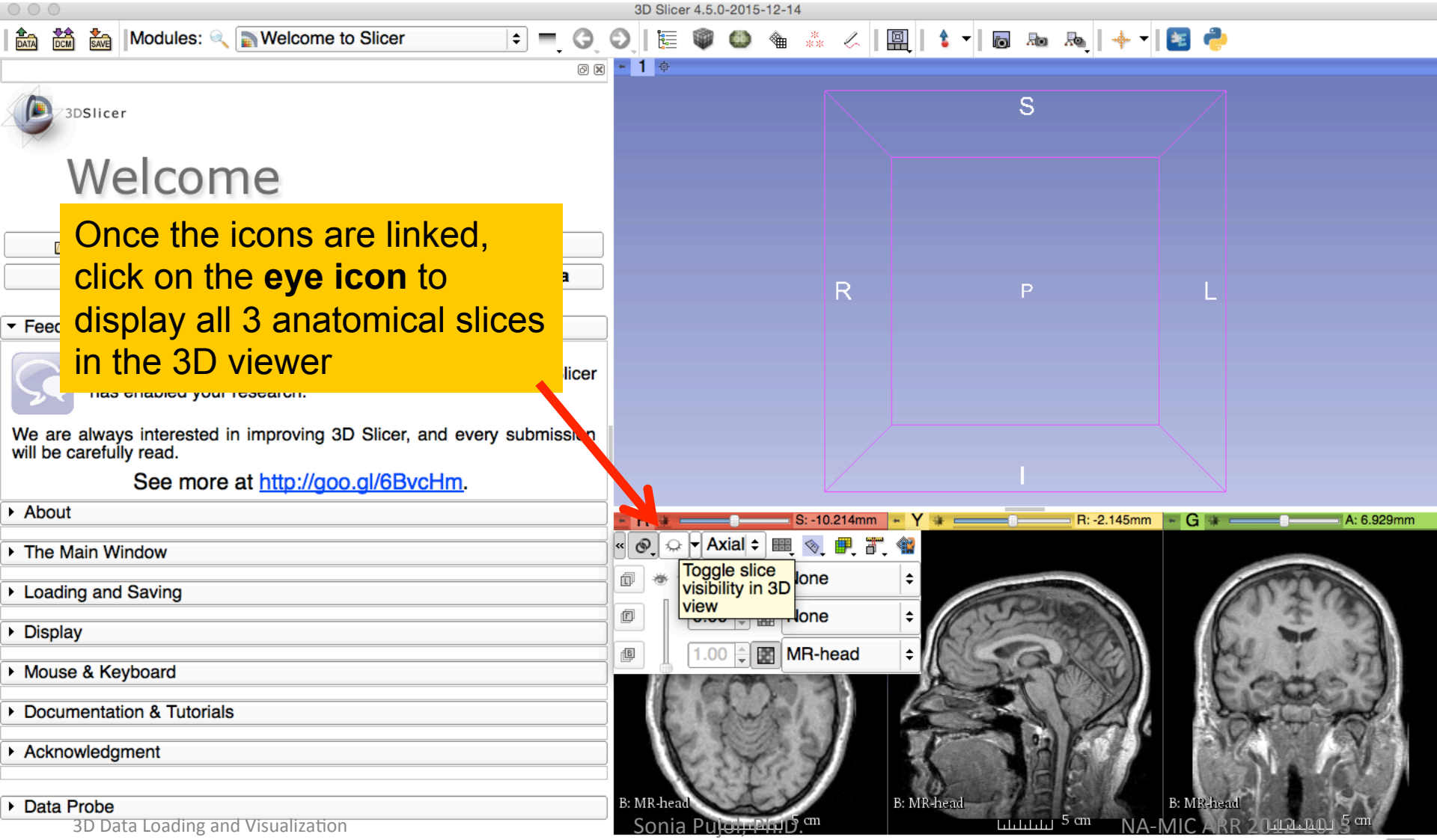
Position your arrow again on the **pin icon** of the red viewer, select the **Lightbox** menu and change it back to "**1x1 view**"

Loading a volume

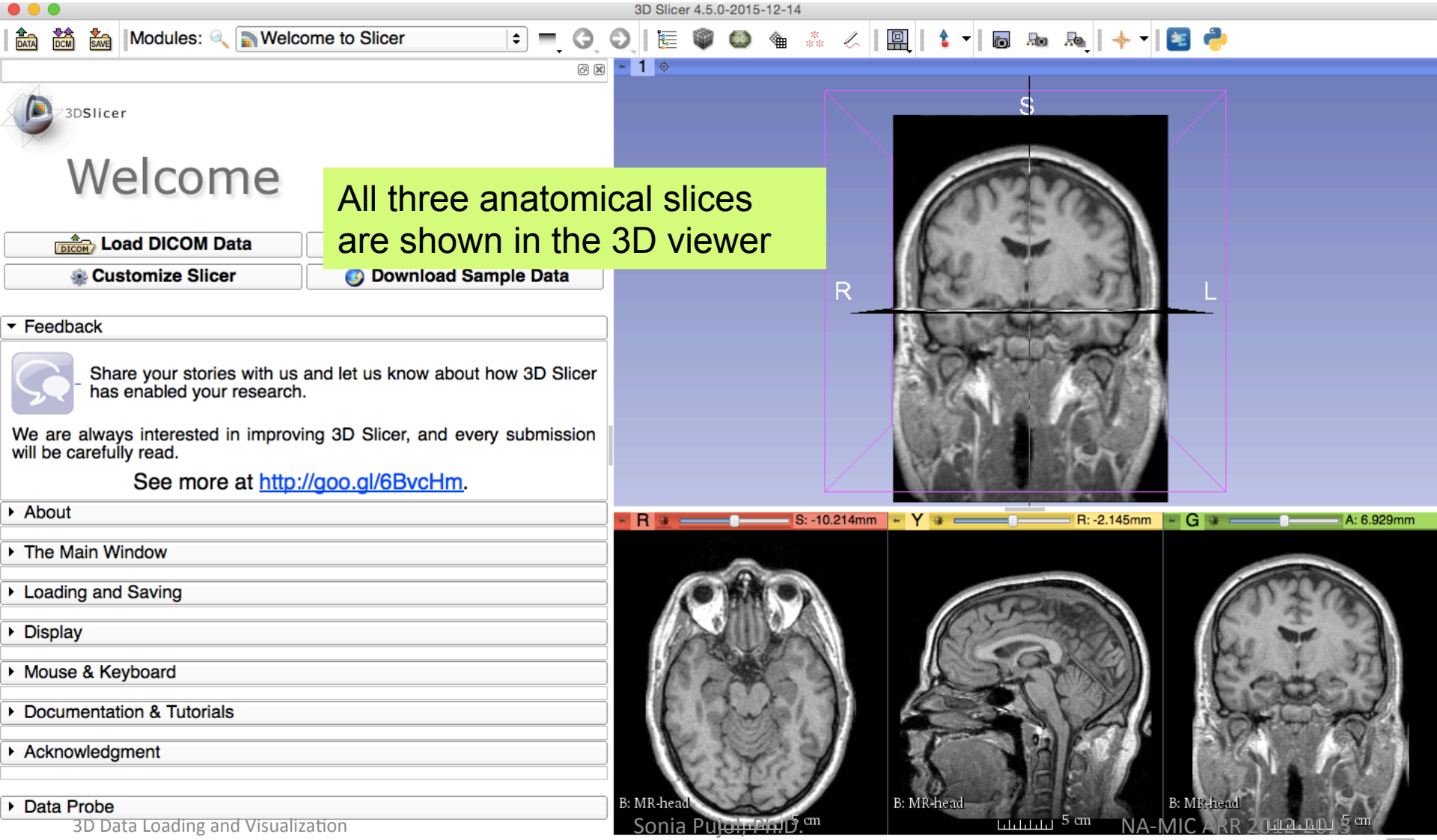


Position your arrow again on the **pin icon** of the red viewer and click on the links icon to link all three viewers

