

3D Slicer

3D Slicer

Data Loading and Visualization Tutorial



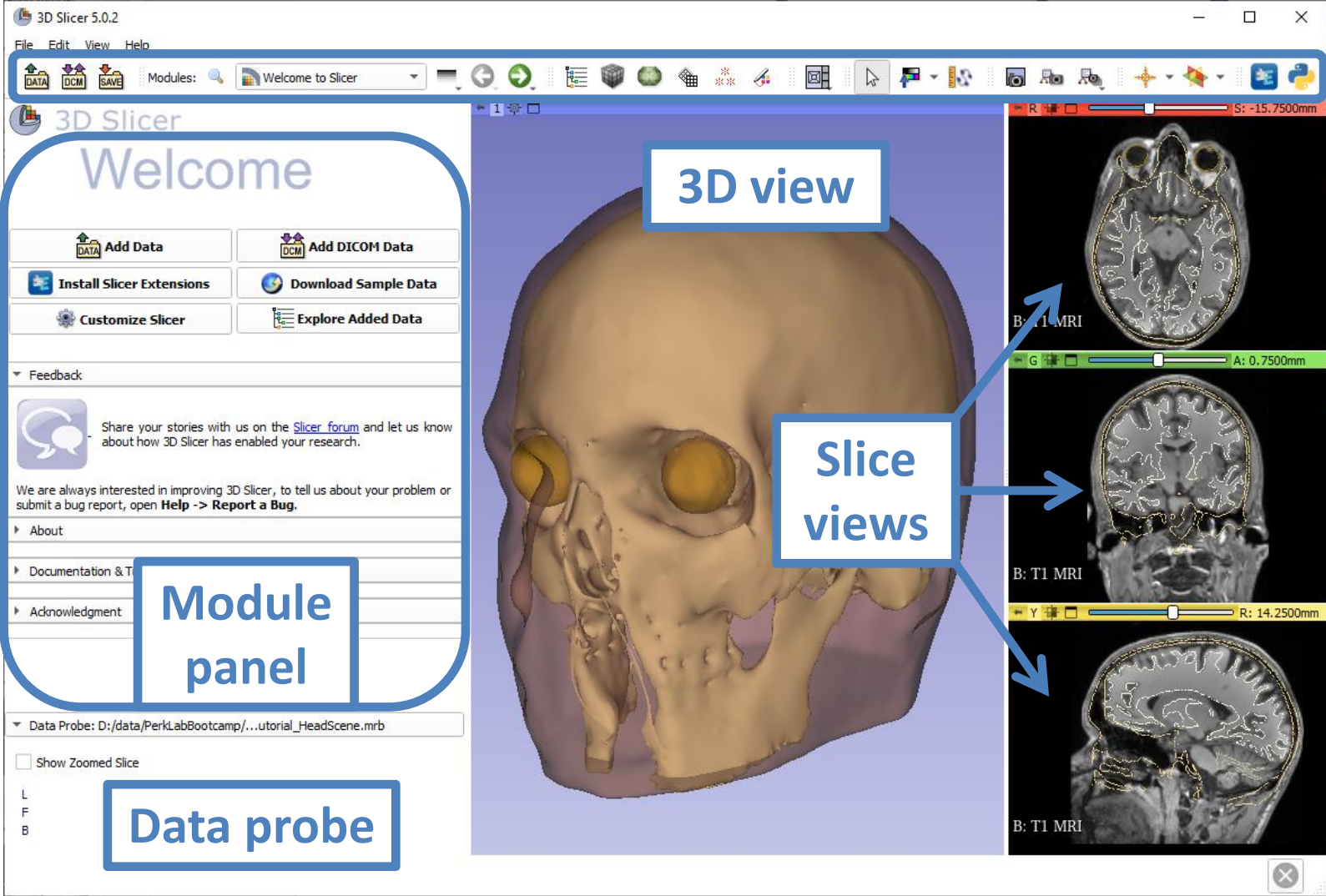
Tutorial dataset

Please download the following two datasets:

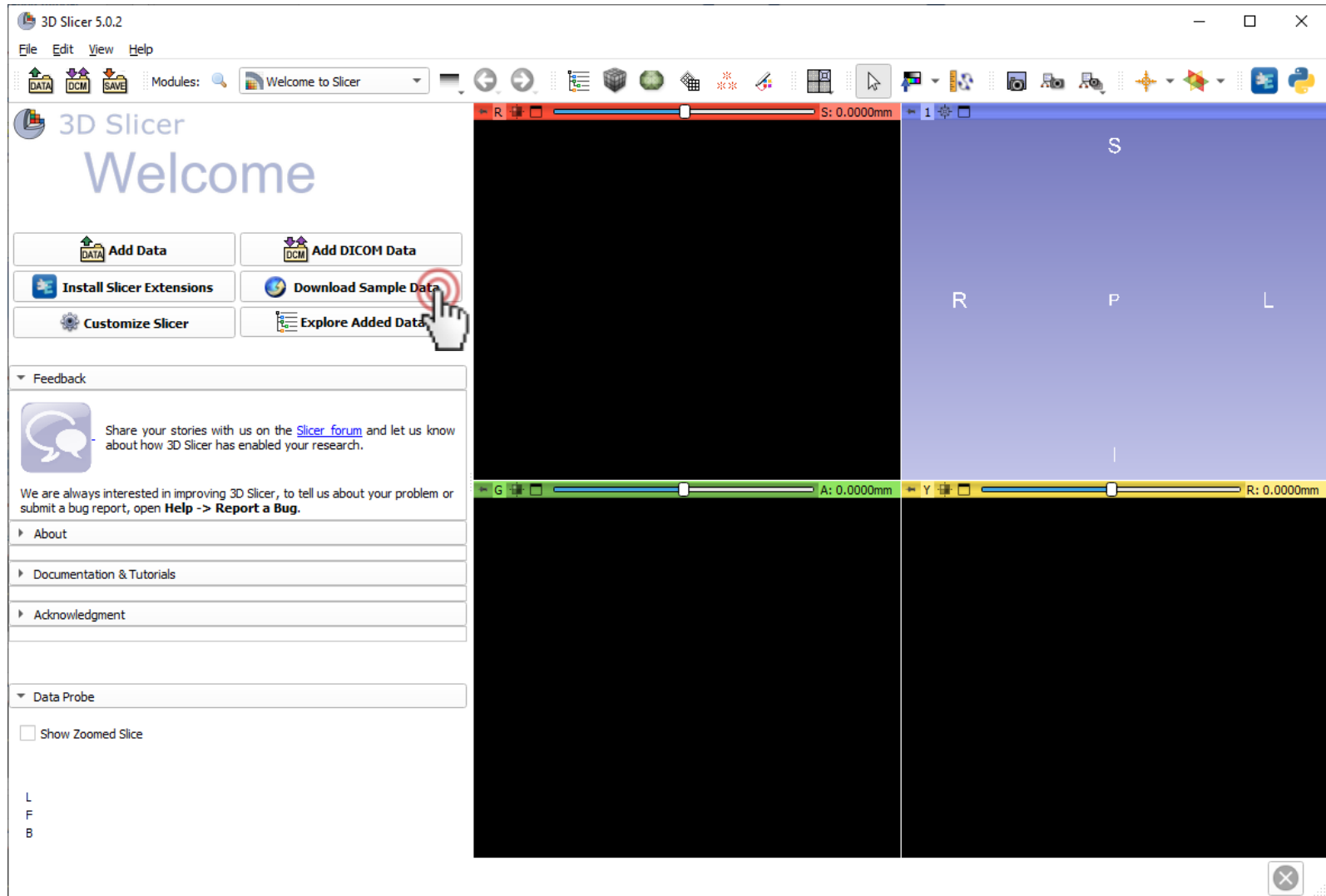
https://github.com/Slicer/SlicerDataLoadingAndVisualizationTutorial/raw/main/VisualizationTutorial_HeadScene.mrb



