

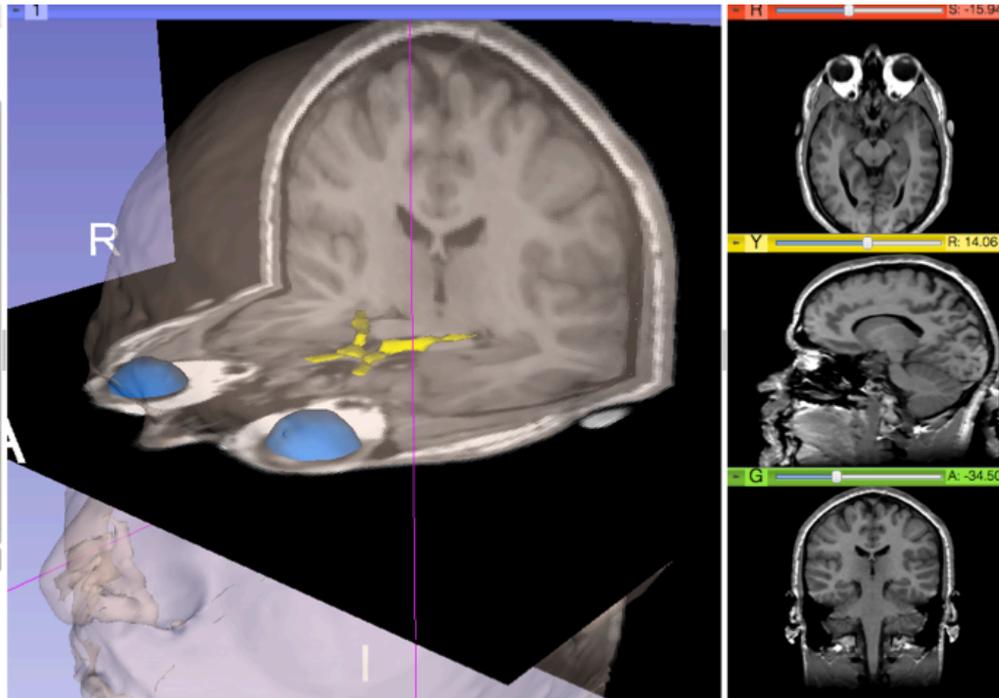
Slicer4 Minute

Sonia Pujol, Ph.D.

Surgical Planning Laboratory

Harvard Medical School

Slicer4 minute tutorial

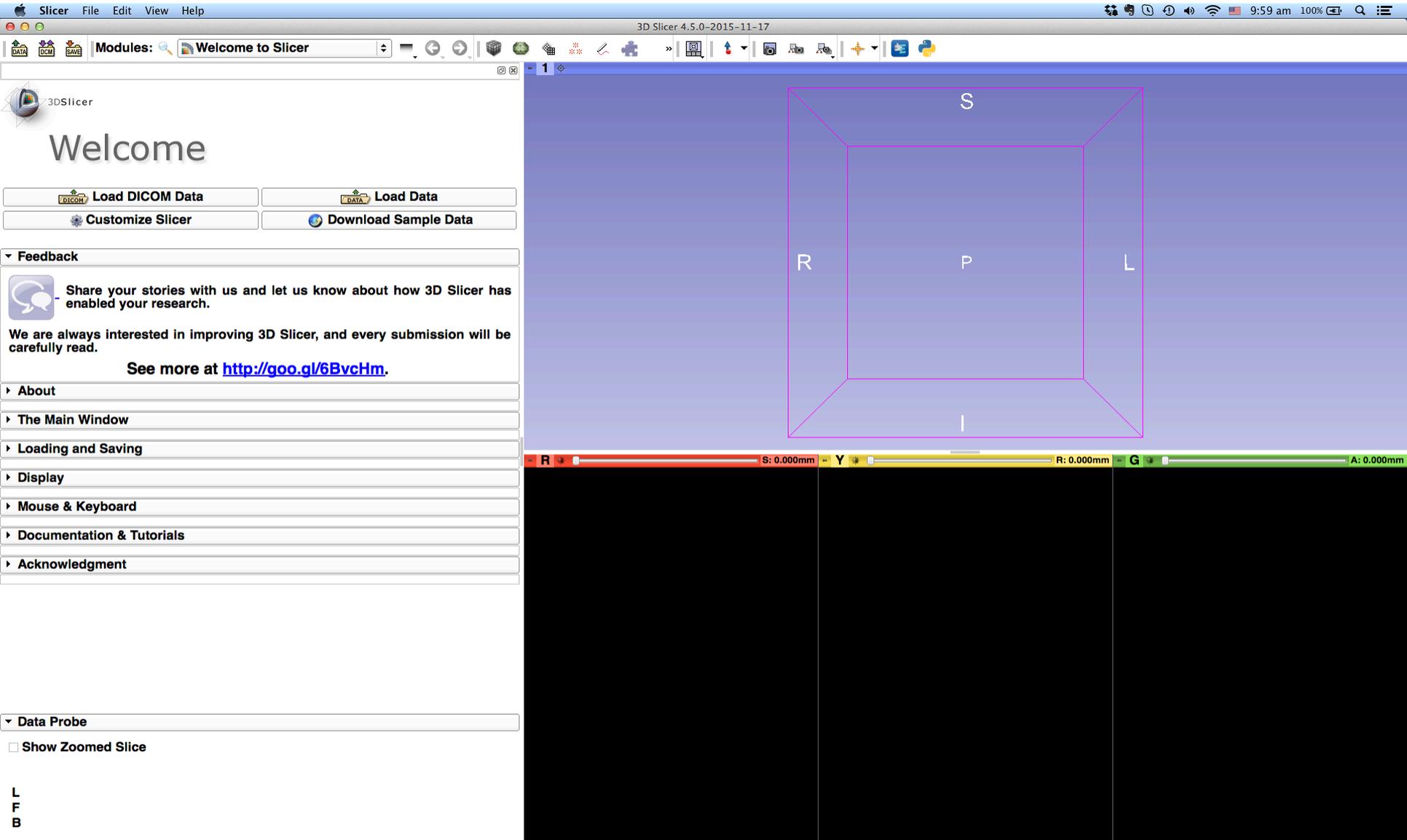


This tutorial is a 4-minute introduction to the 3D visualization capabilities of the Slicer3 software for medical image analysis.