Loading a volume

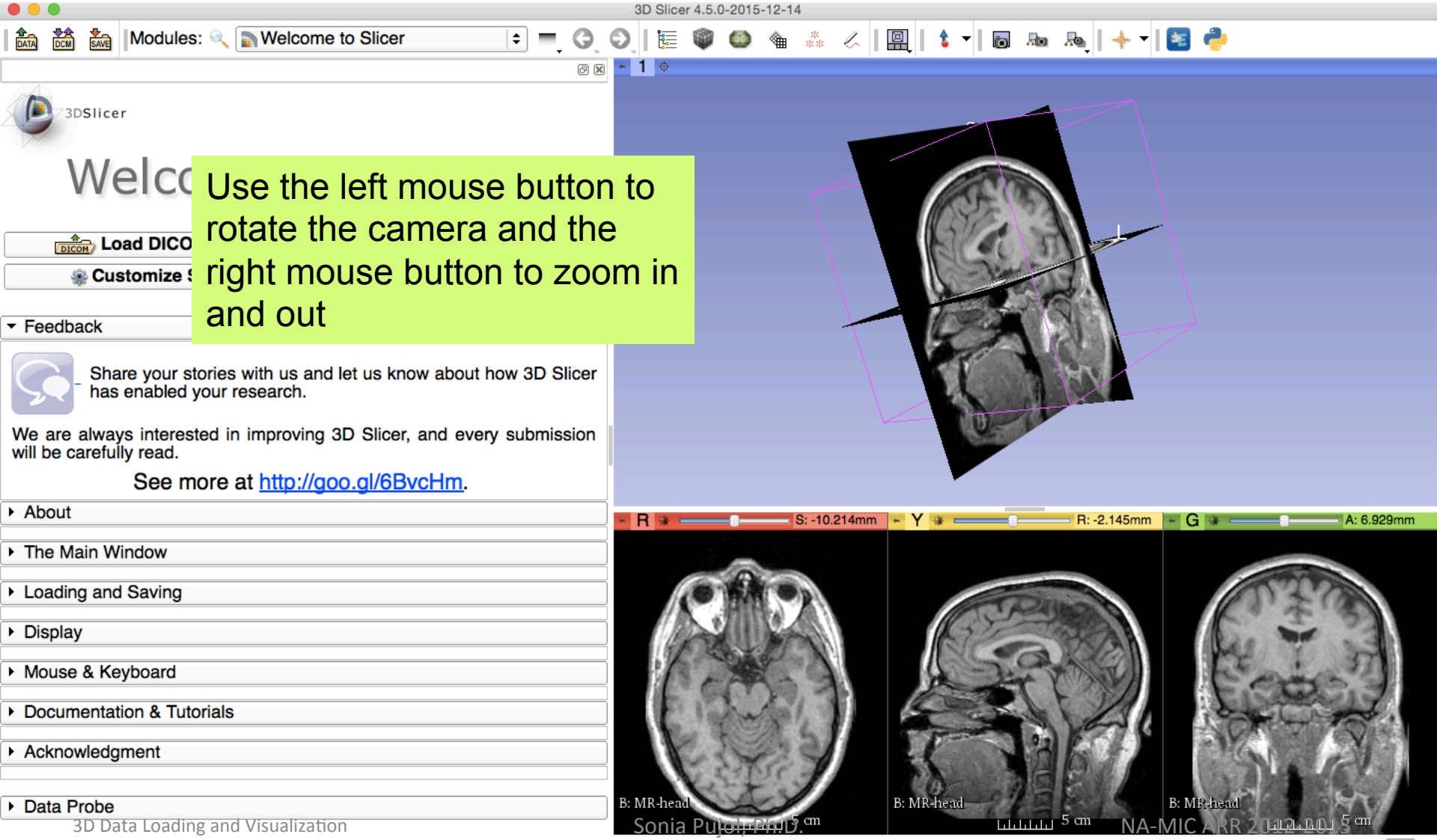


Loading a volume



All three anatomical slices are shown in the 3D viewer

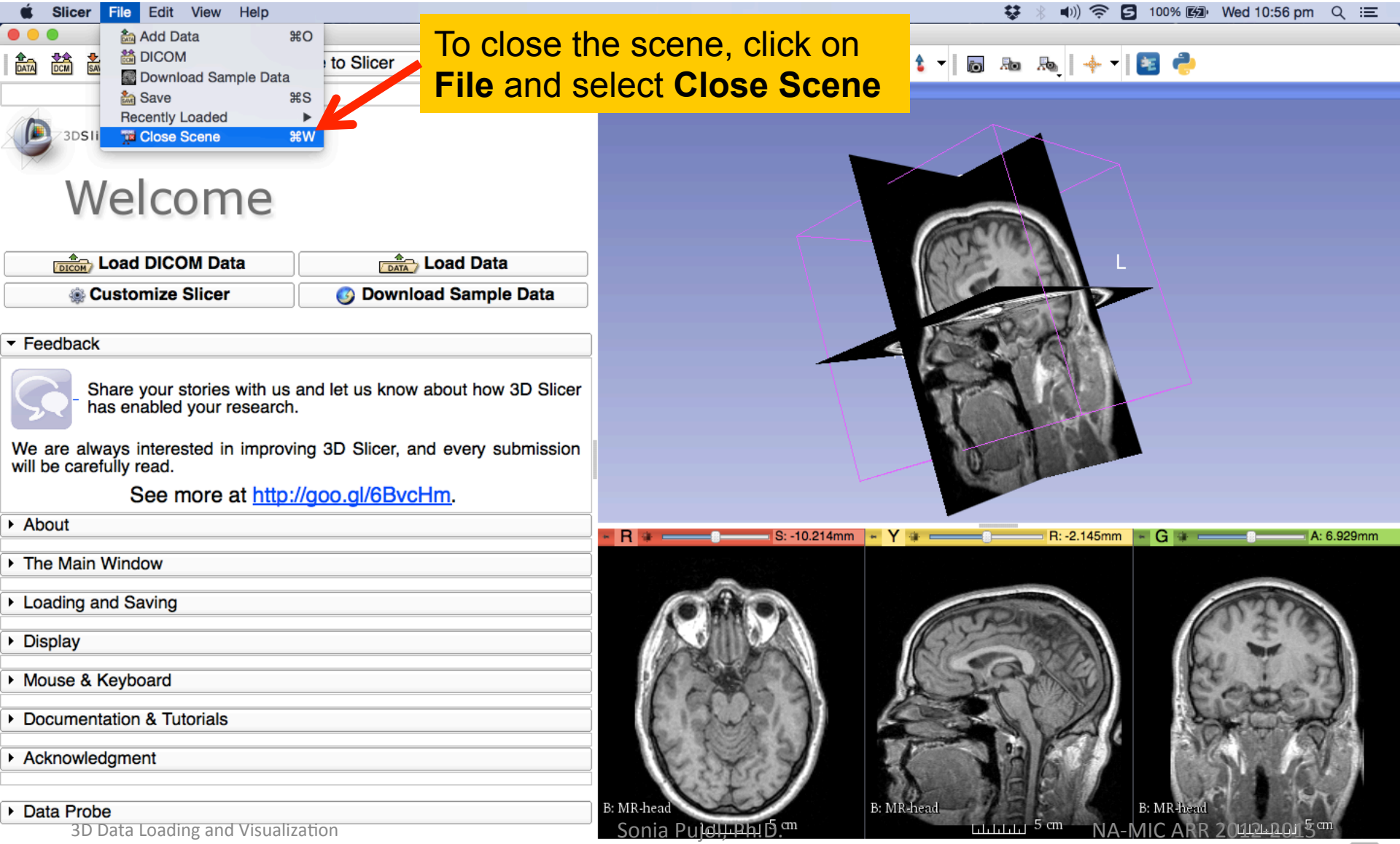
Loading a volume



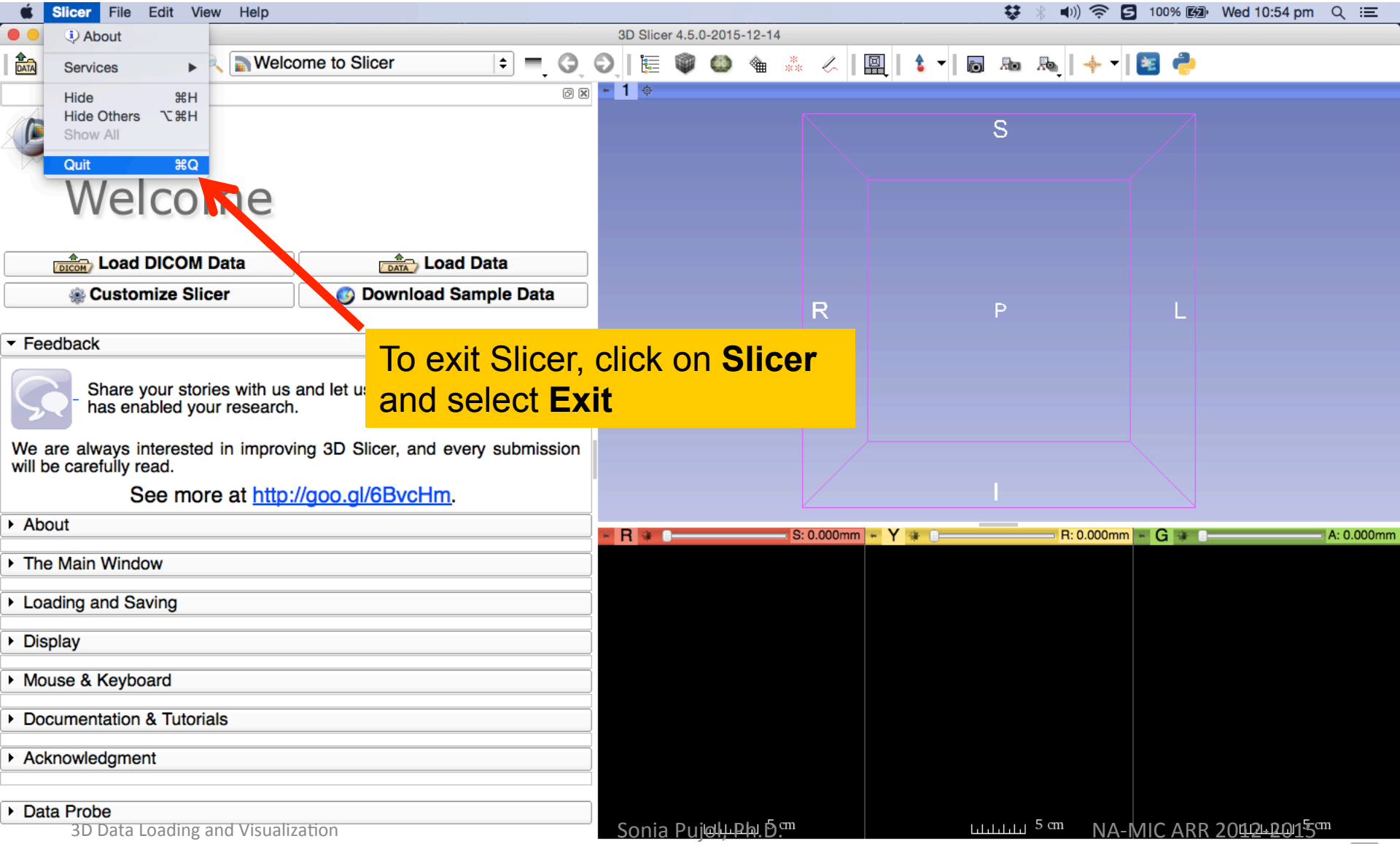
Use the left mouse button to rotate the camera and the right mouse button to zoom in and out

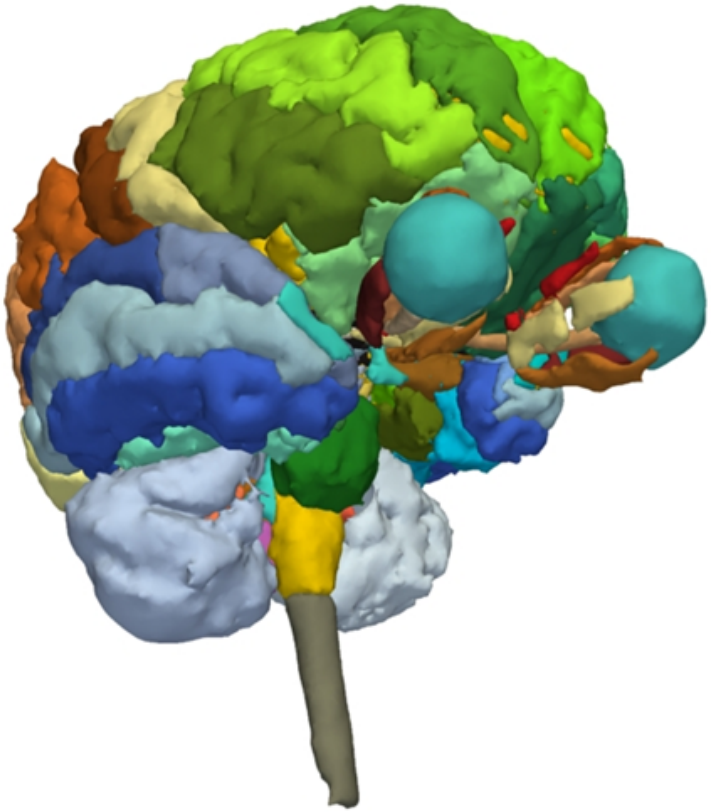
Close the scene

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



Exit Slicer

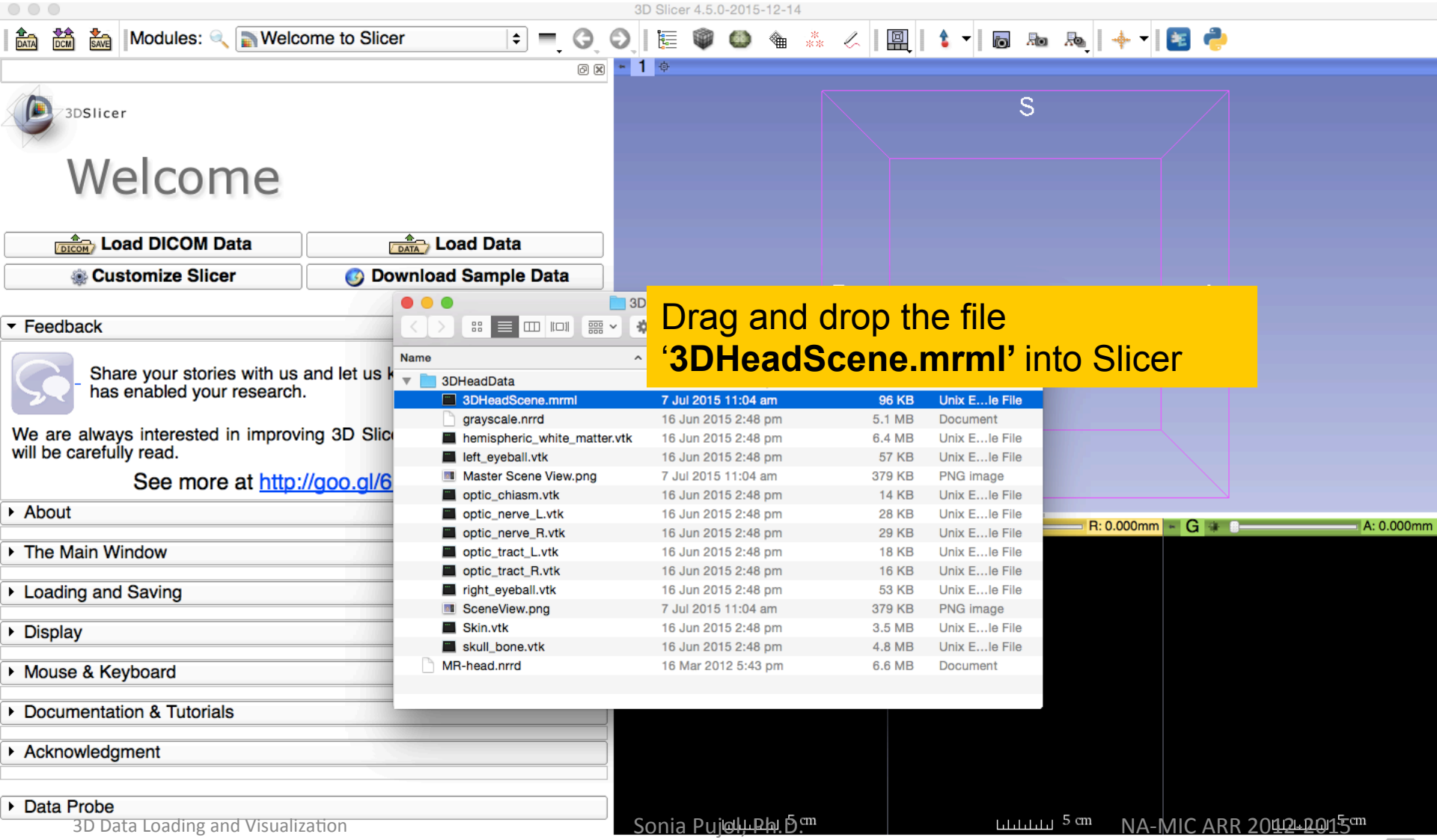

Slicer File Edit View Help
About
Services
Hide ⌘H
Hide Others ⌥⌘H
Show All
Quit ⌘Q
3D Slicer 4.5.0-2015-12-14
Welcome to Slicer
Welcome
Load DICOM Data
Load Data
Customize Slicer
Download Sample Data
Feedback
Share your stories with us and let us
has enabled your research.
We are always interested in 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
Documentation & Tutorials
Acknowledgment
Data Probe
S
R
P
L
I
To exit Slicer, click on **Slicer** and select **Exit**



