

3D Slicer

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Introduction to 3D Slicer

Alicia Pose Díez de la Lastra and Mónica Sevilla García



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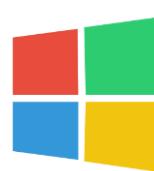
1. Introduction to 3D Slicer
2. 3D Slicer UI and Basic Navigation
3. From Medical Images to 3D Patient Models
(surface rendering)



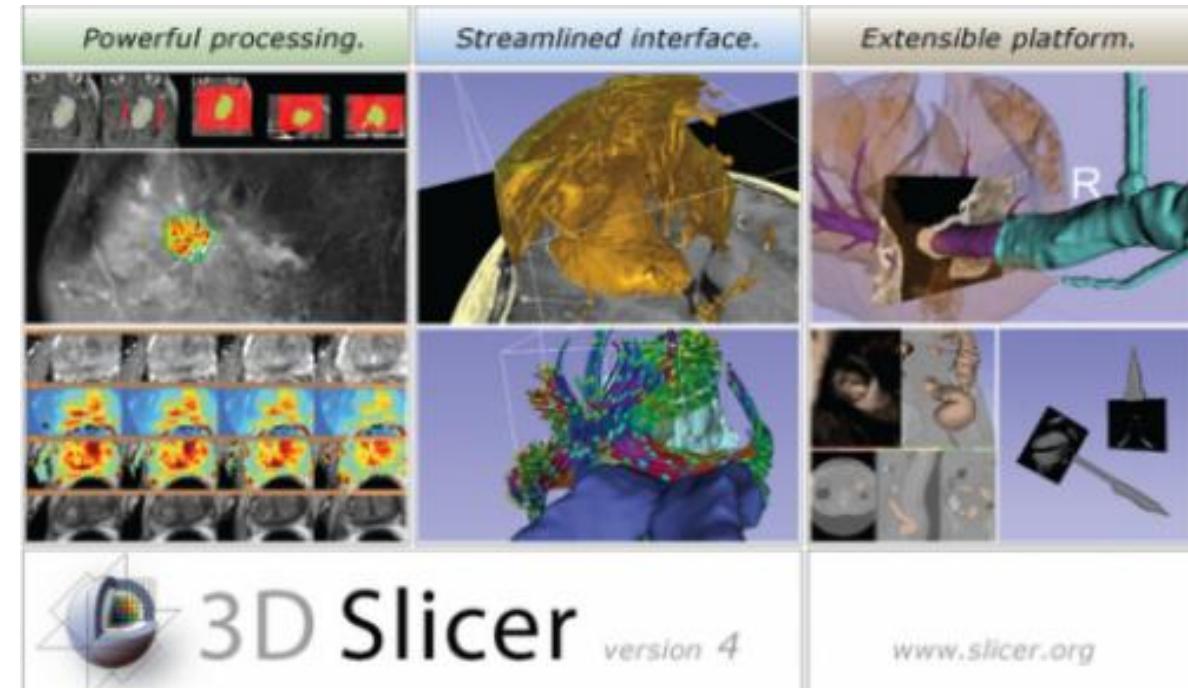
Introduction to 3D Slicer

What is 3D Slicer?

- Medical image computing platform
- Open-source
- Completely free (BSD)
- Multi-platform



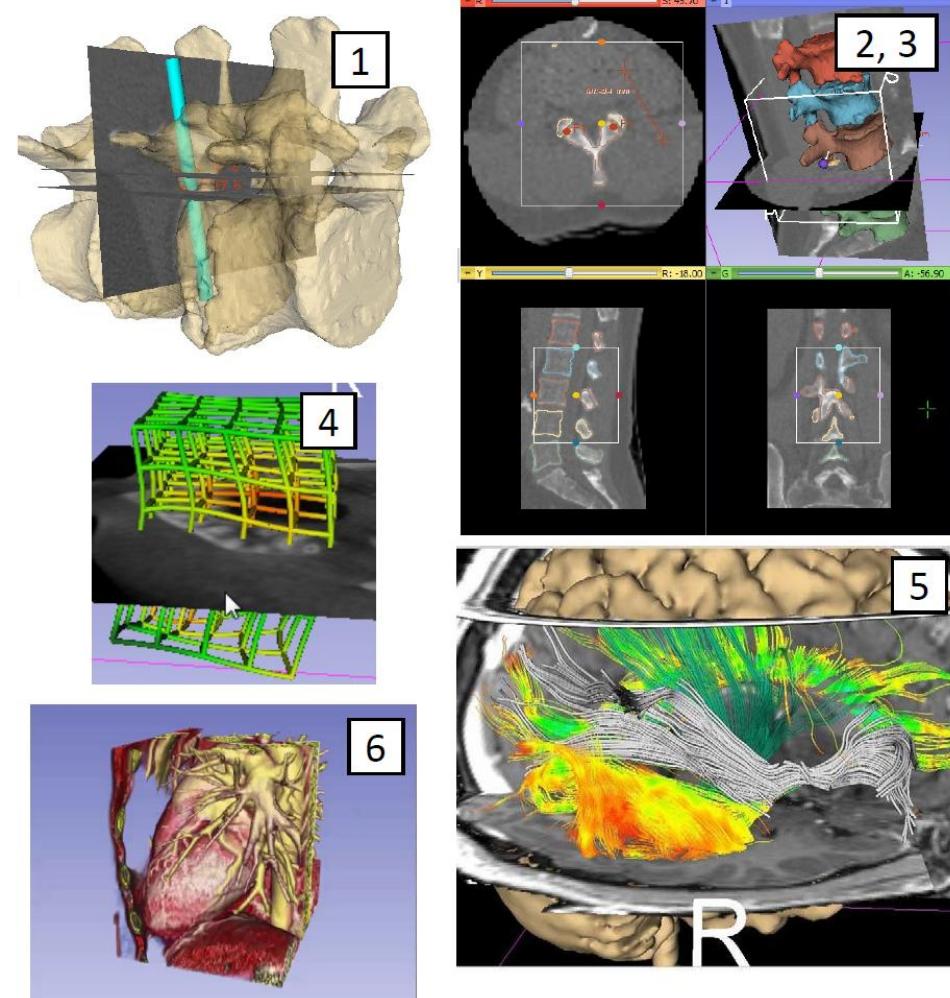
- User and developer support
- Training courses, documentation, tutorials



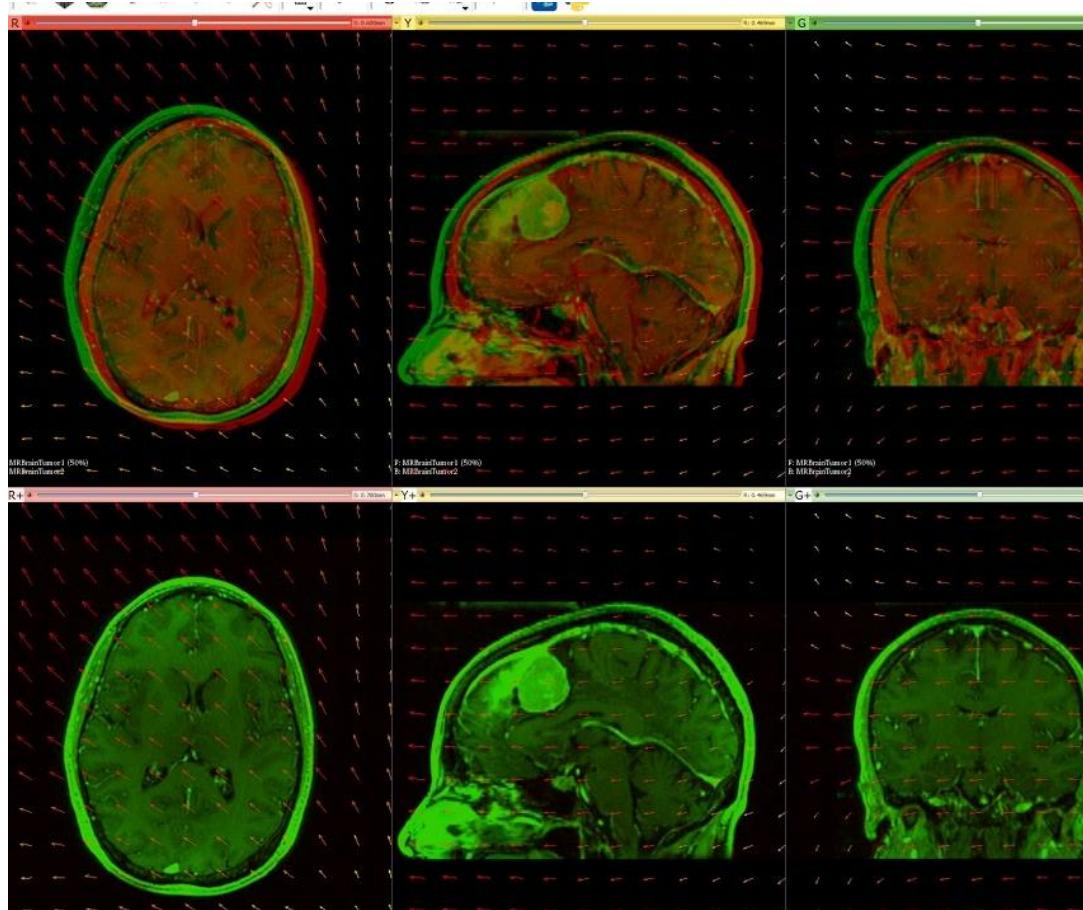
Fedorov, et al. "3D Slicer as an image computing platform for the Quantitative Imaging Network." Magnetic resonance imaging 30.9 (2012): 1323-1341.

Visualization

1. 2D (slice) and 3D views, chart views
2. Configurable layout
3. Mul.-modality image fusion (foreground, background, label map)
4. Transforms, vector and tensor field visualization
5. Surface and volume rendering
6. Time sequence data



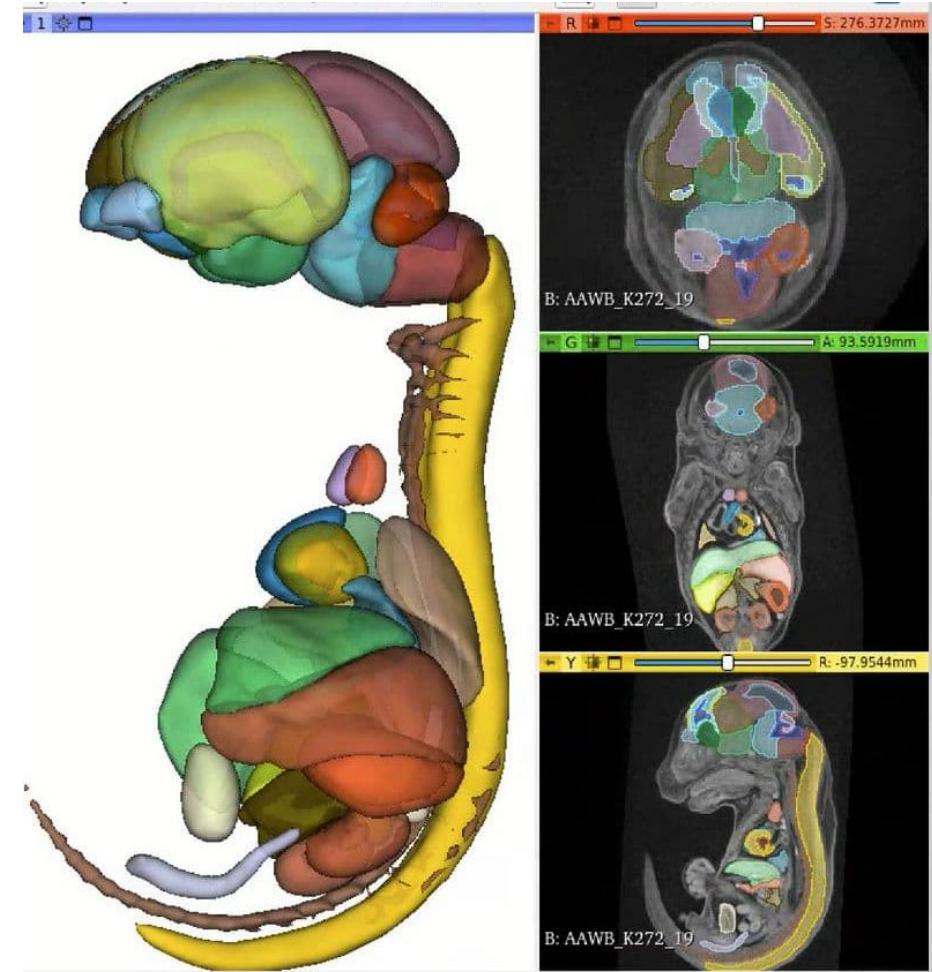
Registration



- Manual: translation, rotation in 3D
- Automatic: rigid, deformable, with various similarity metrics, initialization methods, optimizers, masking, etc.
- Extensions: structure-based registration, Elastix, etc.

Segmentation

- Manual (paint, draw, scissor, threshold, etc.)
- Semi-automatic (region-growing, fill between slices, etc.)
- Automatic (atlas-based, robust statistics, etc.)

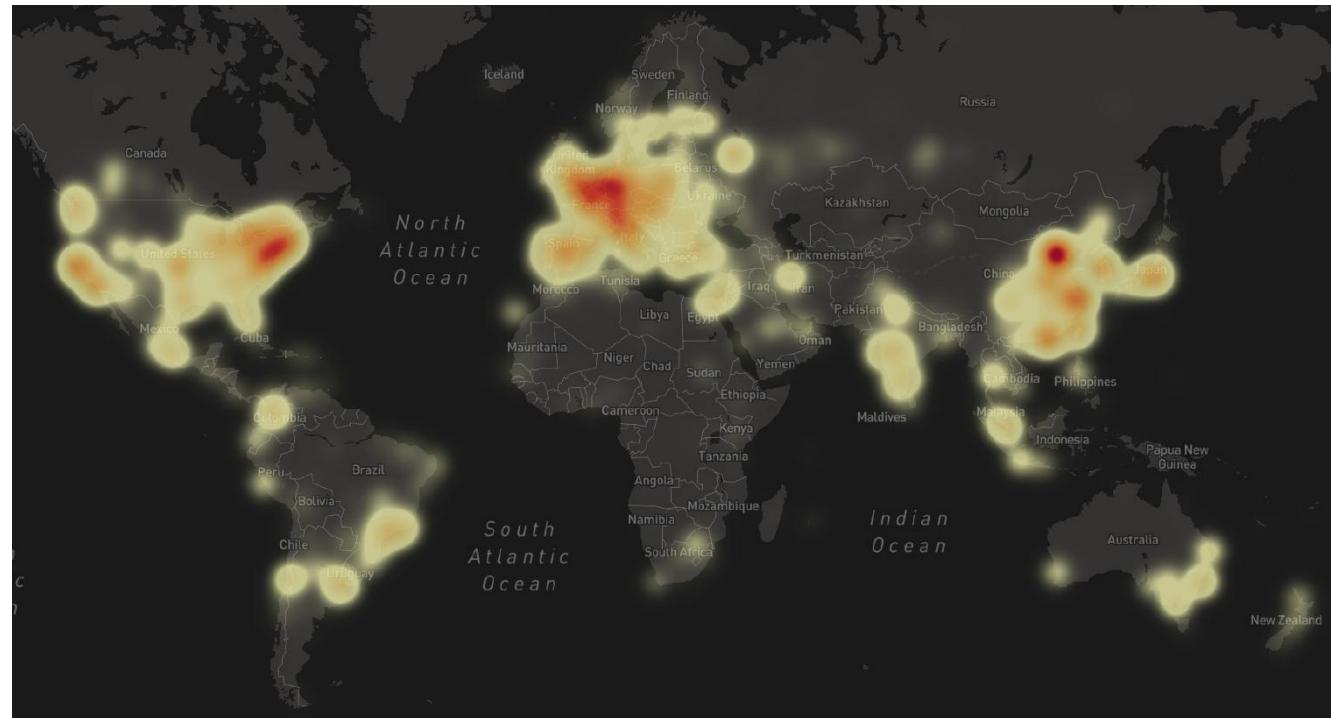


Large user community

500 downloads per week in 2012

3700 downloads per week in 2022

890 000+ downloads over the past 5 years



3D Slicer Internationalization



LanguagePacks

Utilities

Extension for deploying
language packs and editing
translations.