Slicer4 software & dataset

- Download the Slicer4 software available at <http://download.slicer.org/>
- Download the Slicer4minute dataset available at <http://www.slicer.org/slicerWiki/index.php/Documentation/UserTraining>

3D Slicer version 4.5



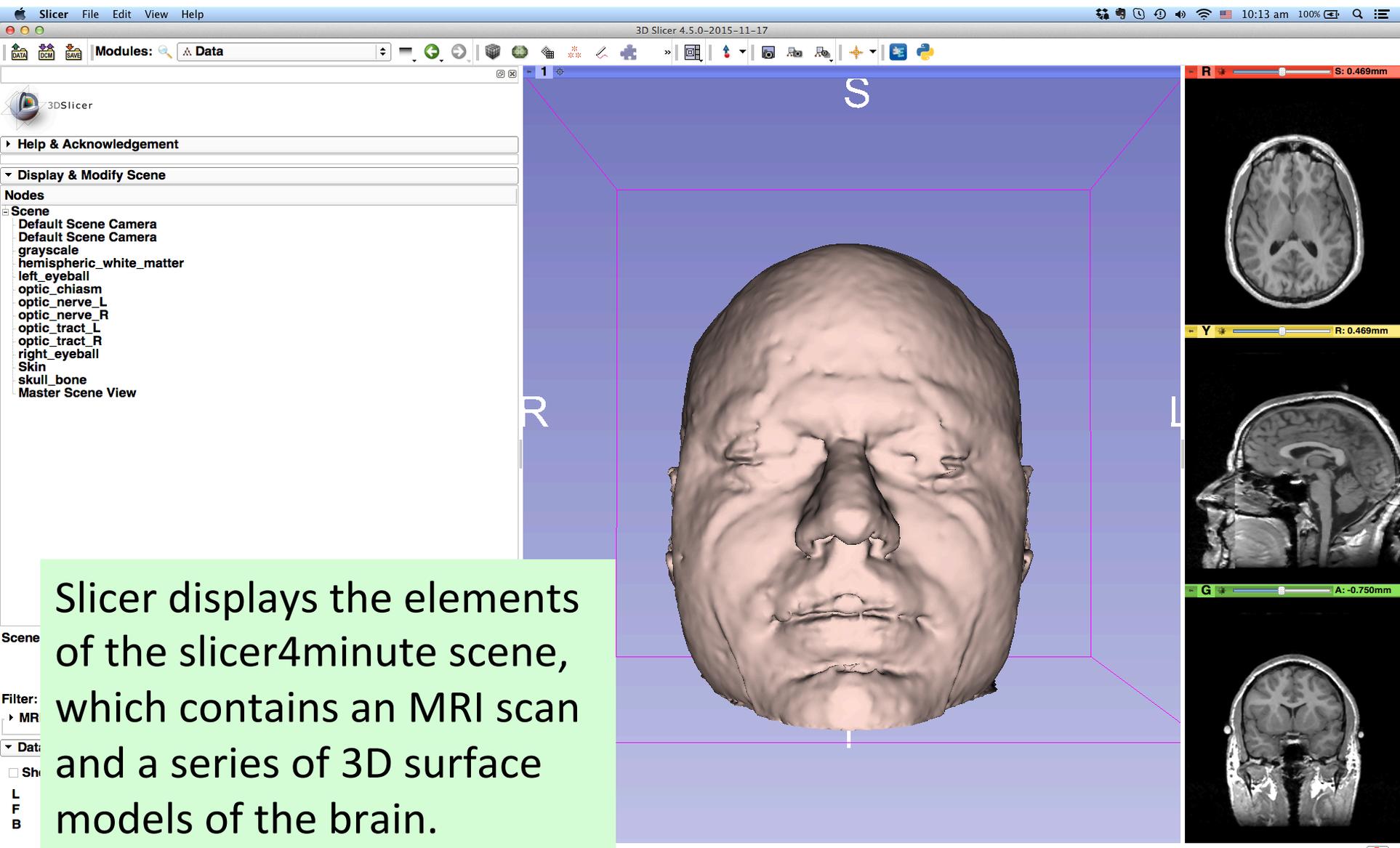
3D Slicer Scene

- A Slicer scene is a MRML (Medical Reality Modeling Language) file which contains a list of elements loaded into Slicer (volumes, models, fiducials, transforms, etc.)
- In the following example, we use a scene 'Slicer4minute.mrml' composed of an MRI scan and 3D models of the head.
- The scene file and datasets have been saved as an '.mrb' (Medical Reality Bundle) file.
- The MRB file format is Slicer's archive file format.