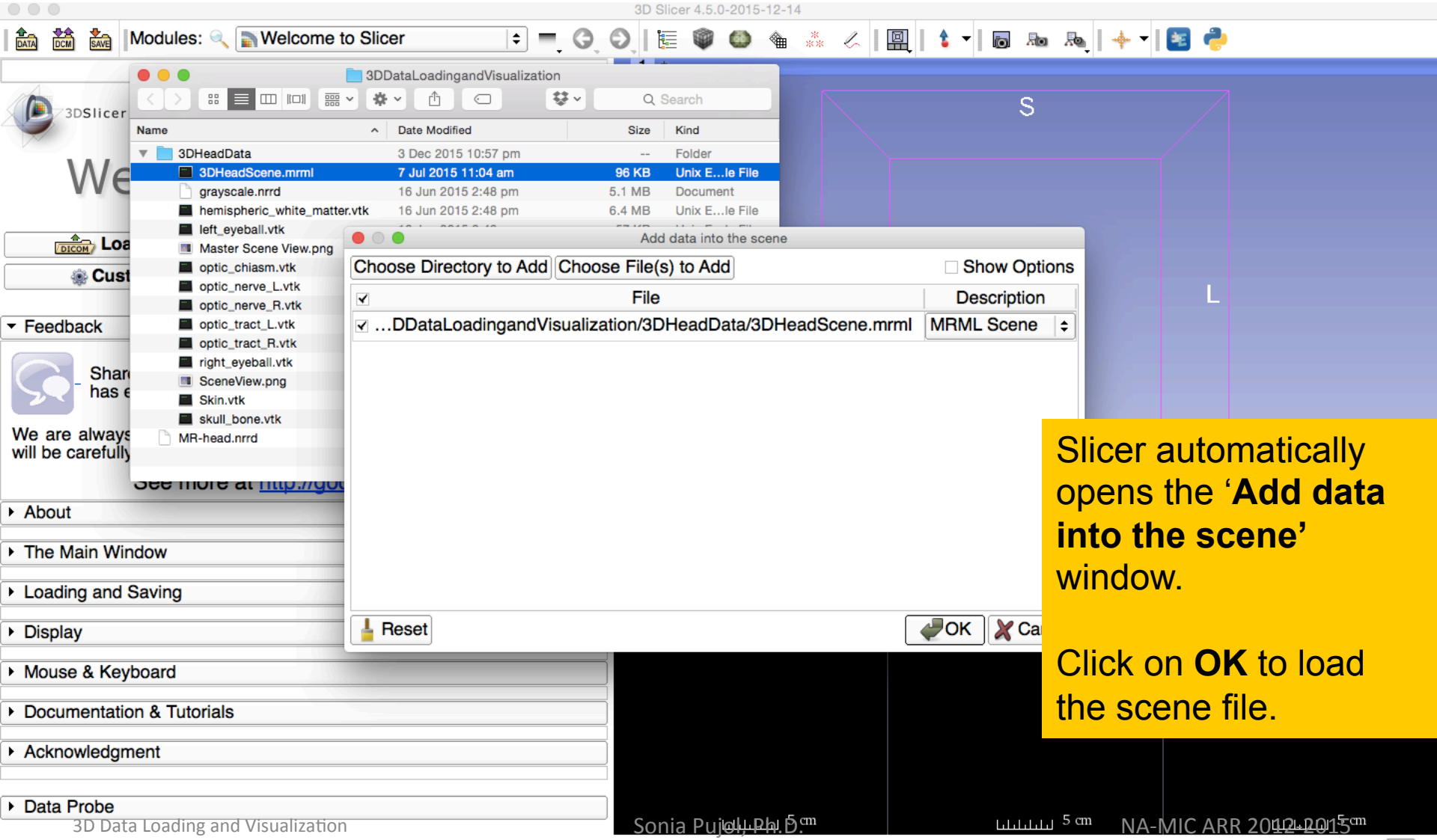
Part 2:

3D visualization of surface models of the brain

Loading a Scene



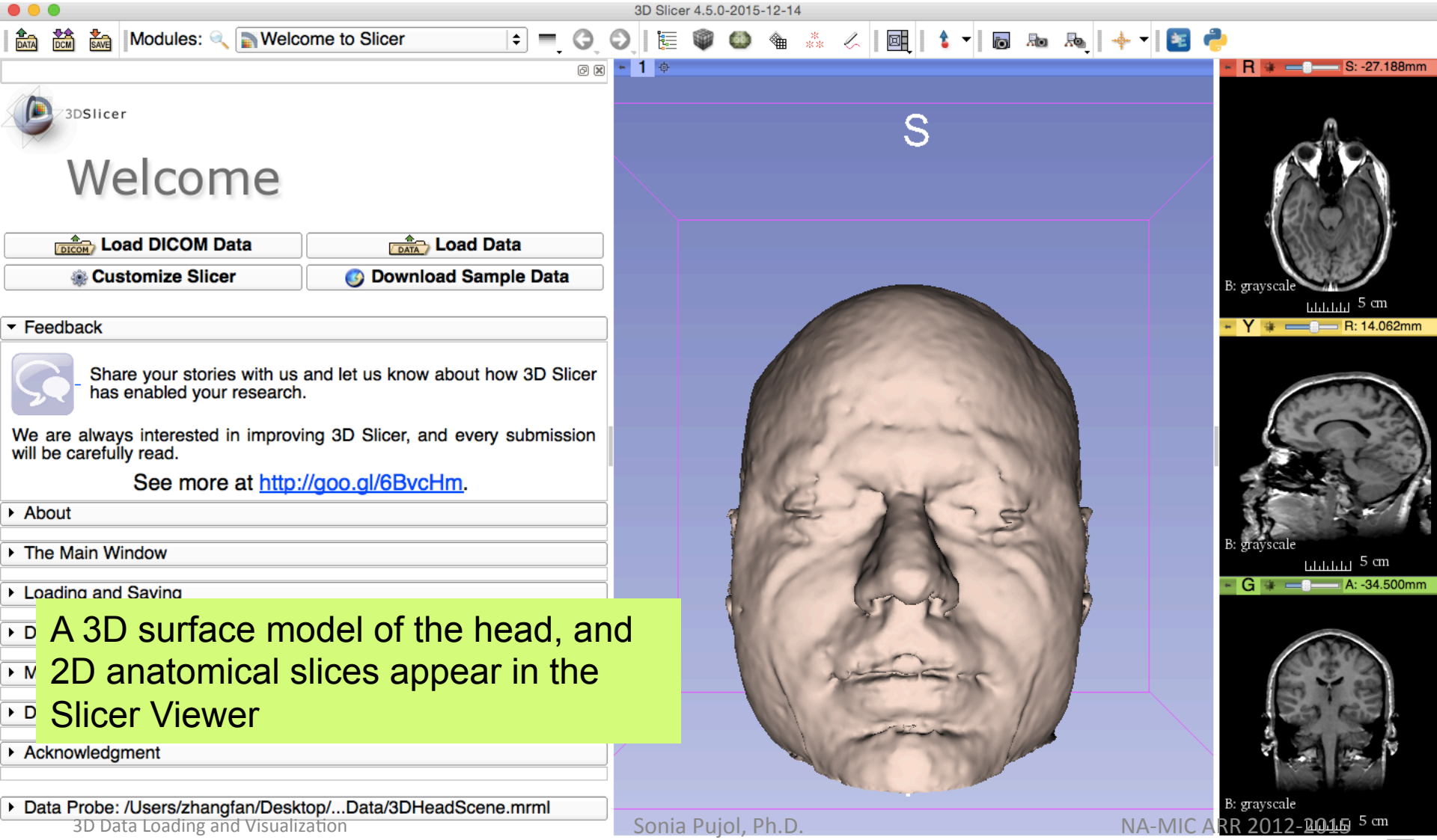
Loading a Scene



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

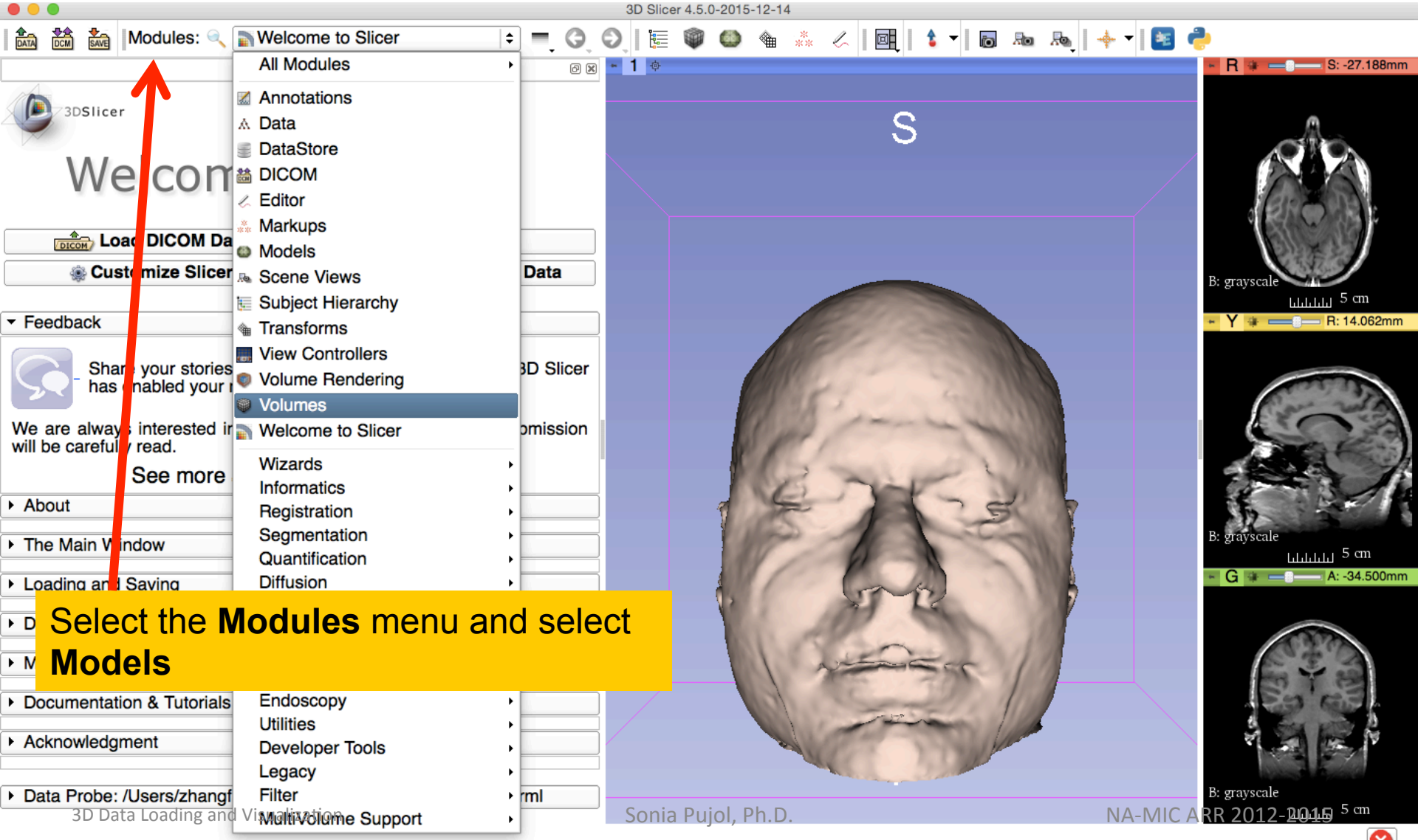
Click on **OK** to load the scene file.