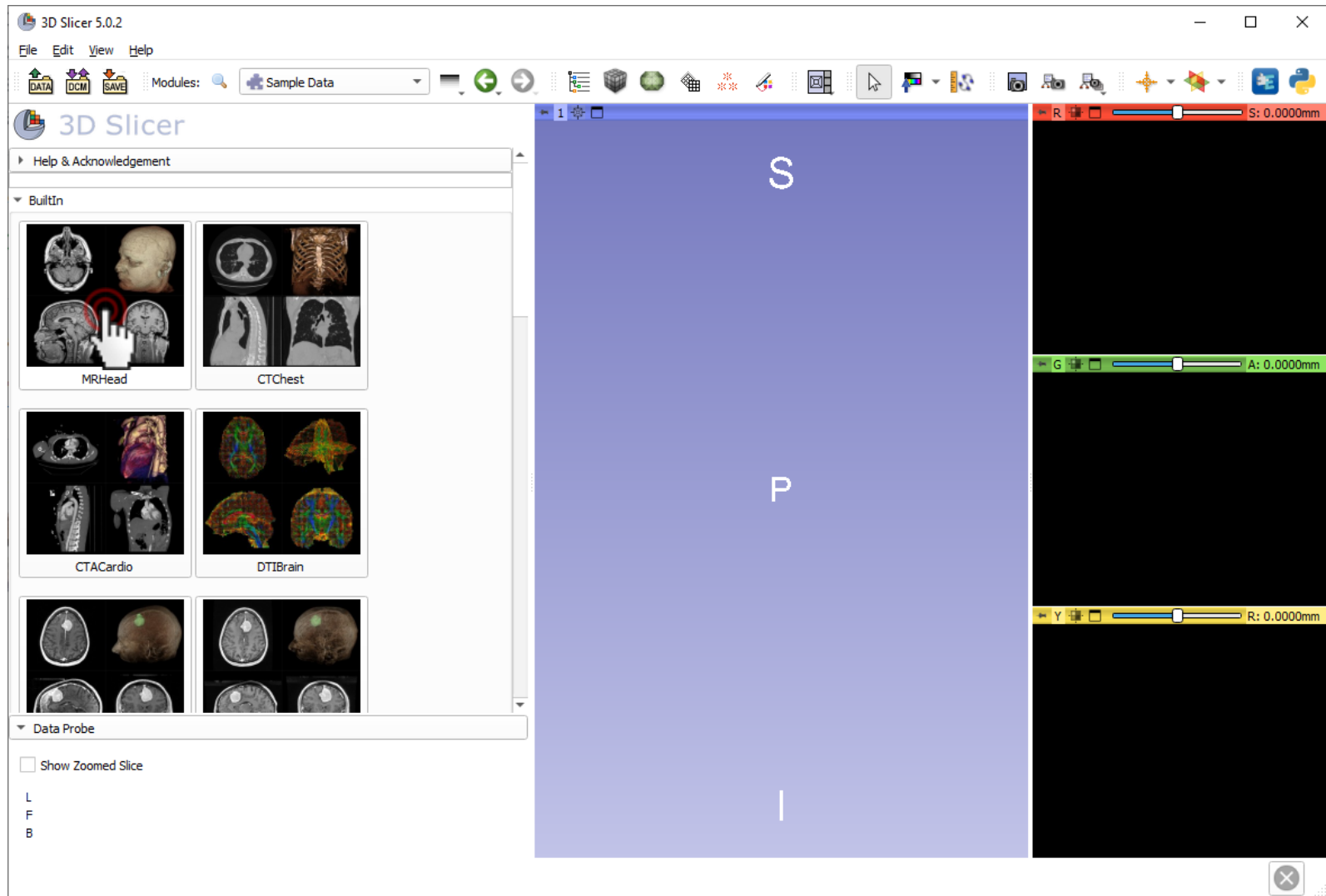
Main user interface



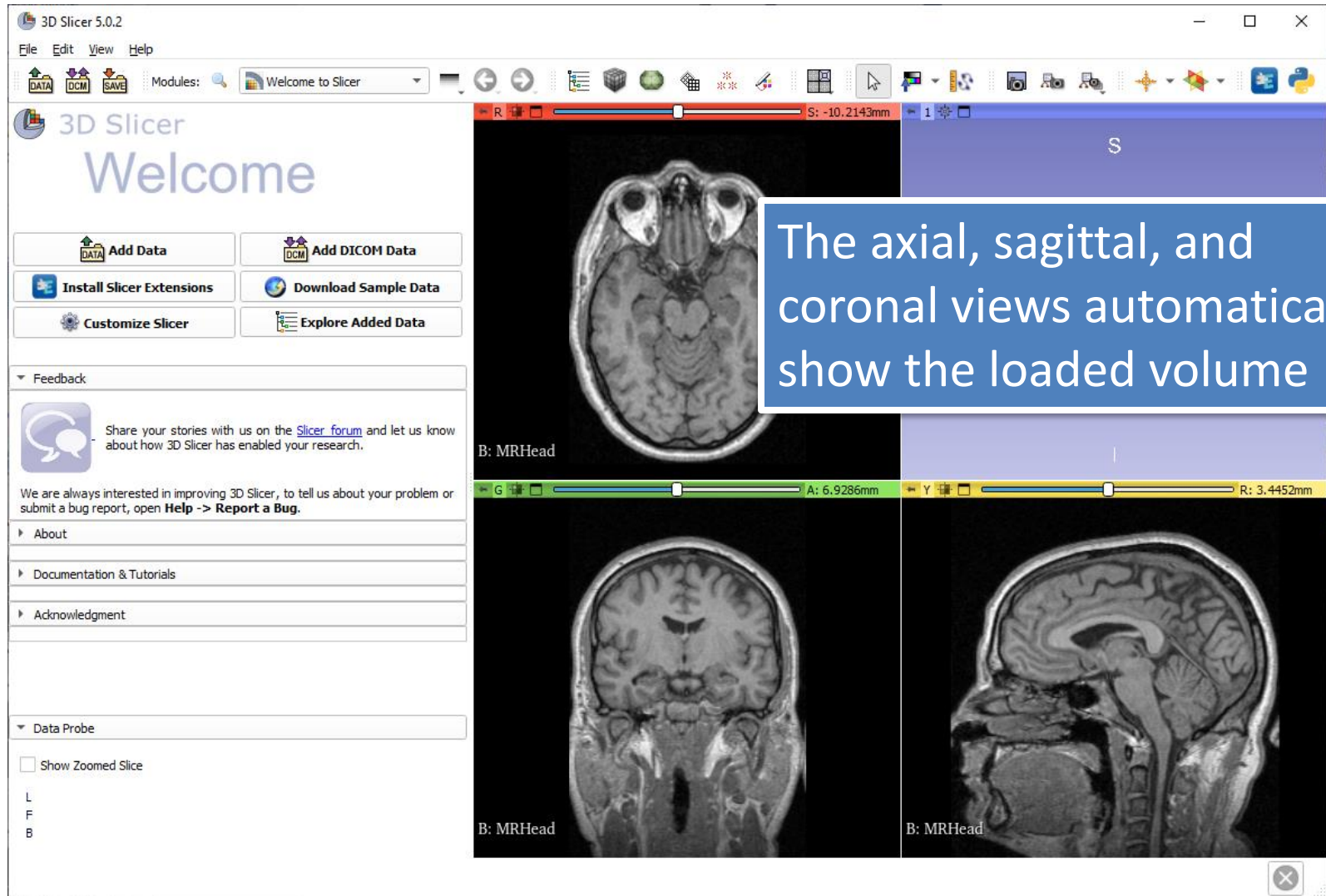
Load sample MRI data



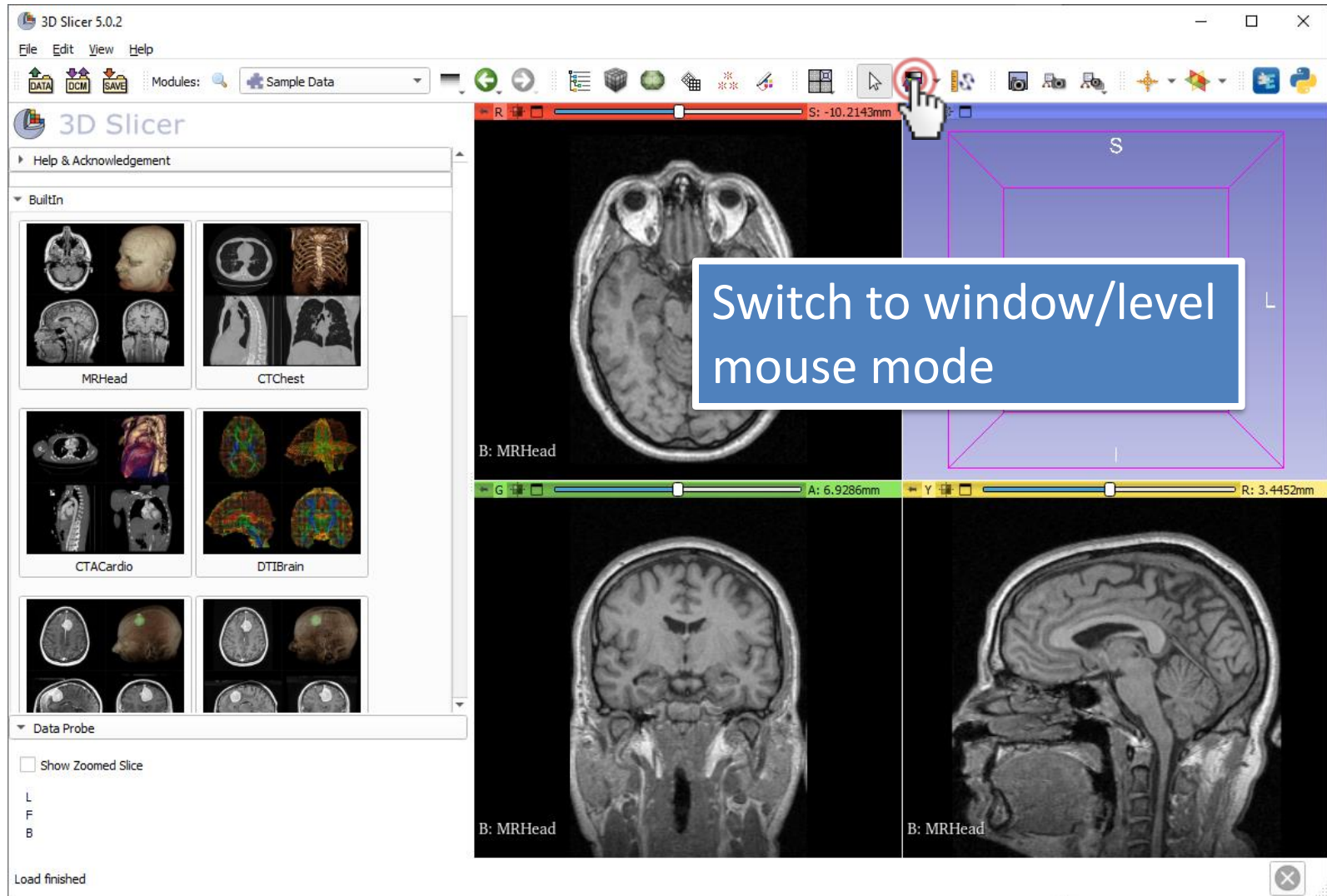
Load sample MRI data



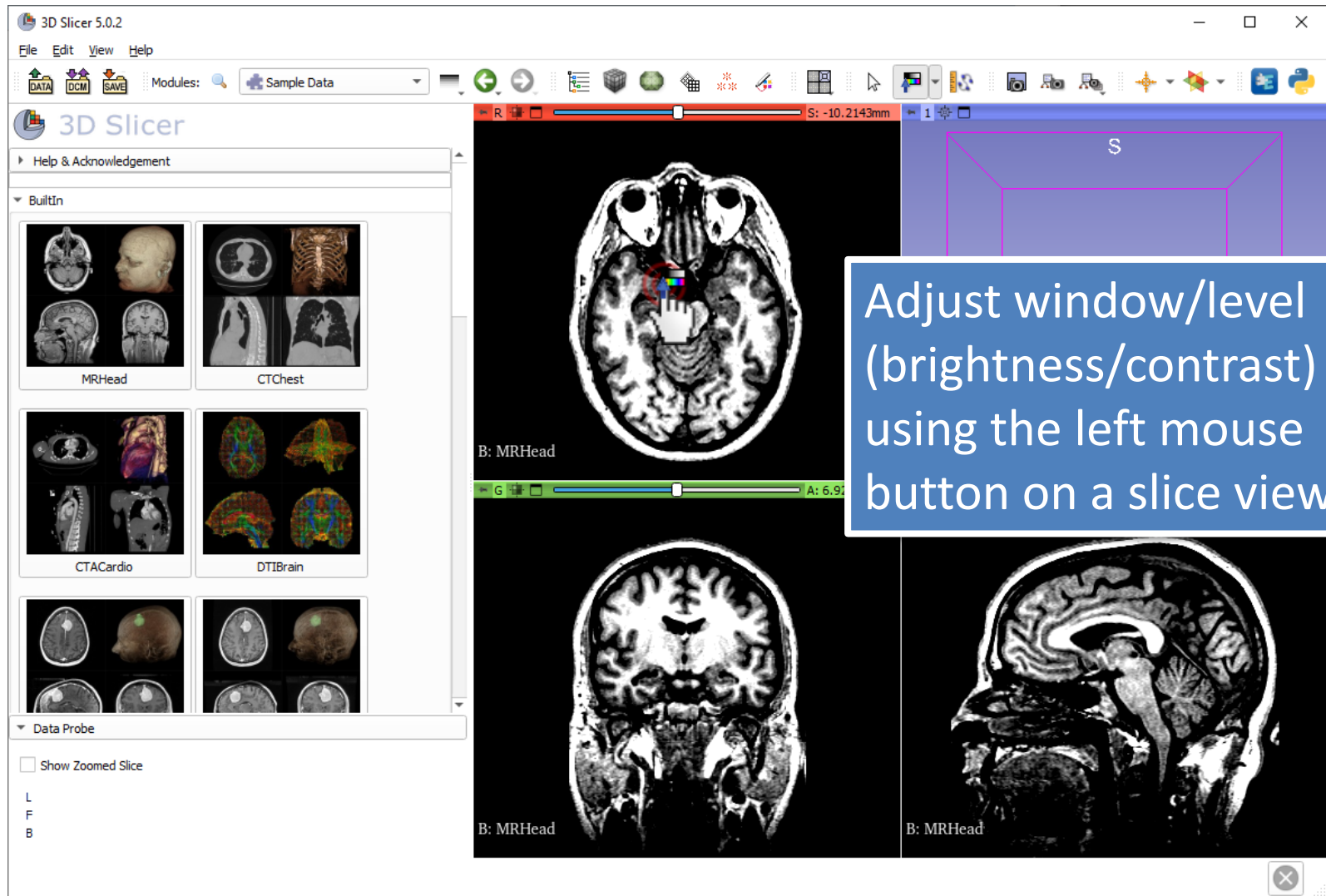
Load sample MRI data



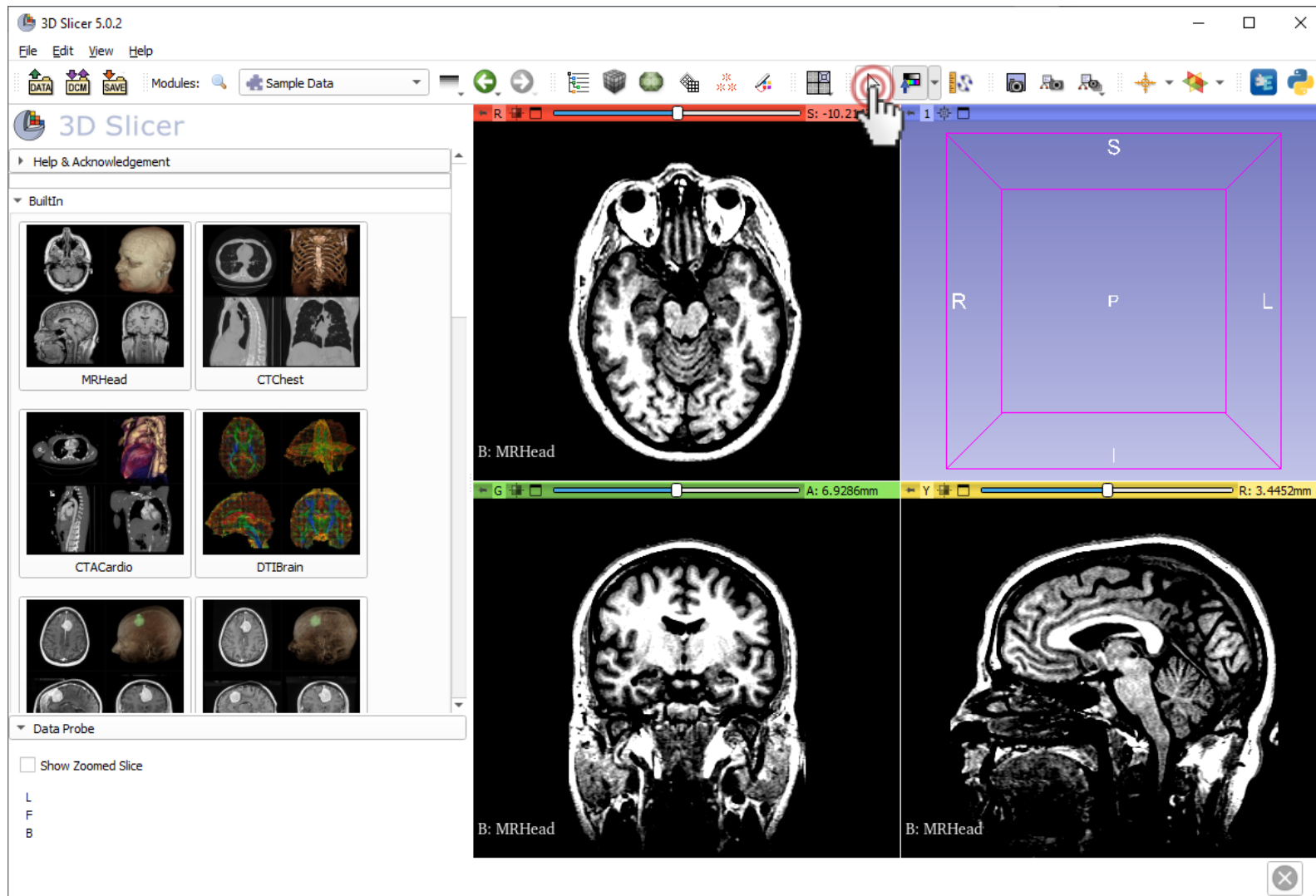
Adjust window/level



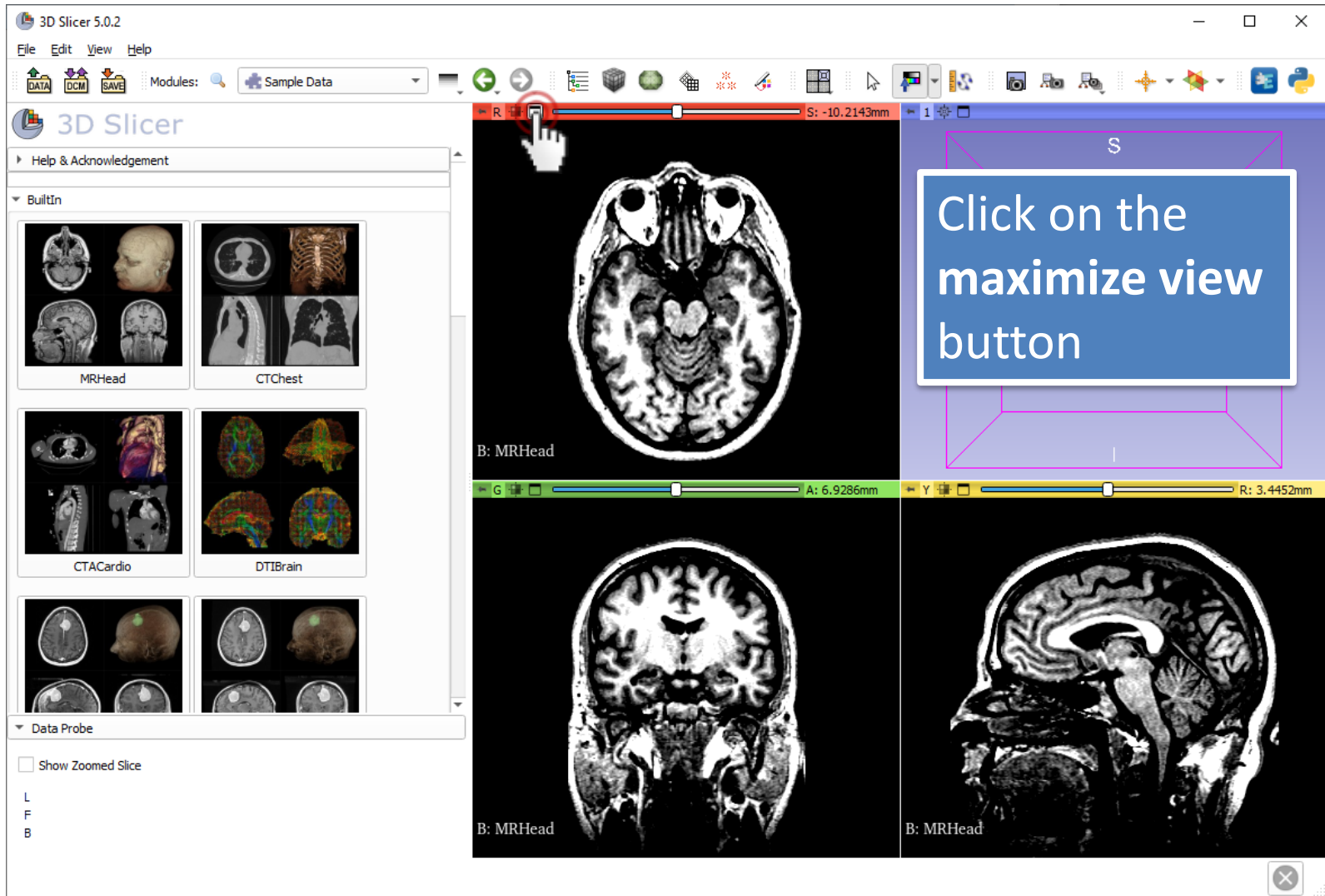
Adjust window/level



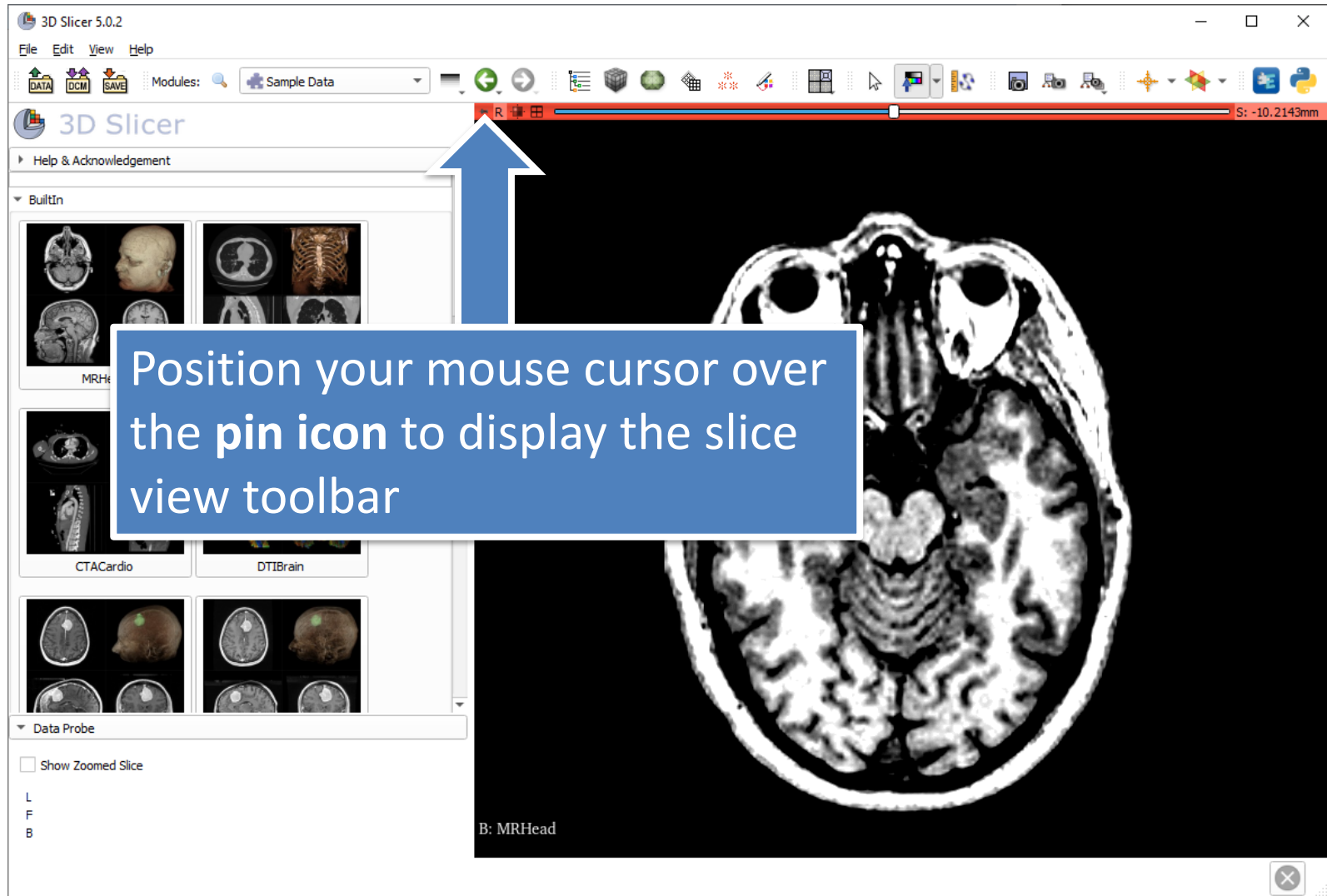
Switch back to view/transform mode



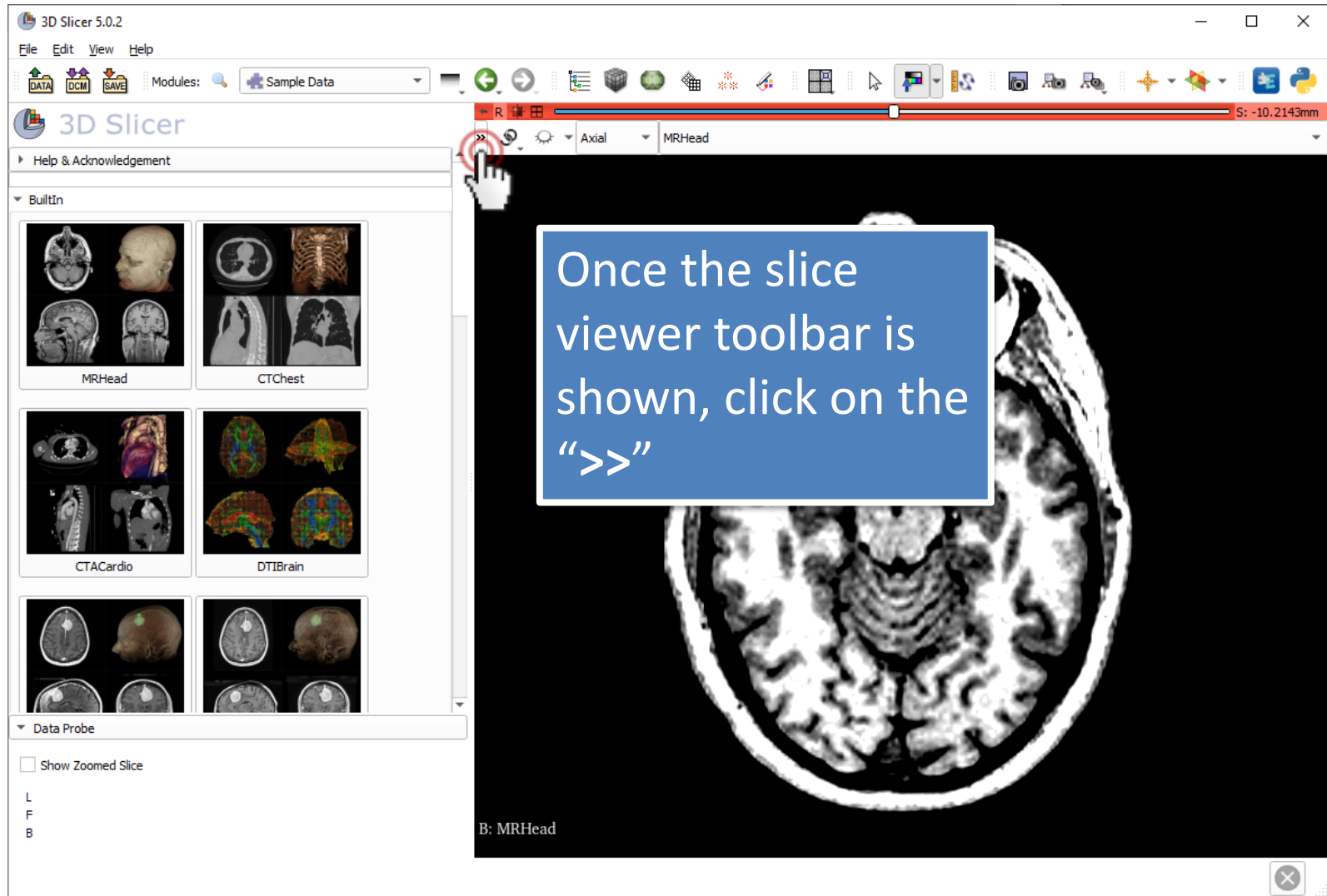
Maximize view



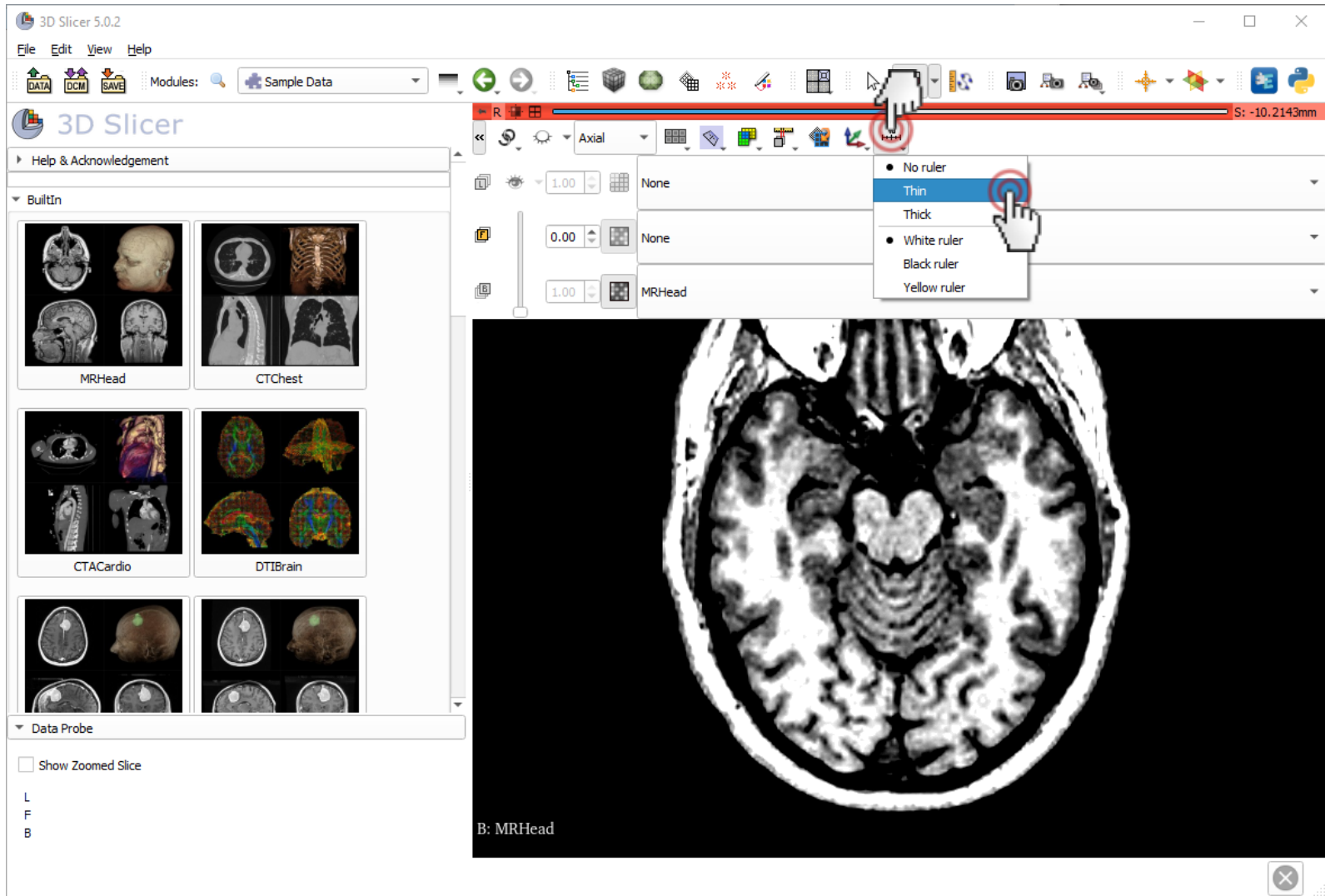
Slice view options



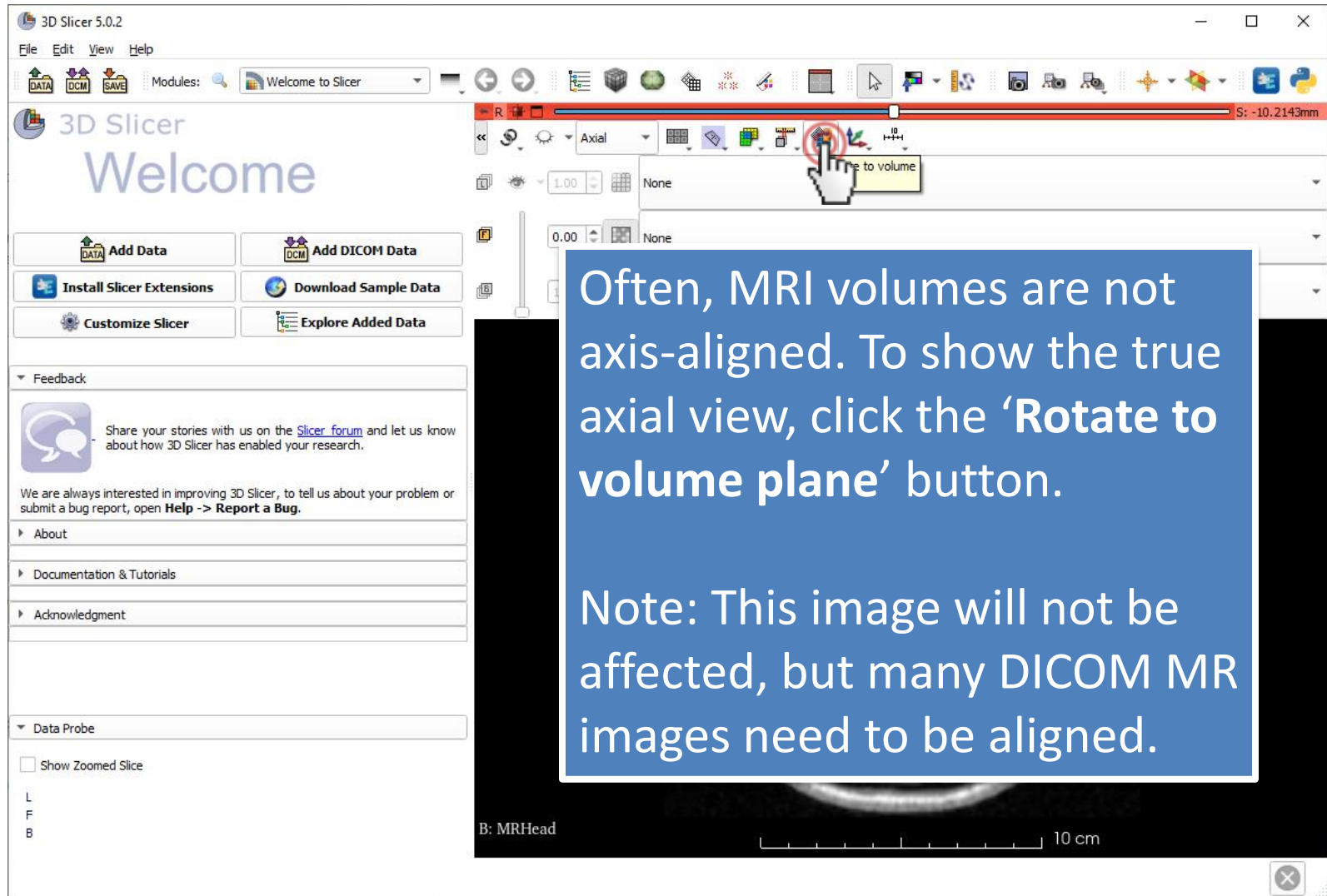
Slice view options



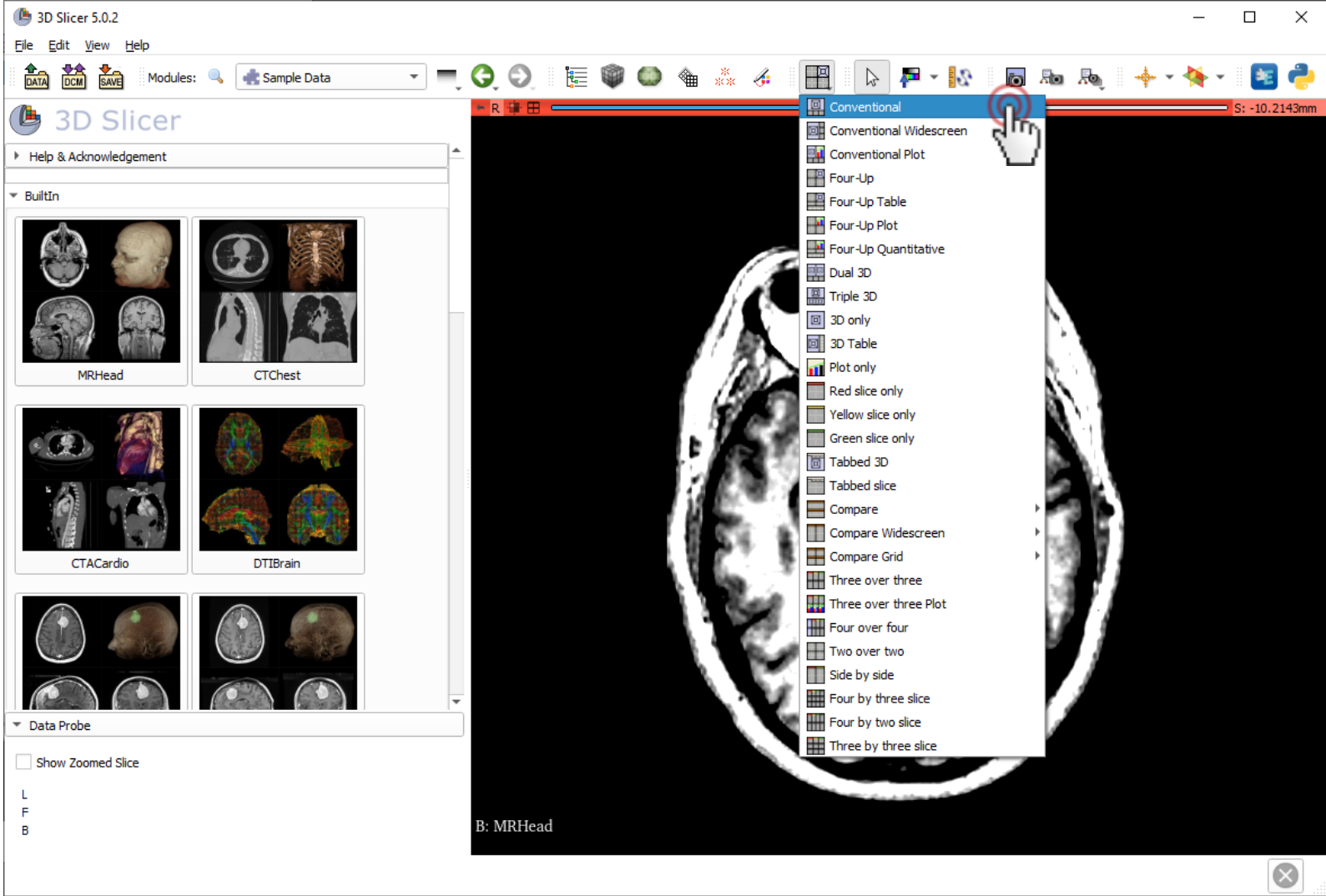
Show ruler



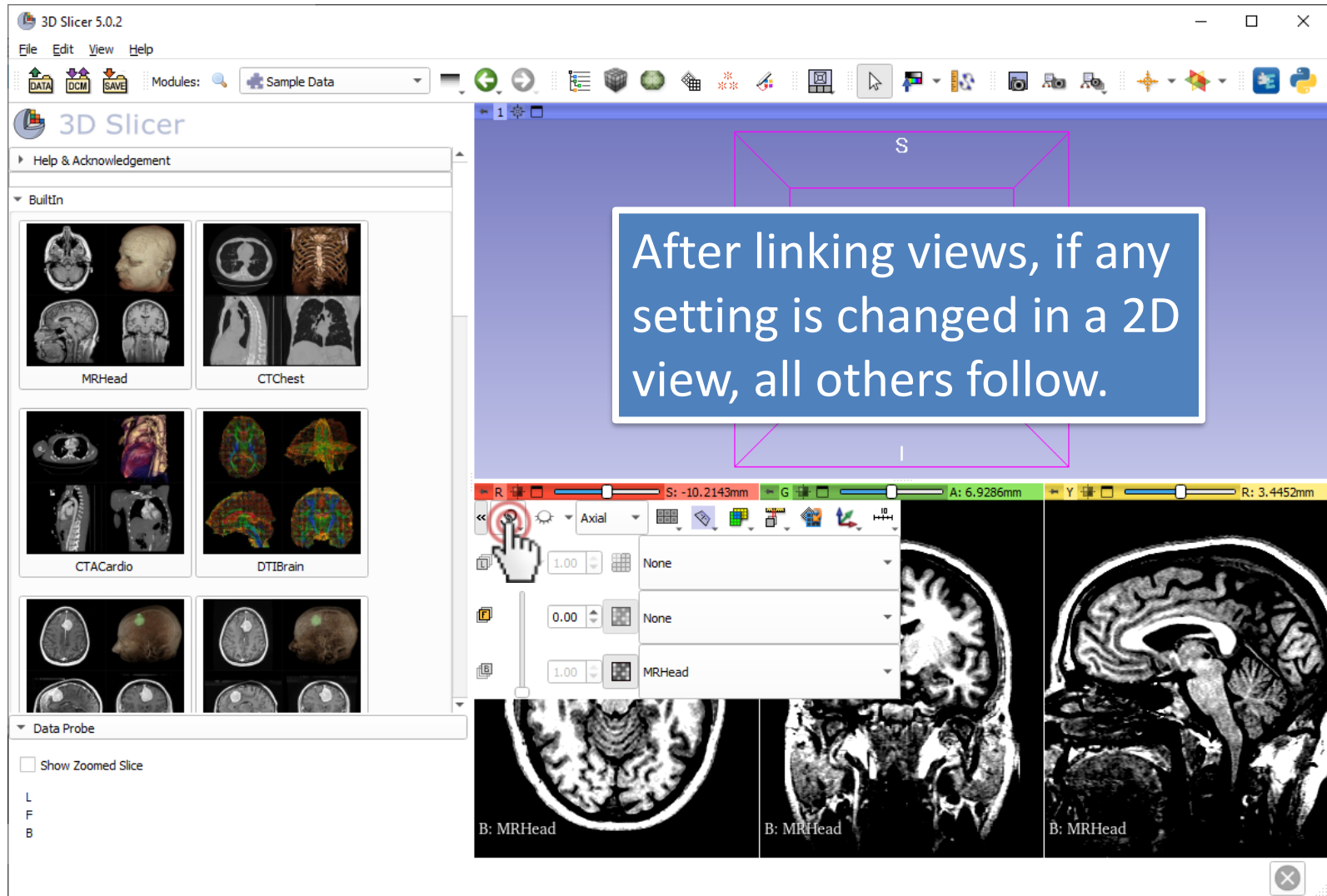
Rotate to volume plane



Switch to conventional layout



Link views

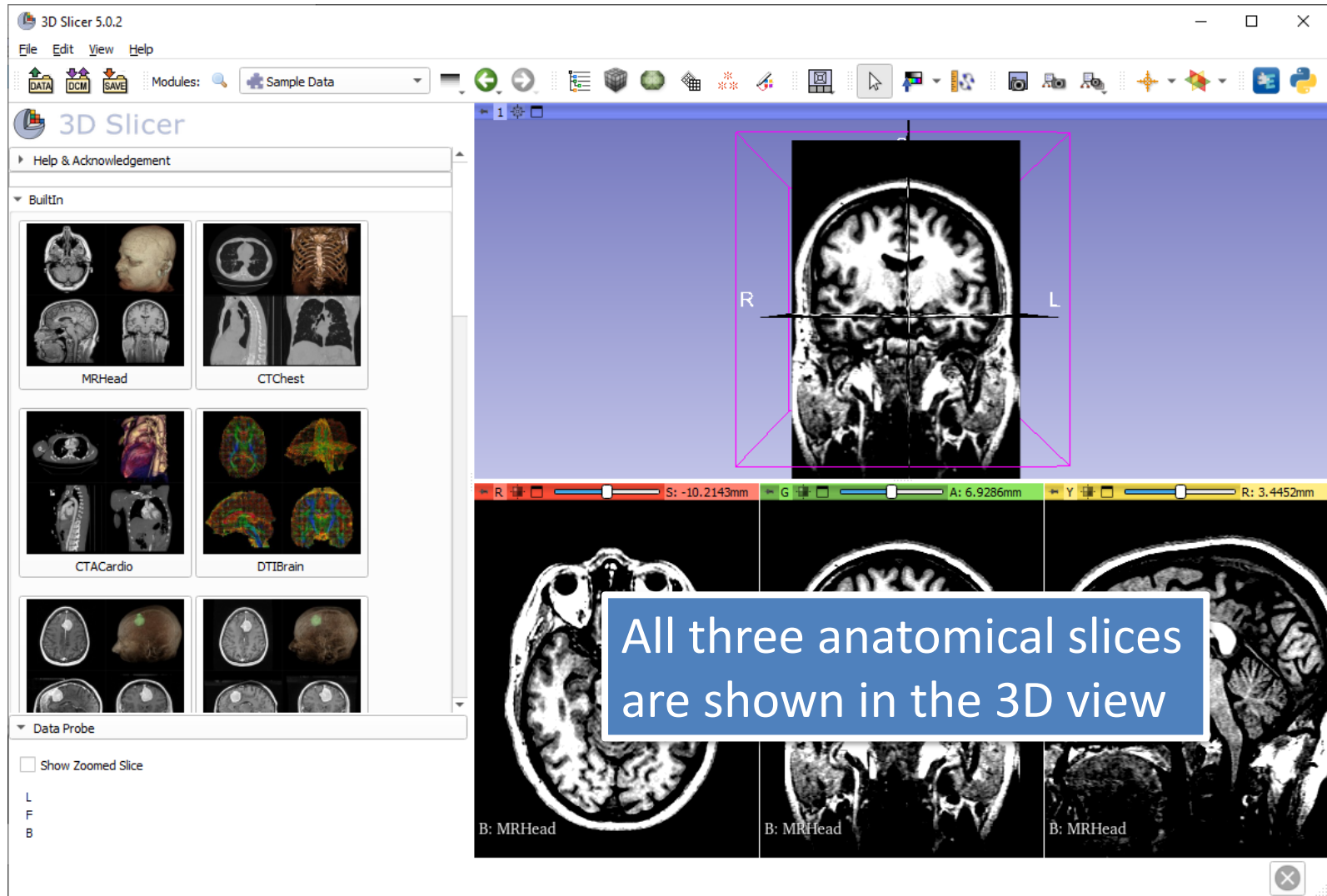