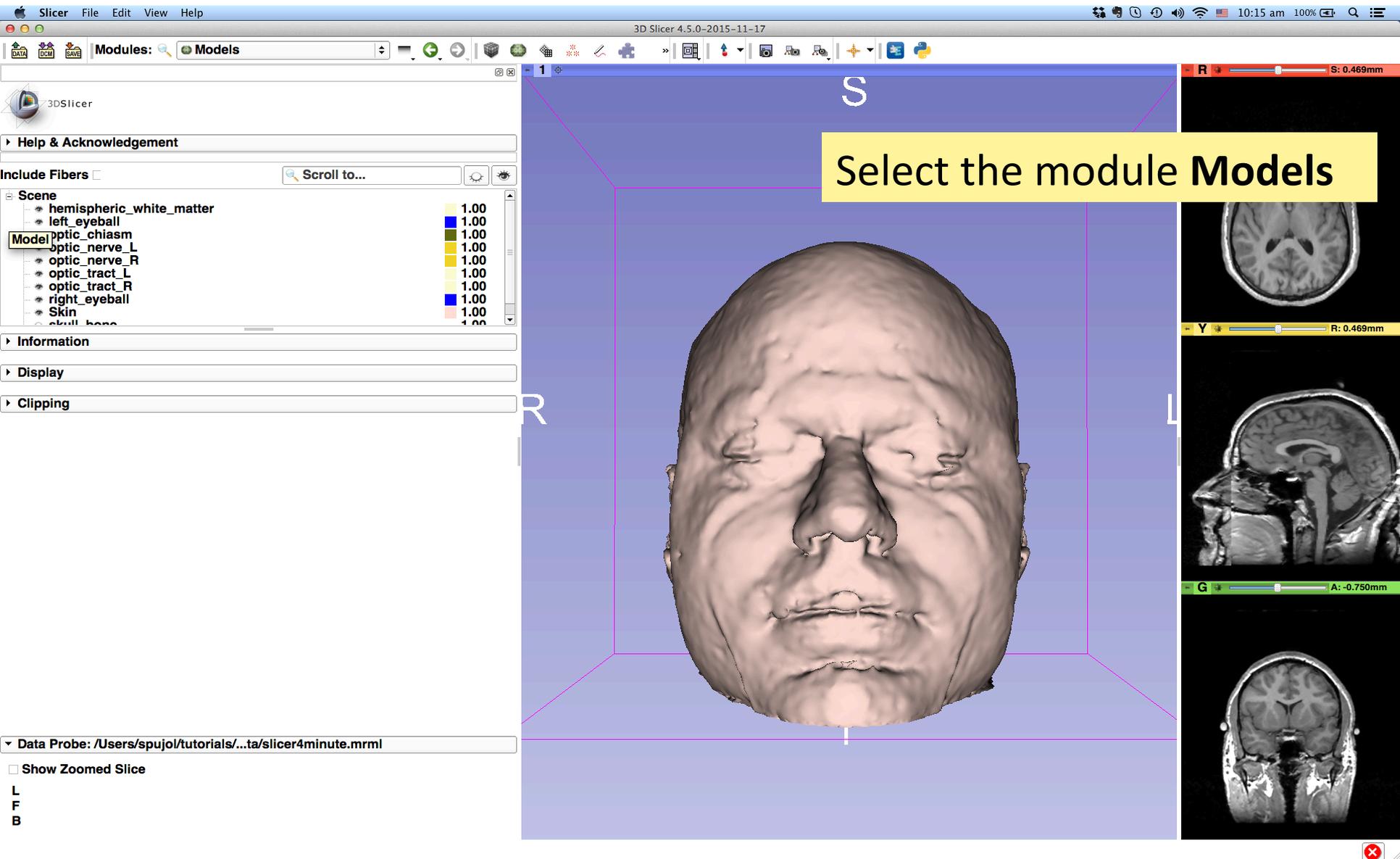
3D Slicer version 4.5

The screenshot displays the 3D Slicer 4.5.0-2015-11-17 interface. The left sidebar shows a 'Welcome' page with buttons for 'Load DICOM Data', 'Load Data', 'Customize Slicer', and 'Download Sample Data'. Below these are sections for 'Feedback', 'About', 'The Main Window', 'Loading and Saving', 'Display', 'Mouse & Keyboard', 'Documentation & Tutorials', and 'Acknowledgment'. A file browser window is open, showing a file named 'slicer4minute.mrb' (21.2 MB) circled in red. A red arrow points from this file to the 3D view area. The 3D view area is currently empty, with a yellow callout box containing the text: 'Drag and drop the slicer4minute.mrb to load the scene in Slicer'. The 3D view area also shows a coordinate system with axes labeled S, R, and I. The bottom status bar shows 'R: 0.000mm', 'Y: 0.000mm', 'R: 0.000mm', 'G: 0.000mm', and 'A: 0.000mm'.

Slicer4minute Scene



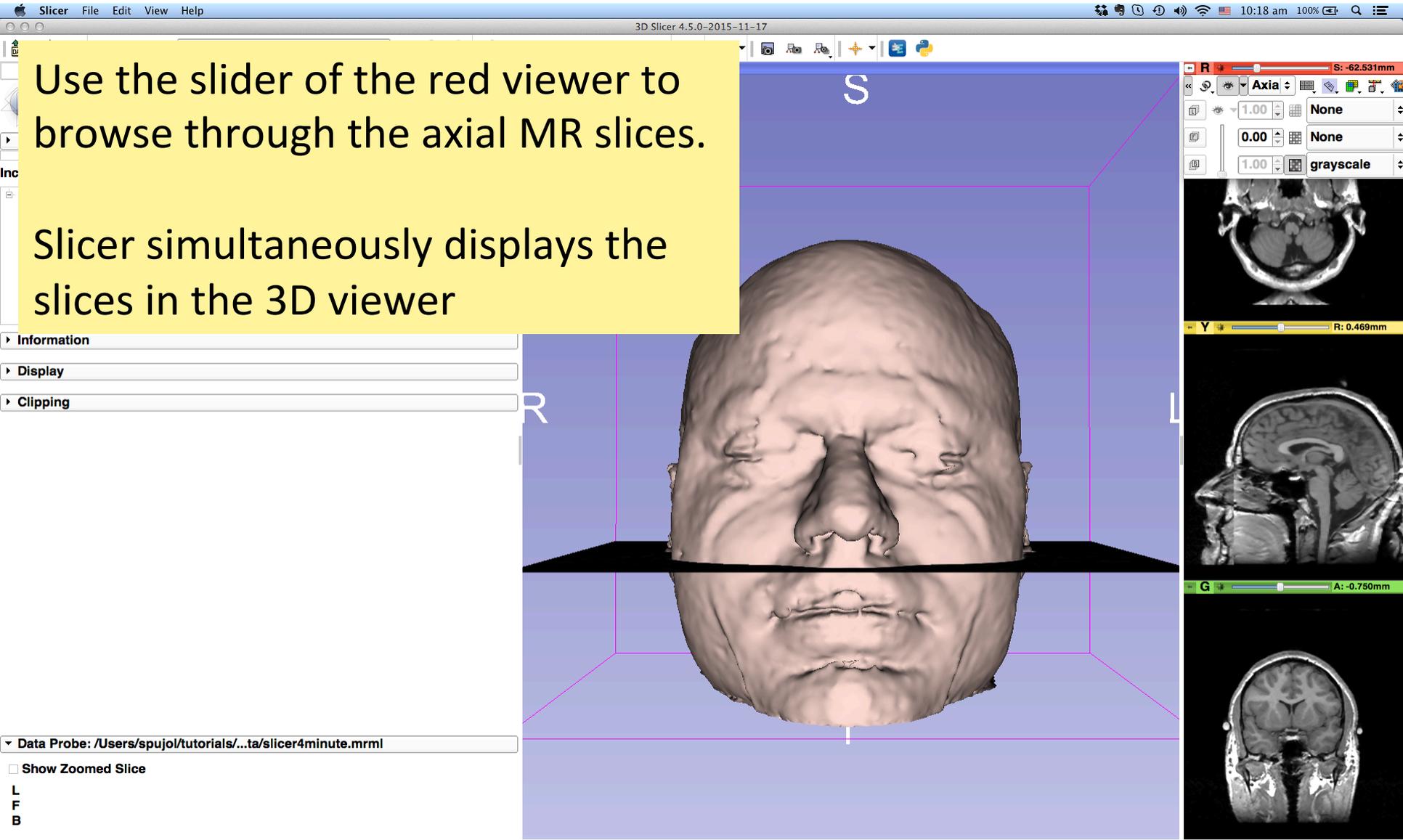
3D Visualization



3D Visualization

Use the slider of the red viewer to browse through the axial MR slices.