Loading the Slicer Scene



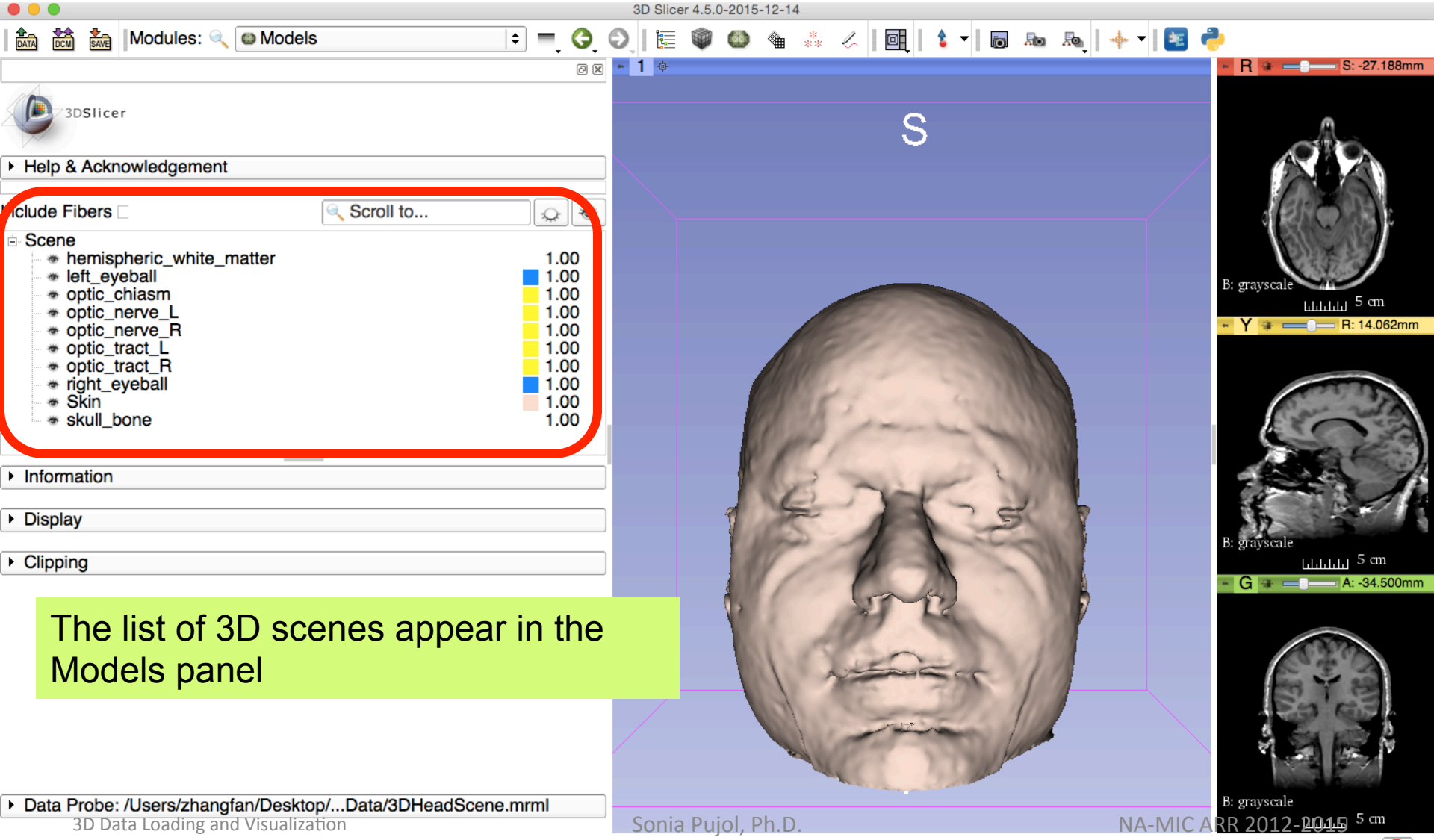
A 3D surface model of the head, and 2D anatomical slices appear in the Slicer Viewer

Loading the Slicer Scene



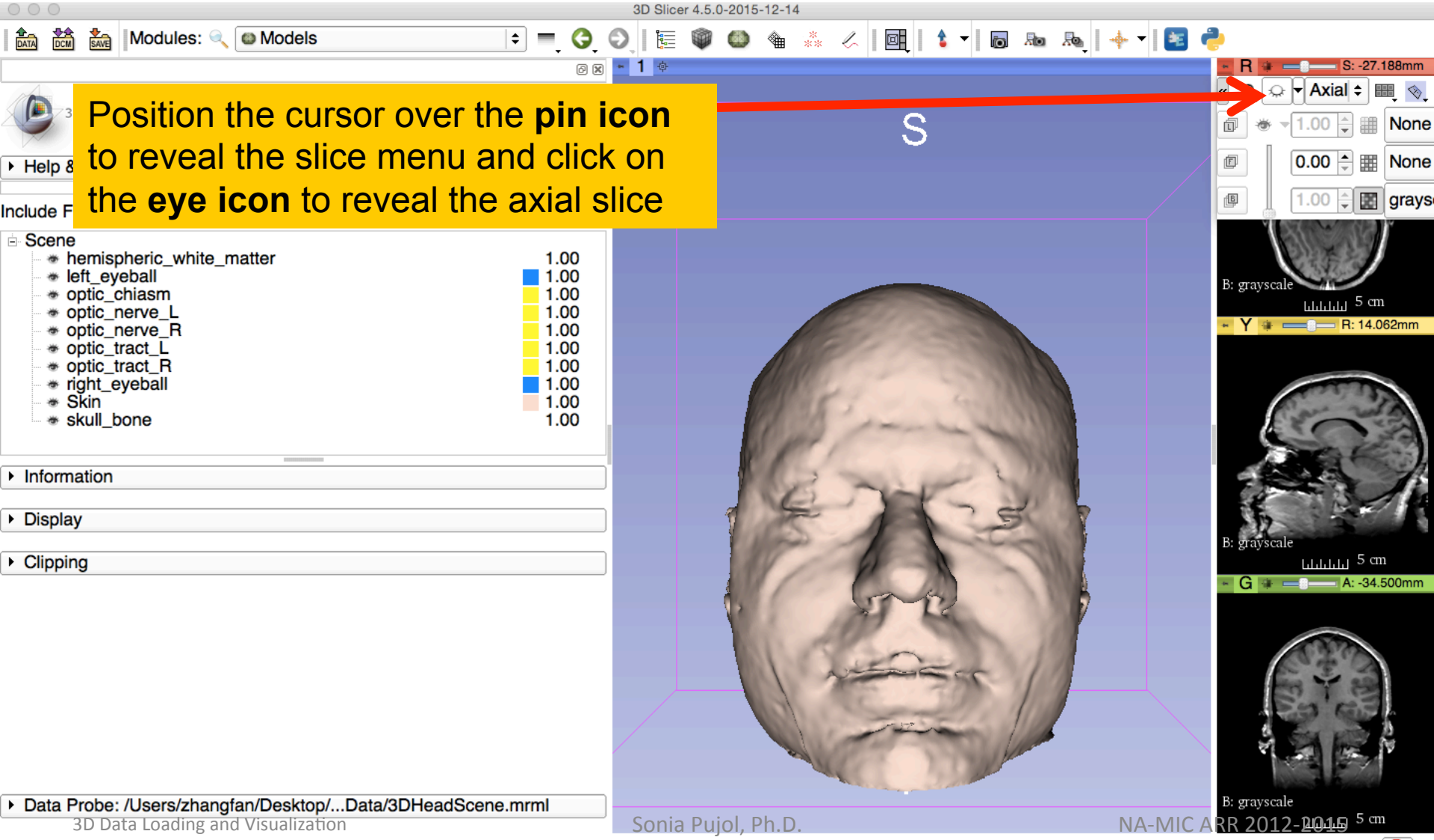
Select the **Modules** menu and select **Models**