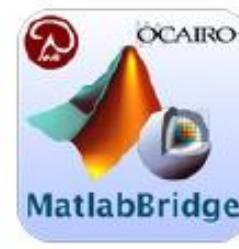
- 3D Slicer is used worldwide, but until recently, the platform was available only in English
- The 3D Slicer Internationalization project aims to improve accessibility by supporting multiple languages in the user interface
- Many languages already available:

English
Arabic
German
Spanish
French
Hungarian
Japanese
Polish
Portuguese
Russian

3D Slicer is extensible



PerkTutor



MatlabBridge



SlicerOpenIGTLLink



elastiX



SlicerProstate



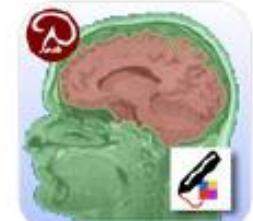
SliceTracker



SlicerVR



Markups to Model



SegmentEditorExtraEffects



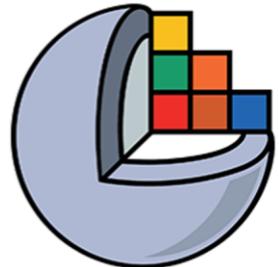
Debugging tools



Debugging Tools For Extensions



SlicerRT



3D Slicer

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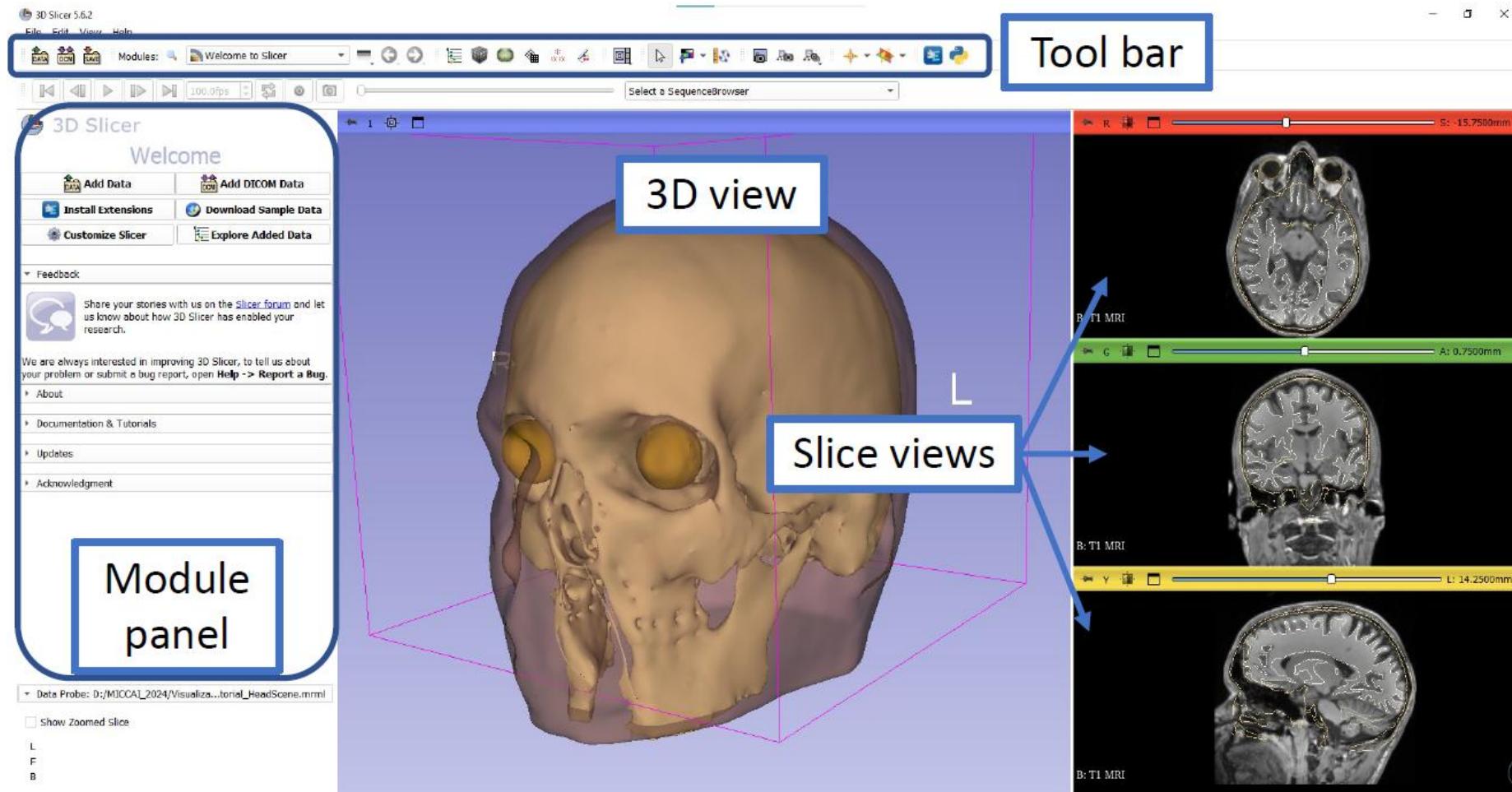
3D Slicer UI and Basic Navigation