Slicer simultaneously displays the slices in the 3D viewer



3D Visualization

Lower the opacity of the Skin.vtk model in the Display tab

Include Fibers Scroll to...

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	0.60
skull_bone	1.00

Information

Display

Visibility

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffdcd3

Opacity: 0.60

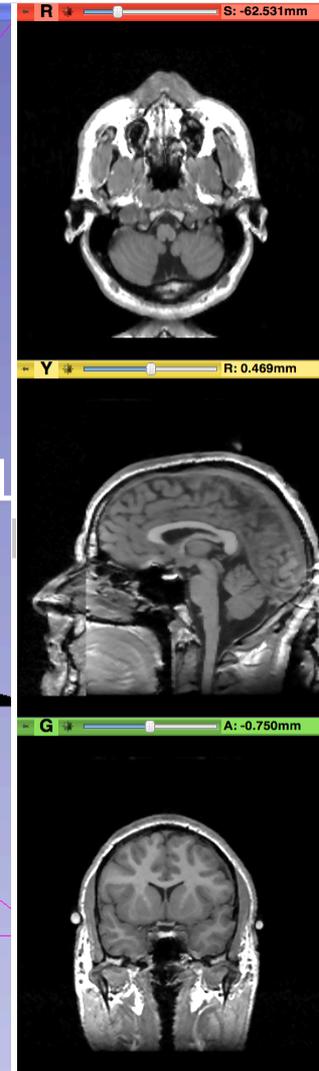
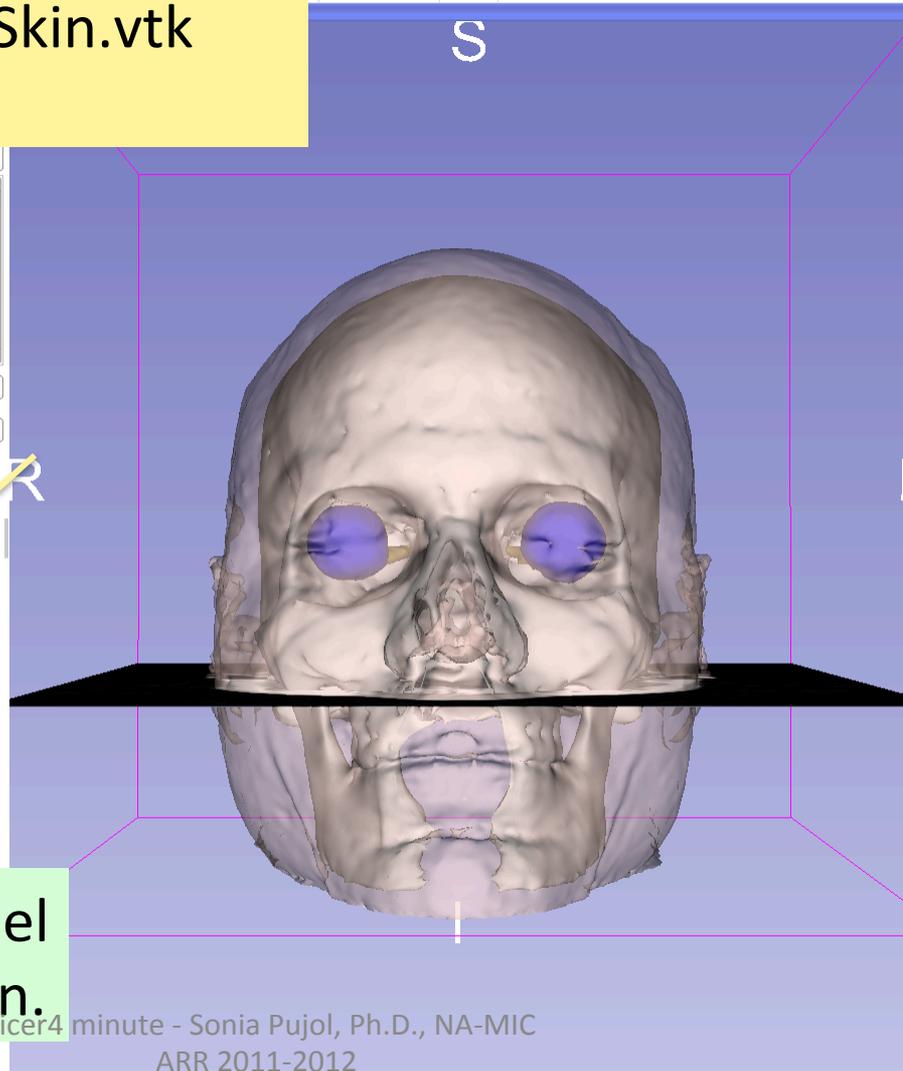
Edge Visibility:

Edge Color: #000000

Lighting

Material

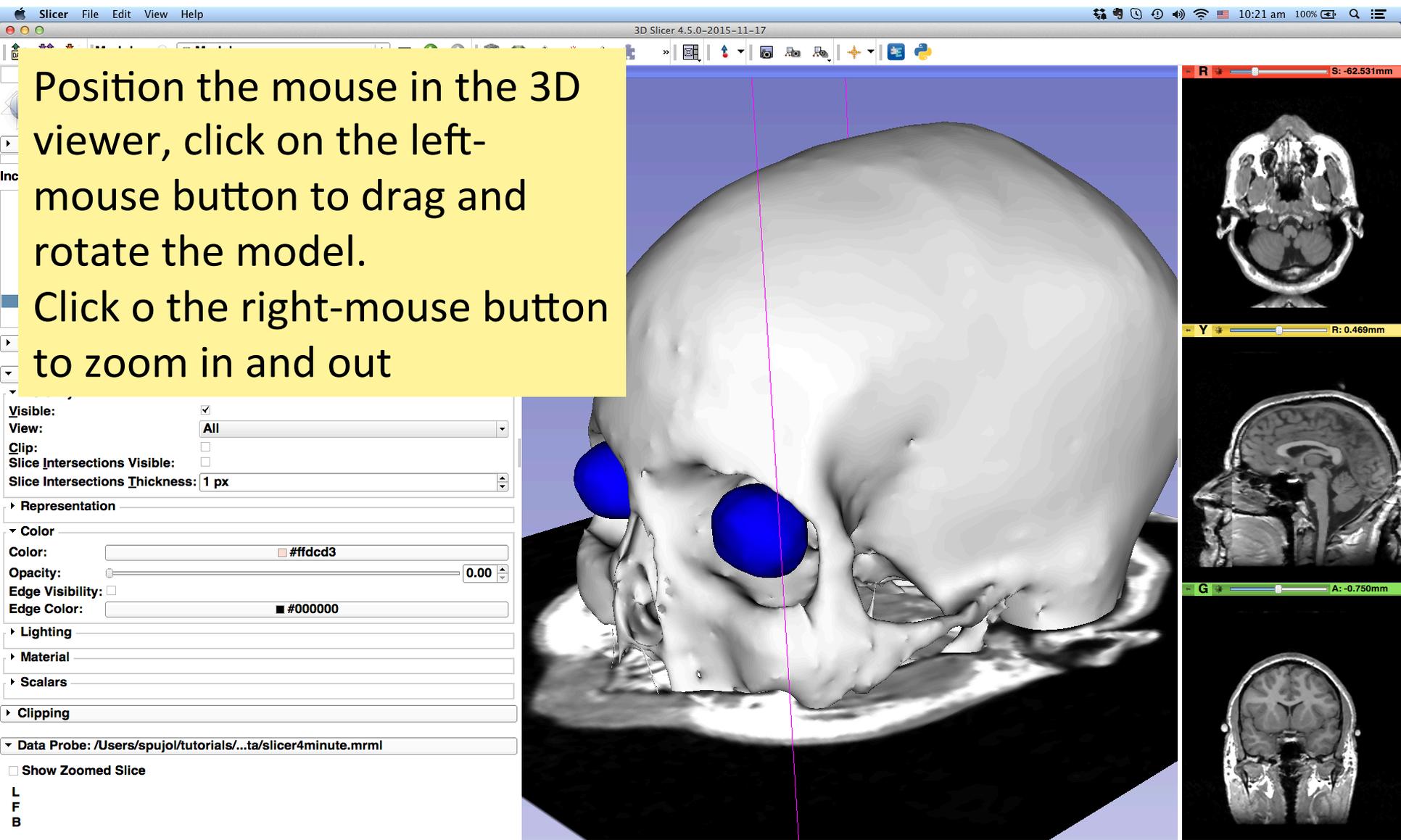
Scalars



The skull_bone.vtk model appears through the skin.

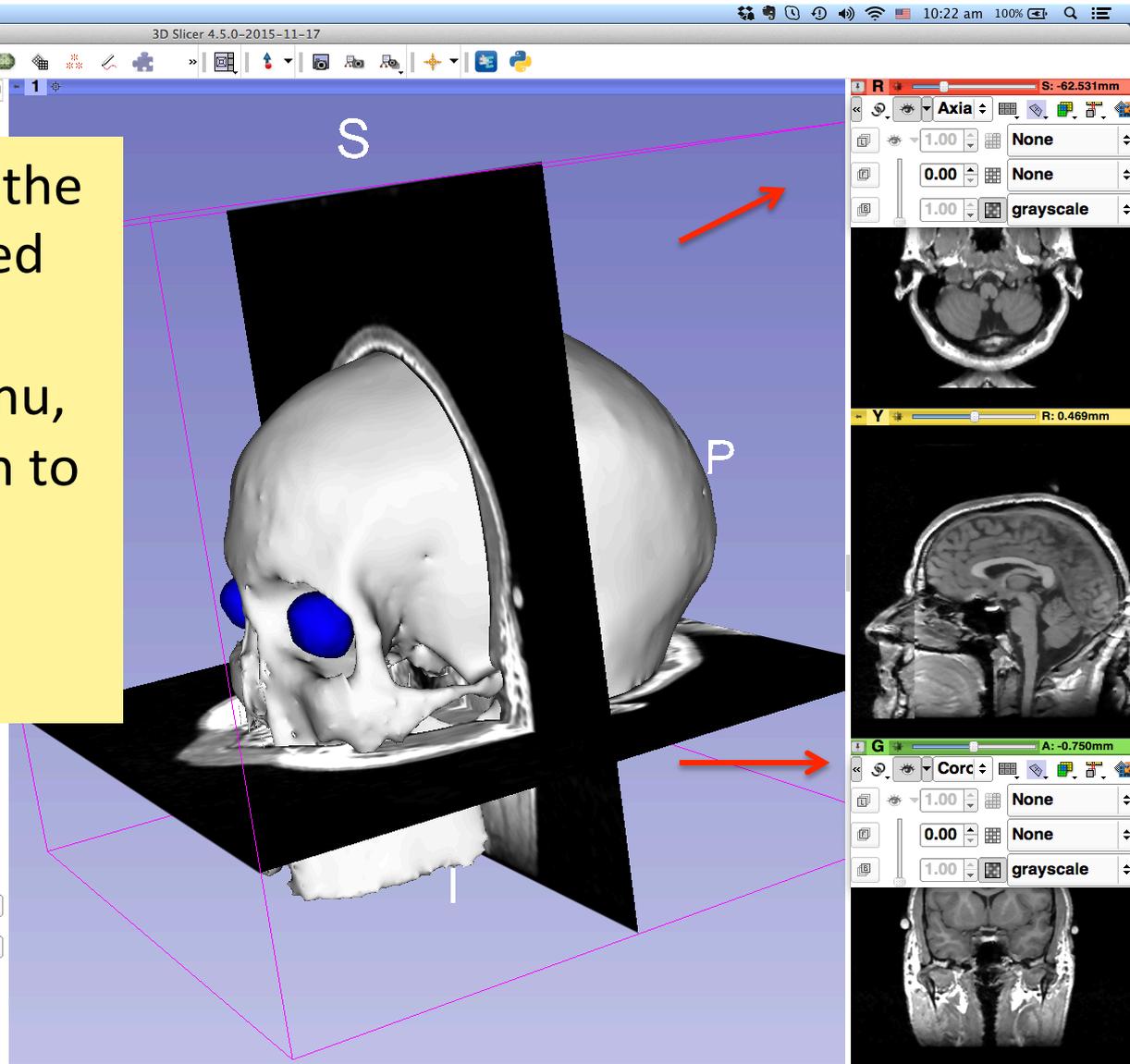
3D Visualization

Position the mouse in the 3D viewer, click on the left-mouse button to drag and rotate the model.
Click on the right-mouse button to zoom in and out



Anatomical Views

Click on the pin icons in the top left corners of the red and green viewers to display the viewers' menu, and click on the eye icon to display the axial and coronal slice in the 3D viewer.