Models Module

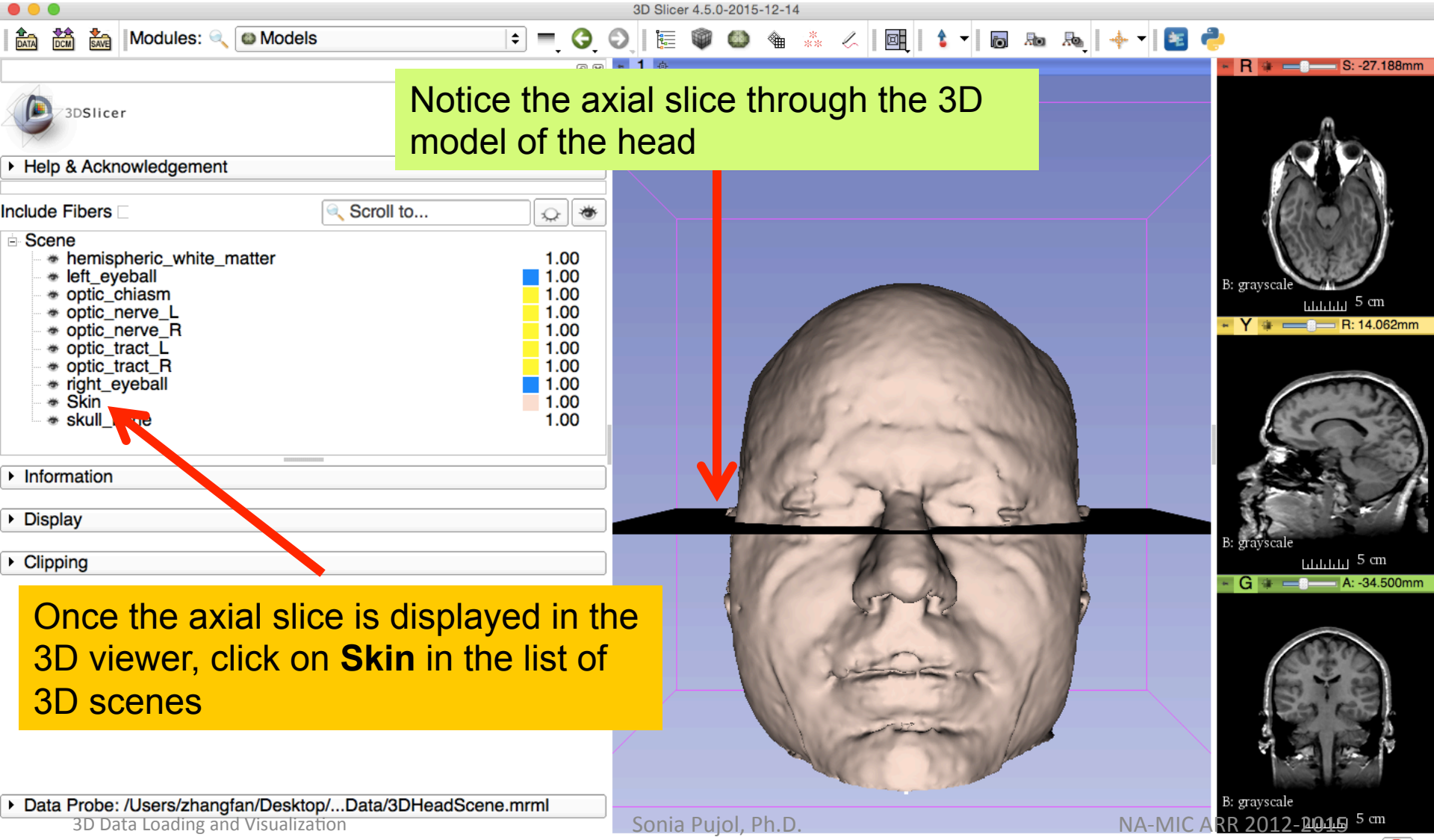


The list of 3D scenes appear in the Models panel

3D Visualization



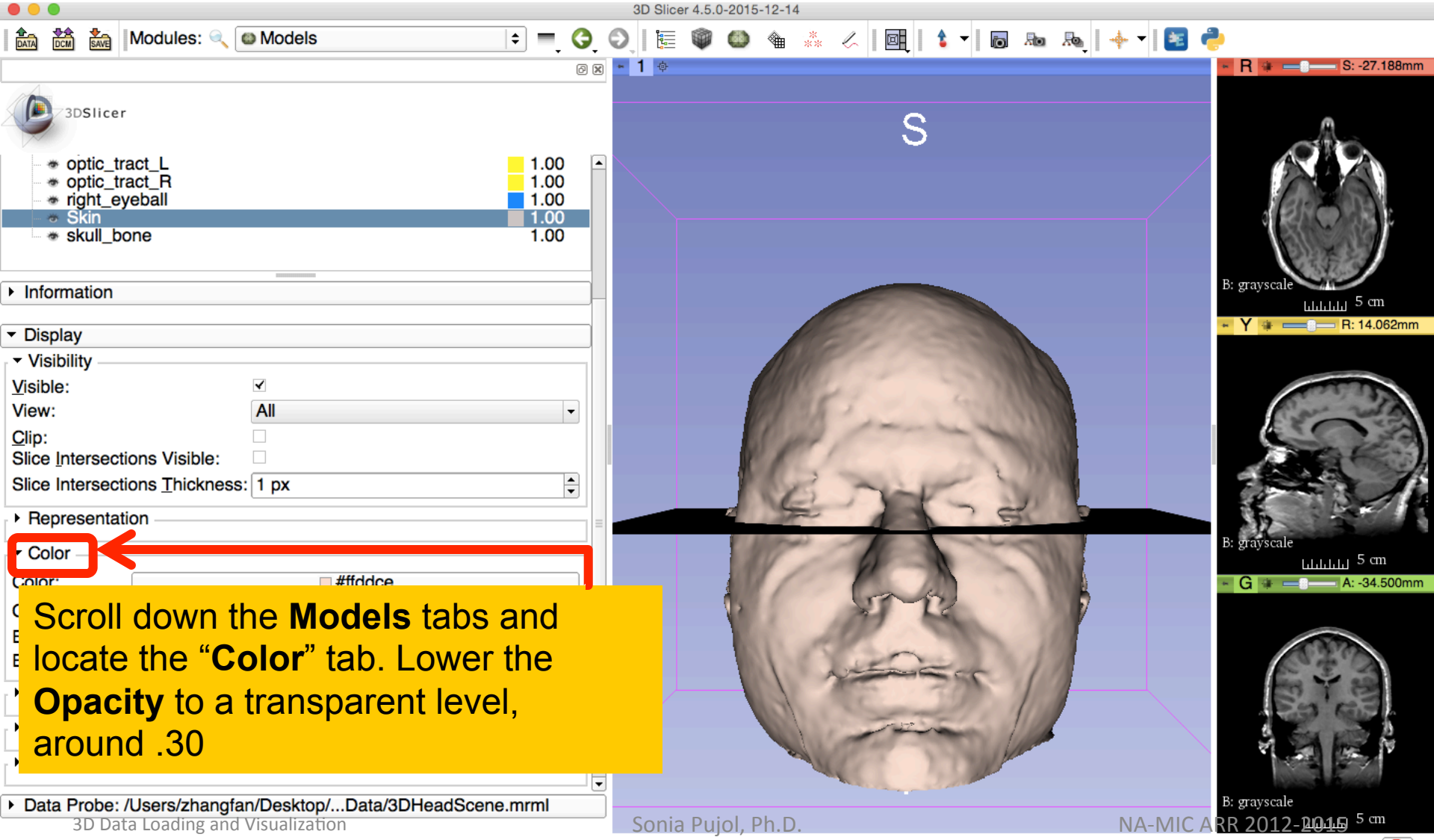
3D Visualization



Notice the axial slice through the 3D model of the head

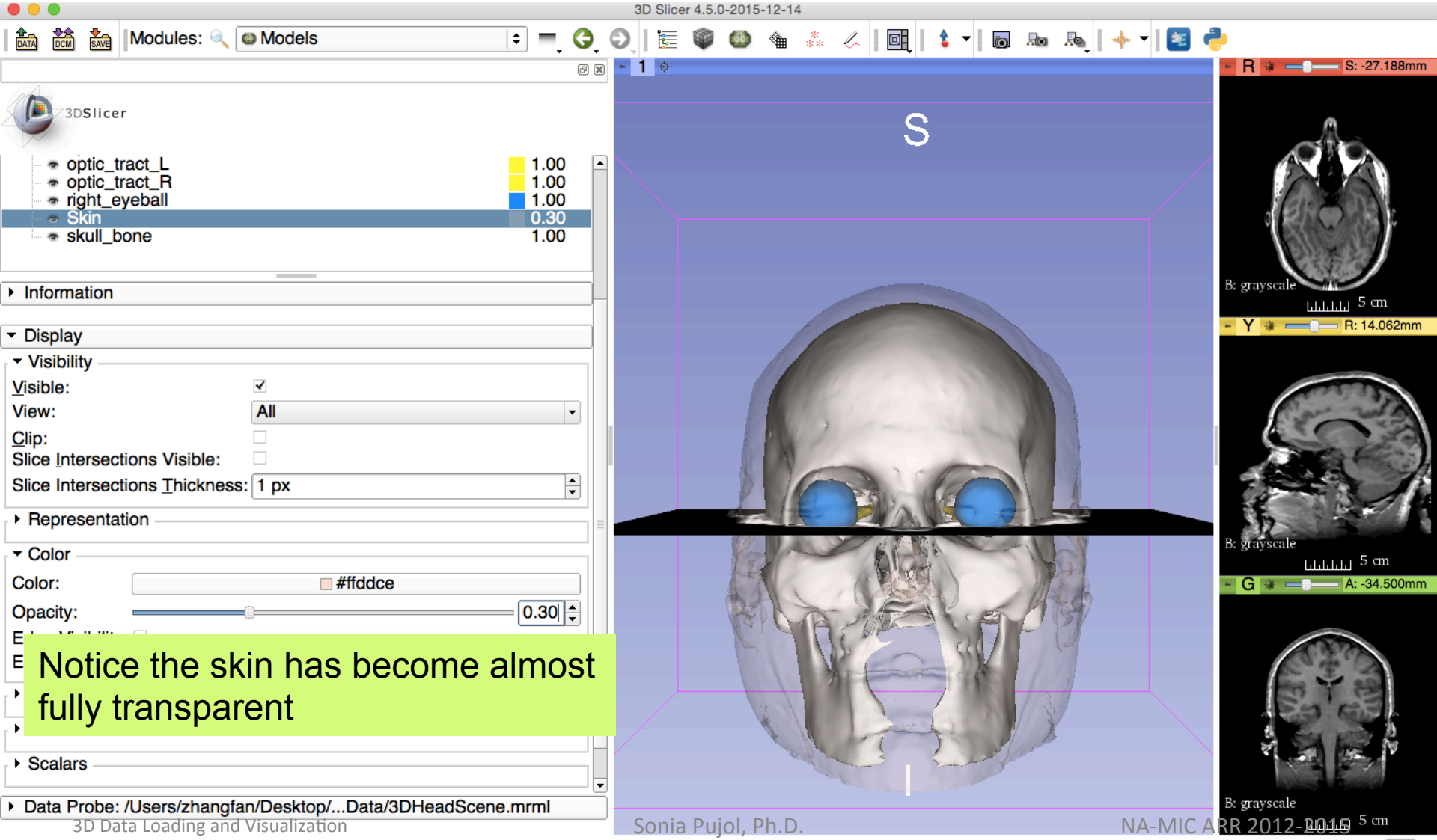
Once the axial slice is displayed in the 3D viewer, click on **Skin** in the list of 3D scenes

3D Visualization



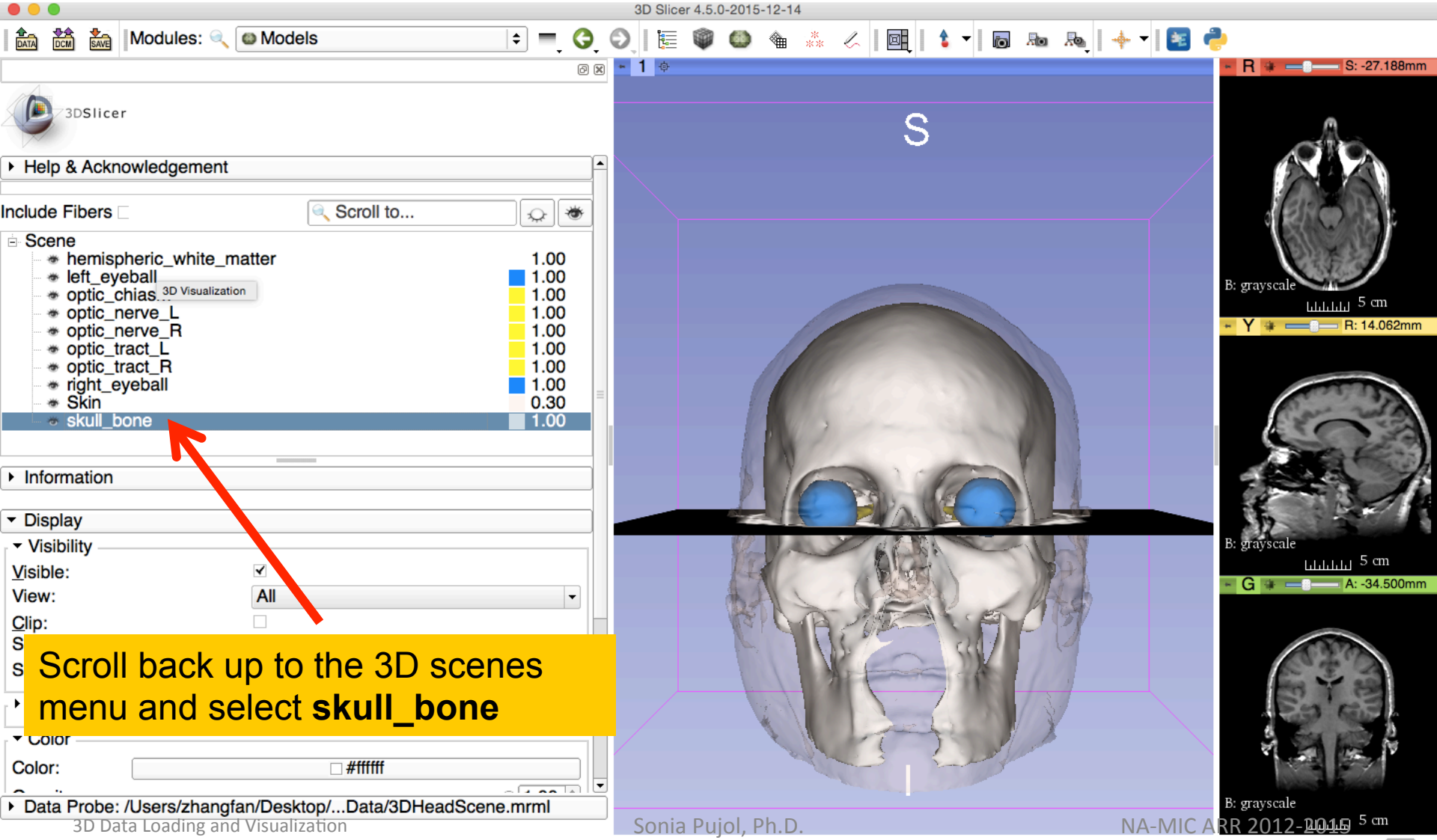
Scroll down the **Models** tabs and locate the "**Color**" tab. Lower the **Opacity** to a transparent level, around .30

3D Visualization



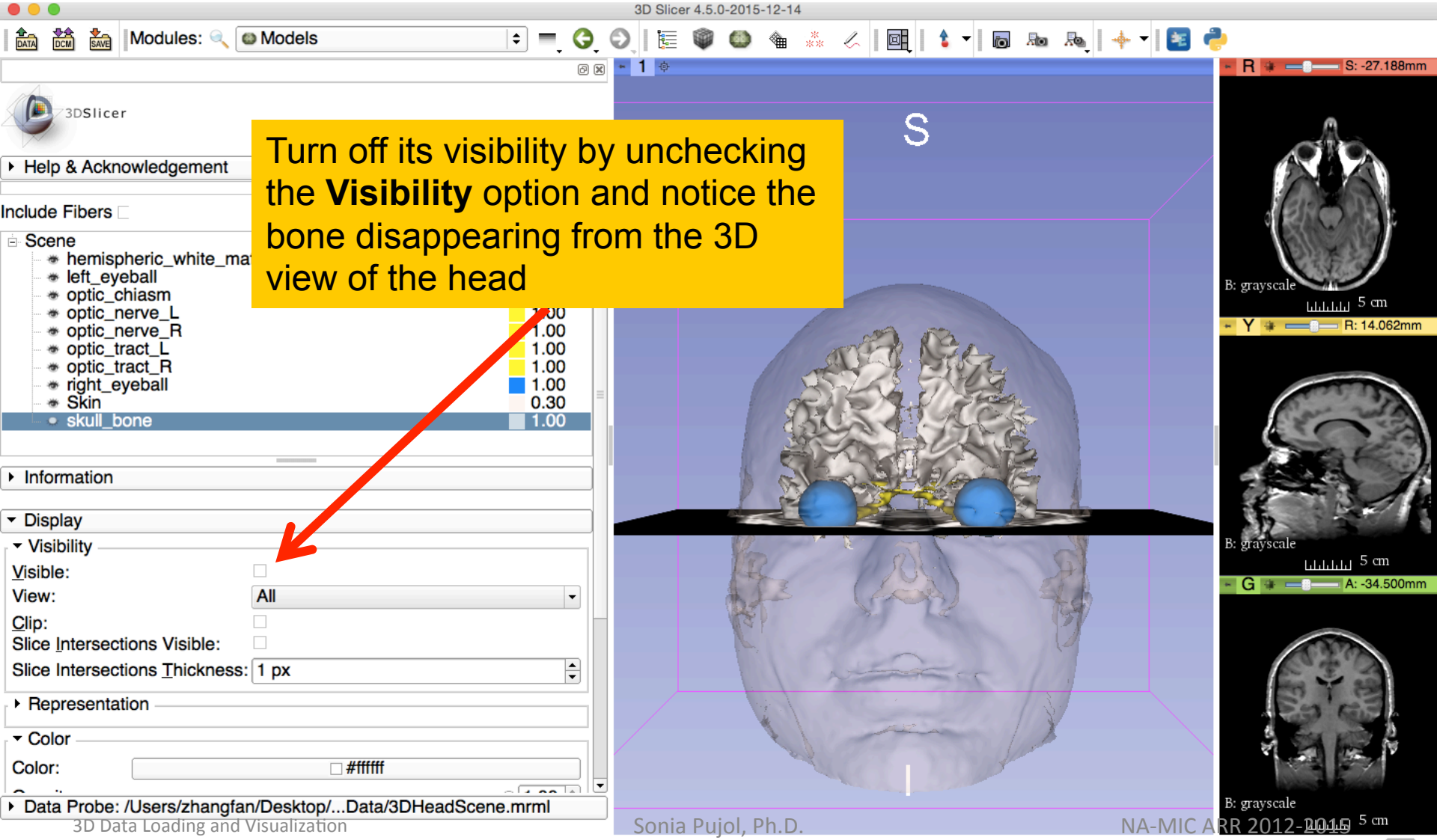
Notice the skin has become almost fully transparent