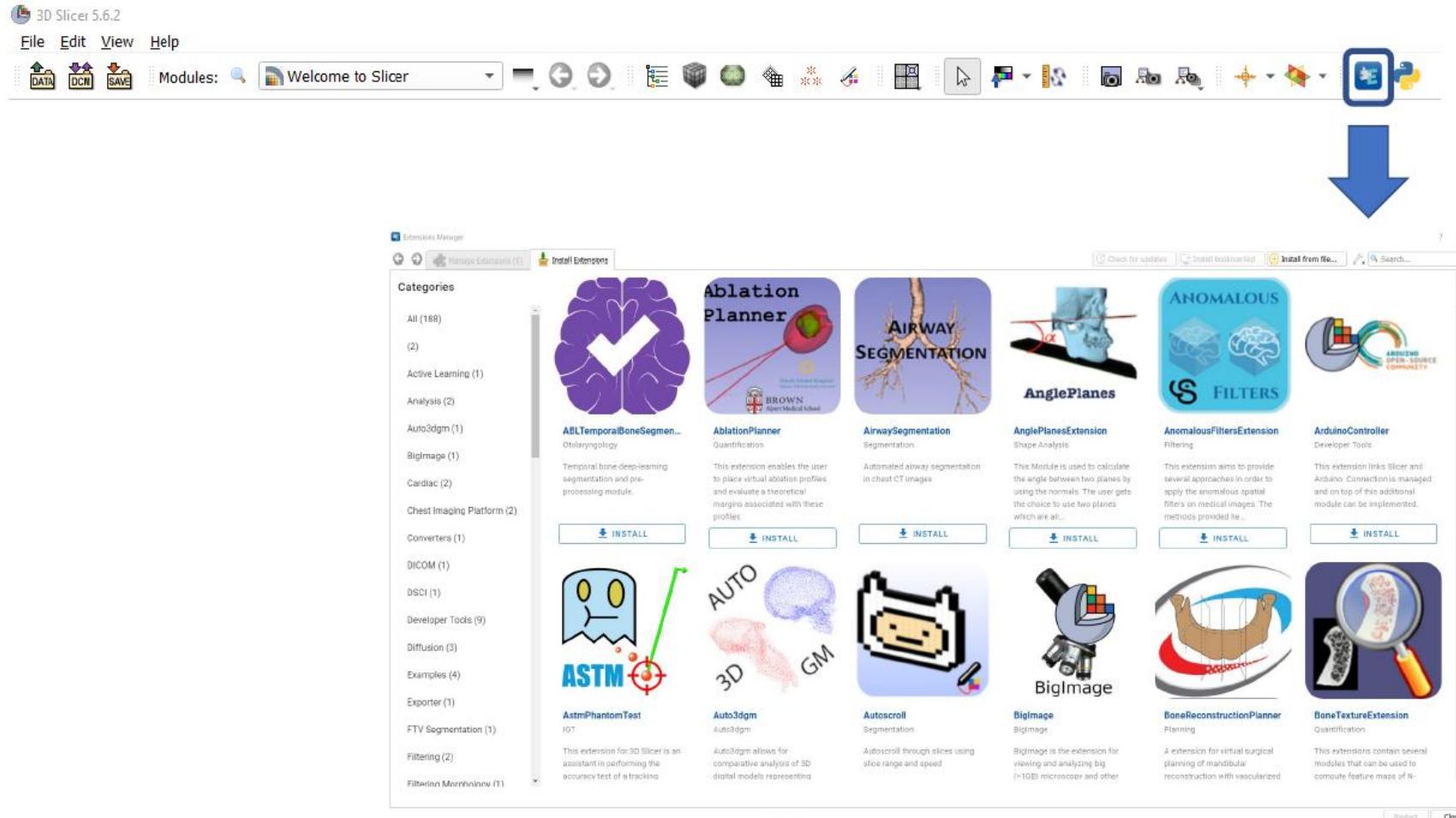
BSEL



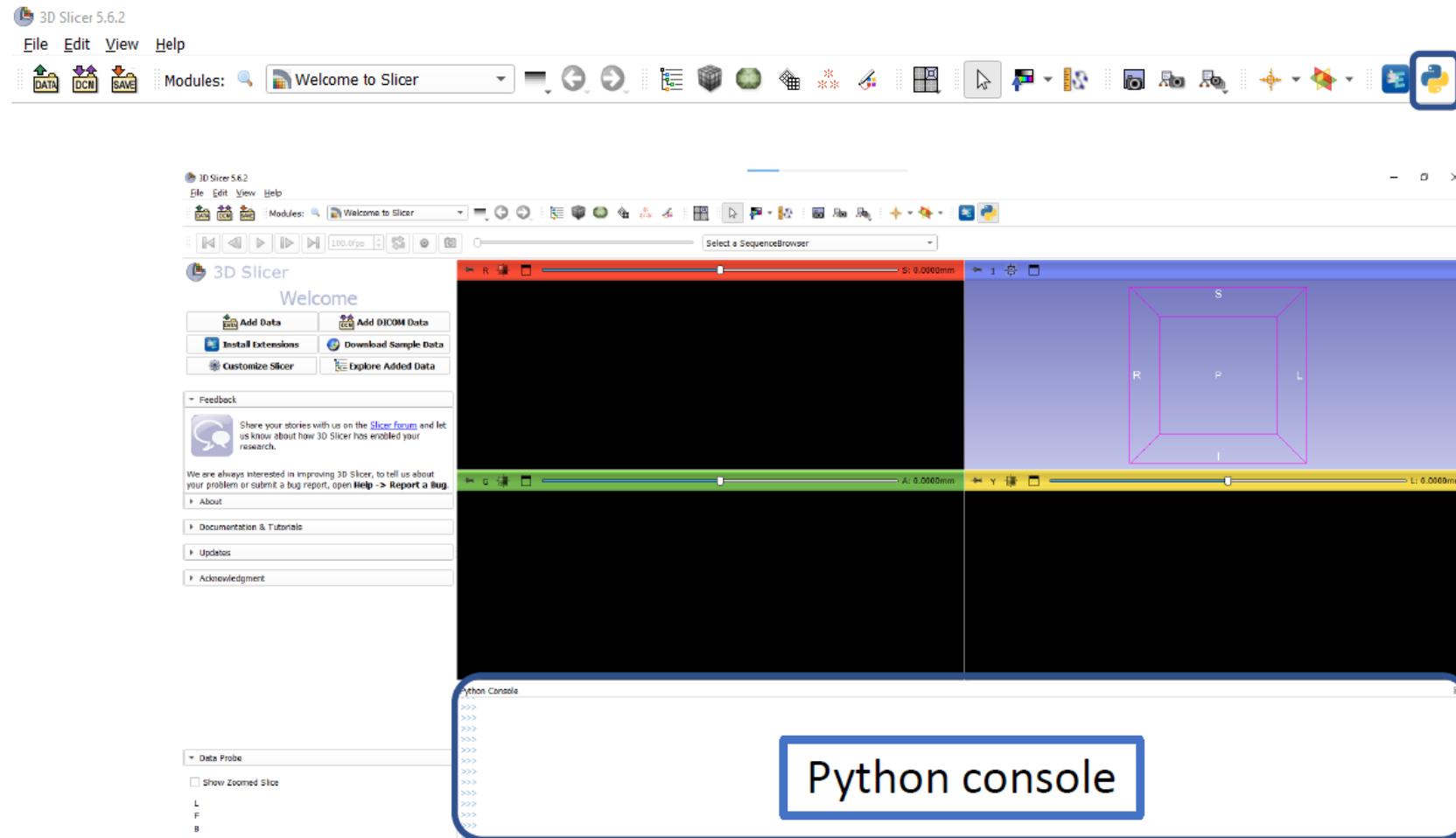
Main user interface



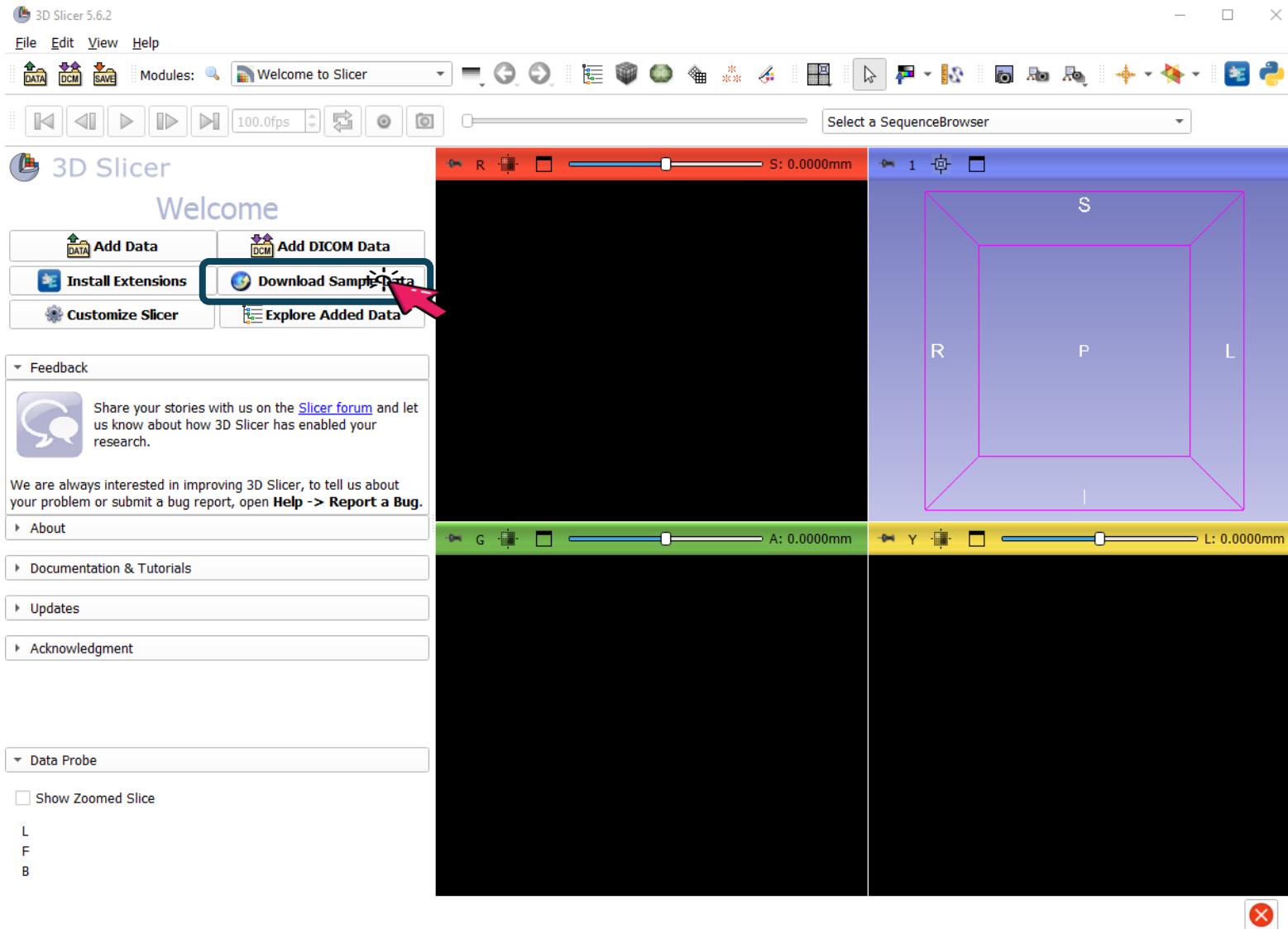
Main UI – Extension Manager



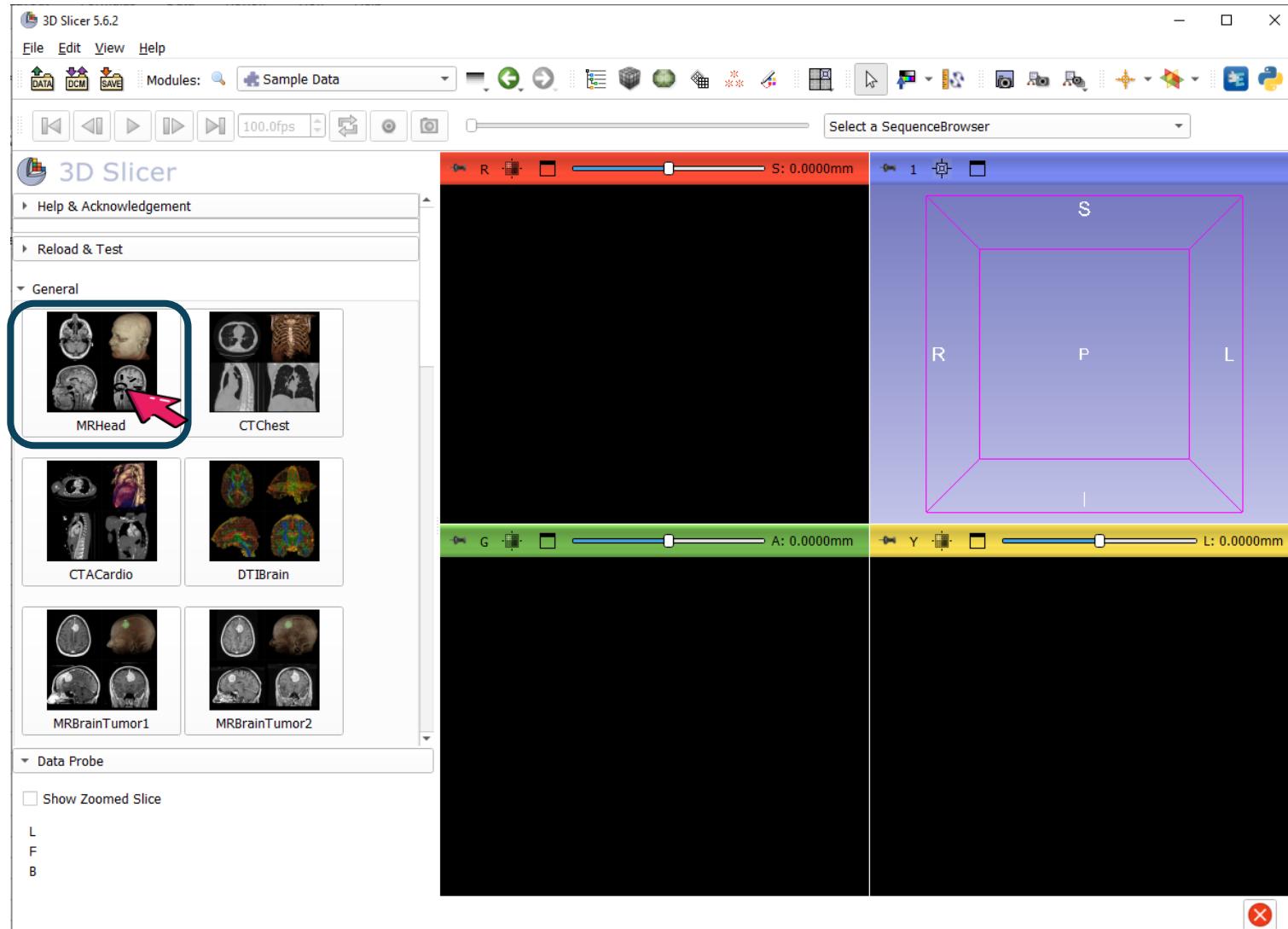
Main UI – Python console



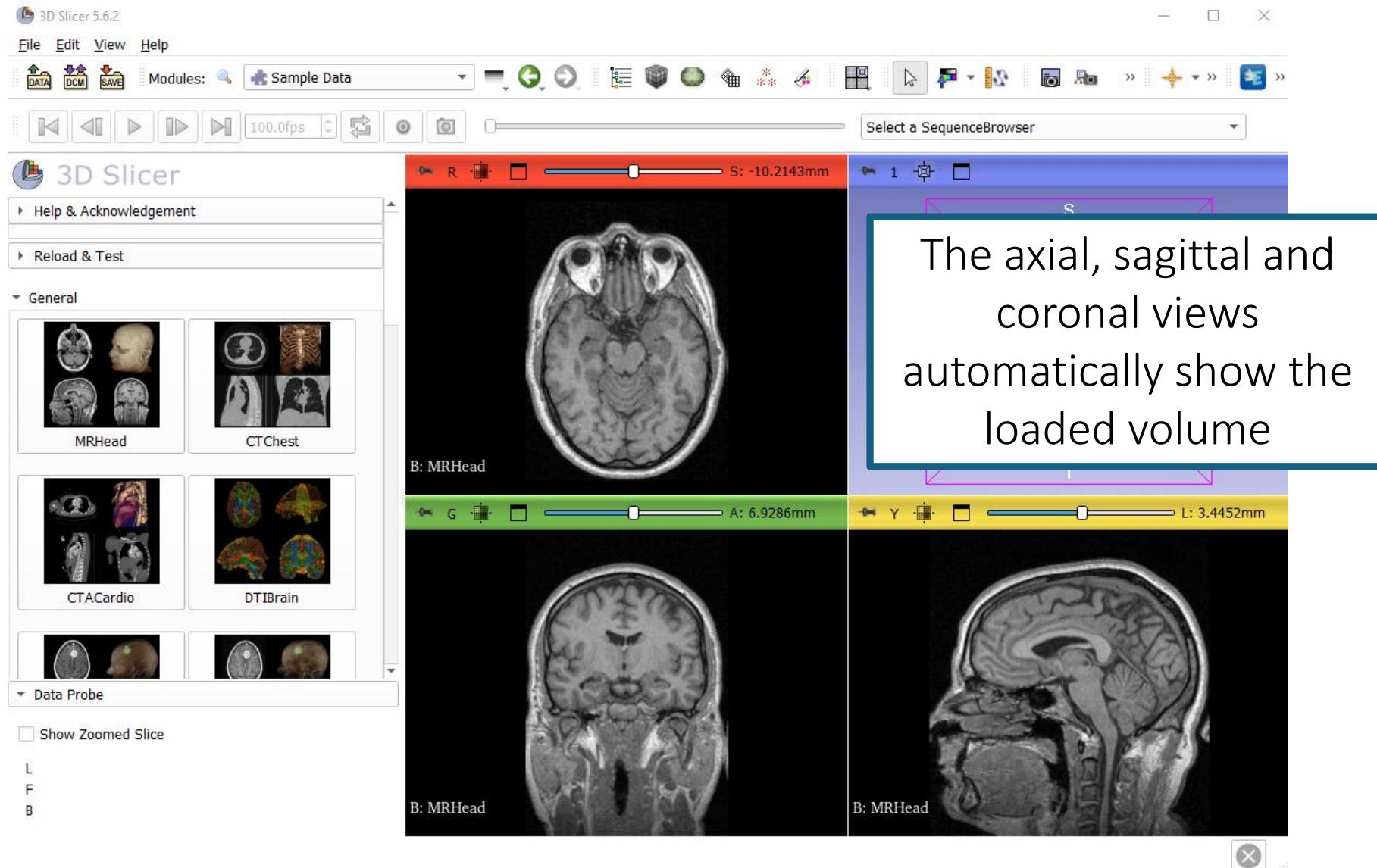
Load sample MRI data



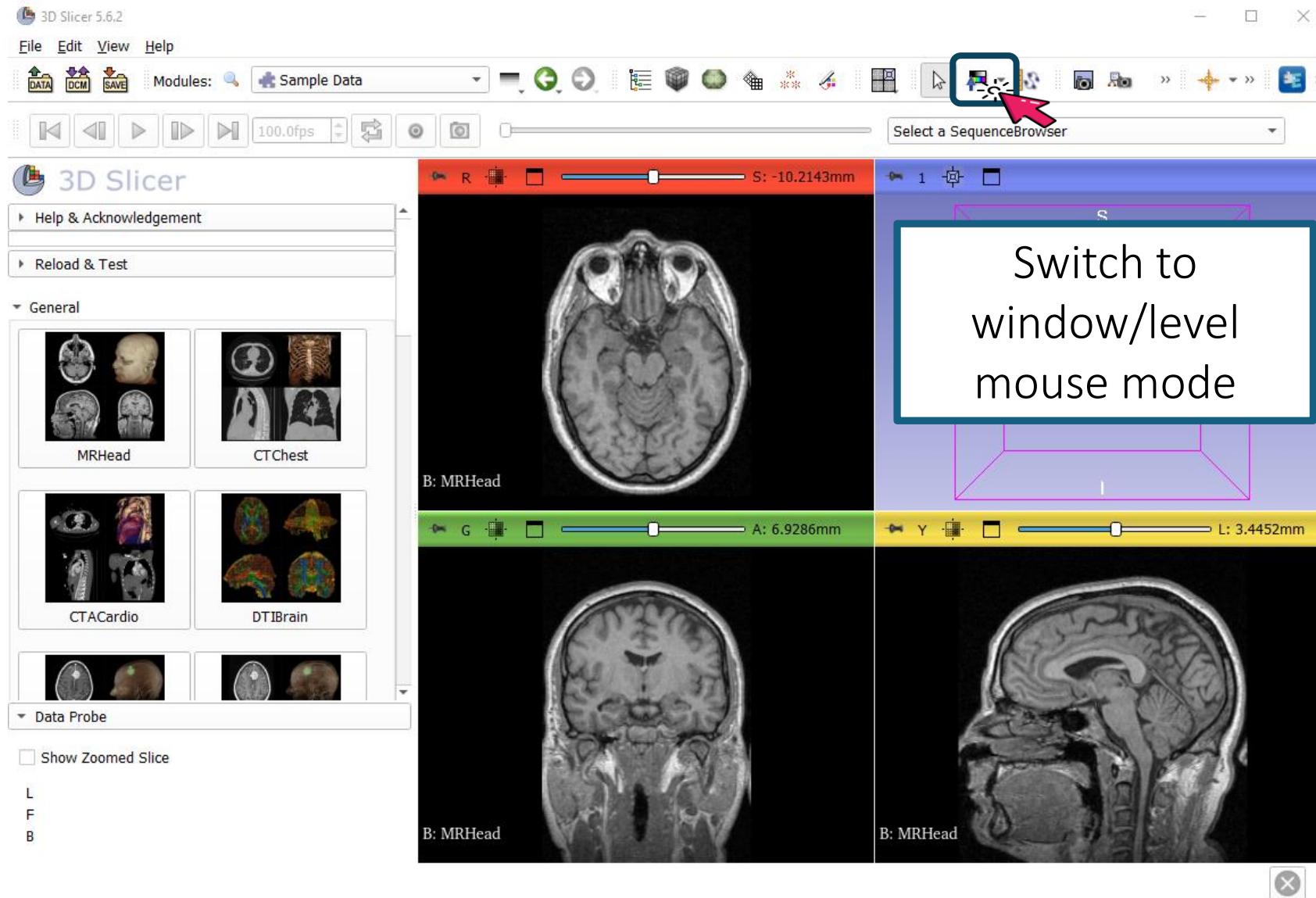
Load sample MRI data



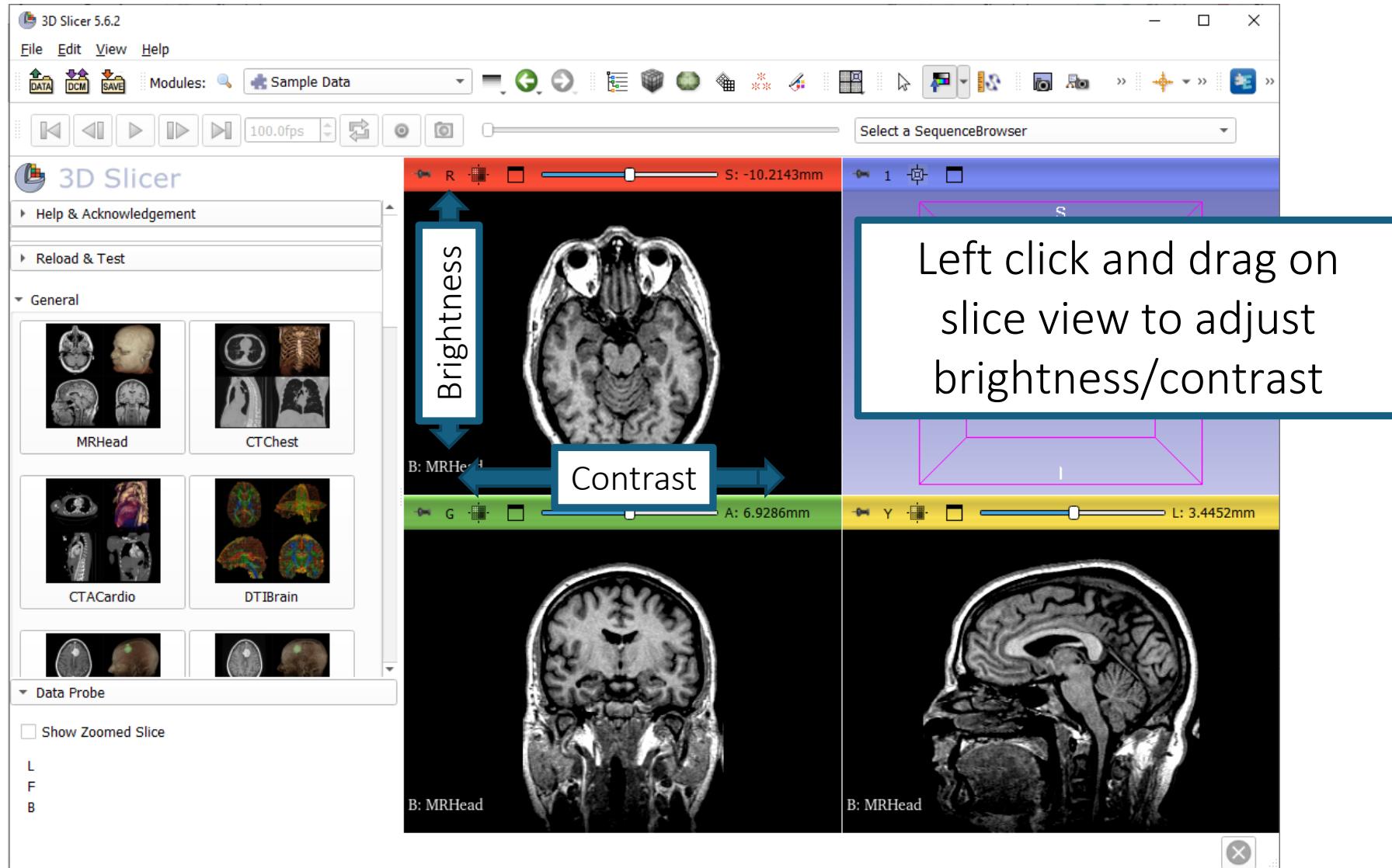