3D Visualization

Turn off the visibility of the skull to display the brain white matter model

The screenshot shows the 3D Slicer software interface. The 'Models' panel on the left lists various anatomical models. The 'skull_bone' model is selected, and its visibility is turned off. The 'Display' panel shows the 'Visibility' section with 'Visible' checked and 'View' set to 'All'. The 'Color' section shows the color set to white (#ffffff) and the opacity set to 1.00. The 'Lighting' and 'Material' sections are also visible.

- hemispheric_white_matter
- left_eyeball
- optic_chiasm
- optic_nerve_L
- optic_nerve_P
- optic_tract_L
- optic_tract_R
- right_eyeball
- sun
- skull_bone

Information:

Display:

Visibility:

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation:

Color:

Color: #ffffff

Opacity: 1.00

Edge Visibility:

Edge Color: #000000

Lighting:

Material:

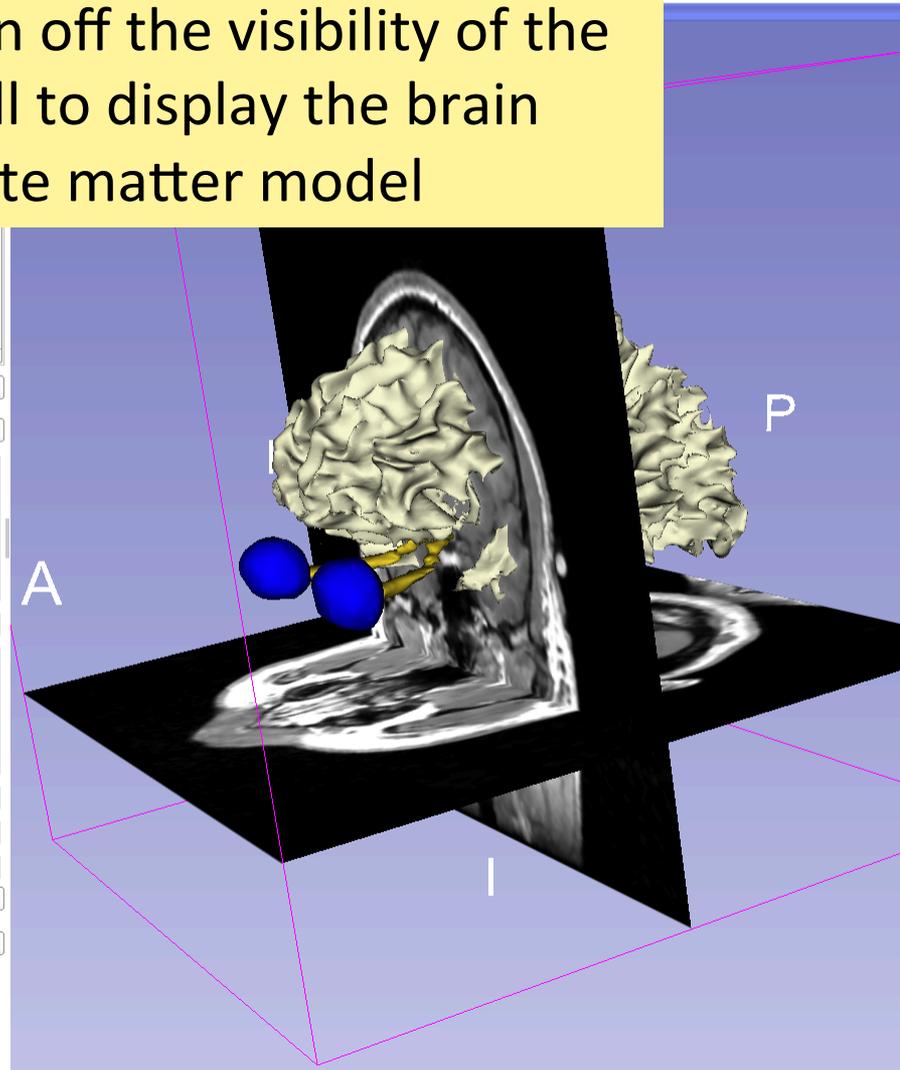
Scalars:

Clipping:

Data Probe: /Users/spujol/tutorials/...ta/slicer4minute.mrml

Show Zoomed Slice

L
F
B



The screenshot shows the 3D Slicer software interface with the 'Axial' and 'Coronal' views of the brain model. The 'Axial' view shows a cross-section of the brain, and the 'Coronal' view shows a side view of the brain. The skull is visible in both views. The brain is shown in a light gray color. The skull is shown in a light gray color. The white matter tracts are highlighted in blue and yellow.