Show slices in 3D

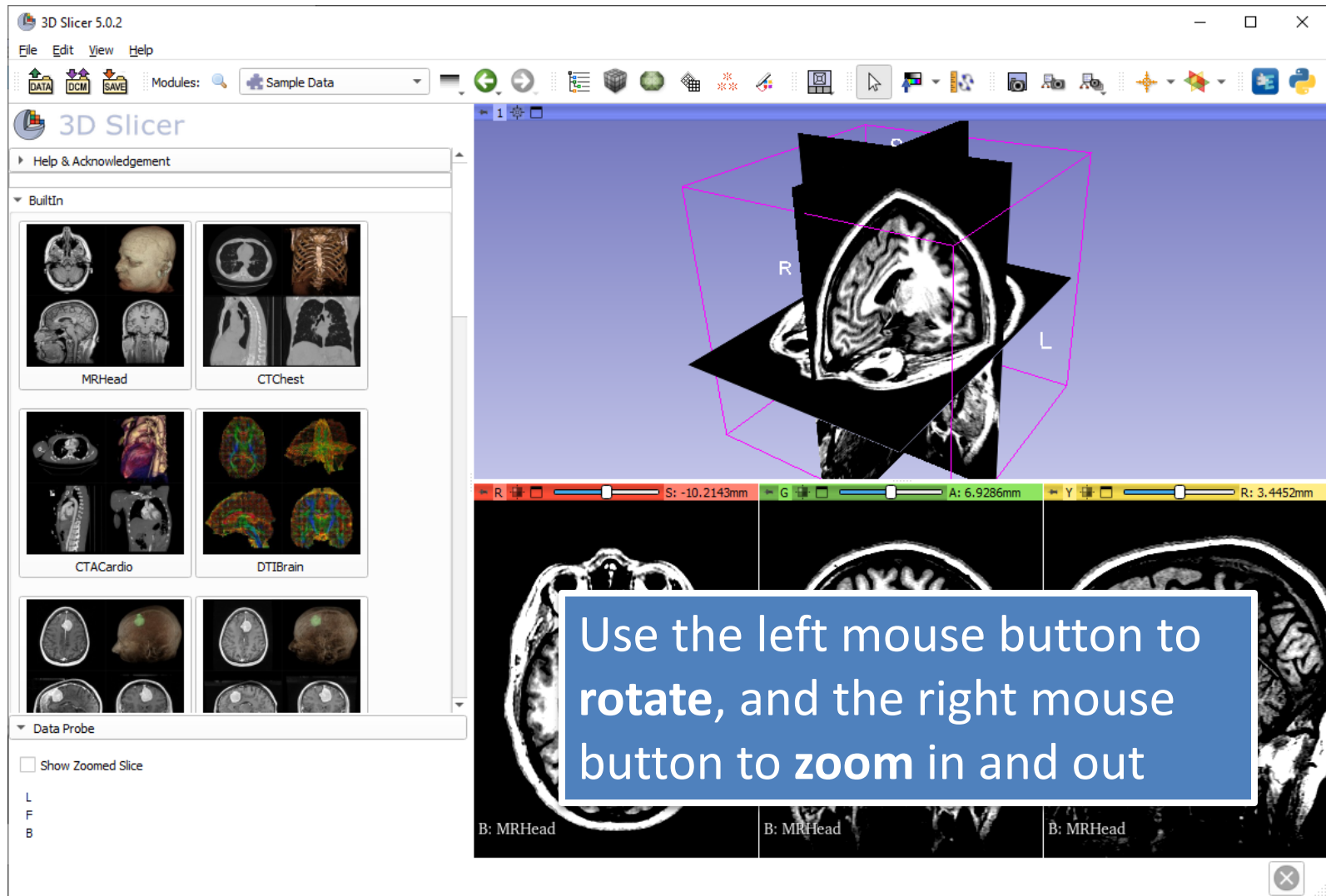
The screenshot displays the 3D Slicer 5.0.2 interface. On the left, the 'BuiltIn' panel shows various data sets including MRHead, CTChest, CTACardio, and DTIBrain. The main 3D view area shows three linked slice views (Axial, Coronal, and Sagittal) of an MRHead dataset. A blue text box overlaid on the 3D view states: 'Now the slice views are linked. If you click the 'Toggle slice visibility in 3D view' button, then all slices will show up.' A red circle highlights the 'Toggle slice visibility in 3D view' button in the top toolbar. The bottom toolbar shows the 'Toggle slice visibility in 3D view' button is currently set to 'None' for the Axial view, 'None' for the Coronal view, and 'MRHead' for the Sagittal view. The 3D view shows the MRHead dataset with the three slice views visible.