Load sample MRI data



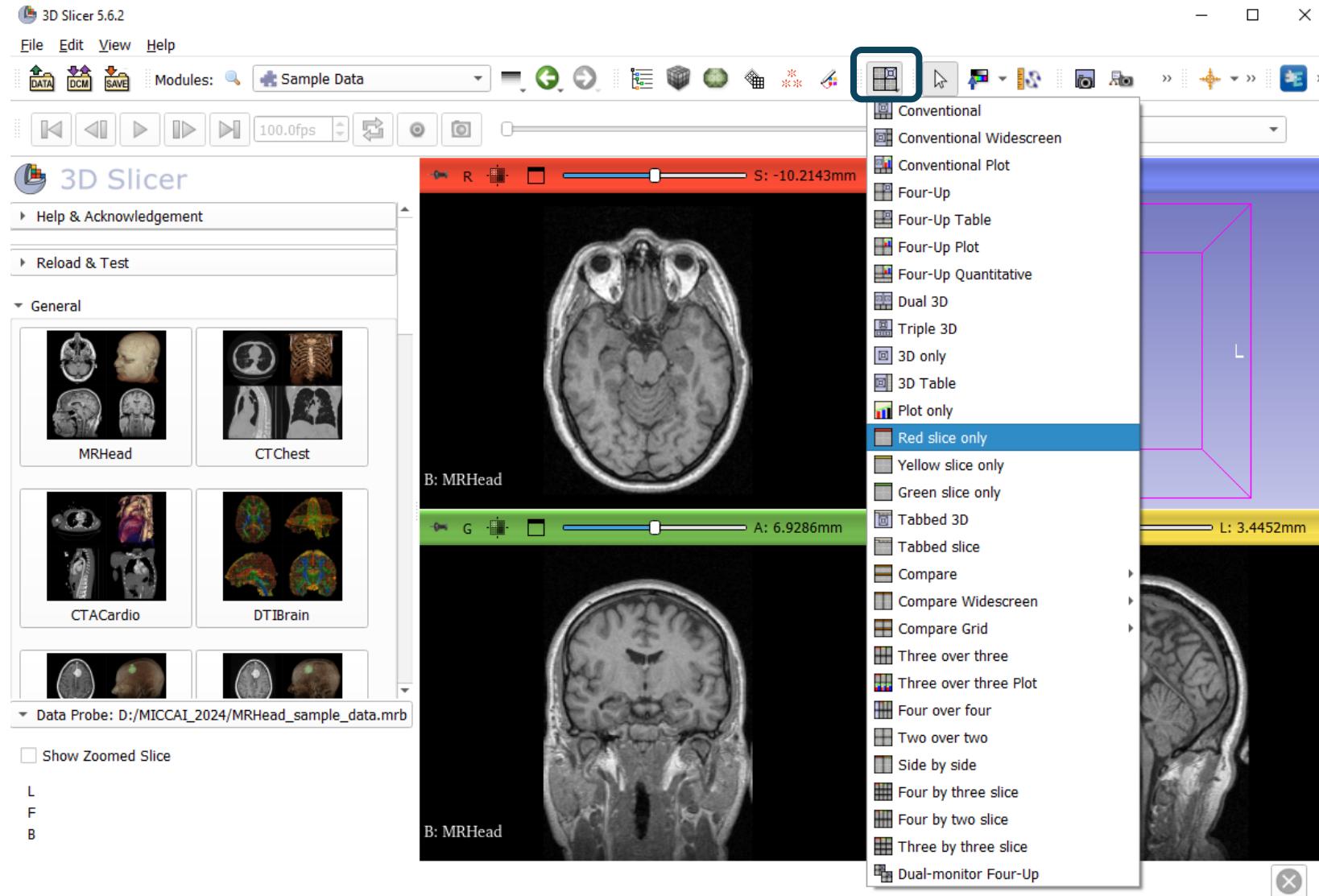
Adjust window/level



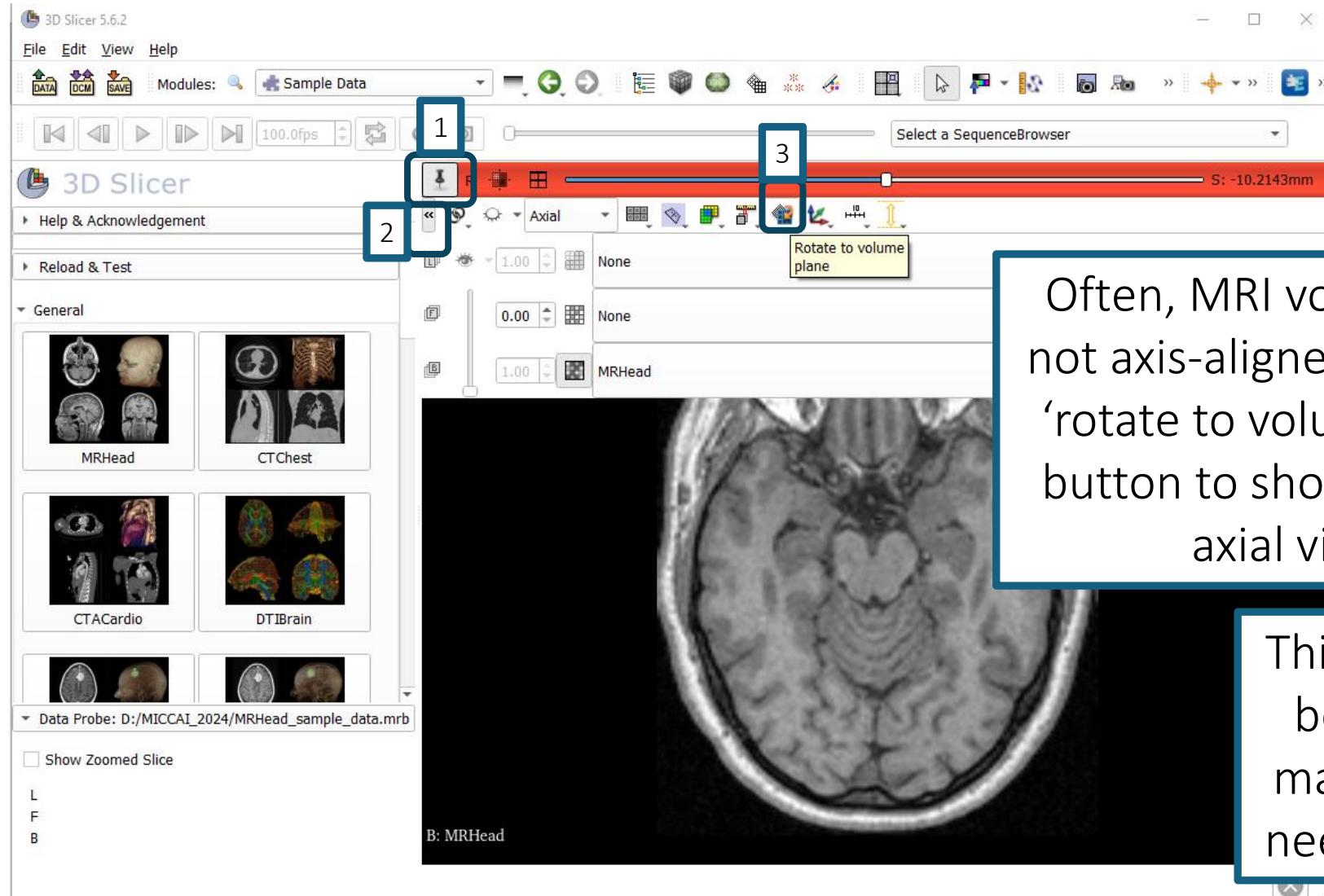
Adjust window/level



Change views



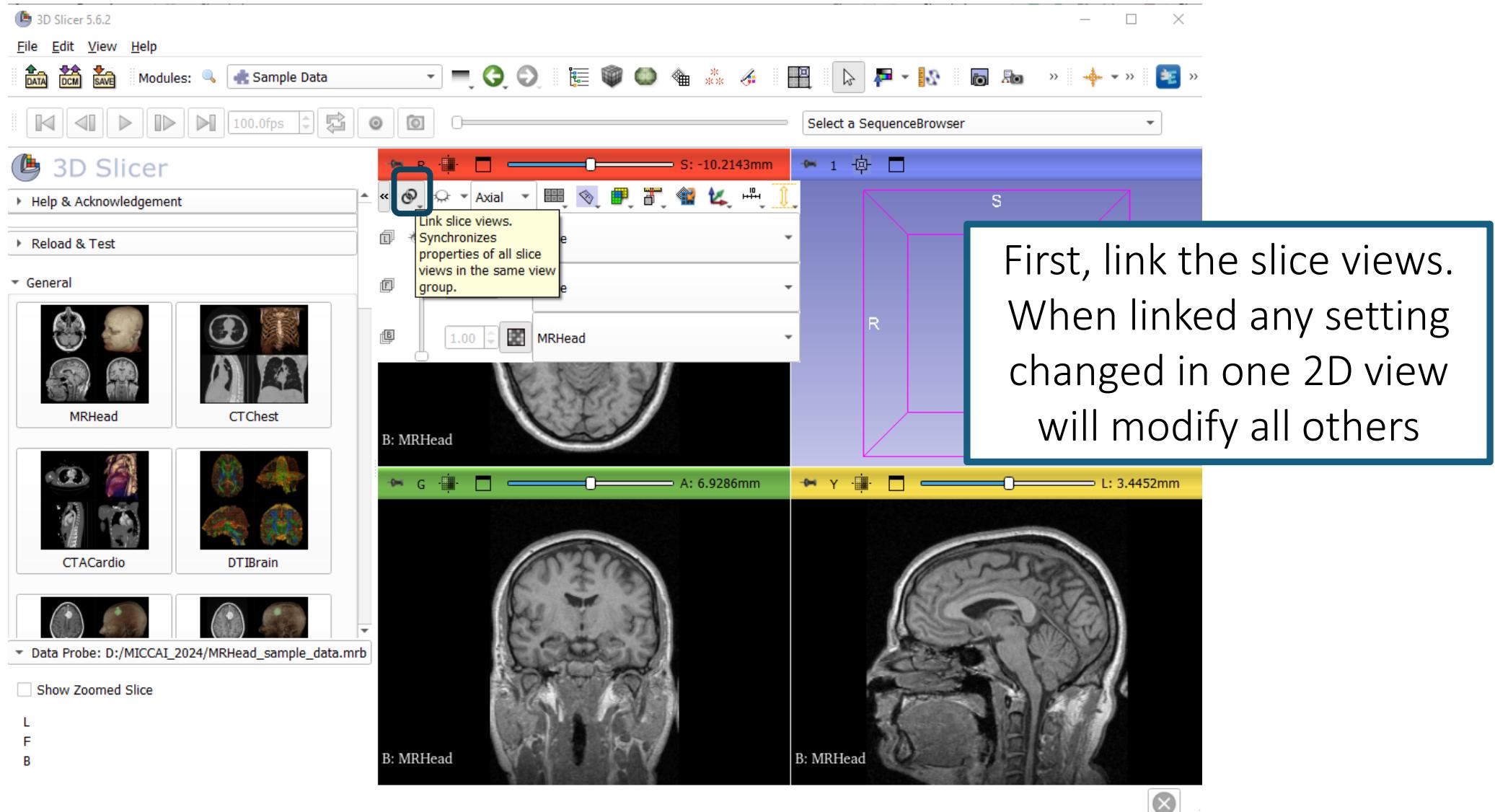
Rotate to volume plane



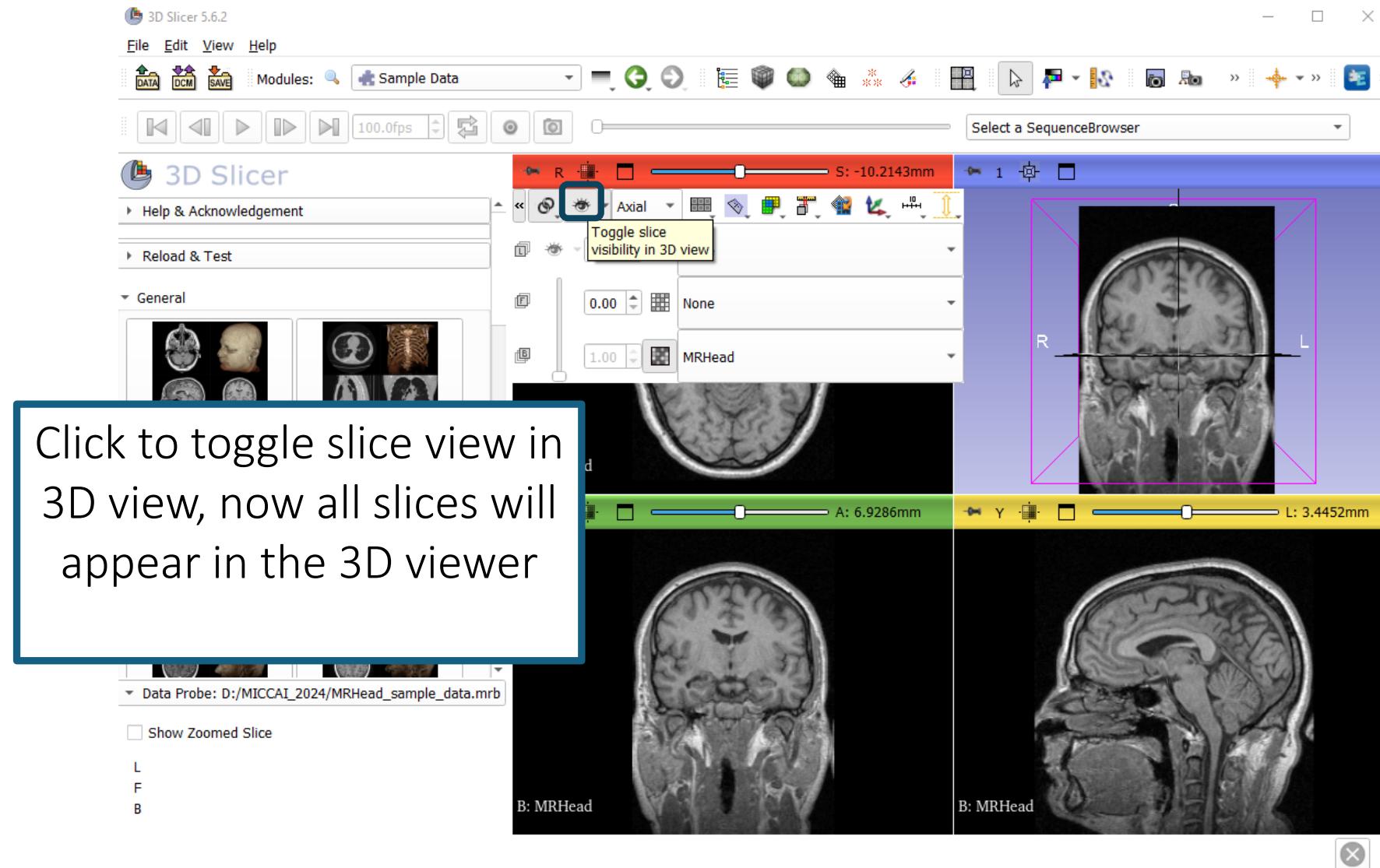
Often, MRI volumes are not axis-aligned. Click the 'rotate to volume plane' button to show the true axial view