R

S: -62.531mm

1.00

None

0.00

None

1.00

grayscale

Y

R: 0.469mm

G

A: -0.750mm

1.00

None

0.00

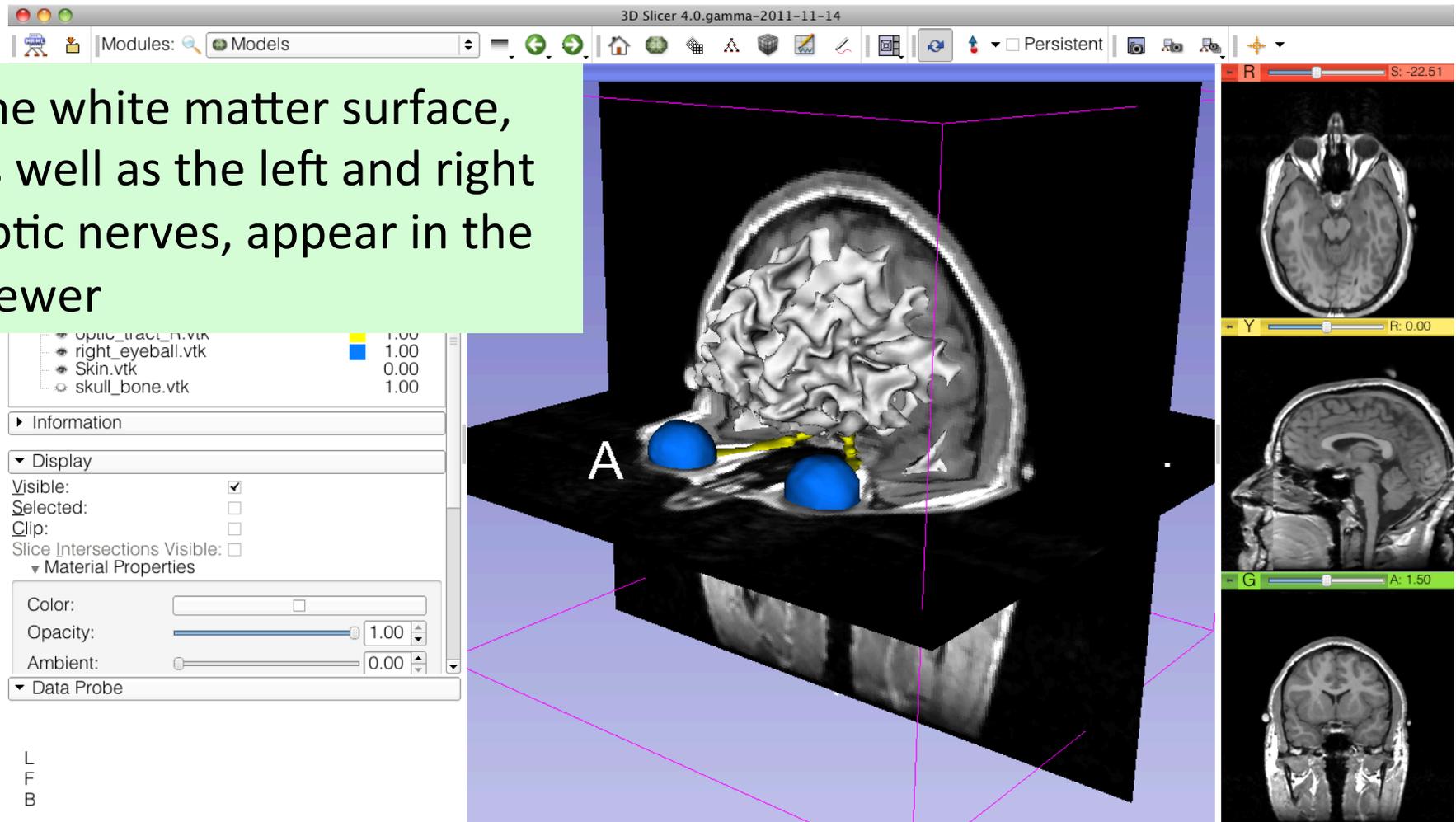
None

1.00

grayscale

3D Visualization

The white matter surface, as well as the left and right optic nerves, appear in the viewer



3D Visualization

The screenshot shows the 3D Slicer 4.5.0-2015-11-17 interface. The 'Models' panel on the left lists several models, with 'hemispheric_white_matter' selected. A red arrow points to this model. The 'Clipping' panel is expanded, showing 'Clipping Type' set to 'Intersection'. Under 'Green Slice Clipping', the 'Negative' option is selected, indicated by a red arrow. The 'Display' panel is also visible. The main 3D view shows a brain slice with a blue sphere and a white cone. The 'Data Probe' panel at the bottom shows the file path: /Users/spujol/tutorials/...ta/slicer4minute.mrml. On the right, three orthogonal views (axial, sagittal, and coronal) are shown with their respective axes (R, Y, G) and coordinates.

Select the **hemispheric_white_matter.vtk** model, and check **Clip** in the Display options tab.

In the **Clipping** tab, select the option '**Green Slice Clipping: Negative**'

3D Visualization

3D Slicer 4.5.0-2015-11-17

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers Scroll to...

Model	Visibility
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	0.00
skull_bone	1.00

Information

Display

Clipping

Clipping Type: Union Intersection

Red Slice Clipping: Positive Negative

Yellow Slice Clipping: Positive Negative

Green Slice Clipping: Positive Negative

Use the coronal slider (green) to expose the optic chiasm.

1

R

P

L

R: -27.531mm

Y: R: 0.469mm

G: A: -20.250mm

Show zoomed slice

L

F

B

3D Visualization

3D Slicer 4.5.0-2015-11-17

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers Scroll to...

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	0.60
skull_bone	1.00

Information

Display

Visibility

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffdc3

Opacity: 0.60

Edge Visibility:

Edge Color: #000000

Lighting

View

- 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

Viewing mode: R S: -27.531mm

Viewing mode: Y R: 0.469mm

Viewing mode: G A: -20.250mm

Show Zoomed Slice

L
F
B

Increase the opacity of the skin model, and select the viewing mode '3D only'

3D Visualization

The image shows a screenshot of the 3D Slicer software interface. The main 3D viewer displays a semi-transparent skull model with internal structures like the optic chiasm and optic nerves highlighted in yellow and blue. The viewer is oriented with 'R' (Right) and 'P' (Posterior) labels. A toolbar in the top left of the 3D viewer contains various icons, including a blue pin icon and a spin icon. A yellow callout box points to these icons with the text: "Click on the blue pin icon in the top left corner of the 3D viewer, and click on the Spin icon." The left sidebar shows the 'Models' panel with a list of anatomical structures and their visibility/opacity settings. The right sidebar shows three orthogonal MRI slices (axial, sagittal, and coronal) with their respective coordinate axes (R, Y, G) and slice positions.

3D Slicer 4.5.0-2015-11-17

Modules: Models

3DSlicer

Help & Acknowledgement

Include Fibers Scroll to...

- 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 0.60
- skull_bone 1.00

Information

Display

Visibility

Visible:

View: All

Clip:

Slice Intersections Visible:

Slice Intersections Thickness: 1 px

Representation

Color

Color: #ffdcd3

Opacity: 0.60

Edge Visibility:

Edge Color: #000000

Lighting

Click on the blue pin icon in the top left corner of the 3D viewer, and click on the Spin icon.