3D Visualization



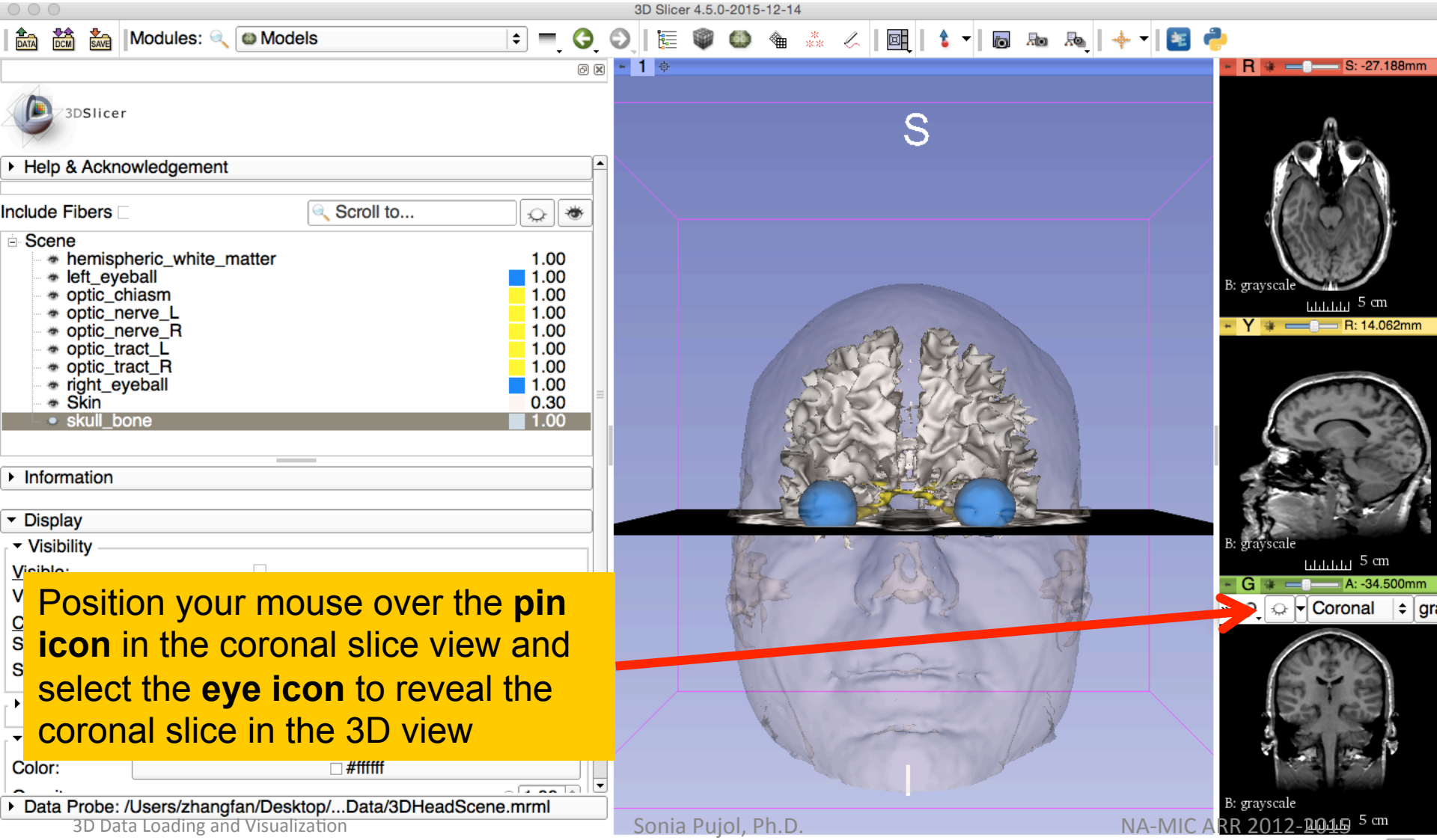
Scroll back up to the 3D scenes menu and select **skull_bone**

3D Visualization



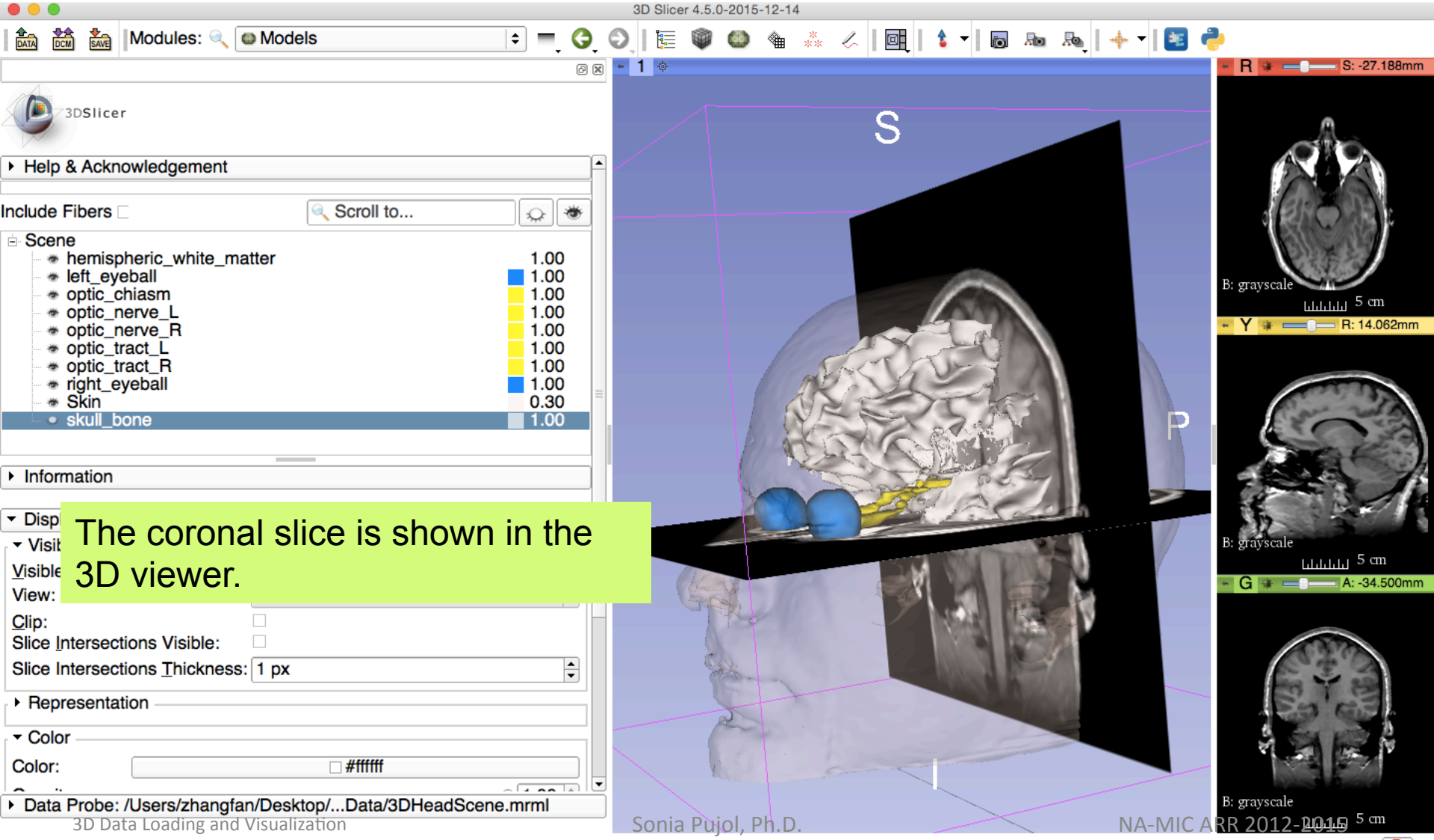
Turn off its visibility by unchecking the **Visibility** option and notice the bone disappearing from the 3D view of the head

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

Scroll up and select the 3D scene **hemispheric_white_matter**, then check off the option for **Clip** under the **Visibility** tab

3D Slicer 4.5.0-2015-12-14

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers

Scroll to...

Scene

hemispheric_white_matter	1.00
left_eyeball	1.00
optic_chiasm	1.00
optic_nerve_L	1.00
optic_nerve_R	1.00
optic_tract_L	1.00
optic_tract_R	1.00
right_eyeball	1.00
Skin	0.30
skull_bone	1.00