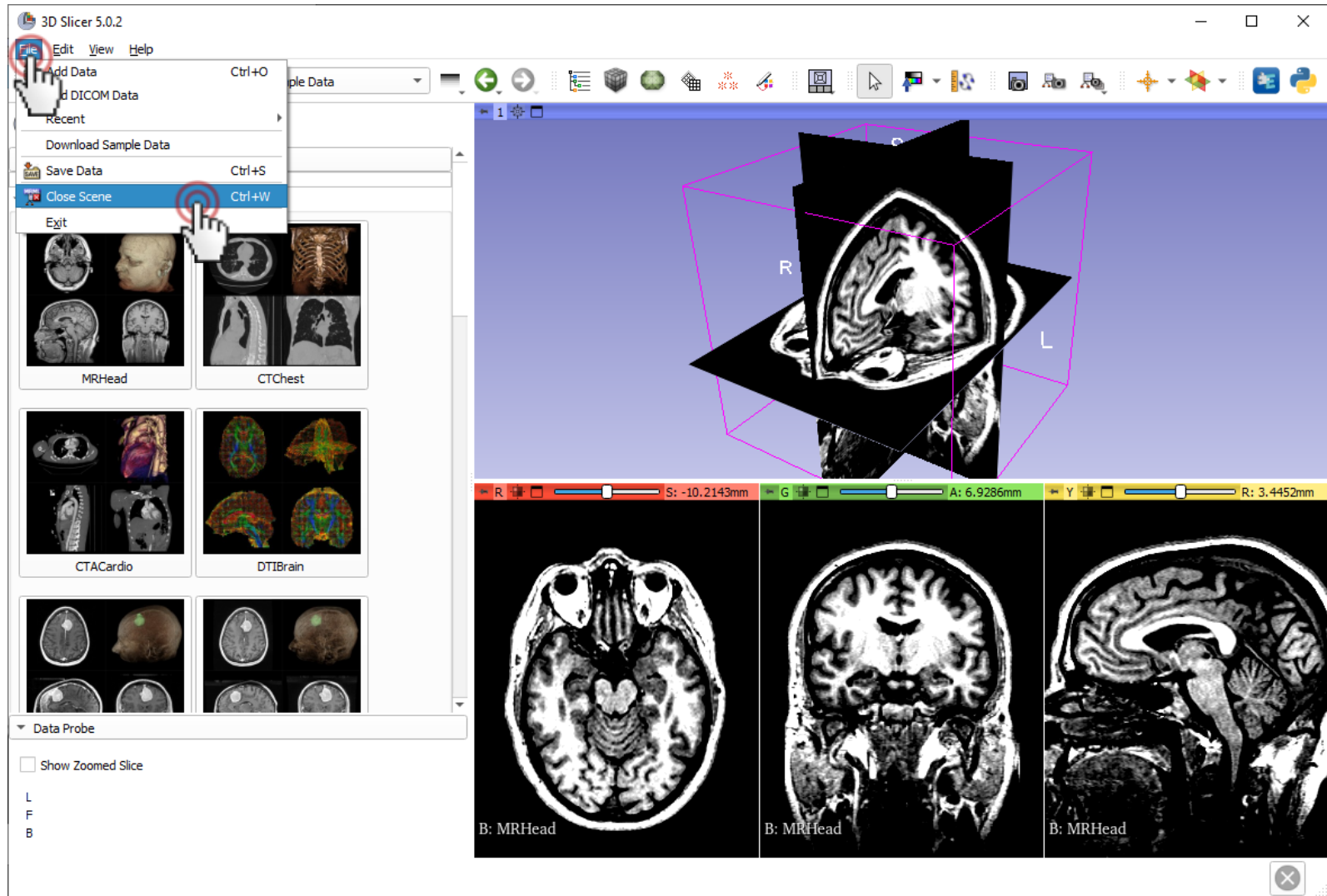
Show slices in 3D



Navigating the 3D view

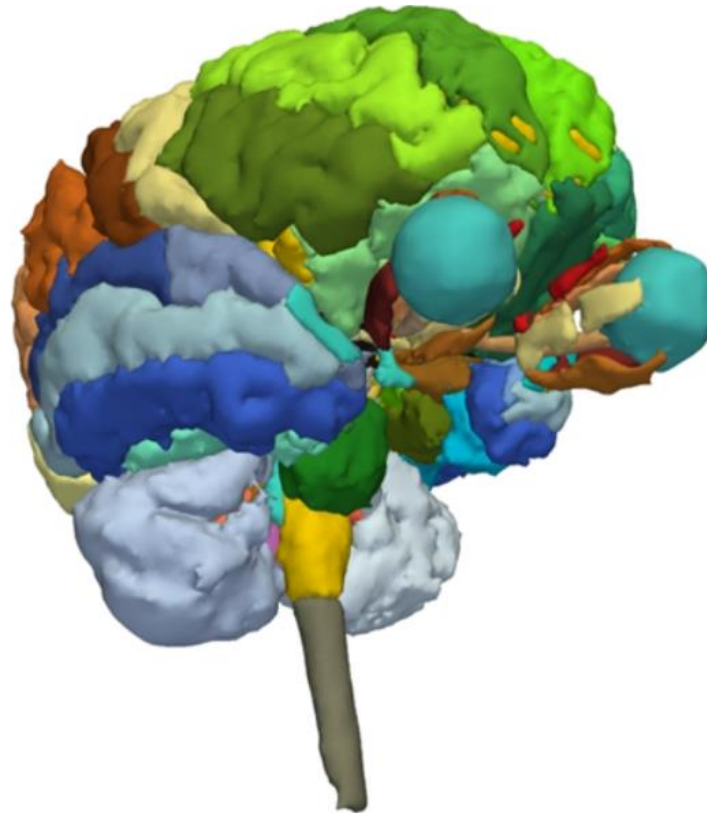


Close the scene



Part 2:

3D visualization of surface models of the brain



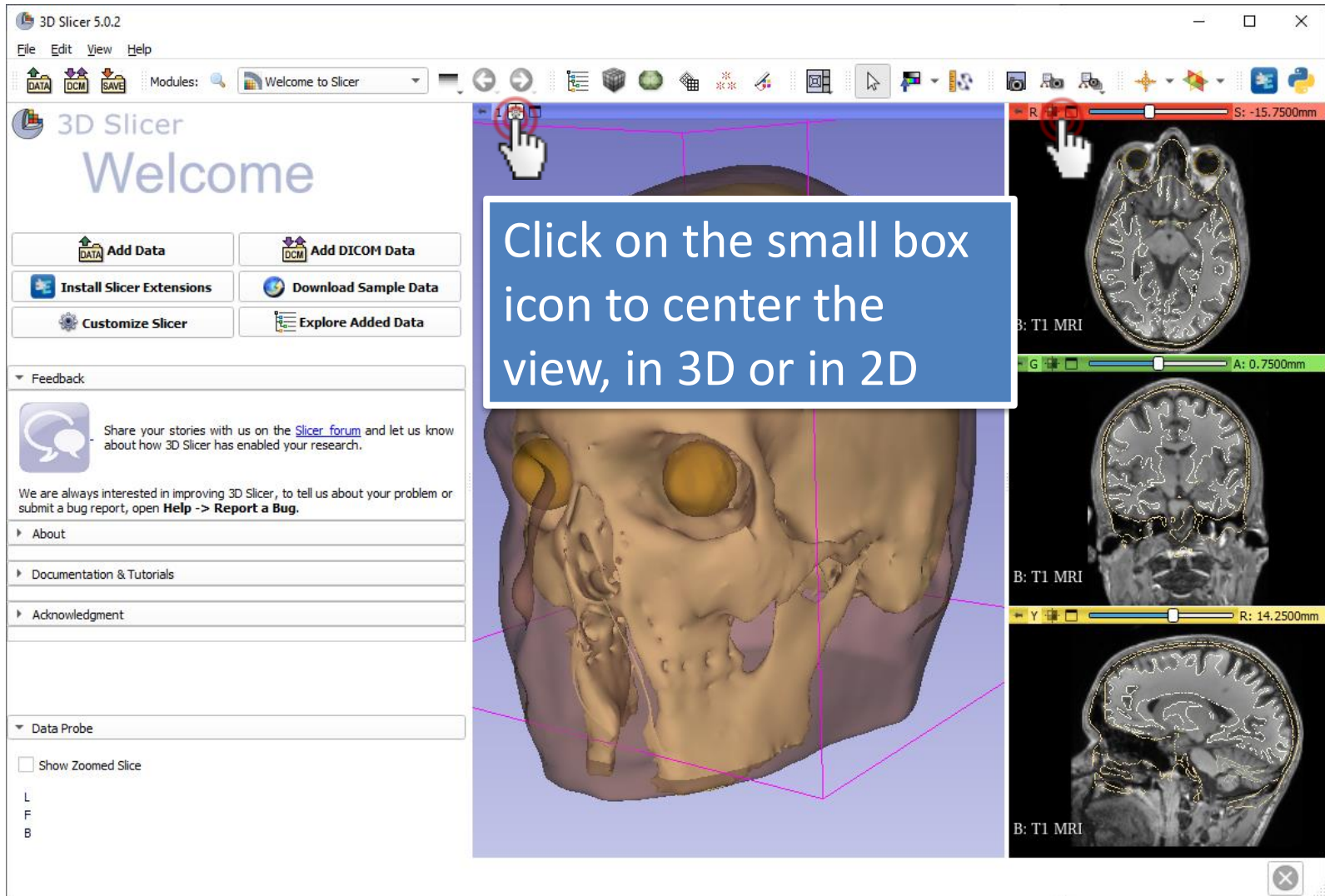
Load tutorial scene

Drag and drop the file VisualizationTutorial_HeadScene.mrb into Slicer, then click OK

File	Description
<input checked="" type="checkbox"/> D:/data/PerkLabBootcamp/VisualizationTutorial/VisualizationTutorial_HeadScene.mrb	MRB Slicer Data Bundle



Center view

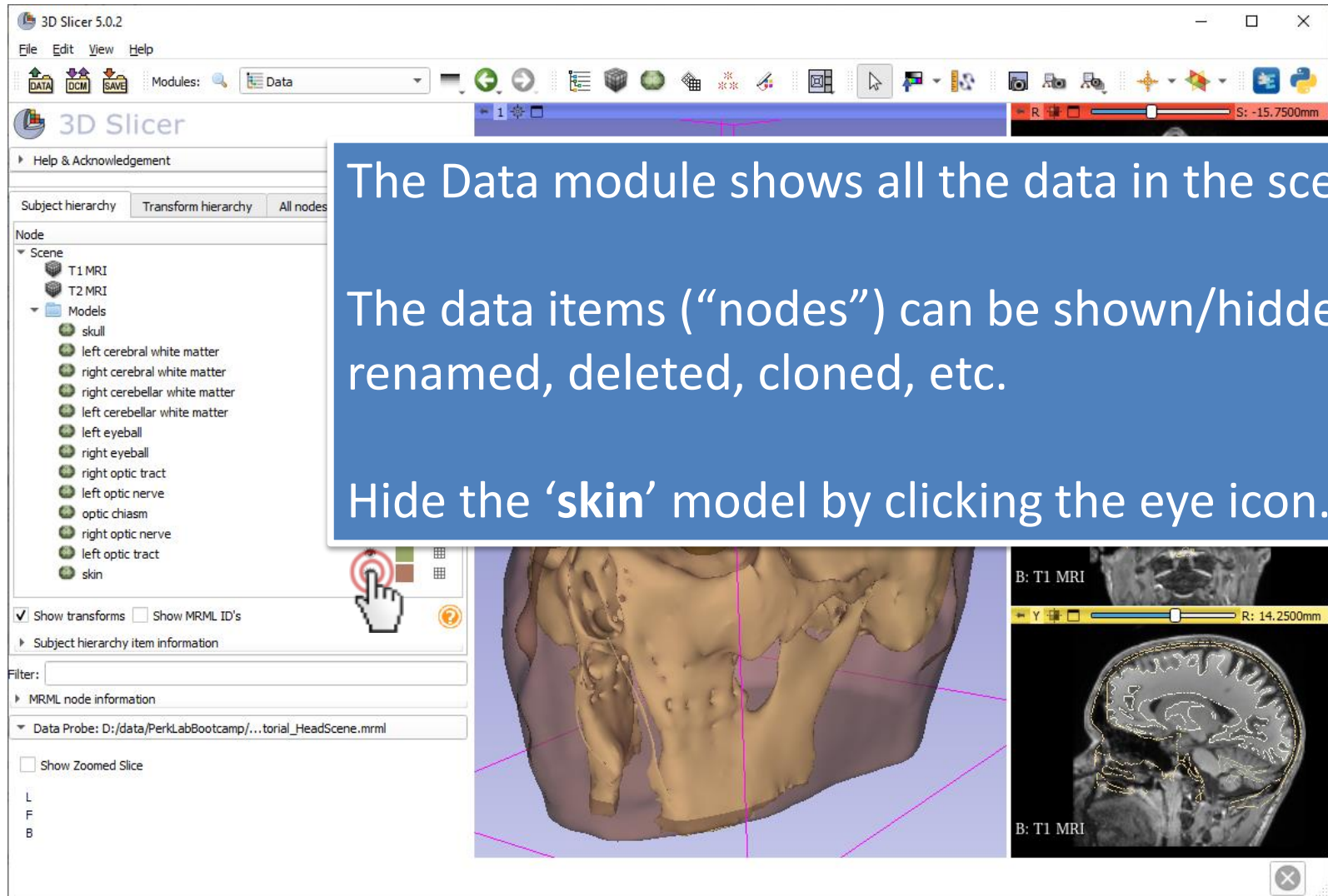


Explore loaded data

The screenshot displays the 3D Slicer 5.0.2 software interface. On the left, the 'Data' module is selected in the 'Modules' list, with red circles and arrows pointing to it. A blue text box in the center of the main 3D view area contains the text: 'You can use the module list, or the favorite module toolbar to switch to the Data module'. The main 3D view shows a 3D model of a skull. On the right, there are three axial MRI slices of a brain, each labeled 'B: T1 MRI'. The top slice has a red scale bar for 'S: -15.7500mm', the middle slice has a green scale bar for 'A: 0.7500mm', and the bottom slice has a yellow scale bar for 'R: 14.2500mm'. The interface includes a menu bar (File, Edit, View, Help), a toolbar with various icons, and a sidebar with buttons for 'Add Data', 'Install Slicer Extensions', and 'Customize Slicer'.