This image will not be affected, but many DICOM MRI need to be aligned

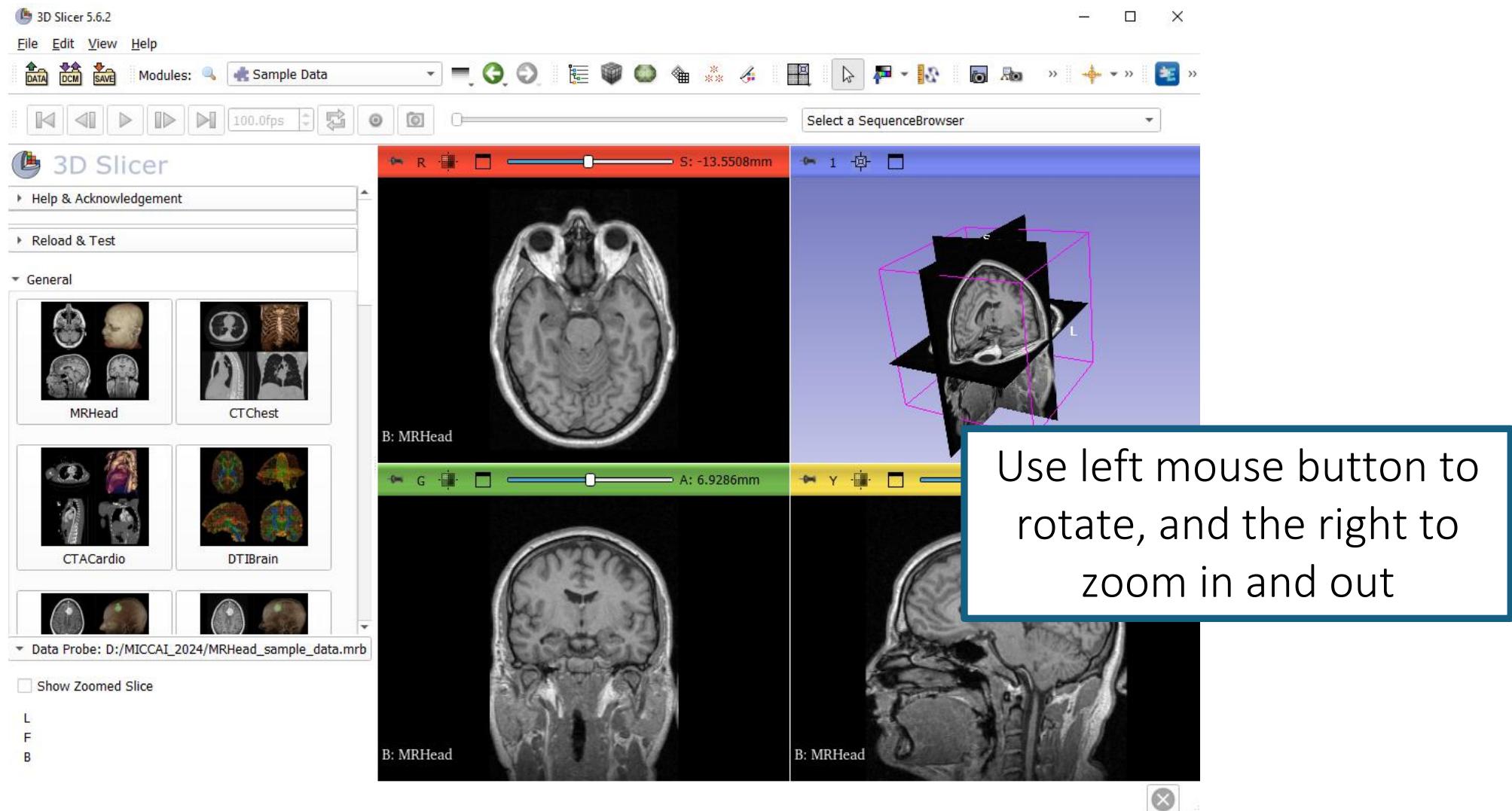
Show slices in 3D



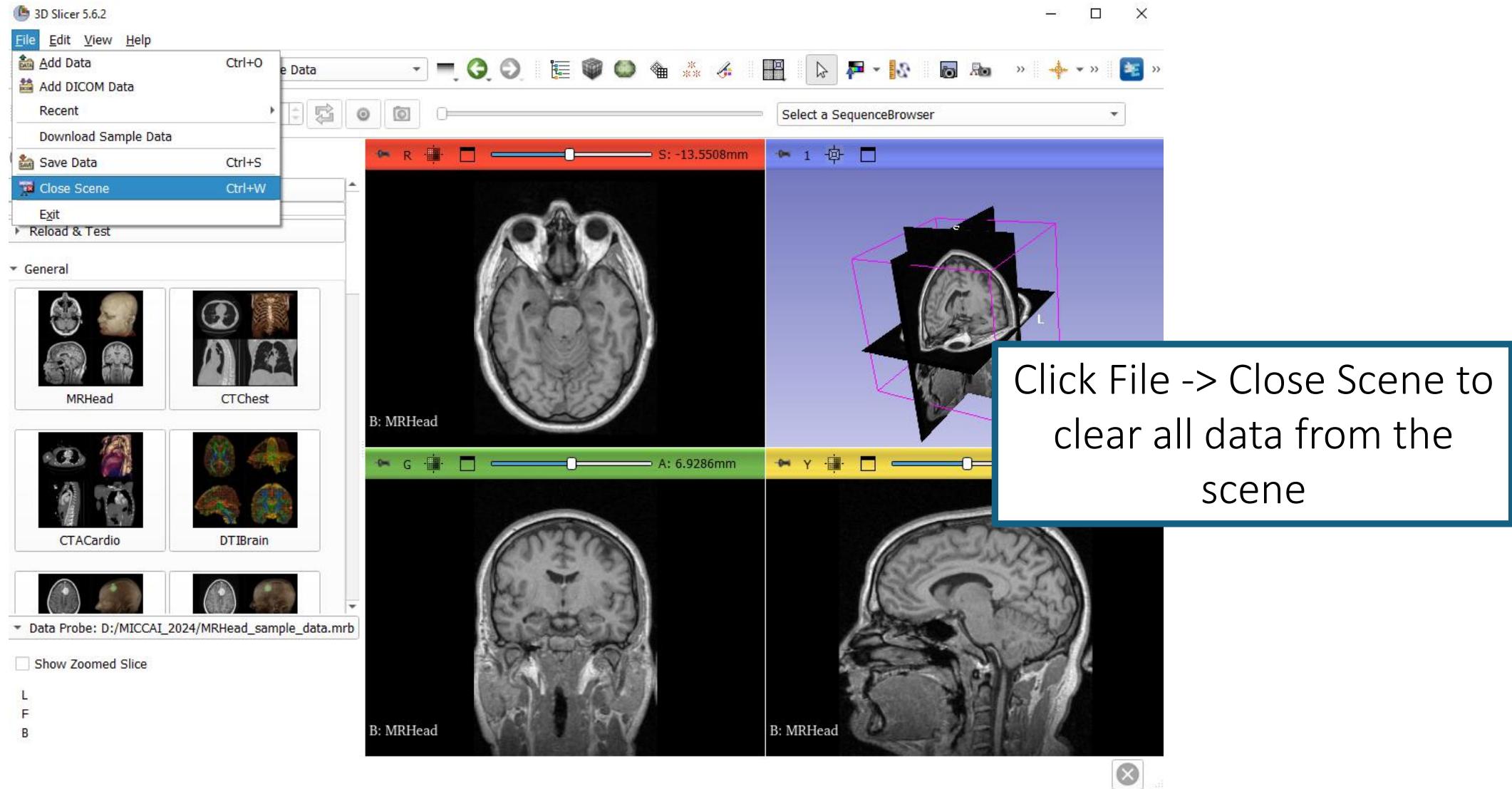
Show slices in 3D



Navigating the 3D view



Close the scene

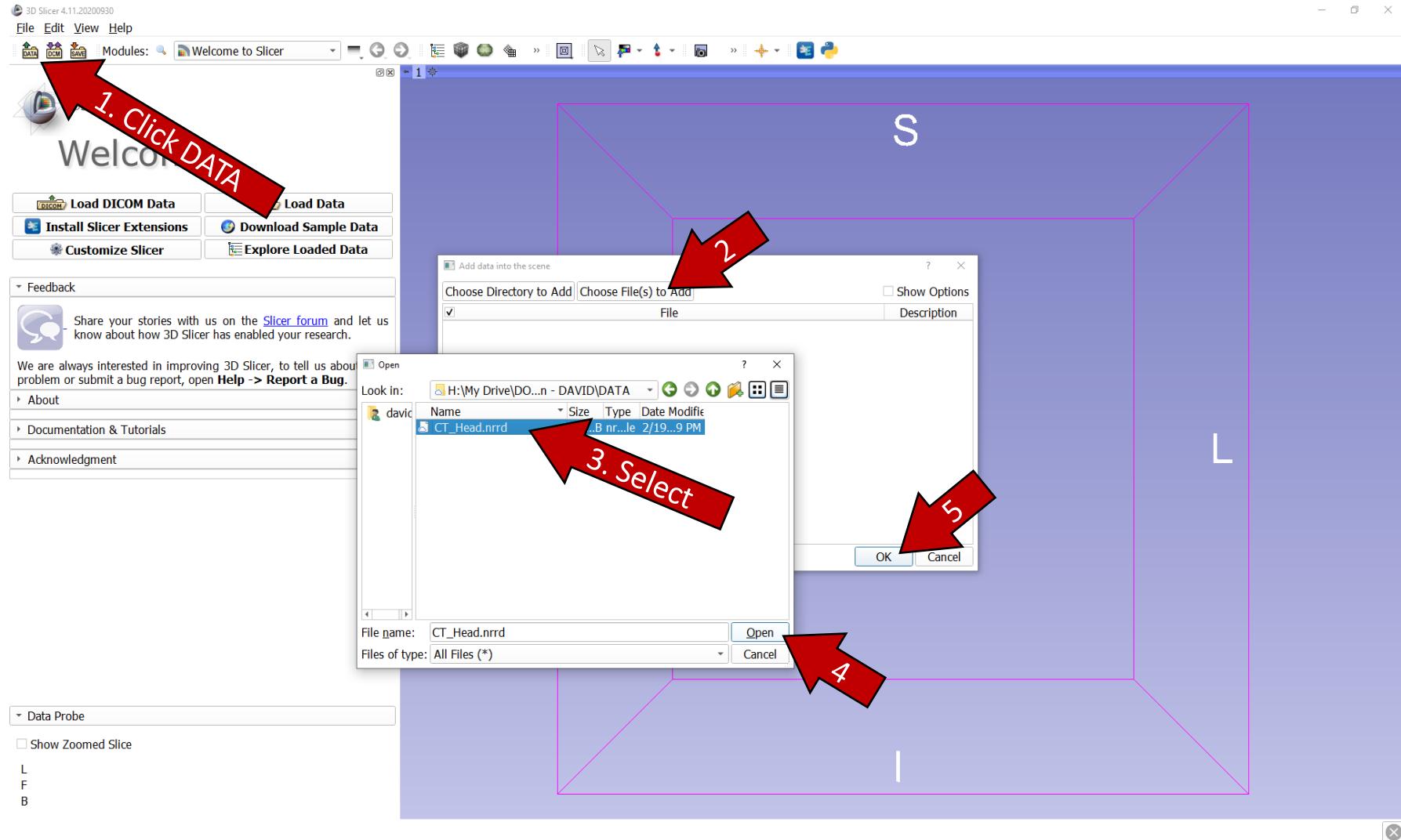




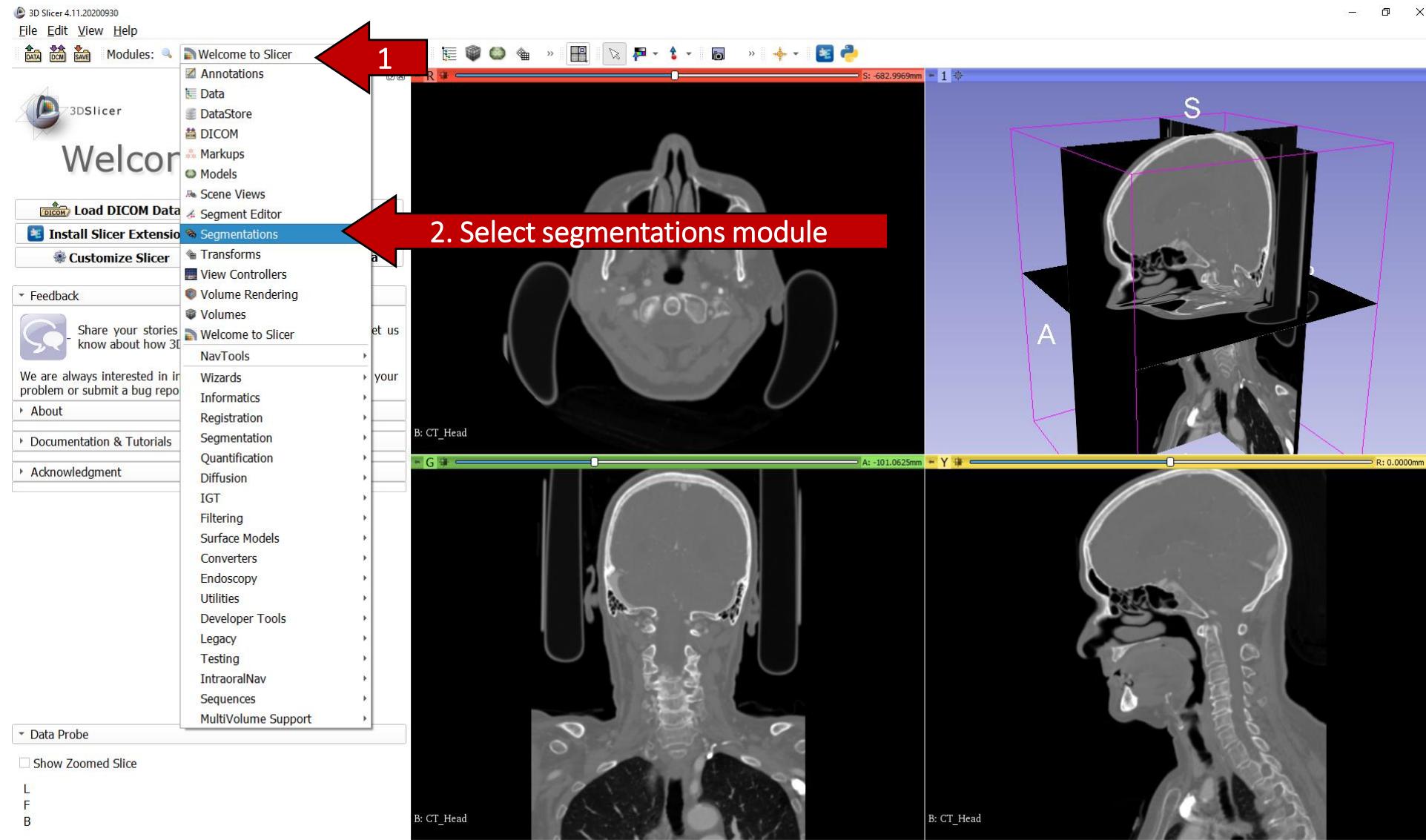
From Medical Images to 3D Patient Models