Information

Display

Visibility

Visible: ☑

Clip: ☑

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffffff

Data Probe: /Users/zhangfan/Desktop/...Data/3DHeadScene.mrml

R: S: -27.188mm

B: grayscale 5 cm

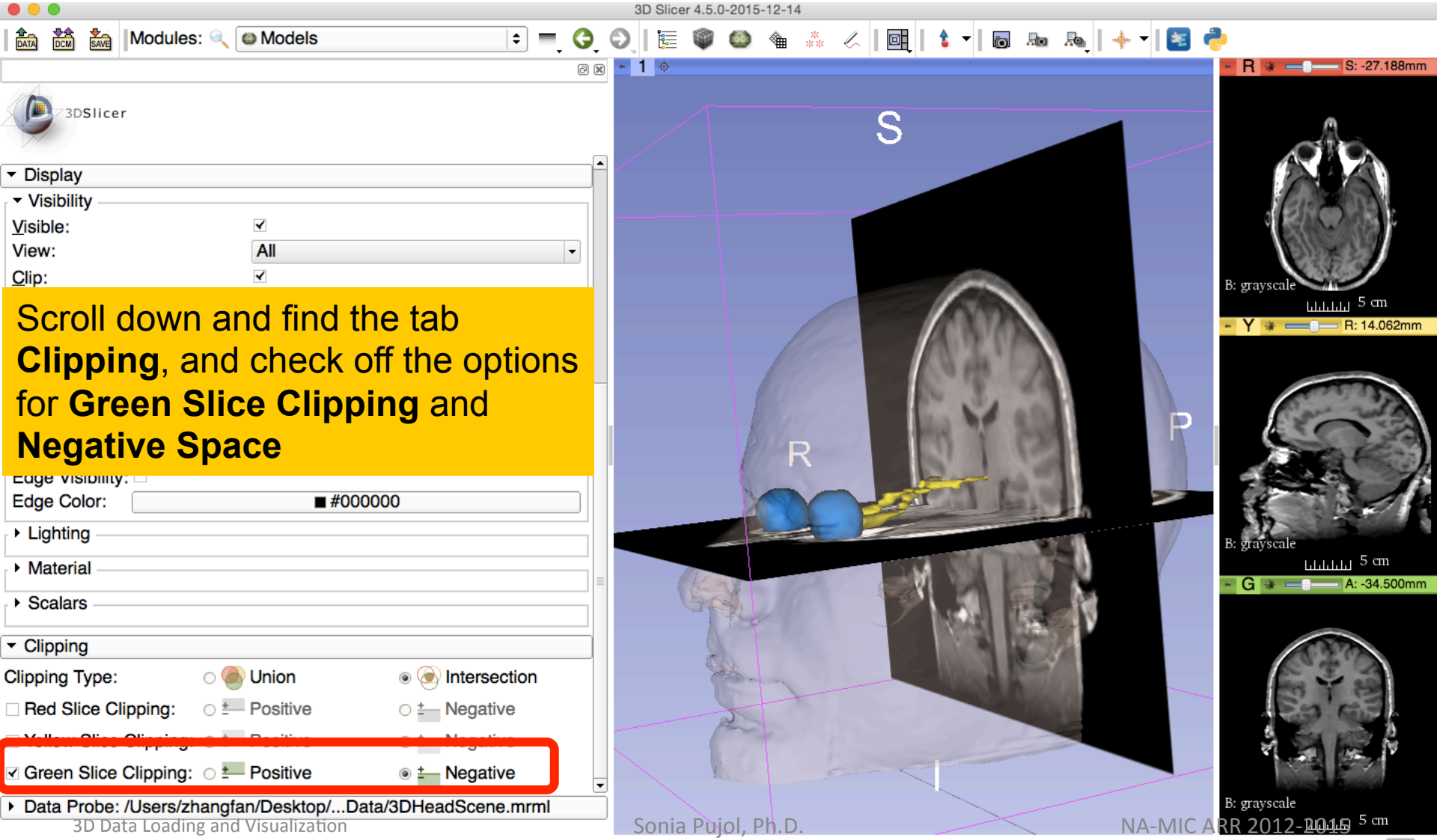
Y: R: 14.062mm

B: grayscale 5 cm

G: A: -34.500mm

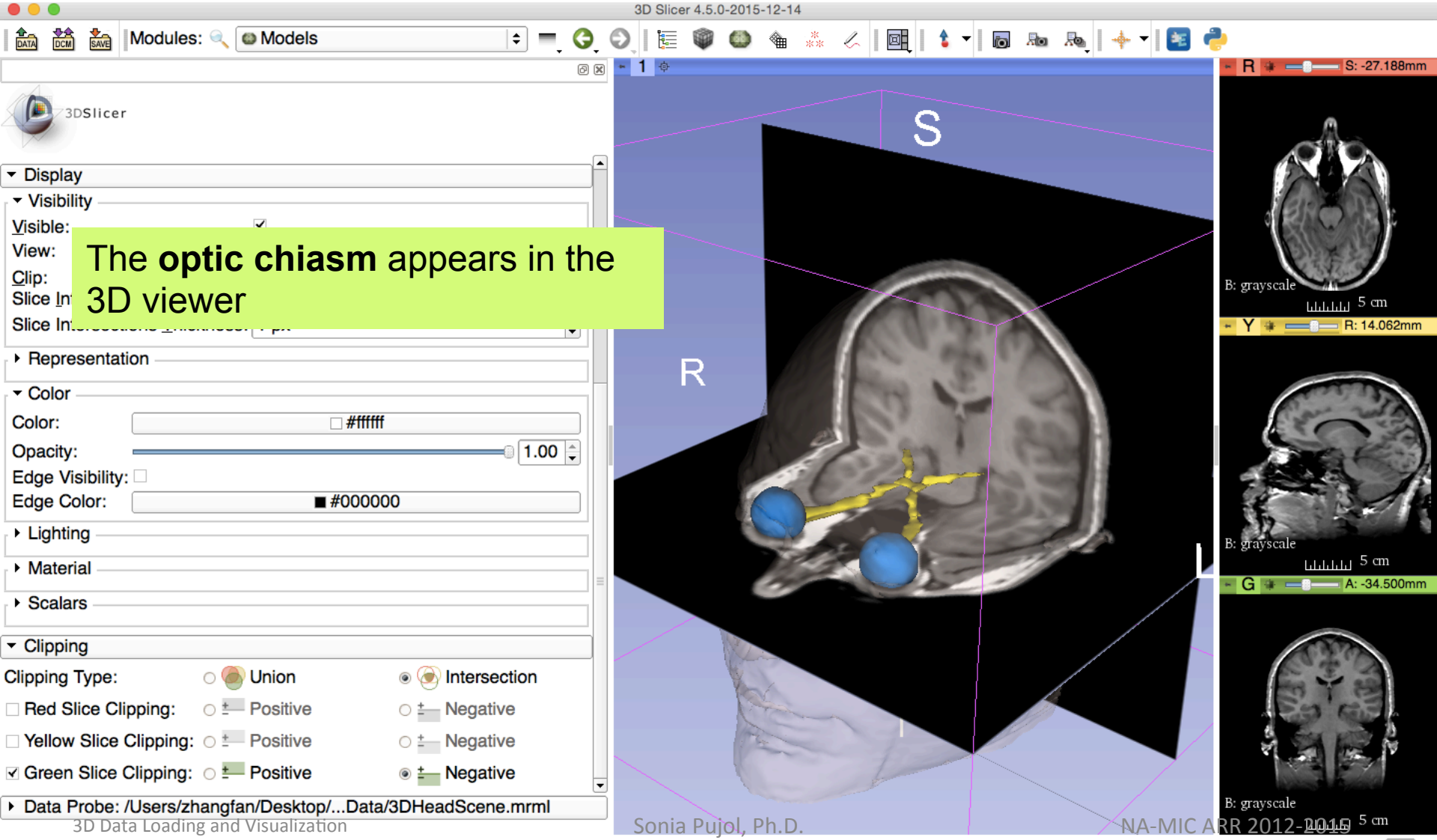
B: grayscale 5 cm

3D Visualization



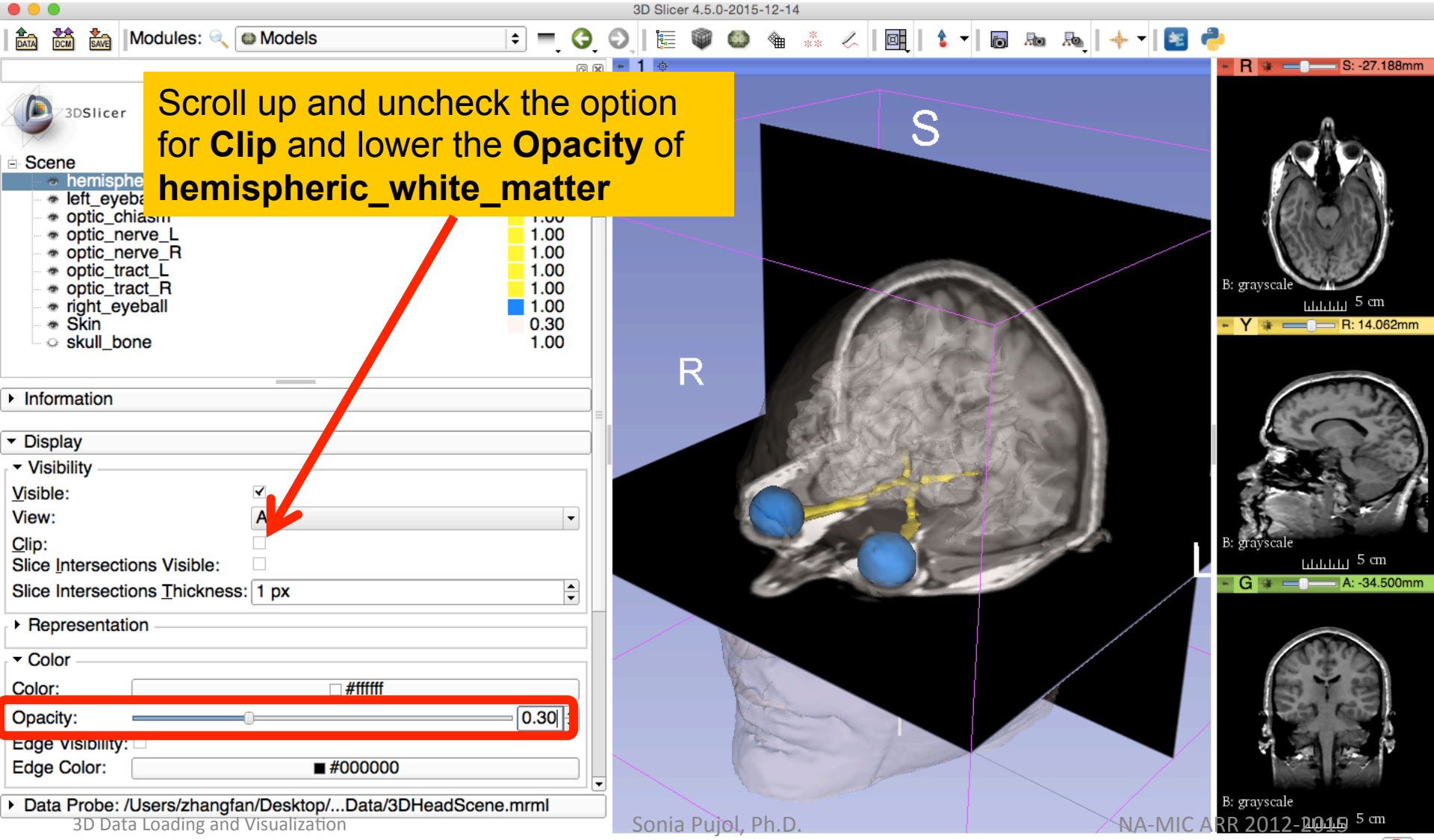
Scroll down and find the tab **Clipping**, and check off the options for **Green Slice Clipping** and **Negative Space**

3D Visualization



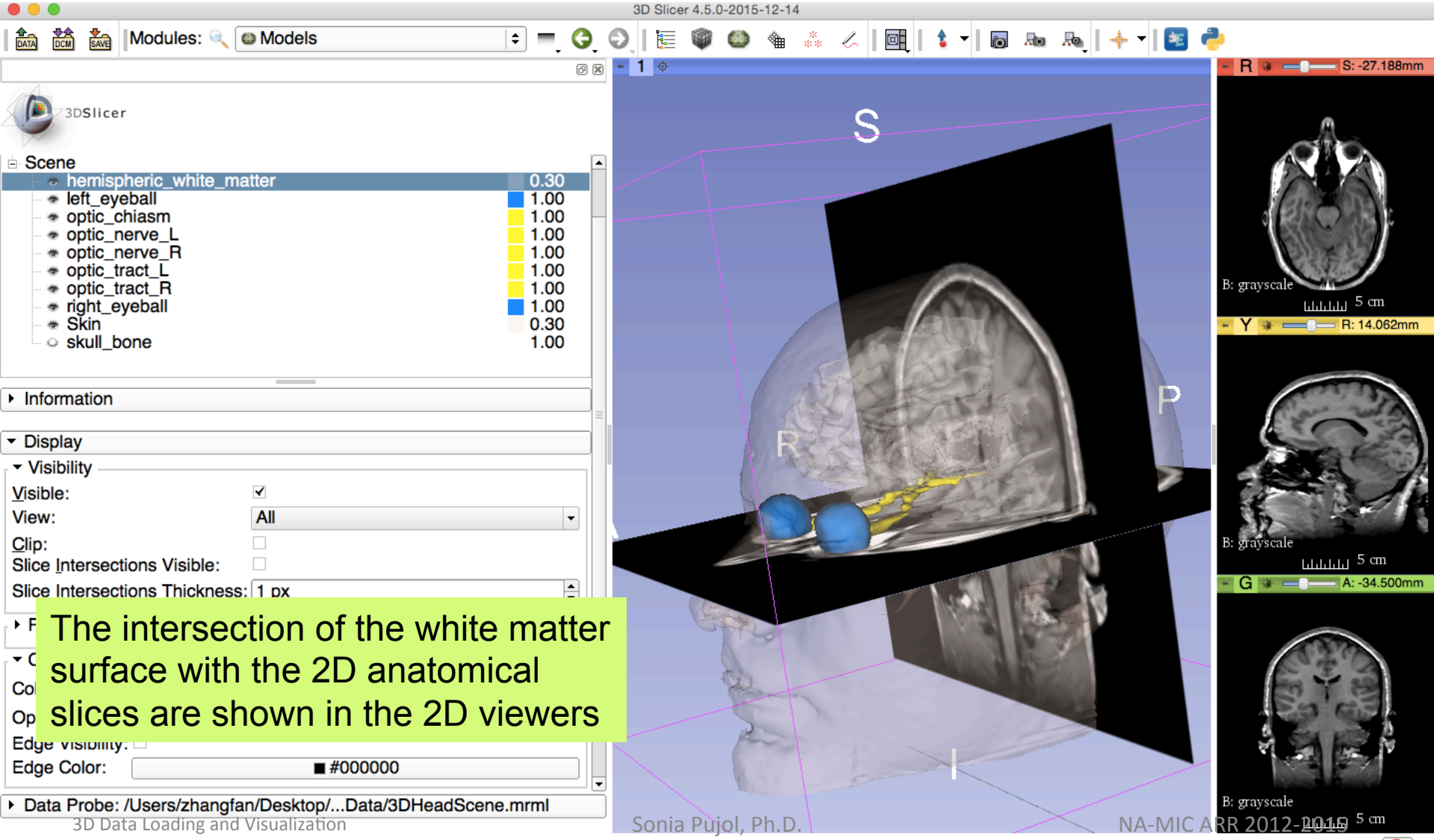
The **optic chiasm** appears in the 3D viewer