Explore loaded data



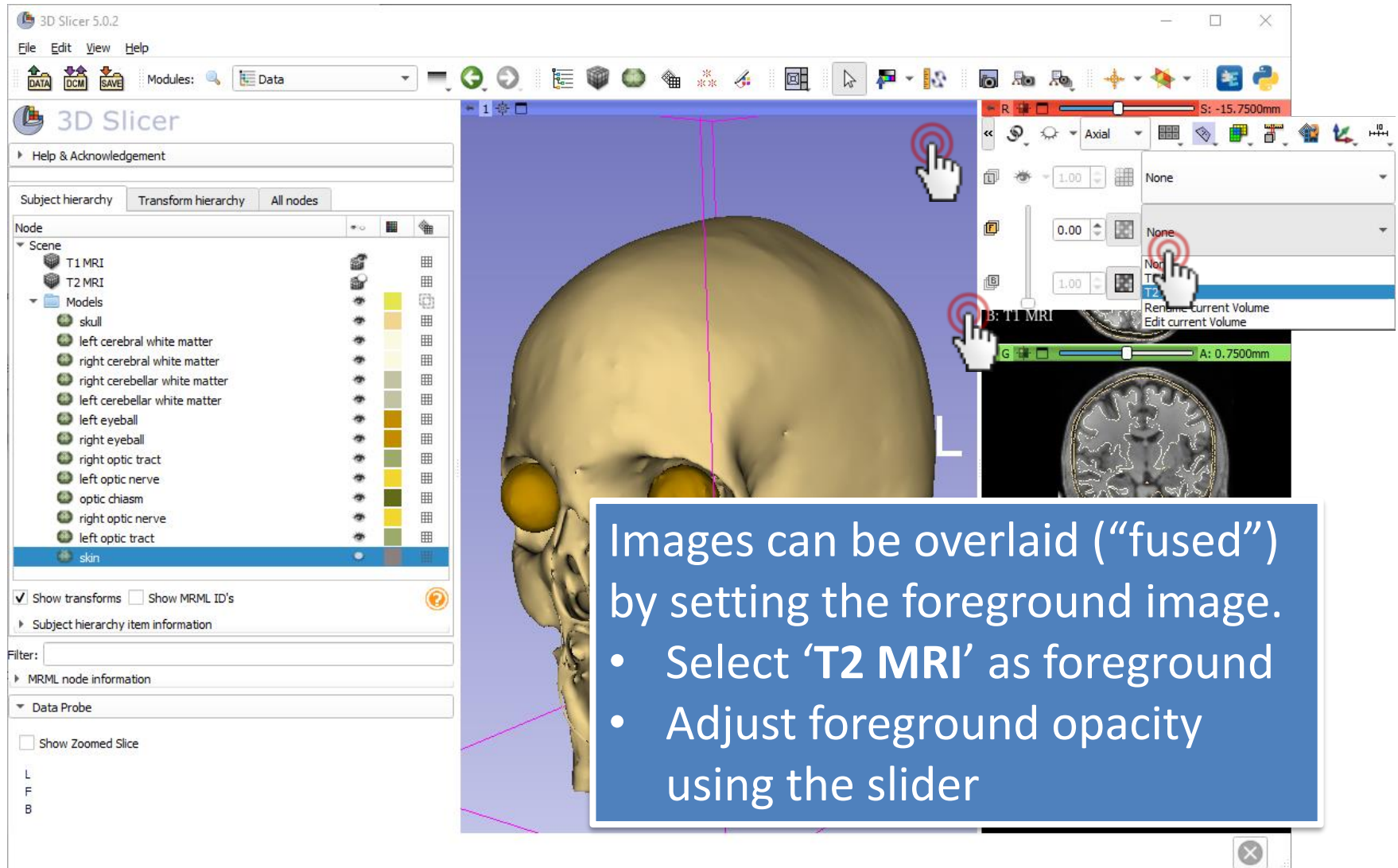
The screenshot shows the 3D Slicer 5.0.2 interface. The top menu bar includes File, Edit, View, and Help. Below it is a toolbar with various icons. The main window is divided into several panels. On the left, the 'Data' module is active, displaying a 'Node' list under the 'Scene' folder. The list includes 'T1 MRI', 'T2 MRI', and a 'Models' folder containing 'skull', 'left cerebral white matter', 'right cerebral white matter', 'right cerebellar white matter', 'left cerebellar white matter', 'left eyeball', 'right eyeball', 'right optic tract', 'left optic nerve', 'optic chiasm', 'right optic nerve', 'left optic tract', and 'skin'. A hand cursor is pointing at the 'skin' node. Below the list are checkboxes for 'Show transforms' (checked) and 'Show MRML ID's' (unchecked), and a 'Subject hierarchy item information' section. A 'Filter:' field is empty. Below that is 'MRML node information' and a 'Data Probe' section showing the path 'D:/data/PerkLabBootcamp/...torial_HeadScene.mrml'. At the bottom left, there are checkboxes for 'Show Zoomed Slice' and orientation indicators 'L', 'F', and 'B'. The main 3D view shows a 3D model of a skull with a semi-transparent skin layer. To the right, there are two MRI slice views labeled 'B: T1 MRI'. The top slice is an axial view with a yellow scale bar and 'R: 14.2500mm'. The bottom slice is a sagittal view.

The Data module shows all the data in the scene.

The data items (“nodes”) can be shown/hidden, renamed, deleted, cloned, etc.

Hide the ‘skin’ model by clicking the eye icon.

Foreground image

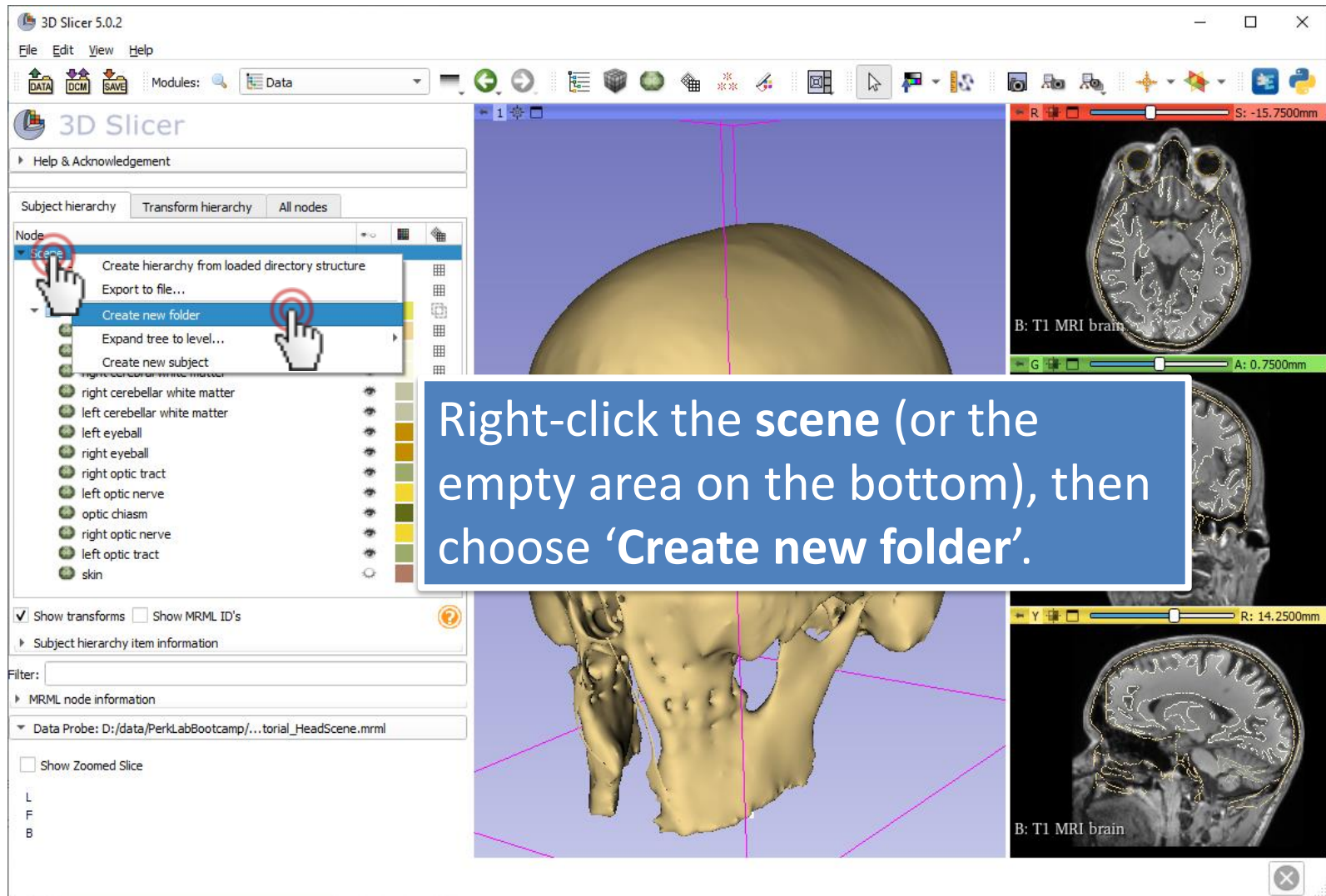


The screenshot shows the 3D Slicer 5.0.2 interface. The main 3D view displays a 3D model of a skull with a vertical pink line indicating a slice plane. The left sidebar shows the 'Subject hierarchy' with 'T2 MRI' selected as the foreground image. The right sidebar shows the 'Properties' panel for the selected image, with a slider for opacity set to 1.00. A blue callout box with white text provides instructions on how to set the foreground image and adjust its opacity.

Images can be overlaid (“fused”) by setting the foreground image.

- Select ‘T2 MRI’ as foreground
- Adjust foreground opacity using the slider

Create folder



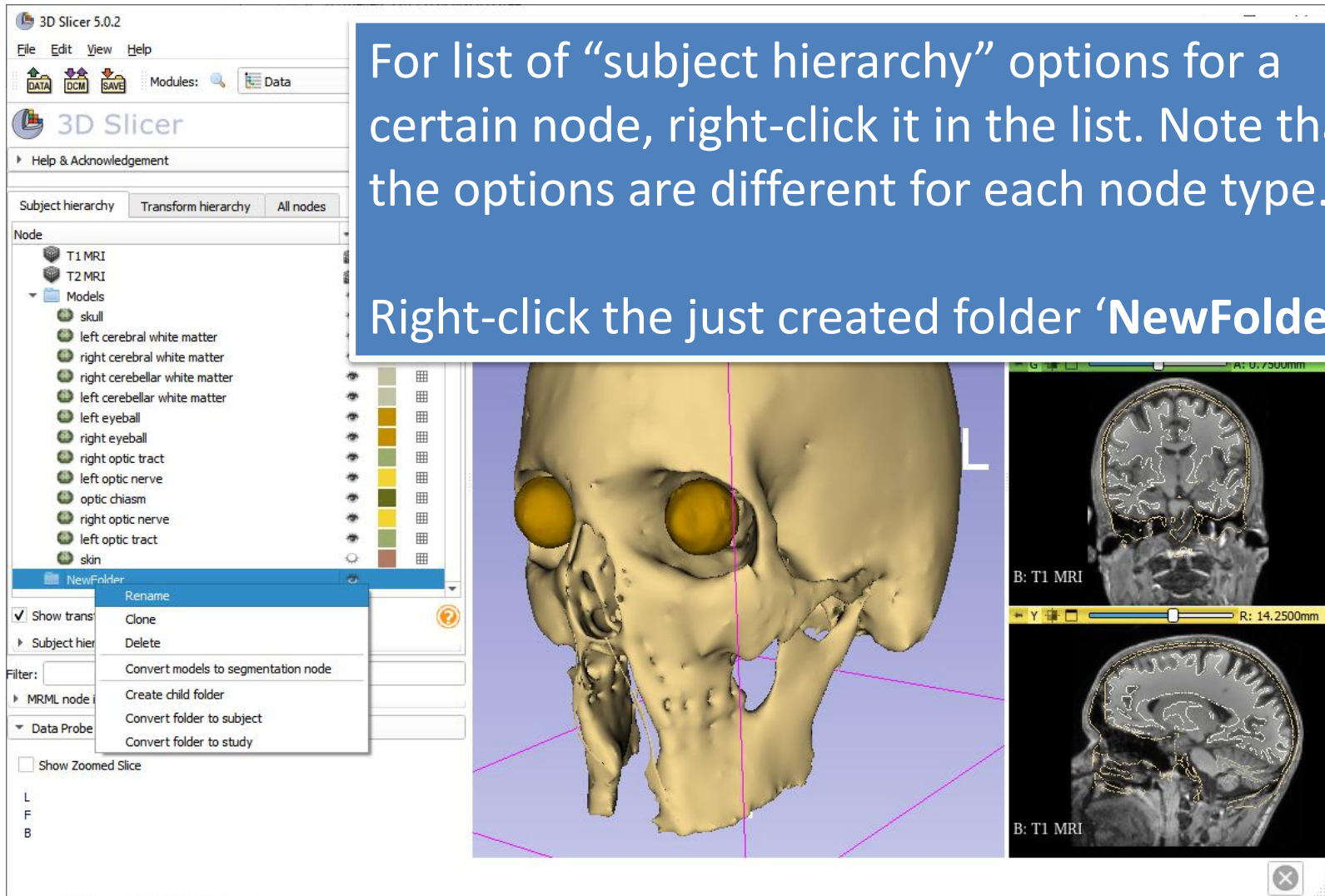
Right-click the scene (or the empty area on the bottom), then choose 'Create new folder'.



Context menu actions

For list of “subject hierarchy” options for a certain node, right-click it in the list. Note that the options are different for each node type.

Right-click the just created folder ‘NewFolder’.

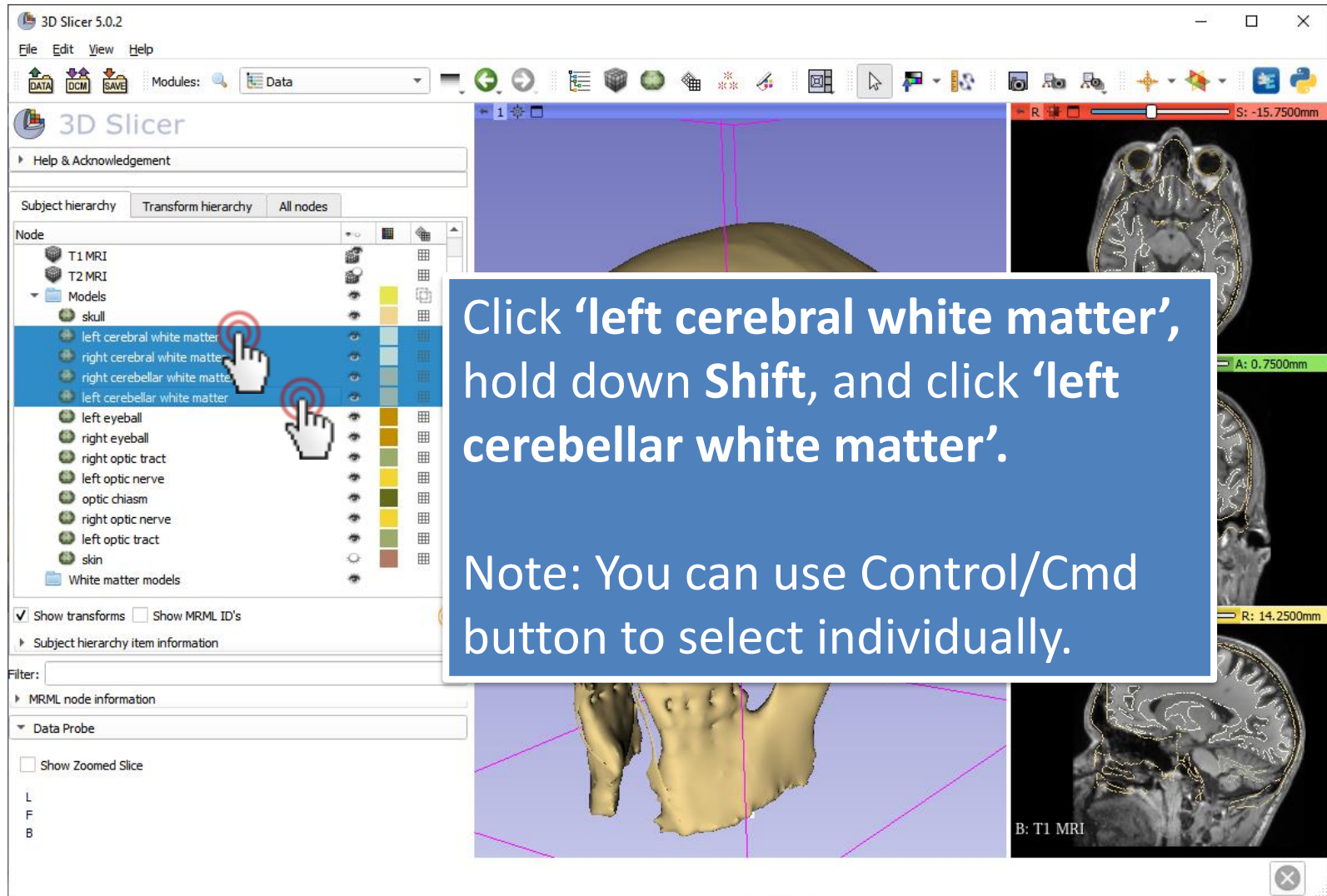


Rename folder

The screenshot shows the 3D Slicer 5.0.2 software interface. The main window displays a 3D model of a skull. On the left, the 'Subject hierarchy' panel shows a tree view with nodes for 'T1 MRI', 'T2 MRI', and a 'Models' folder. The 'Models' folder is expanded, showing various anatomical models. A context menu is open over the 'Models' folder, with the 'Rename' option highlighted by a hand cursor. A blue callout box with white text is overlaid on the bottom right of the interface, stating: 'Choose the Rename option and rename the volume to 'White matter models''.



Select multiple nodes



3D Slicer 5.0.2

File Edit View Help

Modules: Data

3D Slicer

Help & Acknowledgement

Subject hierarchy Transform hierarchy All nodes

Node

- T1 MRI
- T2 MRI
- Models
 - skull
 - left cerebral white matter
 - right cerebral white matter
 - right cerebellar white matter
 - left cerebellar white matter
 - left eyeball
 - right eyeball
 - right optic tract
 - left optic nerve
 - optic chiasm
 - right optic nerve
 - left optic tract
 - skin
 - White matter models

Show transforms Show MRML ID's

Subject hierarchy item information

Filter:

MRML node information

Data Probe

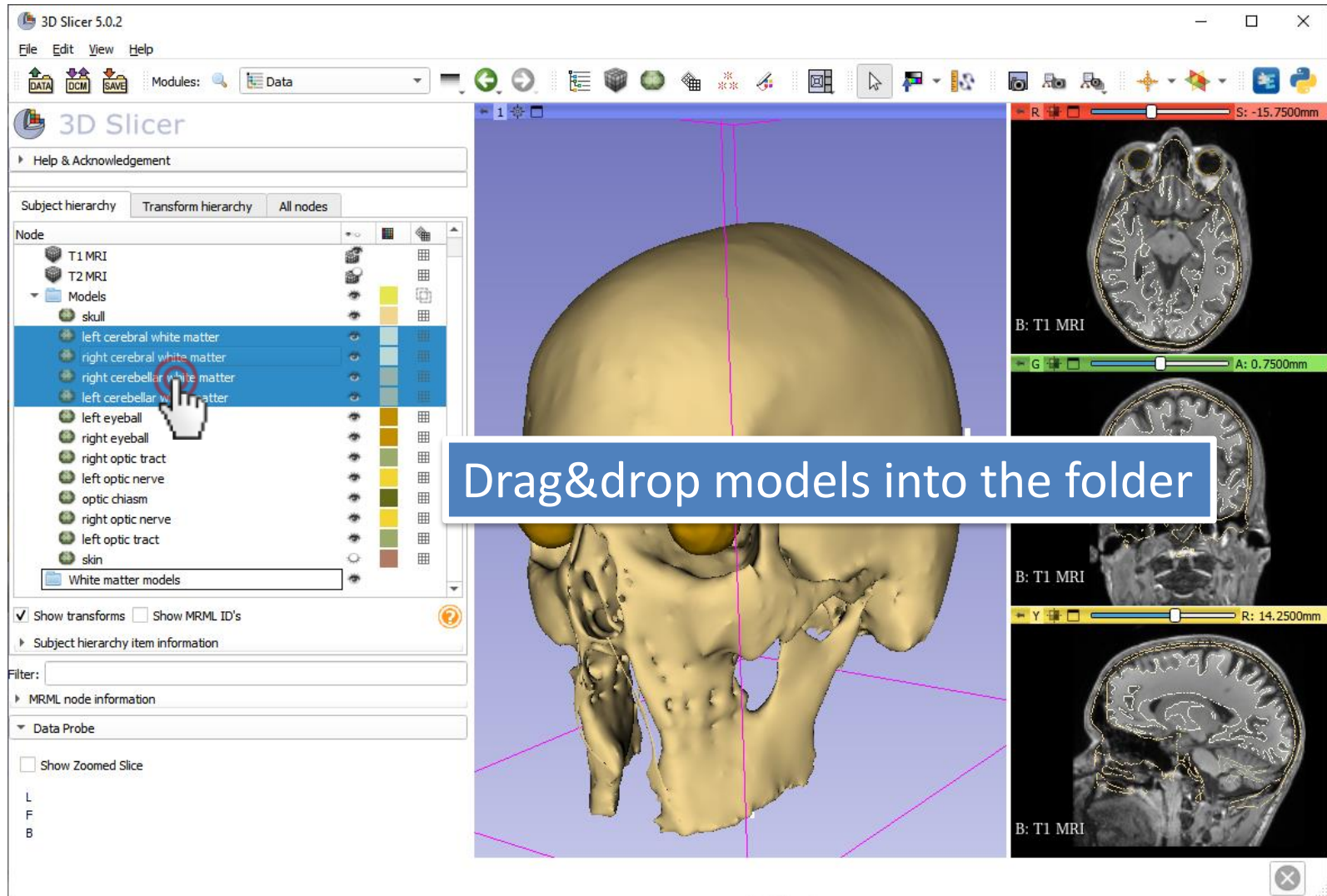
Show Zoomed Slice

L
F
B

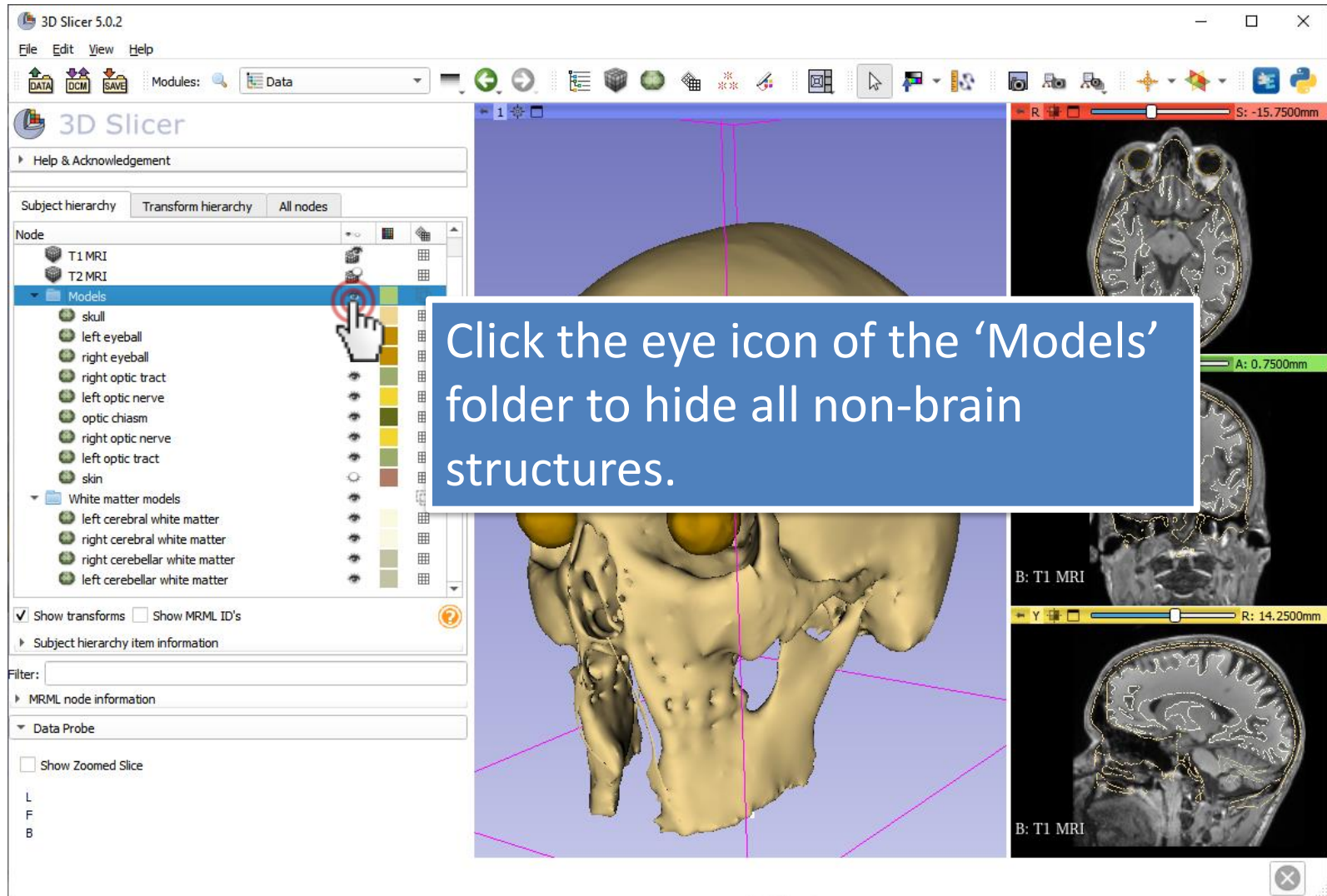
Click 'left cerebral white matter', hold down Shift, and click 'left cerebellar white matter'.

Note: You can use Control/Cmd button to select individually.

Move nodes to folder



Hide all nodes in folder



3D Slicer 5.0.2

File Edit View Help

DATA DCM SAVE Modules: Data

3D Slicer

Help & Acknowledgement

Subject hierarchy Transform hierarchy All nodes

Node

- T1 MRI
- T2 MRI
- Models
 - skull
 - left eyeball
 - right eyeball
 - right optic tract
 - left optic nerve
 - optic chiasm
 - right optic nerve
 - left optic tract
 - skin
- White matter models
 - left cerebral white matter
 - right cerebral white matter
 - right cerebellar white matter
 - left cerebellar white matter

Show transforms Show MRML ID's

Subject hierarchy item information

Filter:

MRML node information

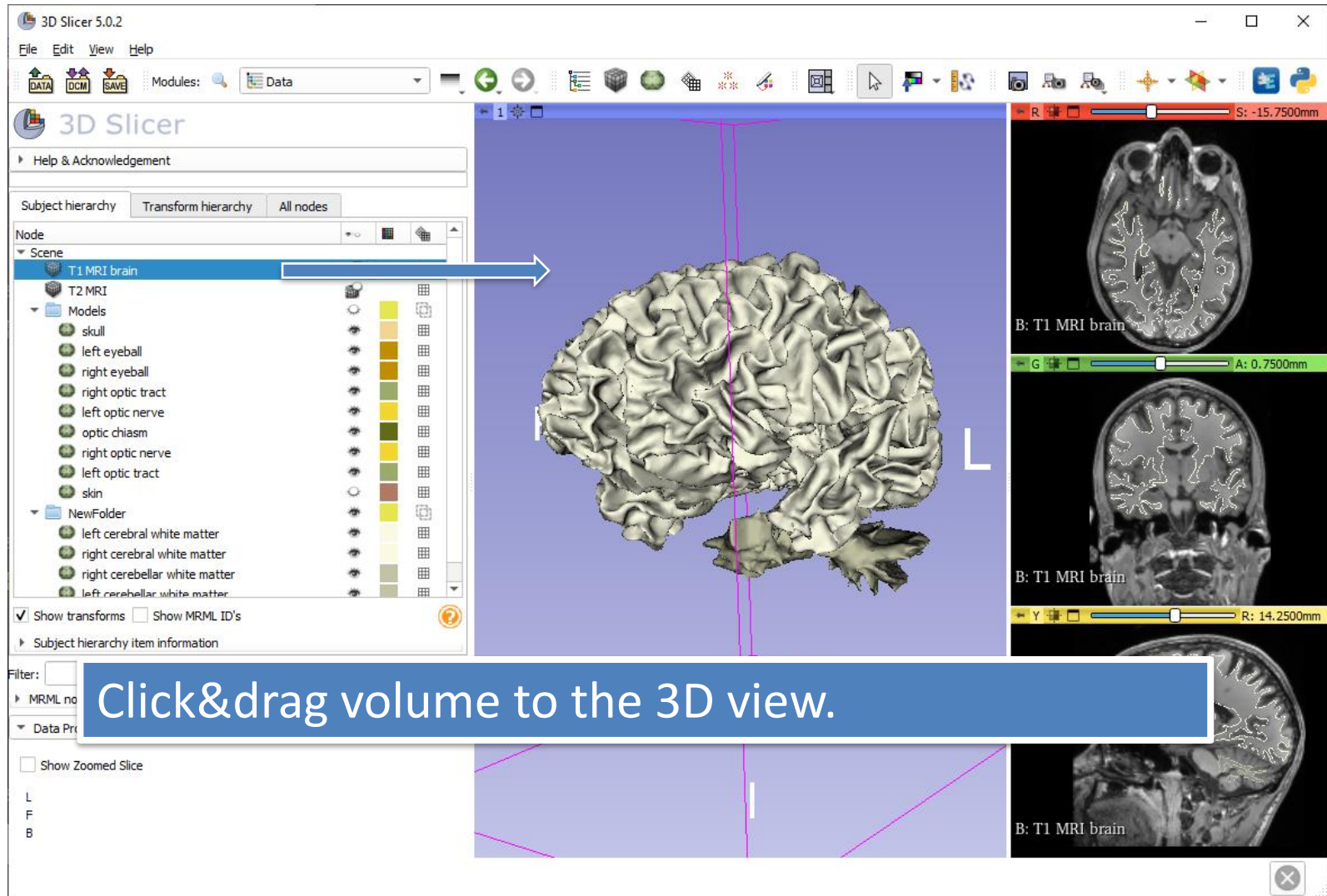
Data Probe

Show Zoomed Slice

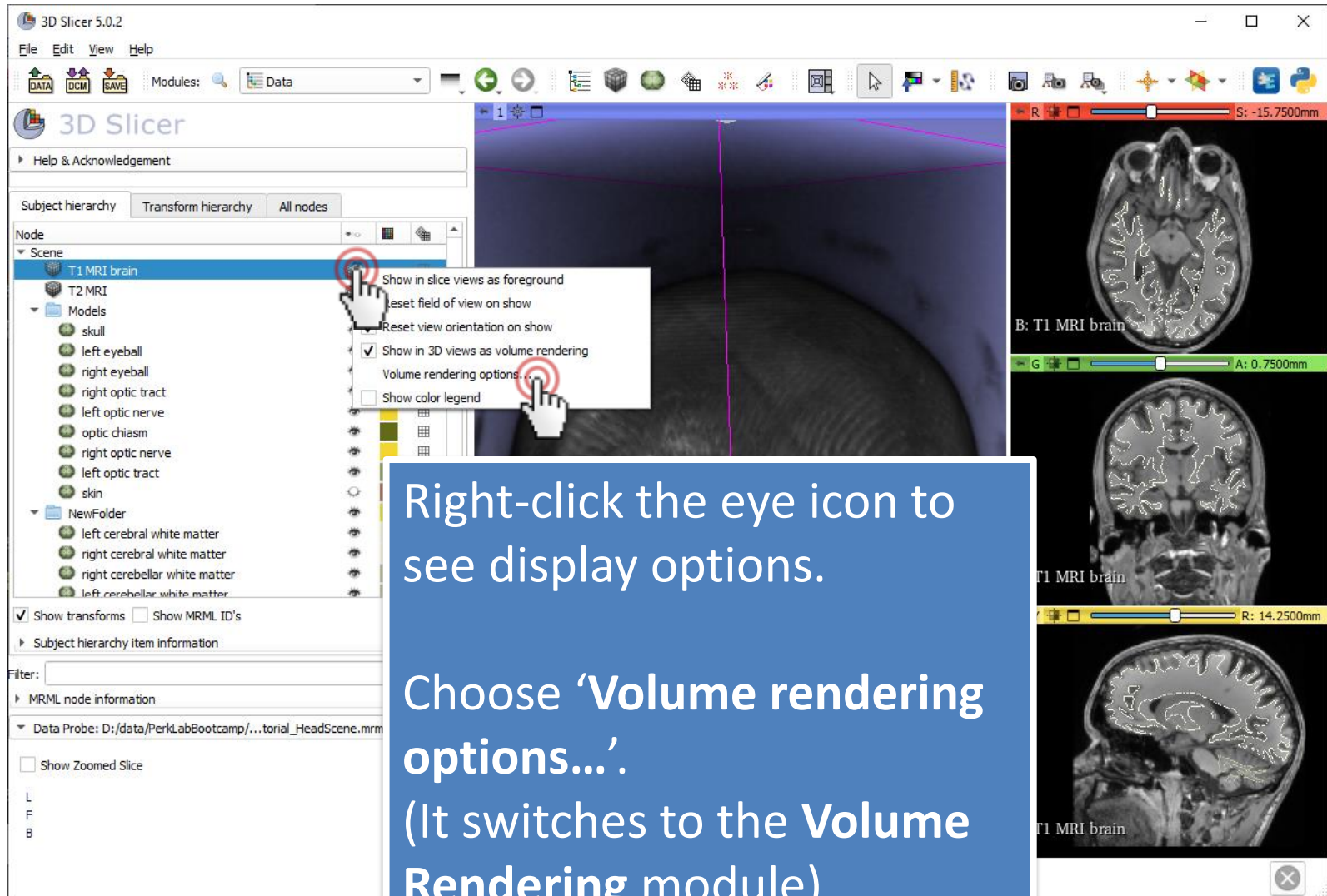
L
F
B

Click the eye icon of the 'Models' folder to hide all non-brain structures.

Volume rendering



Display options



3D Slicer 5.0.2

File Edit View Help

Modules: Data

3D Slicer

Help & Acknowledgement

Subject hierarchy Transform hierarchy All nodes

Node

- Scene
 - T1 MRI brain
 - T2 MRI
 - Models
 - skull
 - left eyeball
 - right eyeball
 - right optic tract
 - left optic nerve
 - optic chiasm
 - right optic nerve
 - left optic tract
 - skin
 - NewFolder
 - left cerebral white matter
 - right cerebral white matter
 - right cerebellar white matter
 - left cerebellar white matter

Show transforms Show MRML ID's

Subject hierarchy item information

Filter:

MRML node information

Data Probe: D:/data/PerkLabBootcamp/...torial_HeadScene.mrml

Show Zoomed Slice

L
F
B

Right-click the eye icon to see display options.

Choose 'Volume rendering options...'.
(It switches to the Volume Rendering module)

B: T1 MRI brain

T1 MRI brain

T1 MRI brain



Adjust volume rendering

3D Slicer 5.0.2

File Edit View Help

Modules: Volume Rendering

3D Slicer

Volume: T1 MRI brain

Input

Display

Preset

Shift

Crop

Render

Advanced

MR-Default

Data Probe: D:/data/PerLabBootcamp/...torial_HeadScene.mrml

Show Zoomed Slice

L
F
B

Click on 'Select a Preset' and choose MR-Default.

Adjust the Shift slider to optimize visualization.

B: T1 MRI brain



Show models again

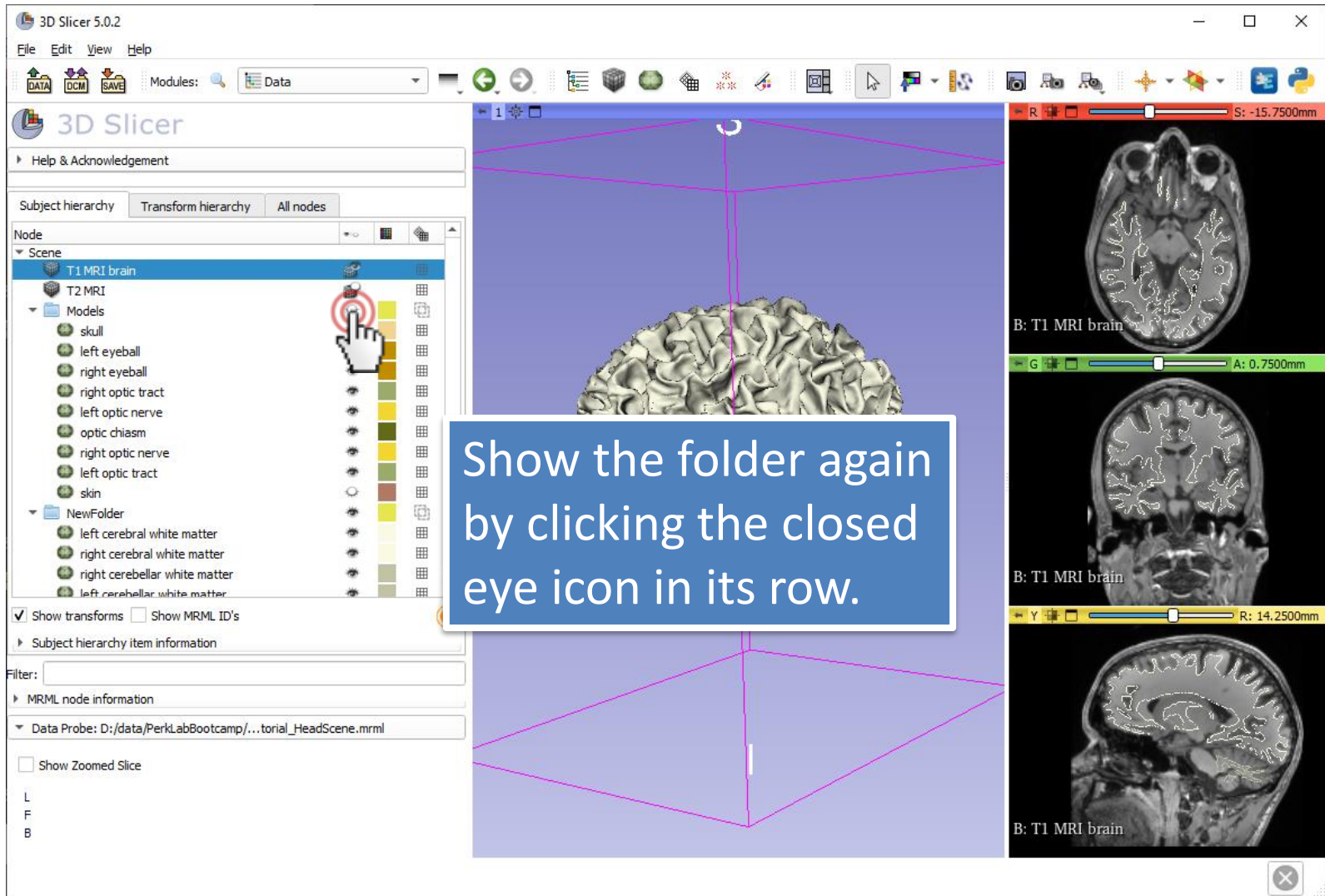
The screenshot shows the 3D Slicer 5.0.2 interface. The 'Volume Rendering' module is currently active, displaying a 3D model of a brain. A hand cursor points to the 'Volume Rendering' icon in the top toolbar, which is circled in red. Another hand cursor points to the 'Data' module in the 'Modules' dropdown menu, also circled in red. A third hand cursor points to the eye icon in the 'Volume Rendering' module's 'Display' section, which is circled in red. A blue text box is overlaid on the interface, containing the following text:

Turn off volume rendering using the eye icon.