Surface Rendering

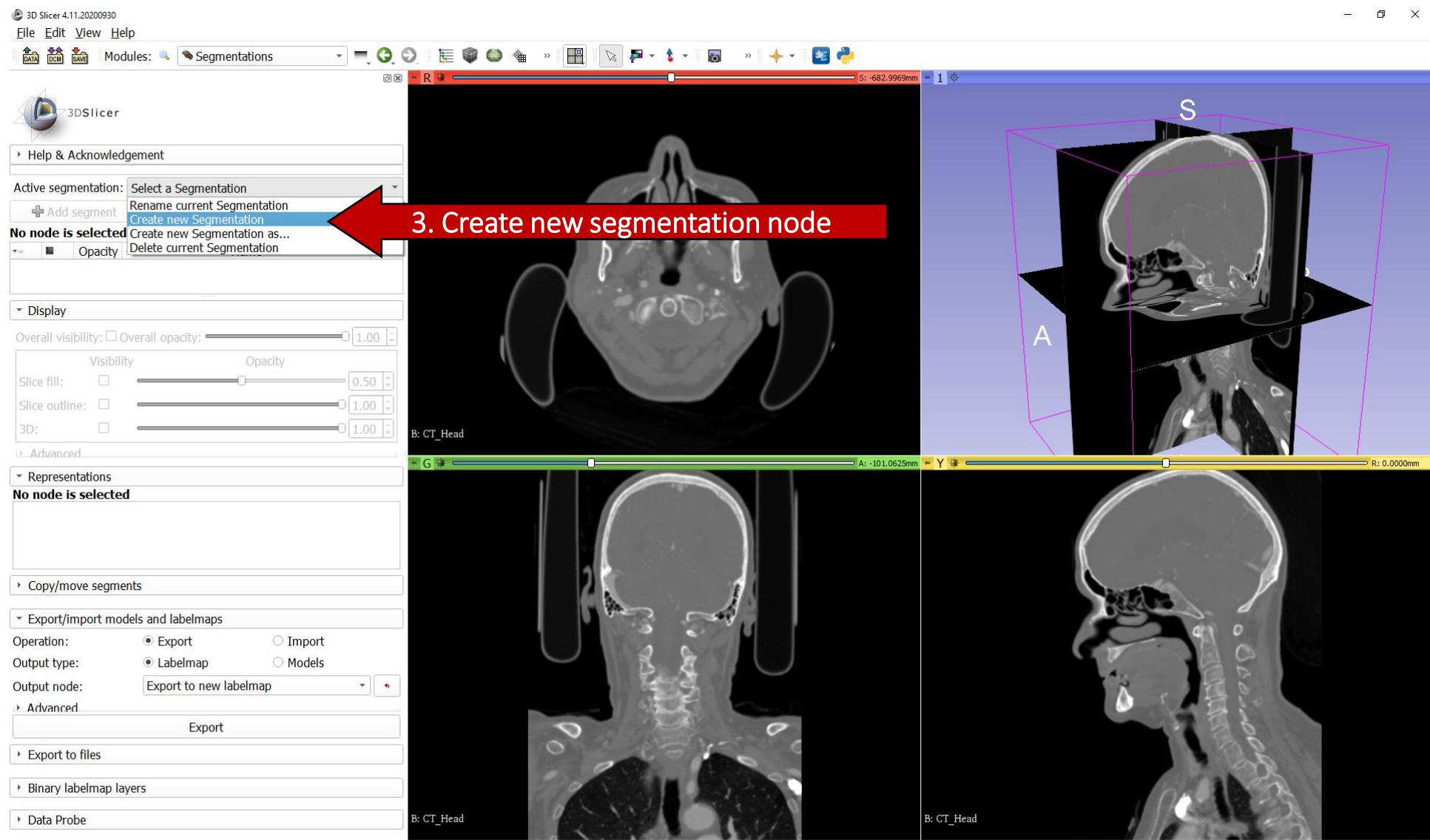
Load sample data



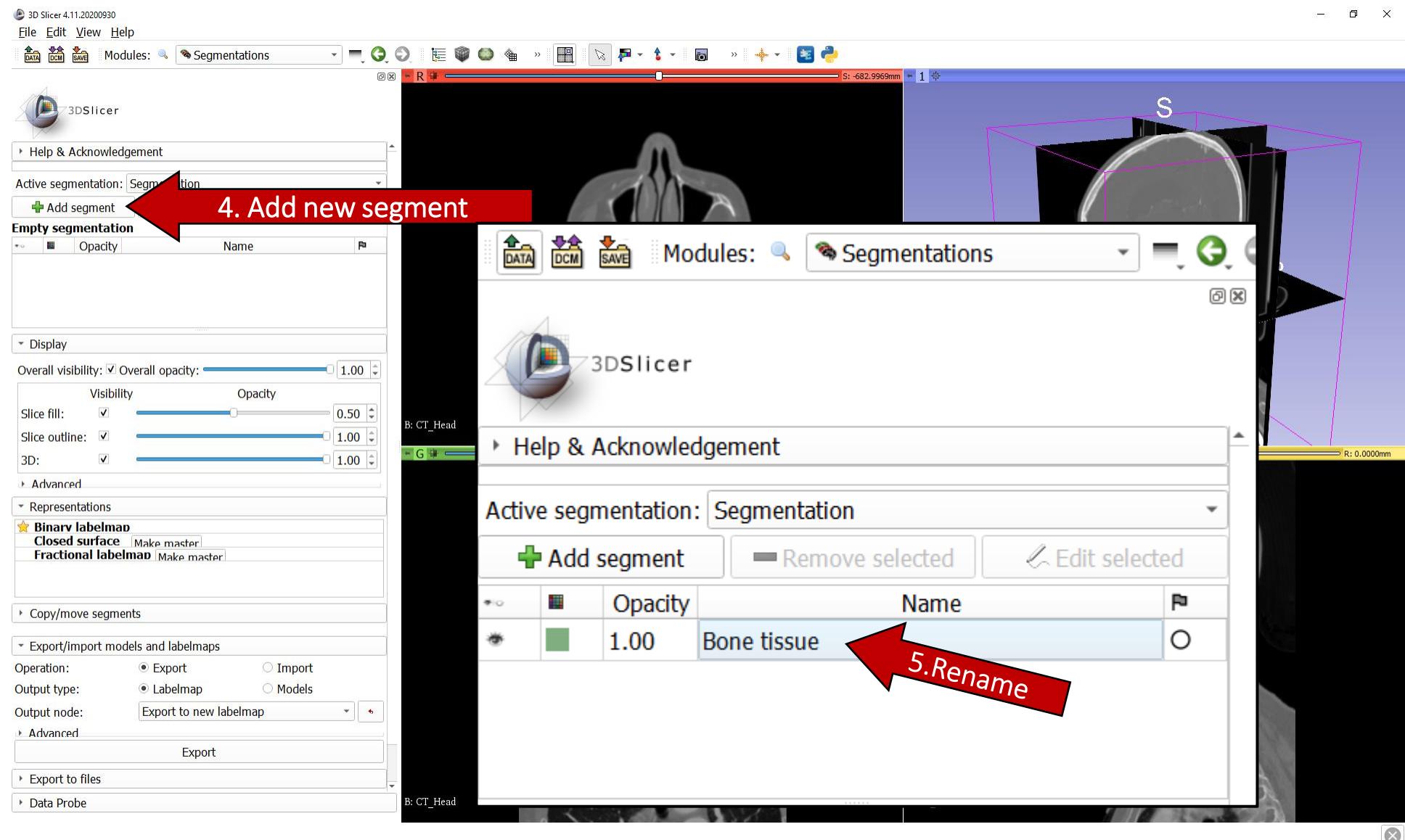
Segmentation of bone tissue



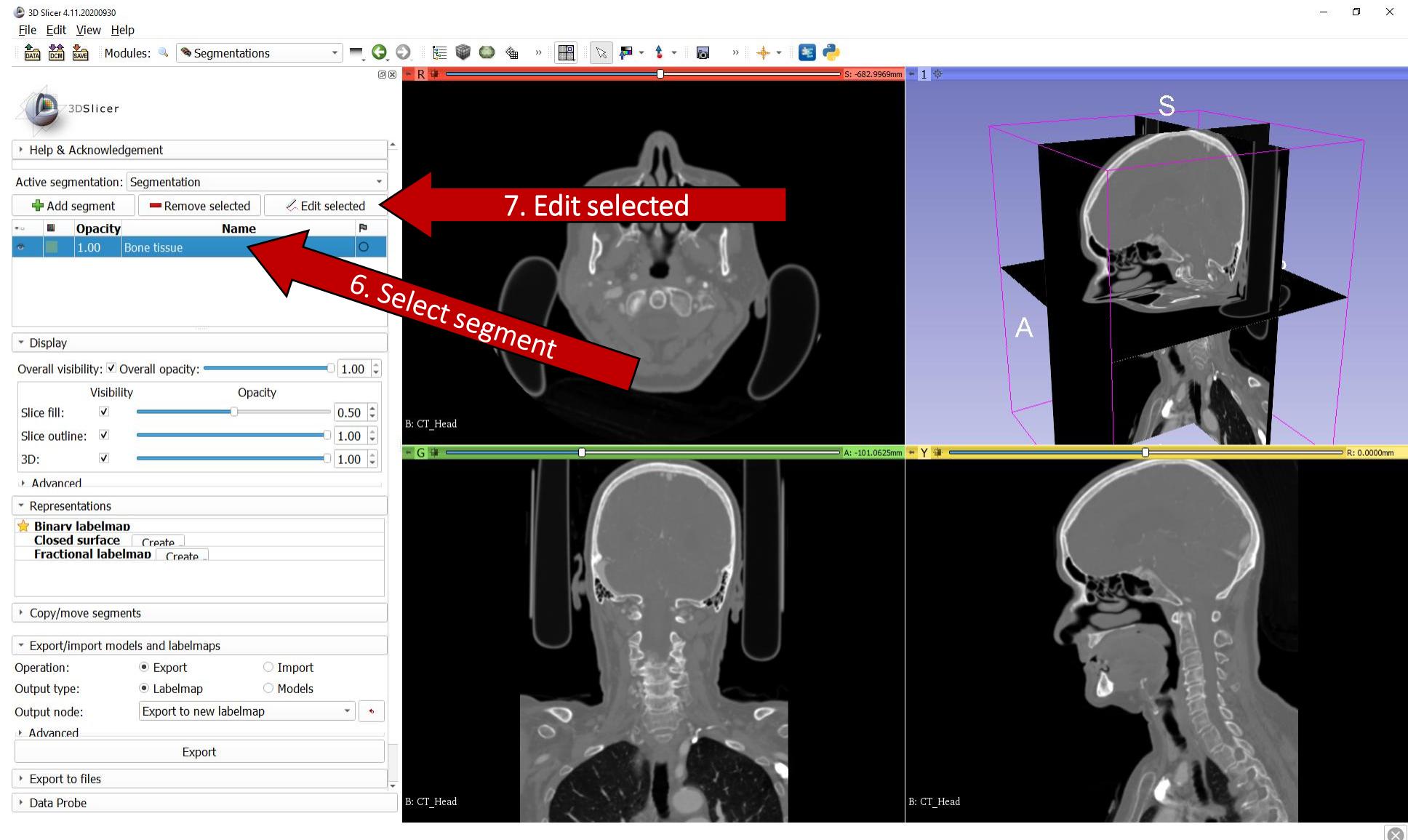
Segmentation of bone tissue



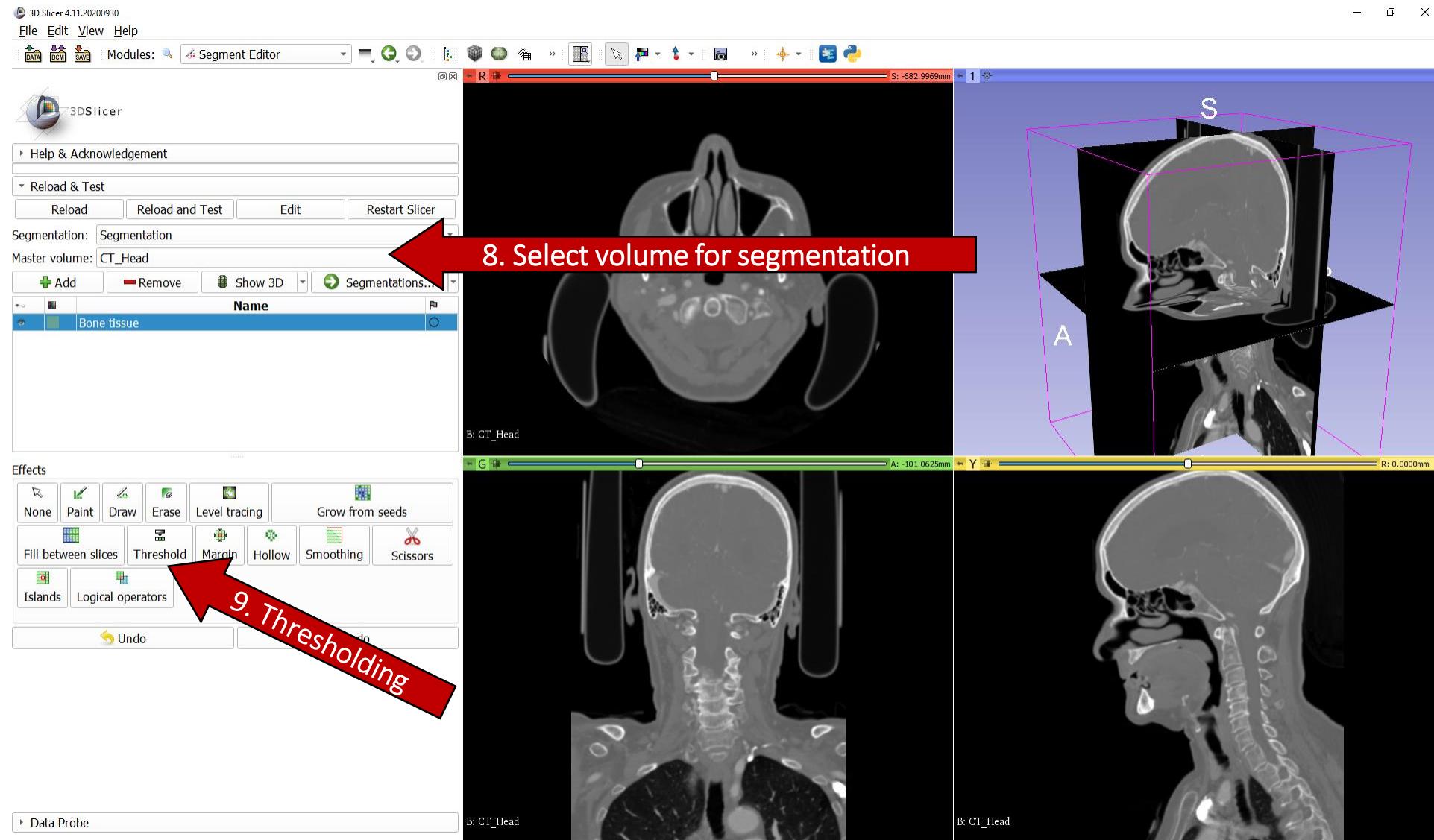
Segmentation of bone tissue



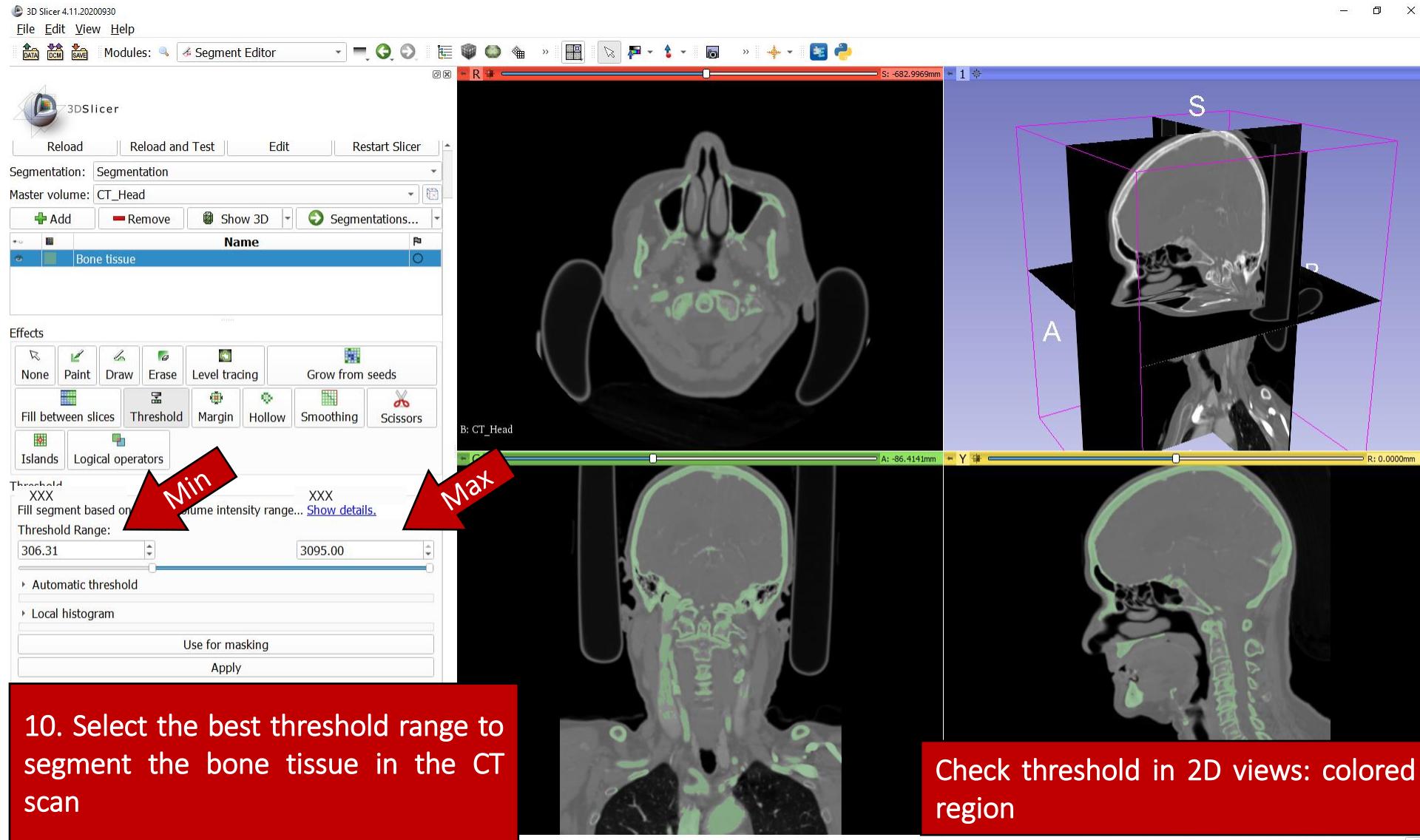
Segmentation of bone tissue