3D Visualization



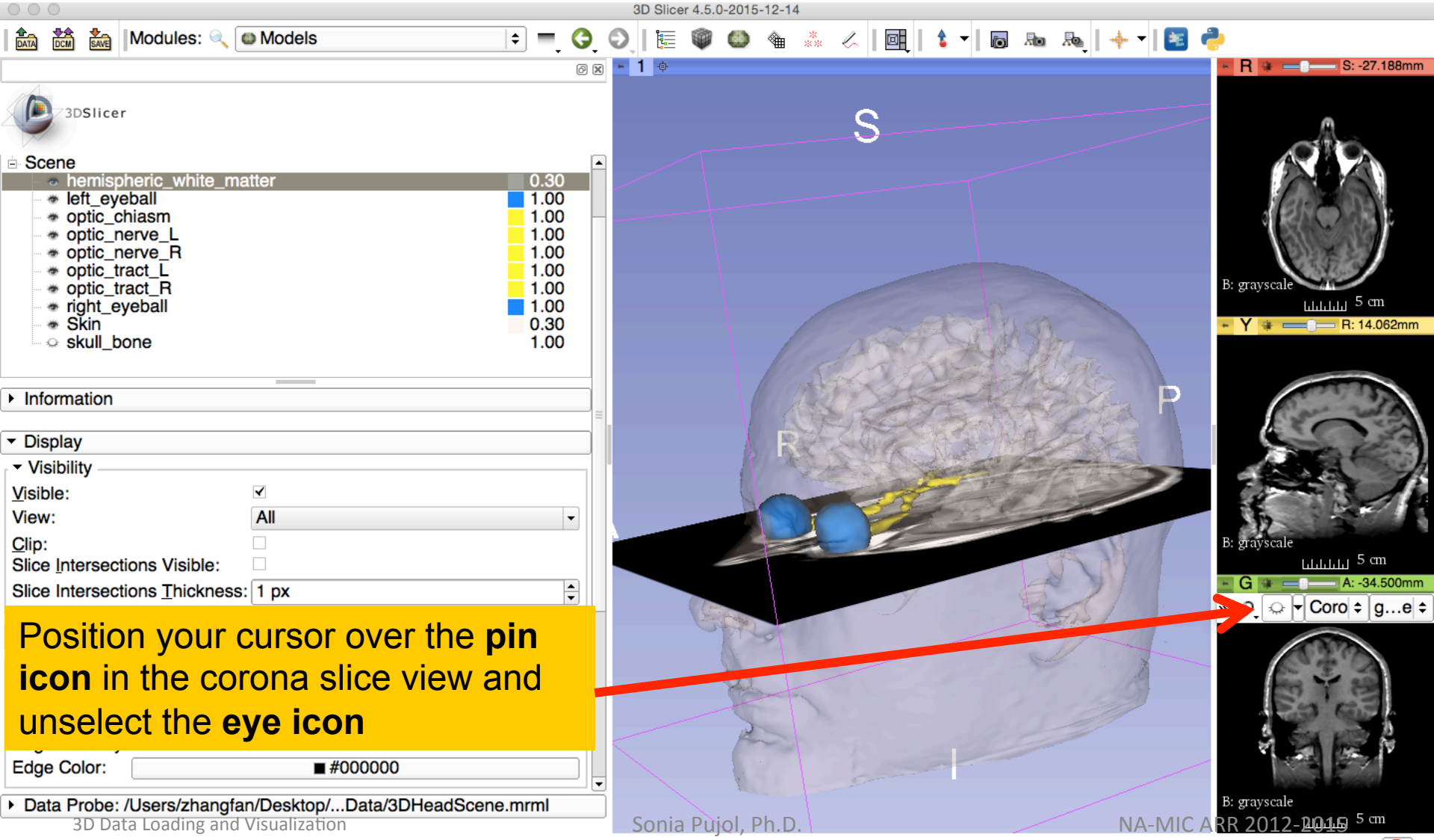
Scroll up and uncheck the option for **Clip** and lower the **Opacity** of **hemispheric_white_matter**

3D Visualization



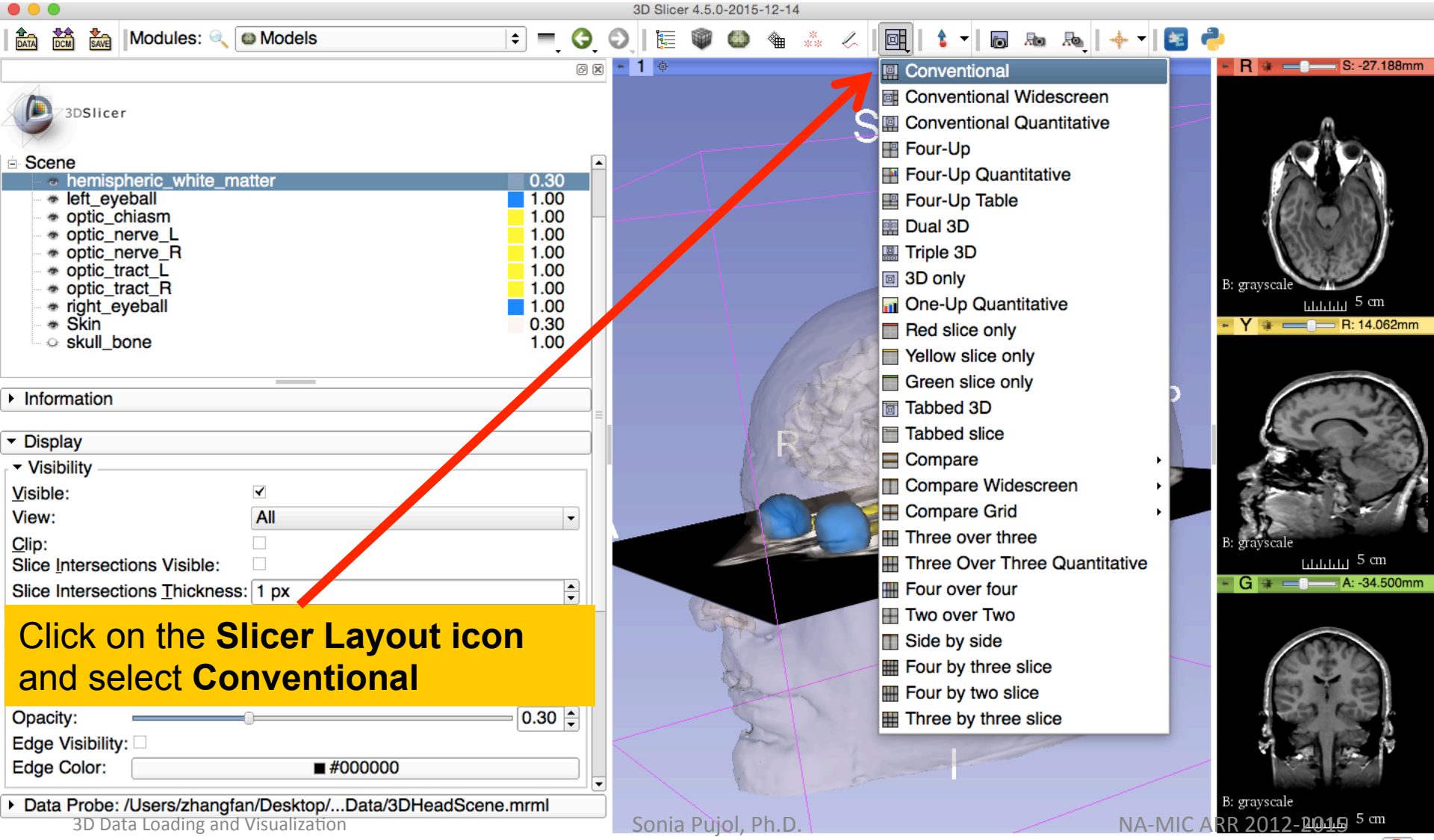
The intersection of the white matter surface with the 2D anatomical slices are shown in the 2D viewers

3D Visualization



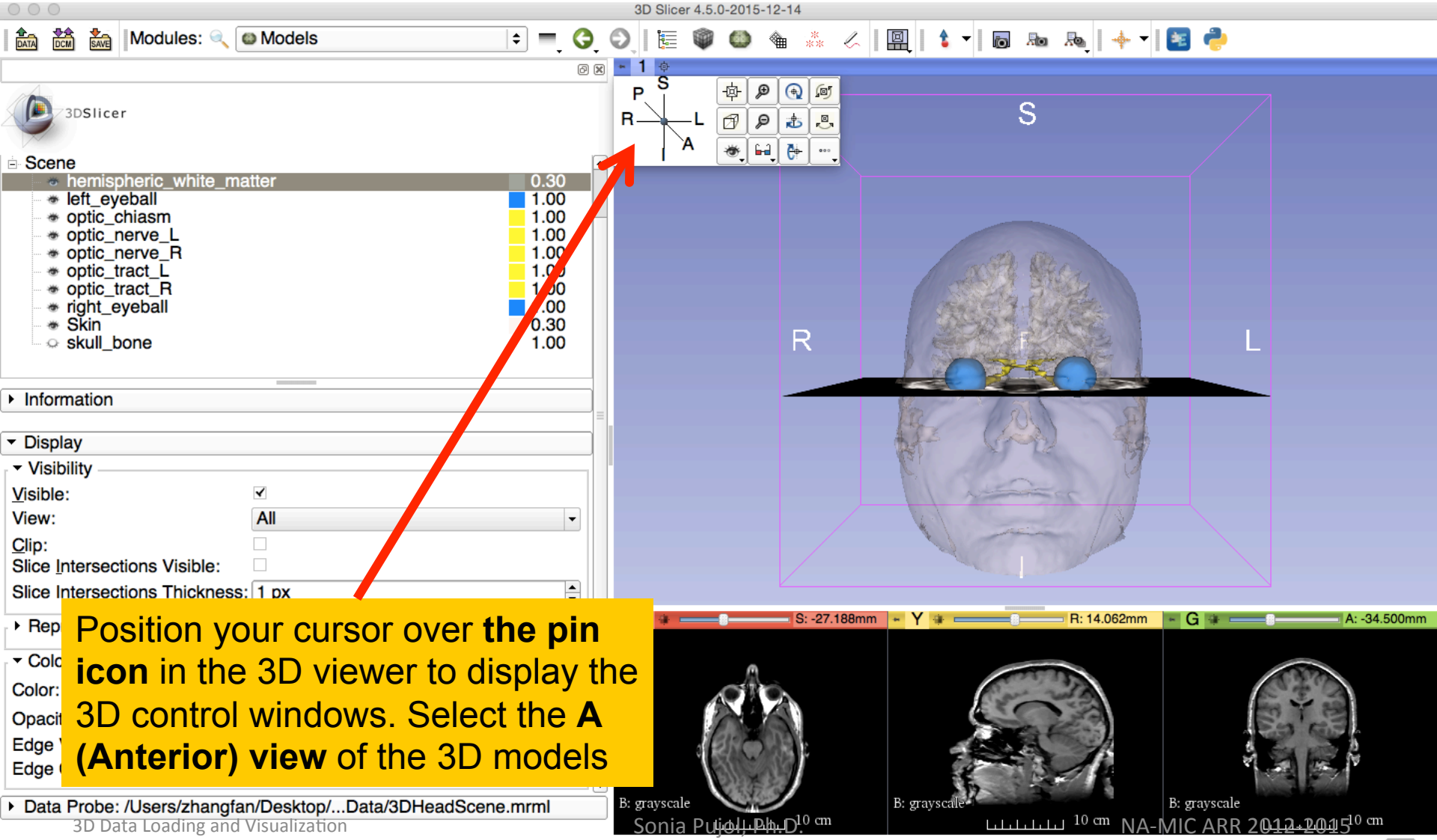
Position your cursor over the **pin icon** in the corona slice view and unselect the **eye icon**

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

Acknowledgments

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

  NIH U54EB005149

- Neuroimage Analysis Center (NAC)

  NIH P41RR013218

- Fan Zhang, The University of Sydney