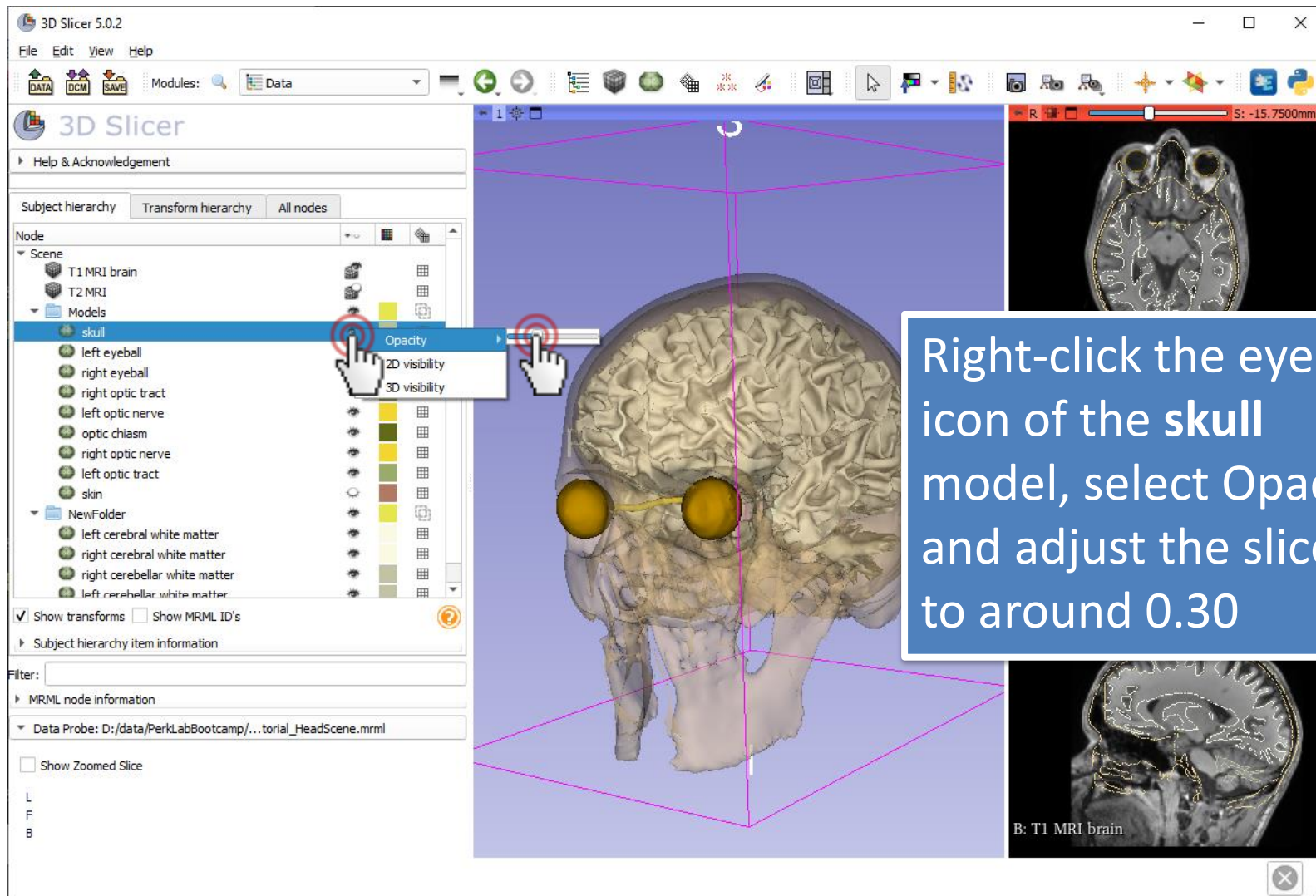
Switch back to the **Data** module using the **Modules history**.

The interface also shows the 'Data' module selected in the 'Modules' dropdown, and the 'Volume Rendering' module selected in the 'Modules history' dropdown. The 'Data' module is currently selected in the 'Modules' dropdown, and the 'Volume Rendering' module is selected in the 'Modules history' dropdown. The 'Data' module is currently selected in the 'Modules' dropdown, and the 'Volume Rendering' module is selected in the 'Modules history' dropdown.

Show models again

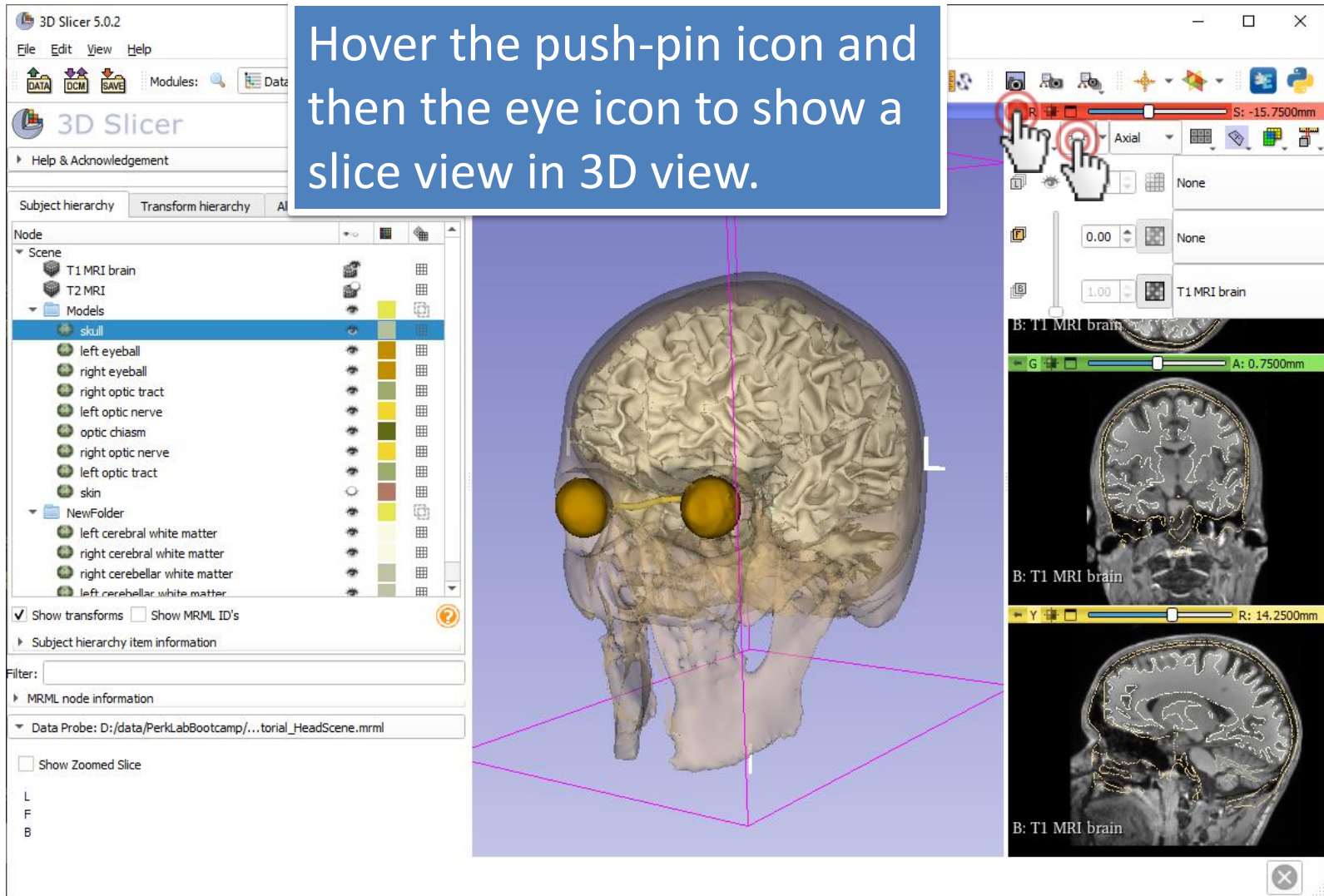


Change skull model opacity

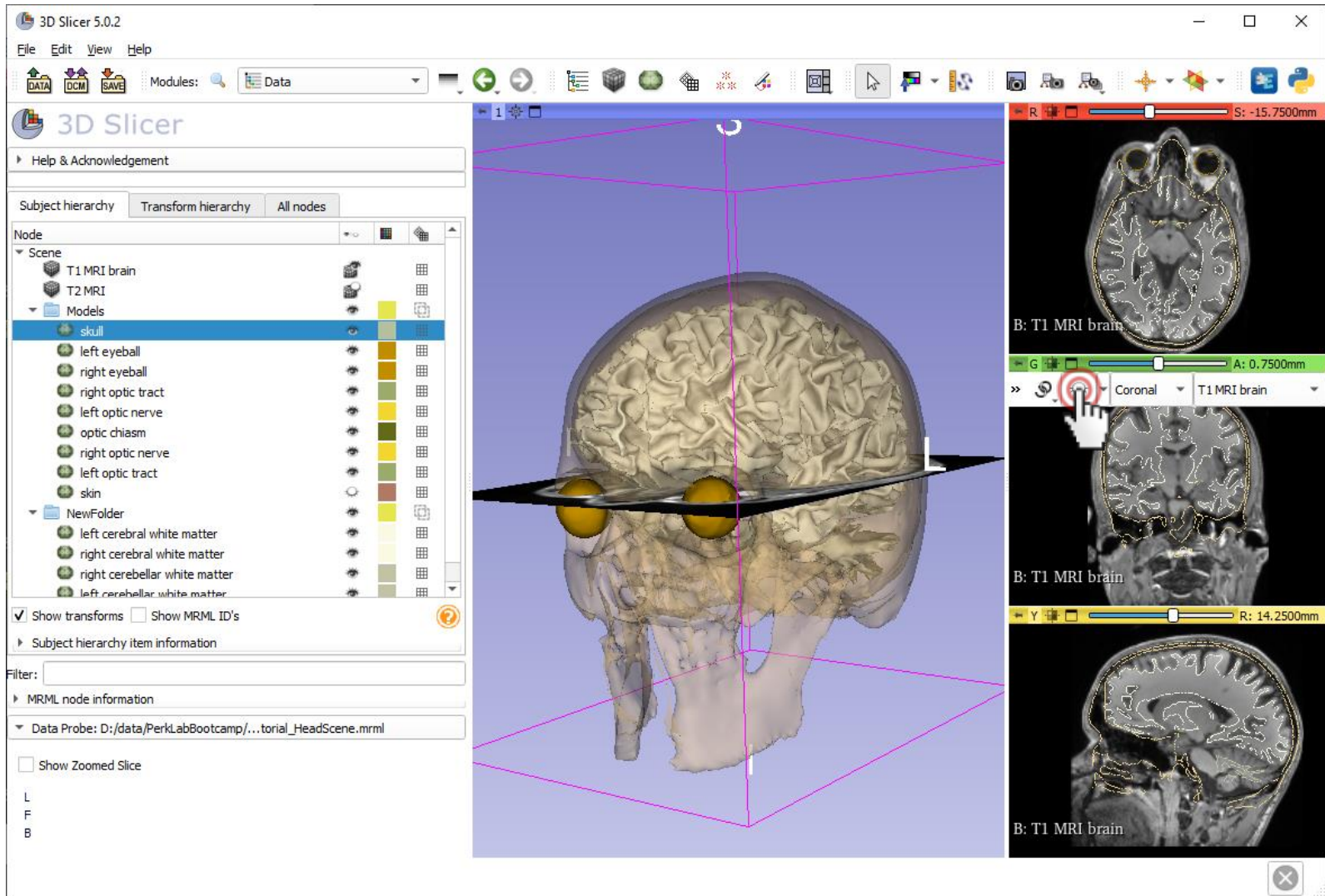


Show axial slice in 3D

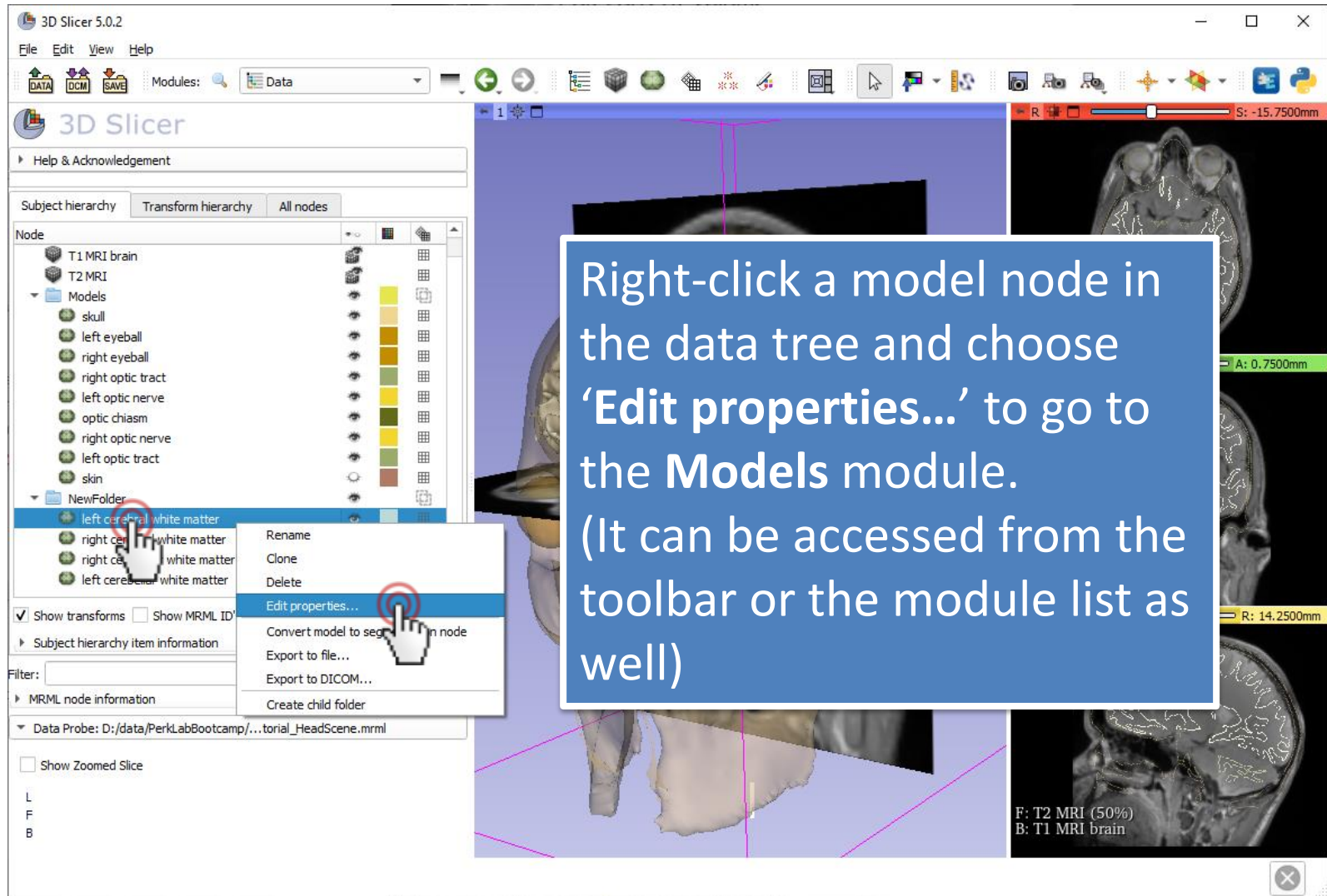
Hover the push-pin icon and then the eye icon to show a slice view in 3D view.



Show coronal slice in 3D



Model clipping



The screenshot shows the 3D Slicer 5.0.2 interface. On the left, the 'Subject hierarchy' panel displays a tree of model nodes. A right-click context menu is open over the 'left cerebral white matter' node. The menu options are: Rename, Clone, Delete, Edit properties..., Convert model to segment in node, Export to file..., Export to DICOM..., and Create child folder. A hand cursor is pointing at the 'Edit properties...' option. The main 3D view shows a 3D model of a skull and brain with a clipping plane. The right side of the interface shows the 'Models' module with a 3D view of the skull and brain. A blue text box is overlaid on the right side of the interface, containing the following text:

Right-click a model node in the data tree and choose 'Edit properties...' to go to the Models module. (It can be accessed from the toolbar or the module list as well)



Model clipping

3D Slicer 5.0.2

File Edit View Help

DATA DCM SAVE Modules: Models

3D Slicer

Help & Acknowledgement

Filter by name...

Node

- Models
 - skull
 - left eyeball
 - right eyeball
 - right optic tract
 - left optic nerve
 - optic chiasm
 - right optic nerve
 - left optic tract
 - skin
- NewFolder
 - left cerebral white matter
 - right cerebral white matter
 - right cerebellar white matter
 - left cerebellar white matter

Information

Display

Visibility

Visibility: Opacity: 1.00

View: All

Data Probe: D:/data/PerLabBootcamp/...torial_HeadScene.mrml

Show Zoomed Slice

L
F
B

Select all brain models using Shift, then scroll down to the 3D Display section.

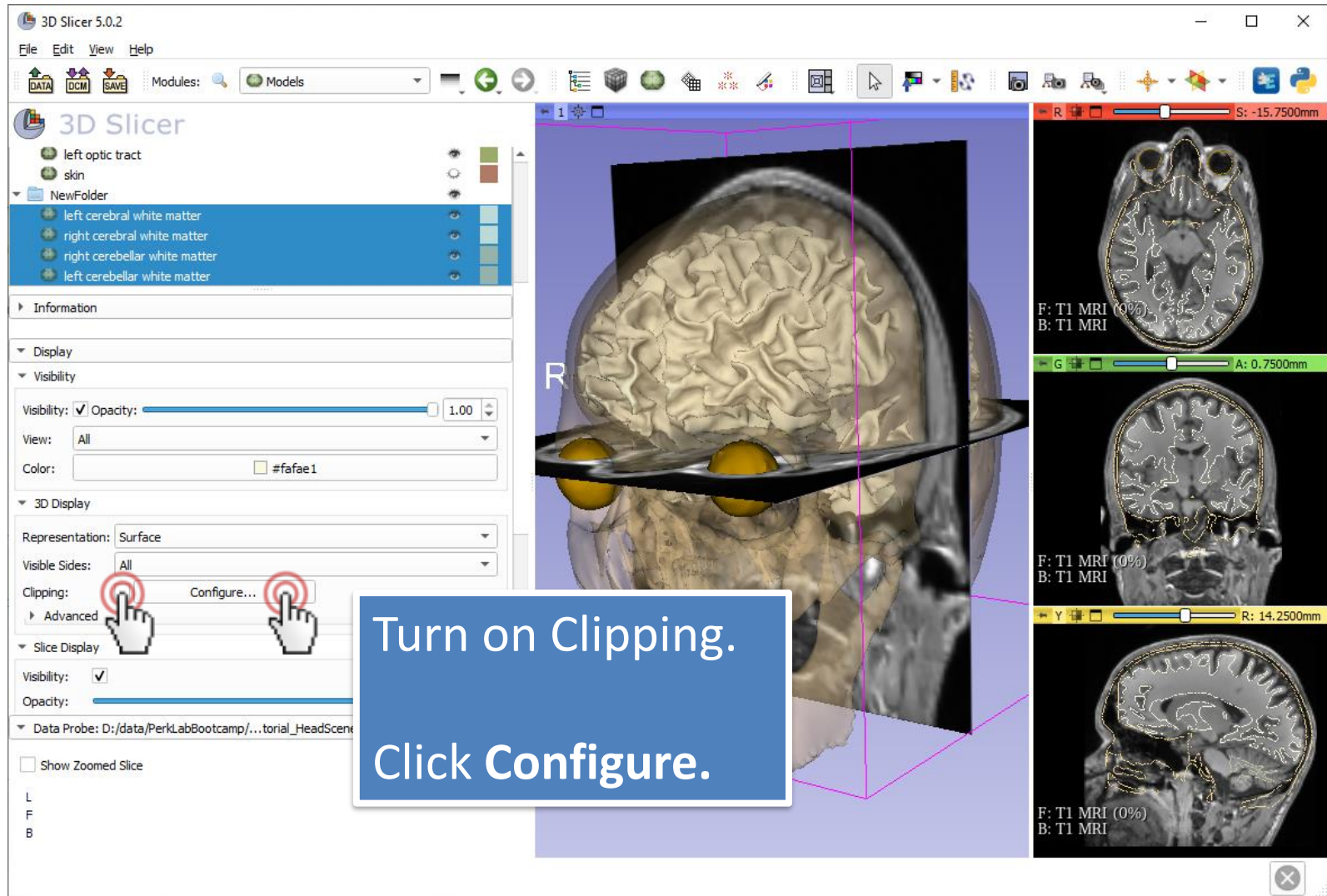
T1 MRI brain

B: T1 MRI brain

B: T1 MRI brain



Model clipping



Turn on Clipping.
Click Configure.