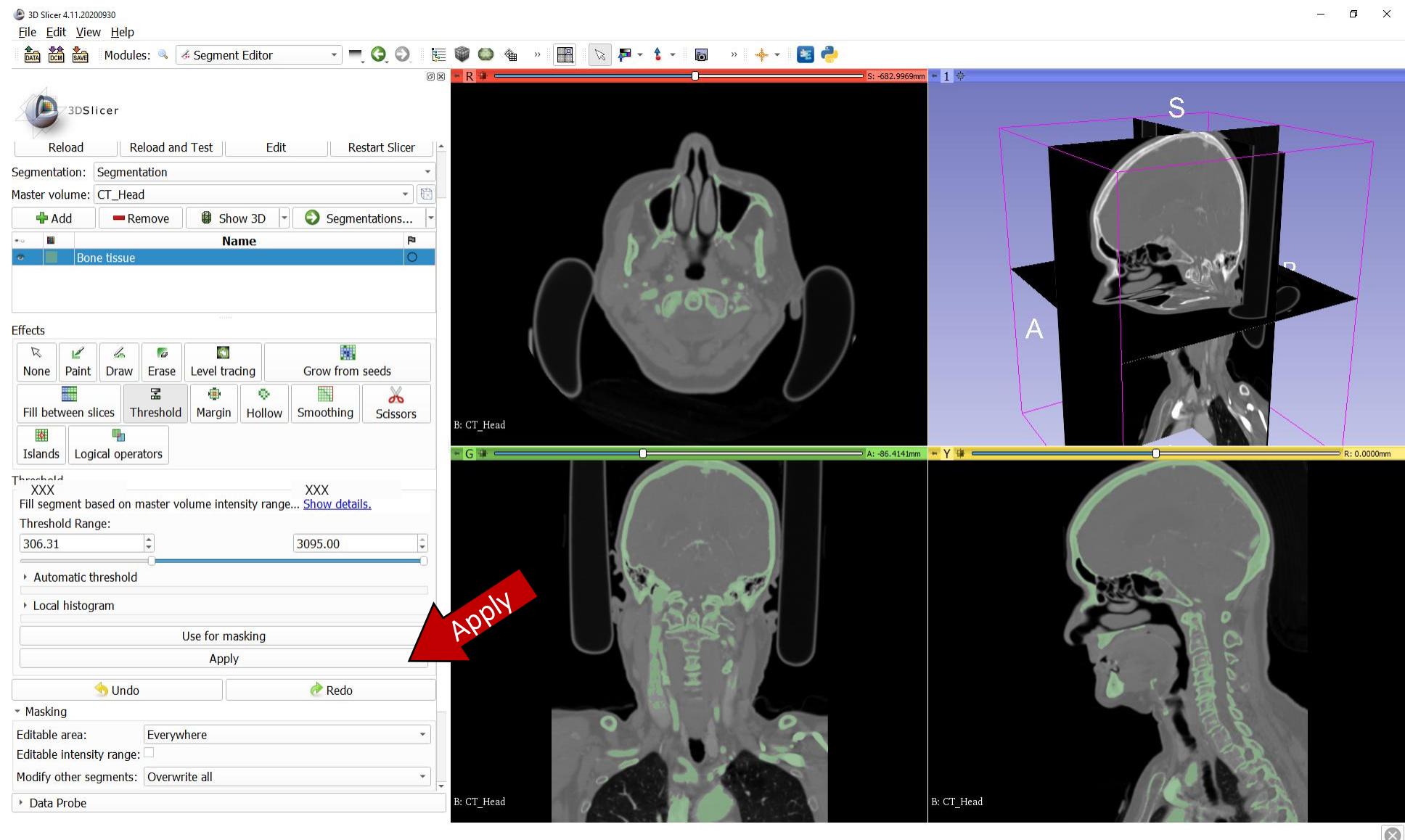
Segmentation of bone tissue



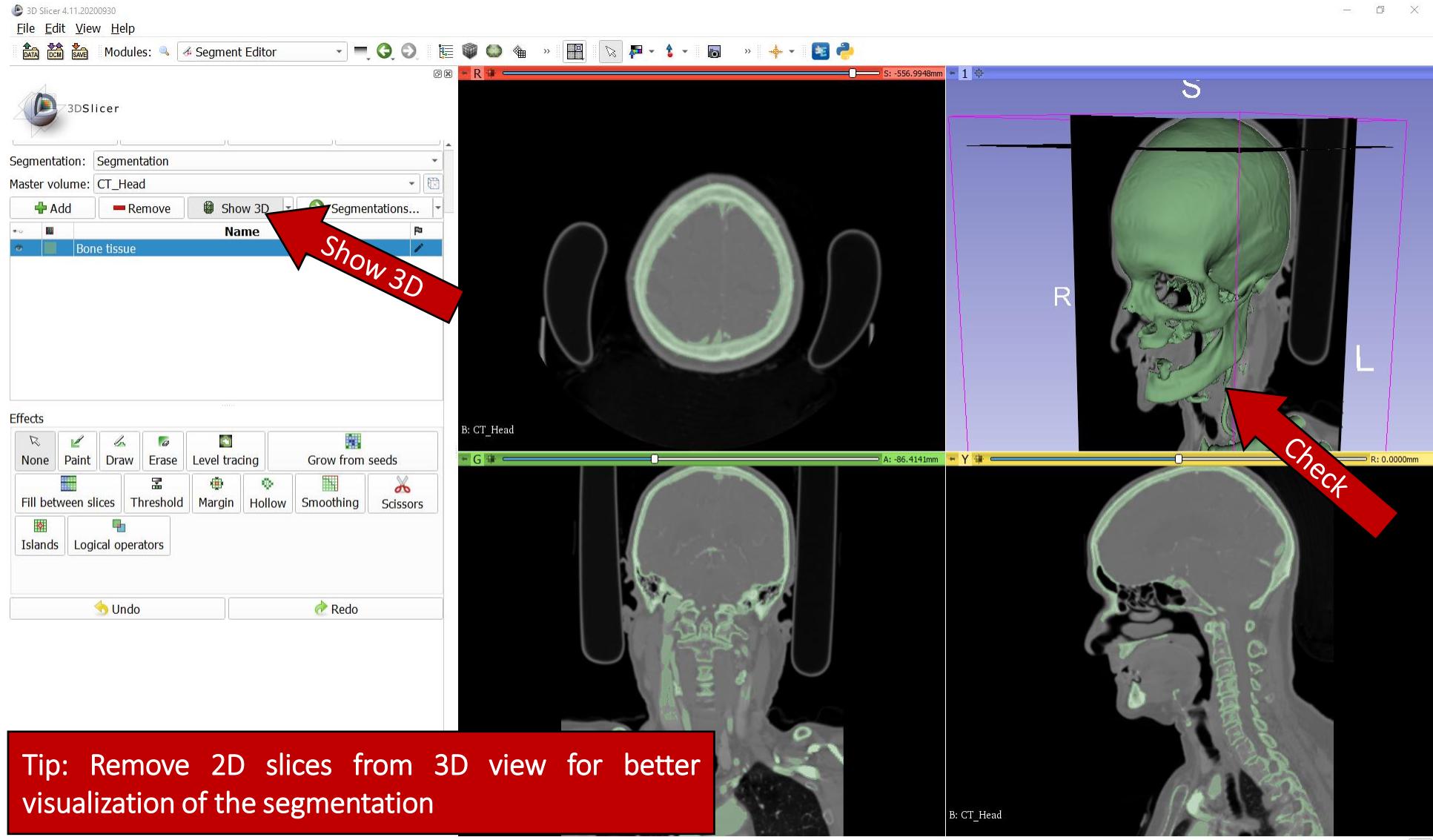
Segmentation of bone tissue



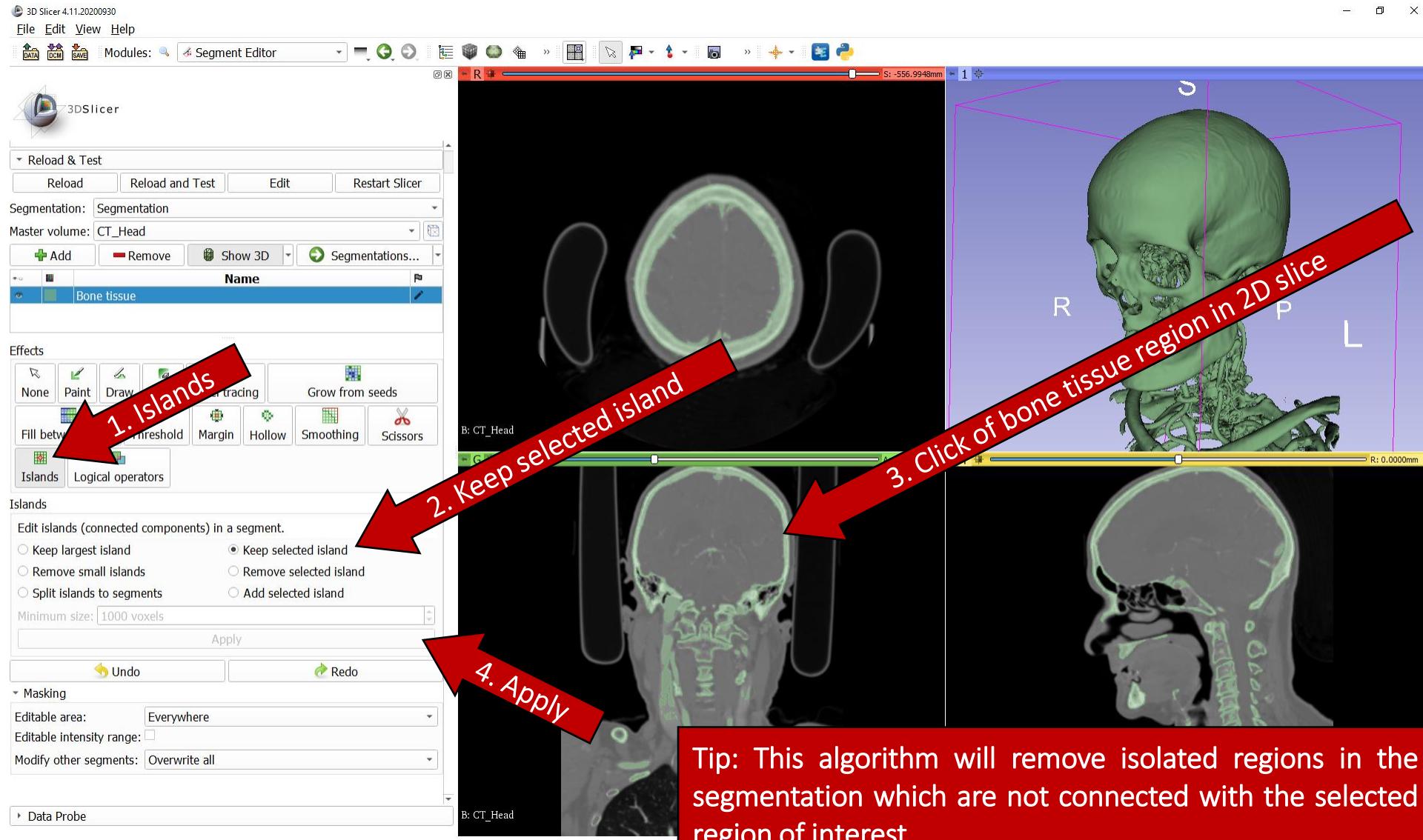
Segmentation of bone tissue



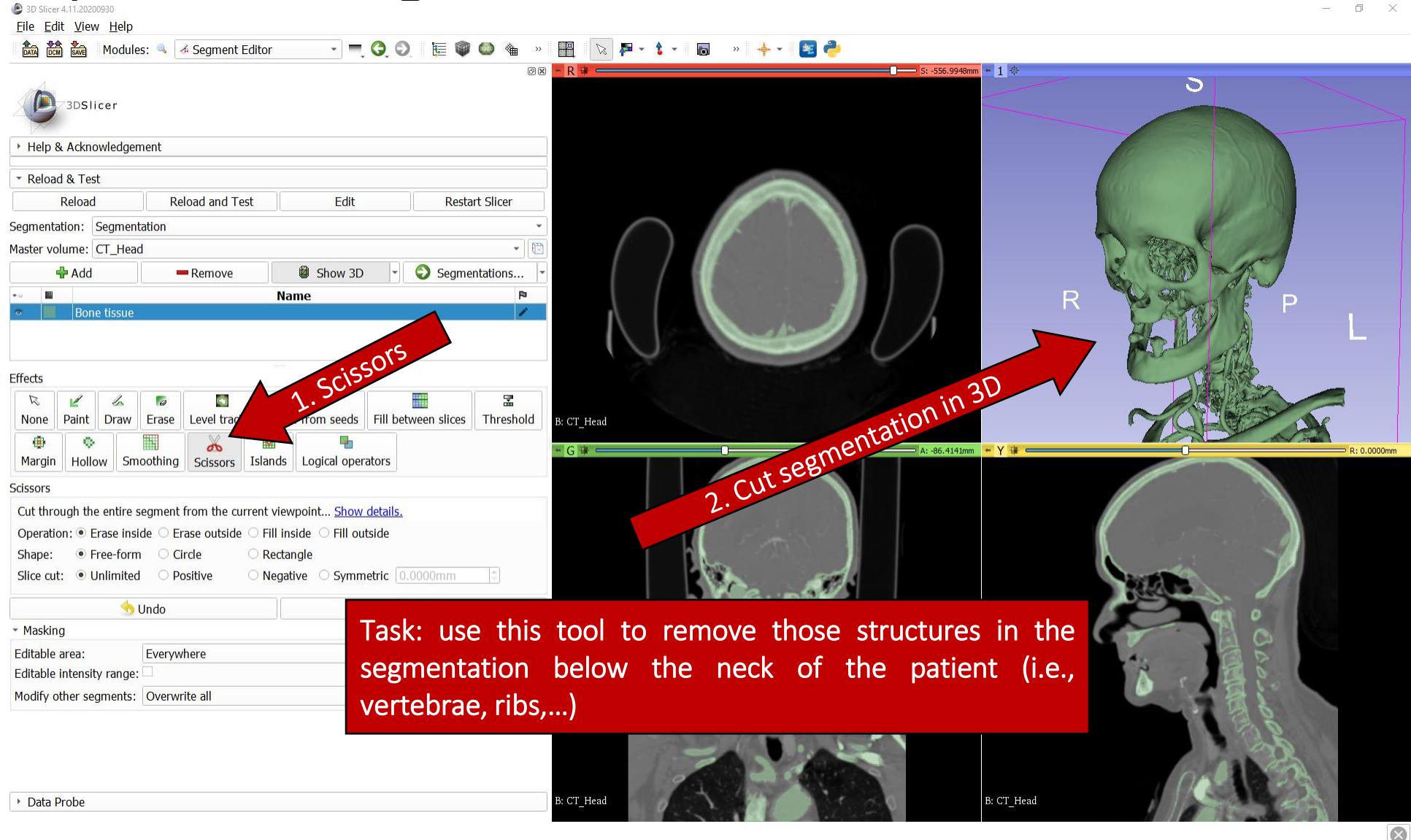
Check segmentation result



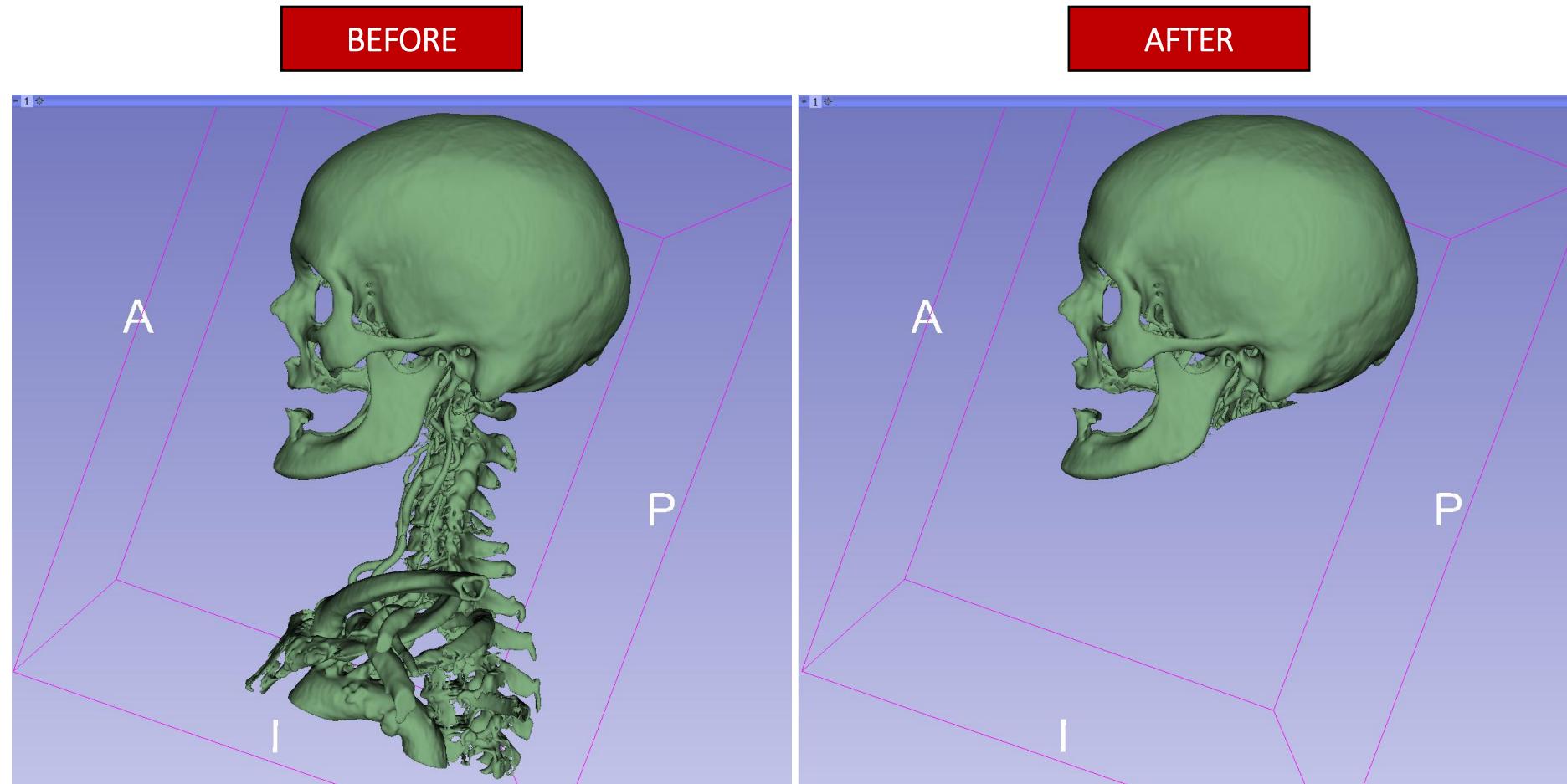
Postprocessing: islands