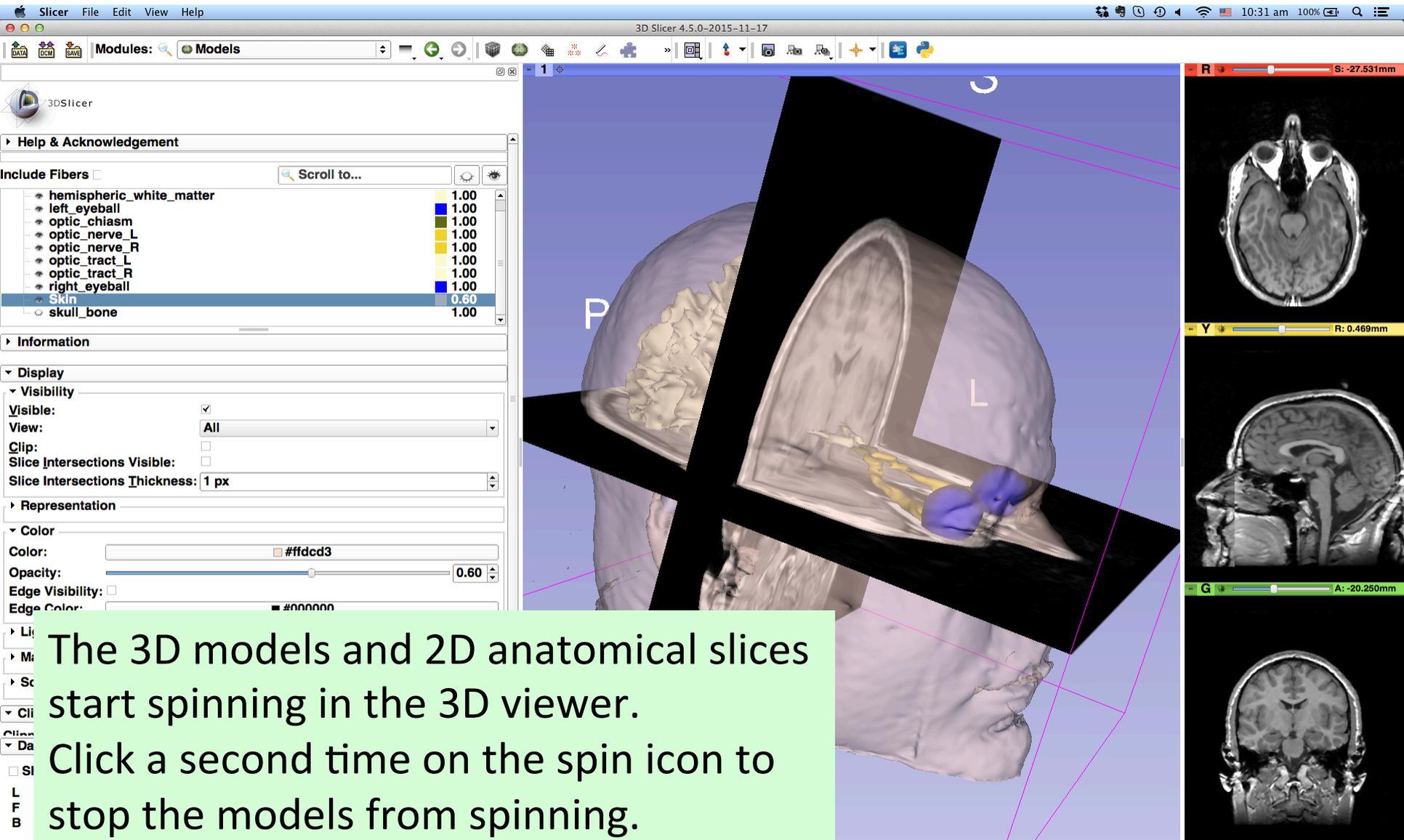
R S
P L
R A

R S: -27.531mm

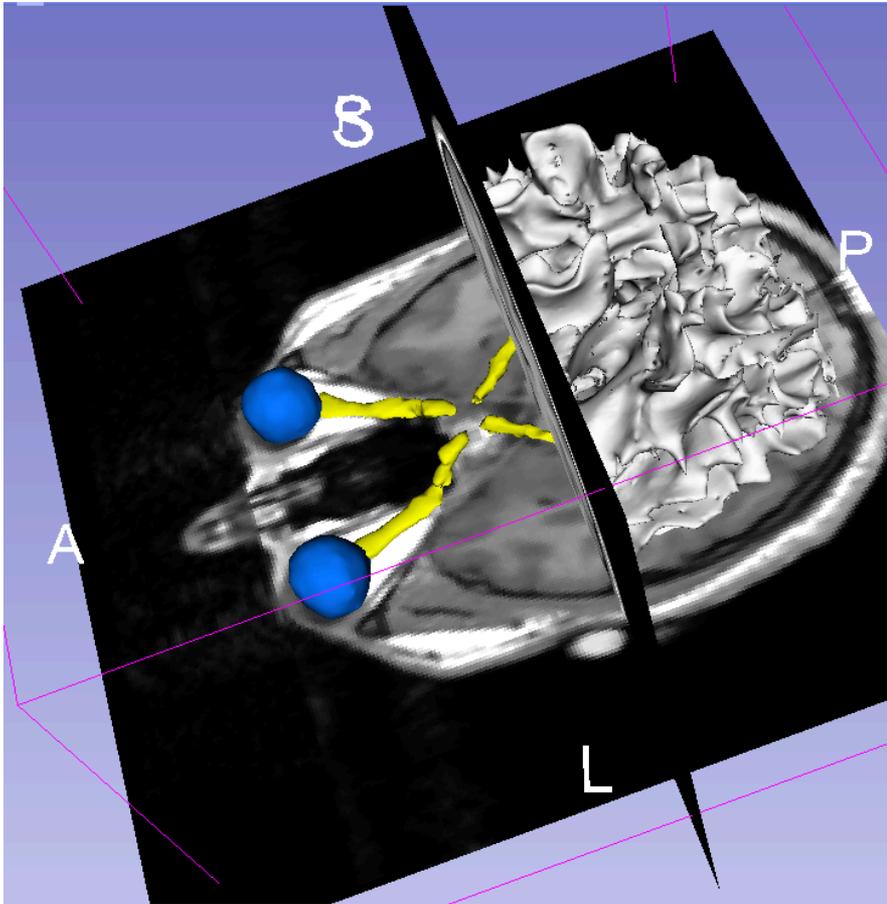
Y R: 0.469mm

G A: -20.250mm

3D Visualization



Slicer4 minute tutorial



This tutorial was a short introduction to the interactive 3D visualization functionalities of Slicer.

The Slicer4 training compendium contains a catalog of training materials on the software.