Model clipping

3D Slicer 5.0.2

File Edit View Help

DATA DCM SAVE Modules: Models

3D Slicer

Representation: Surface

Visible Sides: All

Clipping: Configure...

Advanced

Slice Display

Visibility:

Opacity: 1.00

Mode: Intersection

Line Width: 1 px

Color Table:

Scalars

Color Legend

Clipping Planes

Clip selected model:

Clipping Type:

Union Intersection

Red Slice Clipping: Positive Negative

Blue Slice Clipping: Positive Negative

Green Slice Clipping: Positive Negative

Clip only whole cells when clipping

Data Probe: D:/data/PerkLabBootcamp/...torial_HeadScene.mrml

Show Zoomed Slice

L
F
B

Turn off Red Slice Clipping and turn on Green Slice Clipping.
The optic chiasm becomes visible in the 3D view

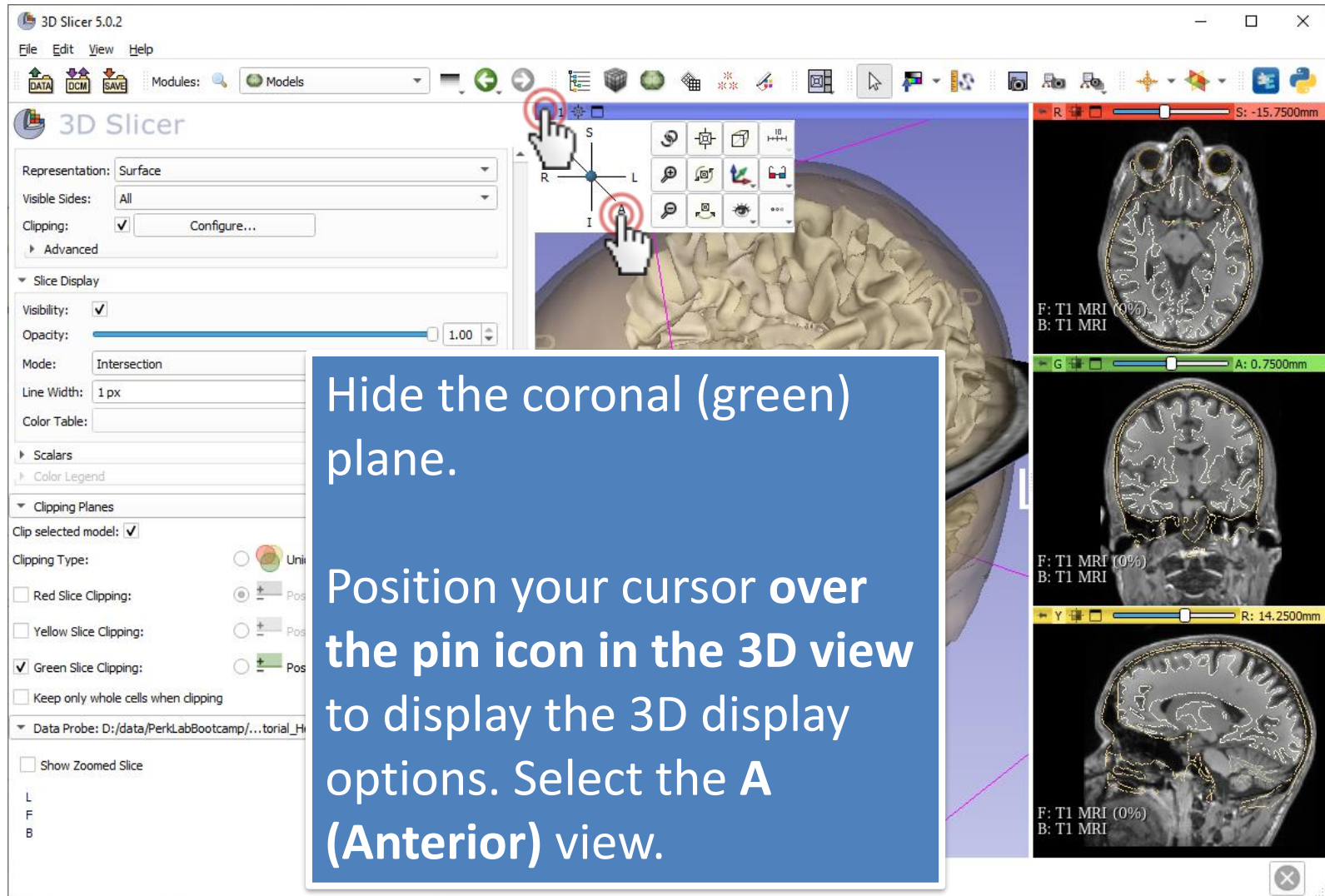
F: T1 M... (0%)
B: T1 MRI brain

R: -15.7500mm

G: 0.7500mm

R: 14.2500mm

3D display options



The screenshot shows the 3D Slicer 5.0.2 software interface. The main 3D view displays a brain model with a coordinate system (S, R, L, I, A) and a toolbar. A hand cursor is positioned over the 'A' (Anterior) view icon. A blue text box is overlaid on the 3D view, providing instructions on how to hide the coronal plane. The right side of the interface features three slice displays: Axial (Sagittal), Coronal (Frontal), and Sagittal (Lateral). The Coronal slice is currently highlighted in green. The interface also includes a left sidebar with various settings for representation, visibility, and clipping.

3D Slicer 5.0.2

File Edit View Help

3D Slicer

Representation: Surface

Visible Sides: All

Clipping: Configure...

Advanced

Slice Display

Visibility:

Opacity: 1.00

Mode: Intersection

Line Width: 1 px

Color Table:

Scalars

Color Legend

Clipping Planes

Clip selected model:

Clipping Type:

Red Slice Clipping: Uni

Yellow Slice Clipping: Pos

Green Slice Clipping: Pos

Keep only whole cells when clipping

Data Probe: D:/data/PerLabBootcamp/...torial_H

Show Zoomed Slice

L

F

B

Hide the coronal (green) plane.

Position your cursor over the pin icon in the 3D view to display the 3D display options. Select the A (Anterior) view.

R S L I A

F: T1 MRI (0%)
B: T1 MRI

G A: 0.7500mm

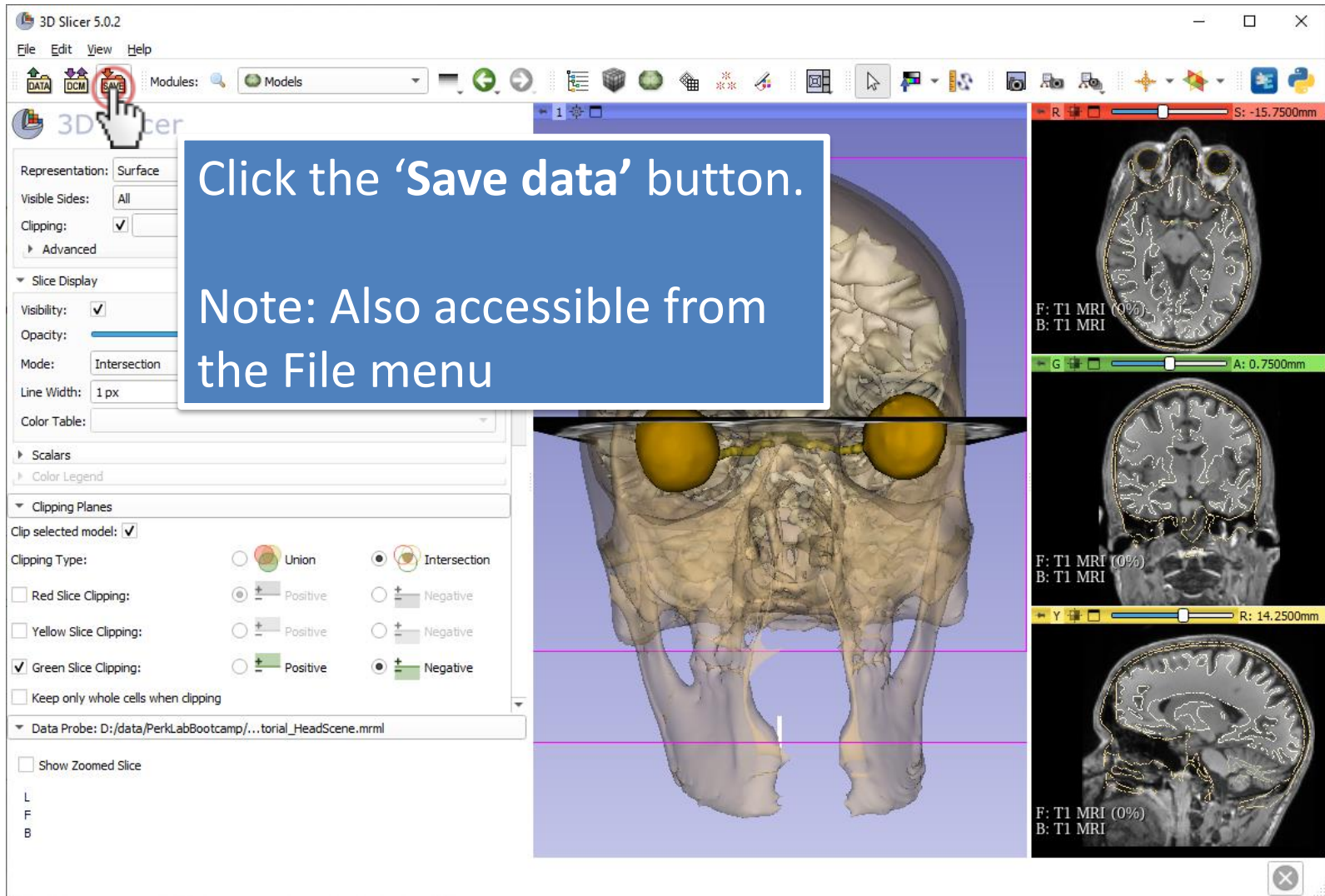
F: T1 MRI (0%)
B: T1 MRI

Y R: 14.2500mm

F: T1 MRI (0%)
B: T1 MRI



Save the scene



Save the scene

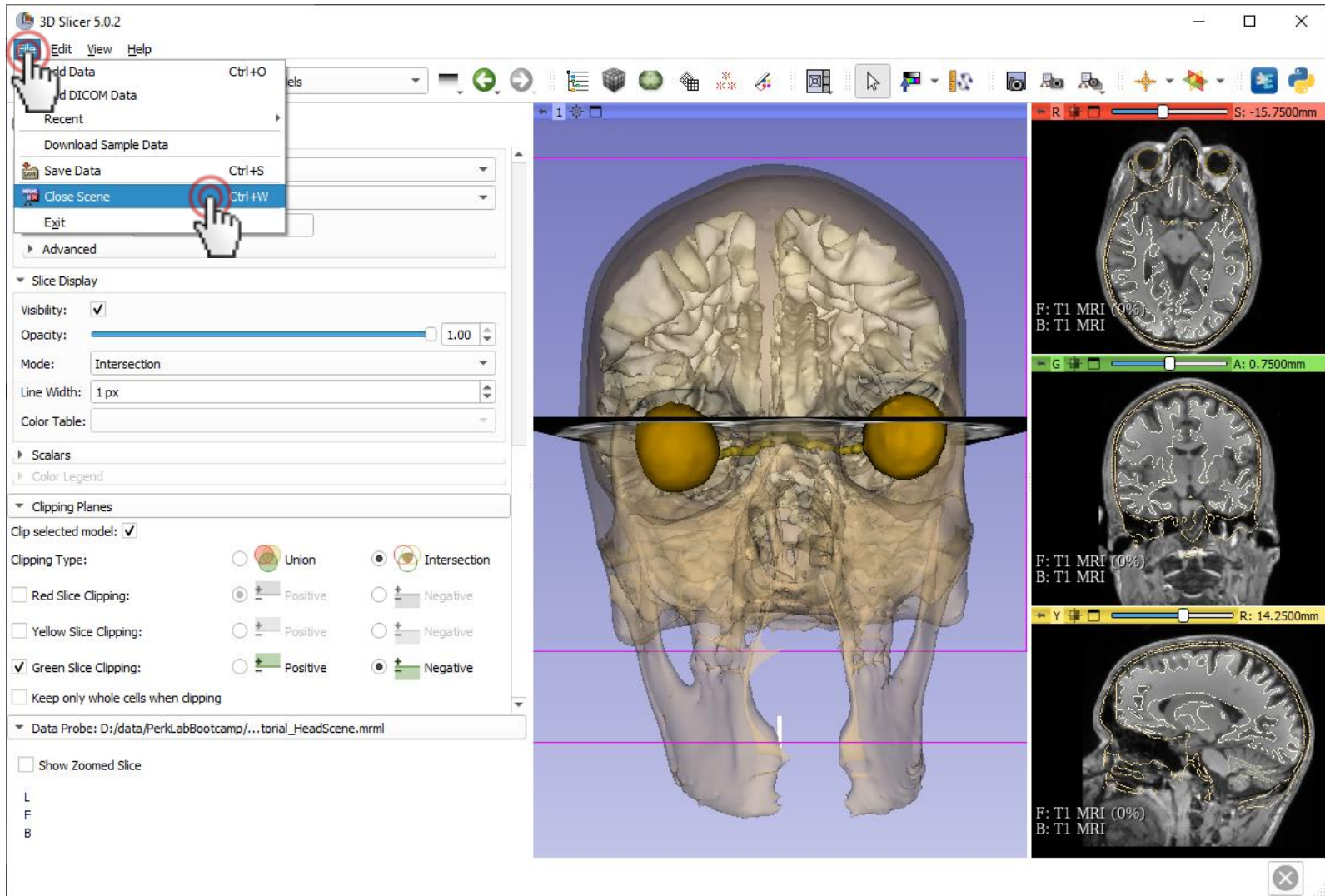
The **Save Scene and Unsaved Data** window lists all elements of the scene. You can save as **MRB** bundle or as list of files.

Double-click the scene and rename it to **myNewScene.mrb**

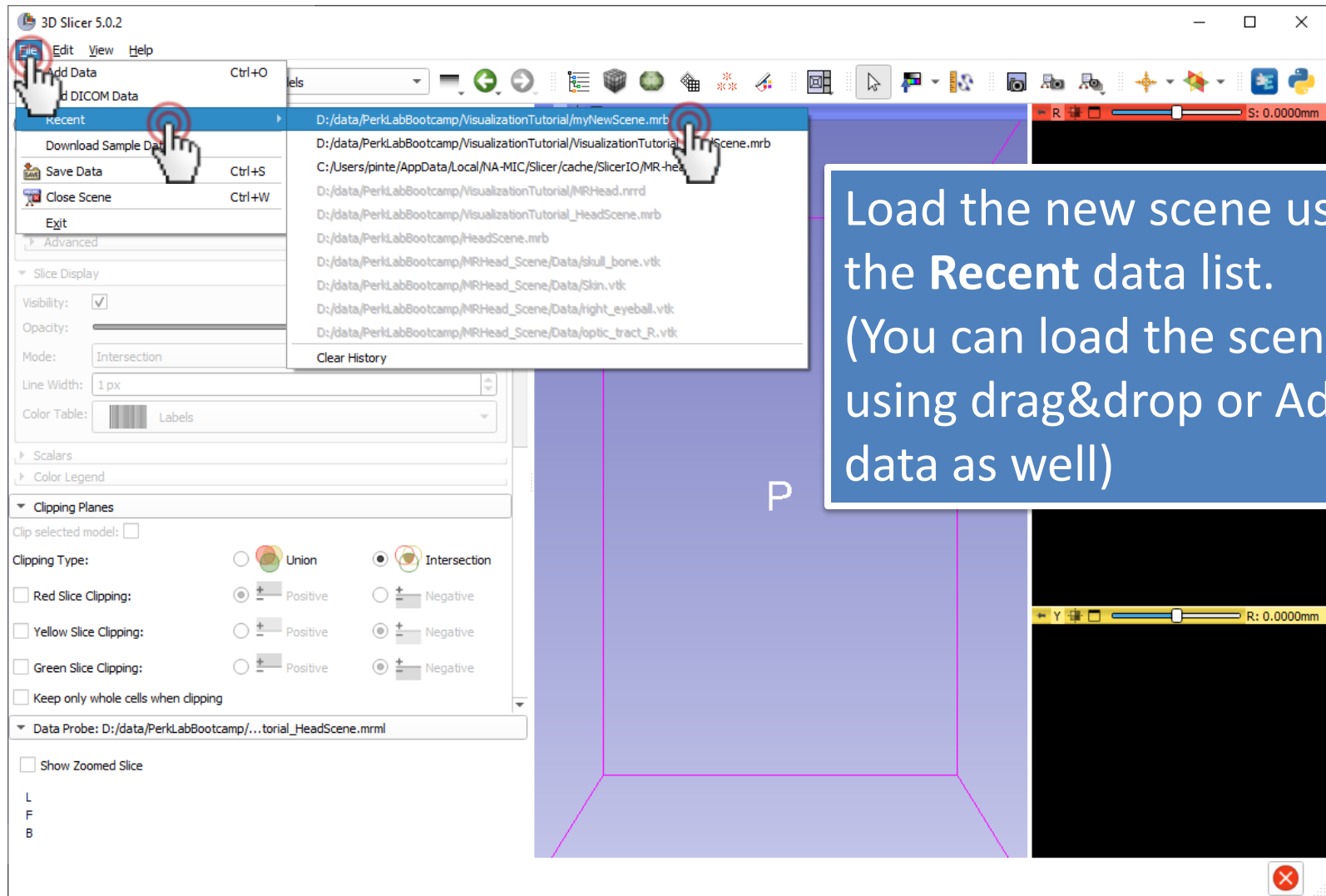
Click **Save**.



Close the scene



Load your recently saved scene



3D Slicer 5.0.2

File Edit View Help

Recent

- D:/data/PerkLabBootcamp/VisualizationTutorial/myNewScene.mrb
- D:/data/PerkLabBootcamp/VisualizationTutorial/VisualizationTutorial/...Scene.mrb
- C:/Users/pinte/AppData/Local/NA-MIC/Slicer/cache/SlicerIO/MR-head...Scene.mrb
- D:/data/PerkLabBootcamp/VisualizationTutorial/MRHead.nrrd
- D:/data/PerkLabBootcamp/VisualizationTutorial_HeadScene.mrb
- D:/data/PerkLabBootcamp/HeadScene.mrb
- D:/data/PerkLabBootcamp/MRHead_Scene/Data/skull_bone.vtk
- D:/data/PerkLabBootcamp/MRHead_Scene/Data/Skin.vtk
- D:/data/PerkLabBootcamp/MRHead_Scene/Data/right_eyeball.vtk
- D:/data/PerkLabBootcamp/MRHead_Scene/Data/optic_tract_R.vtk

Clear History

Load the new scene using the **Recent** data list. (You can load the scene using drag&drop or Add data as well)



Thanks for participating!