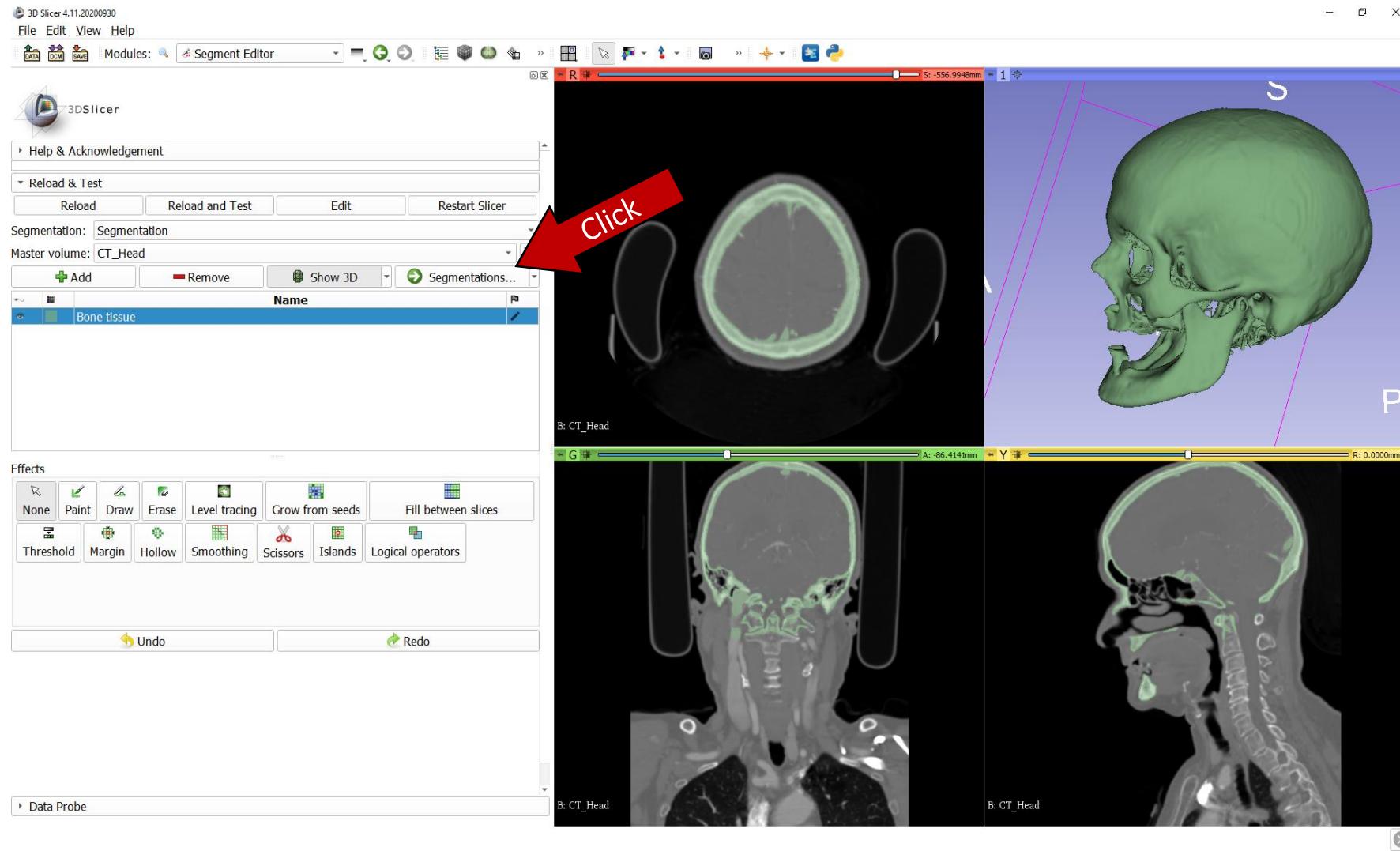
Postprocessing: scissors



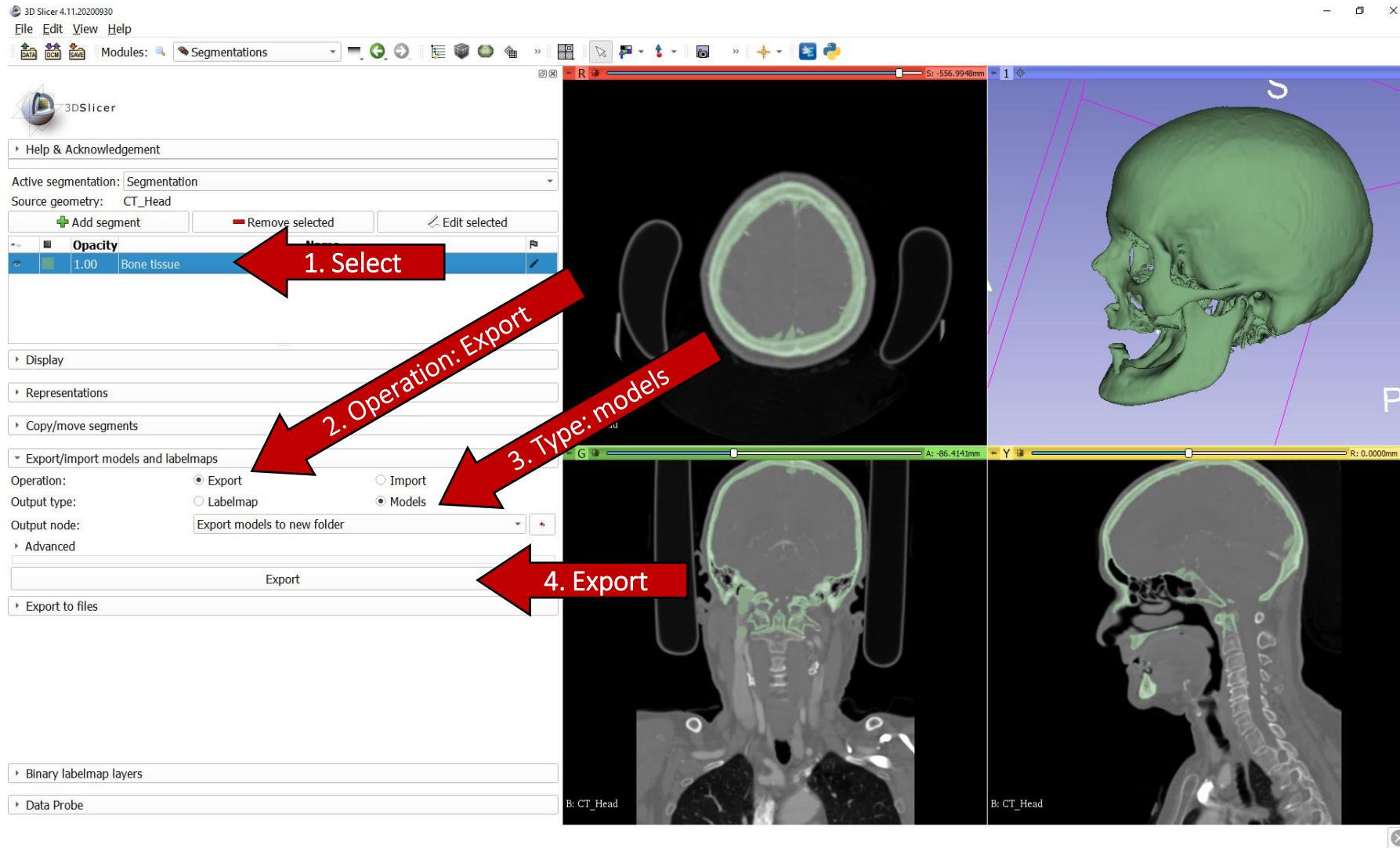
Postprocessing: scissors



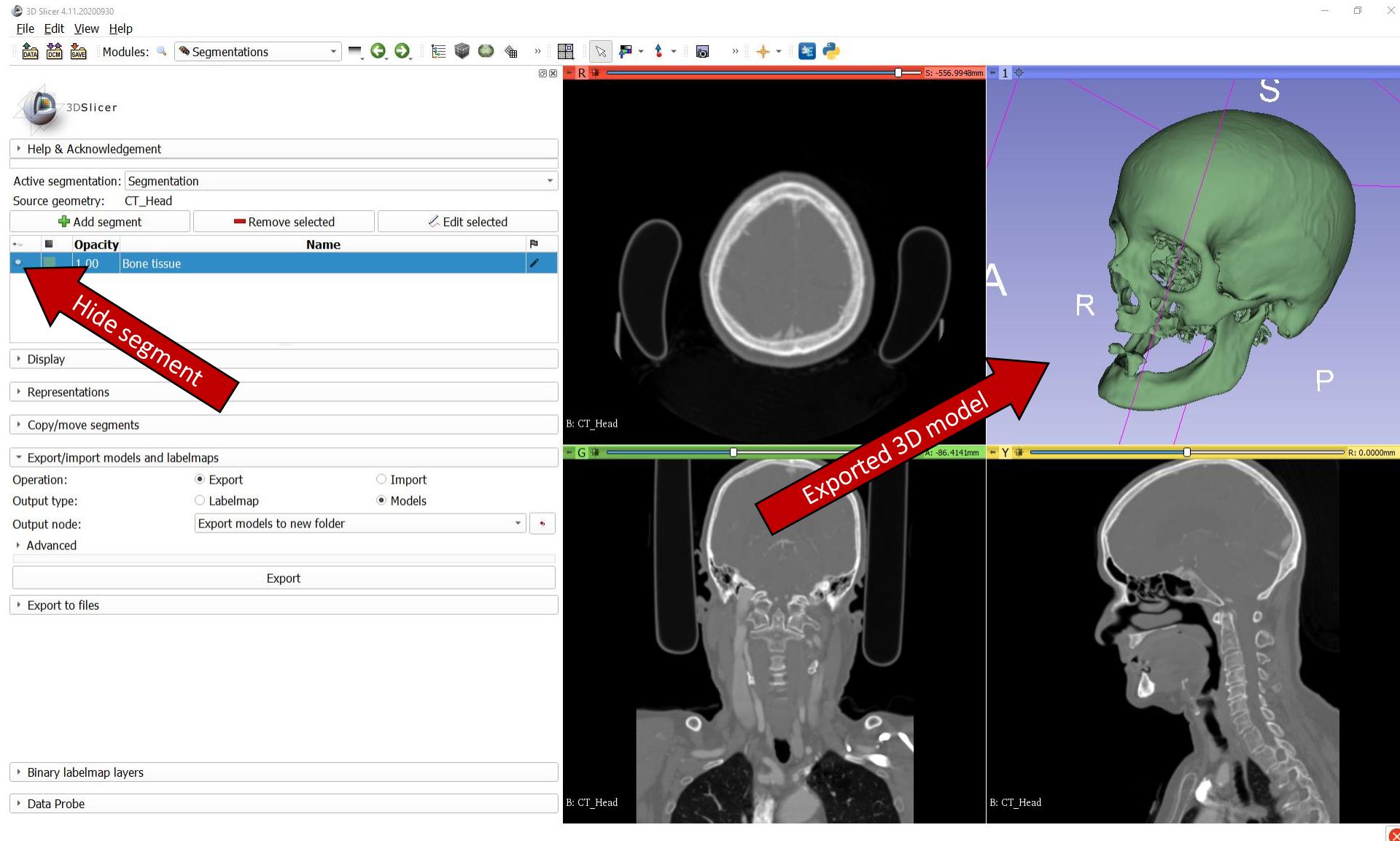
Export segmentation as 3D model



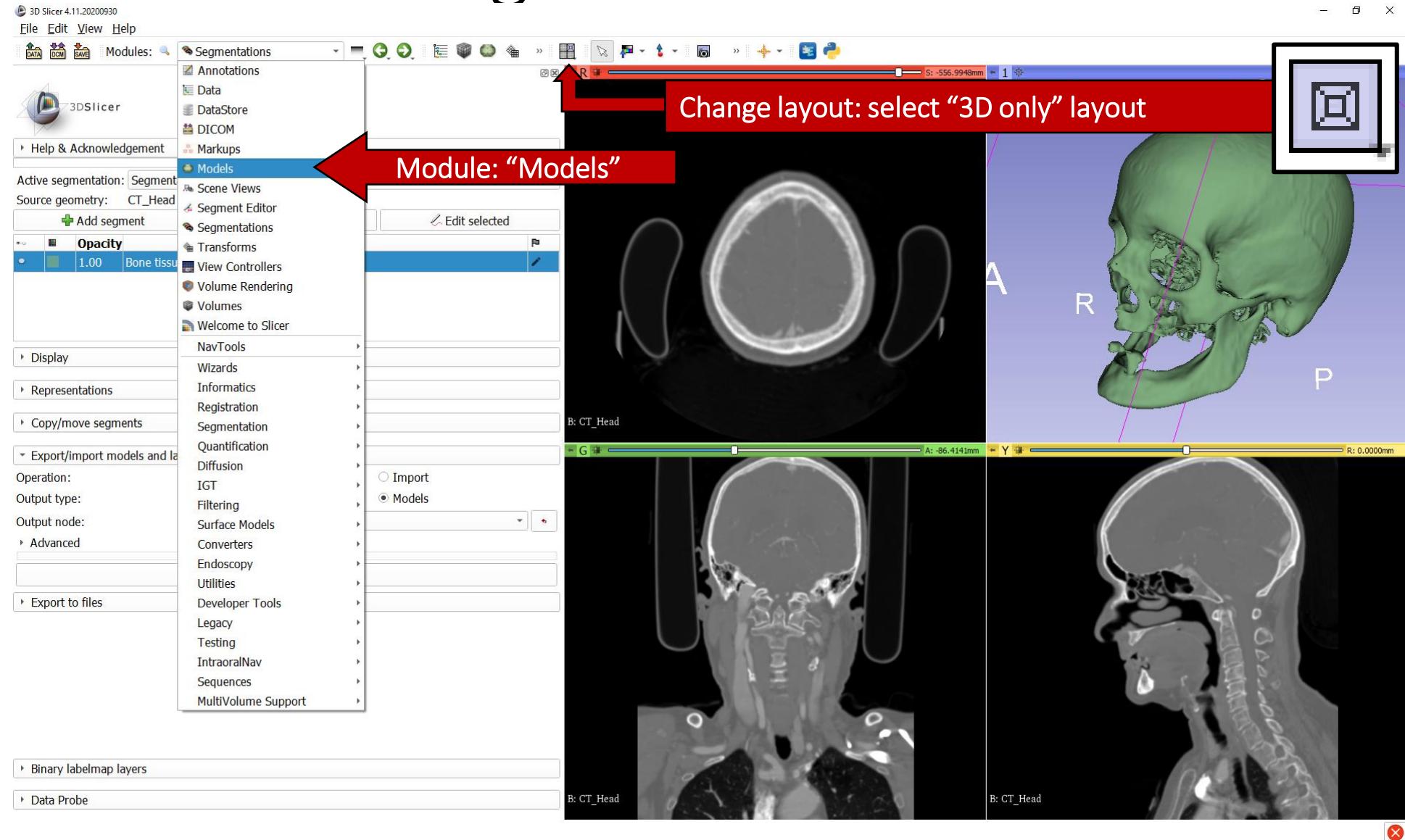
Export segmentation as 3D model



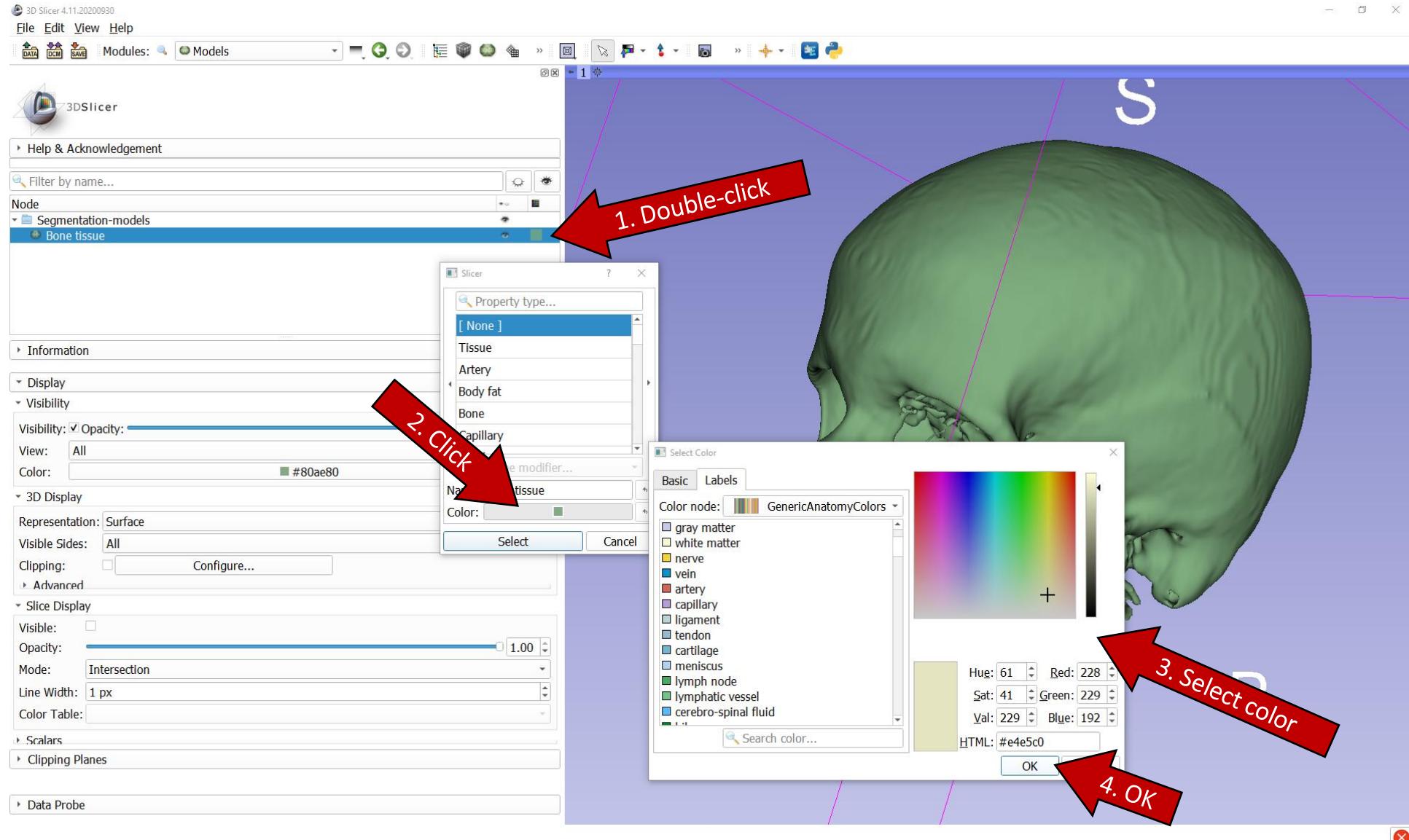
Export segmentation as 3D model



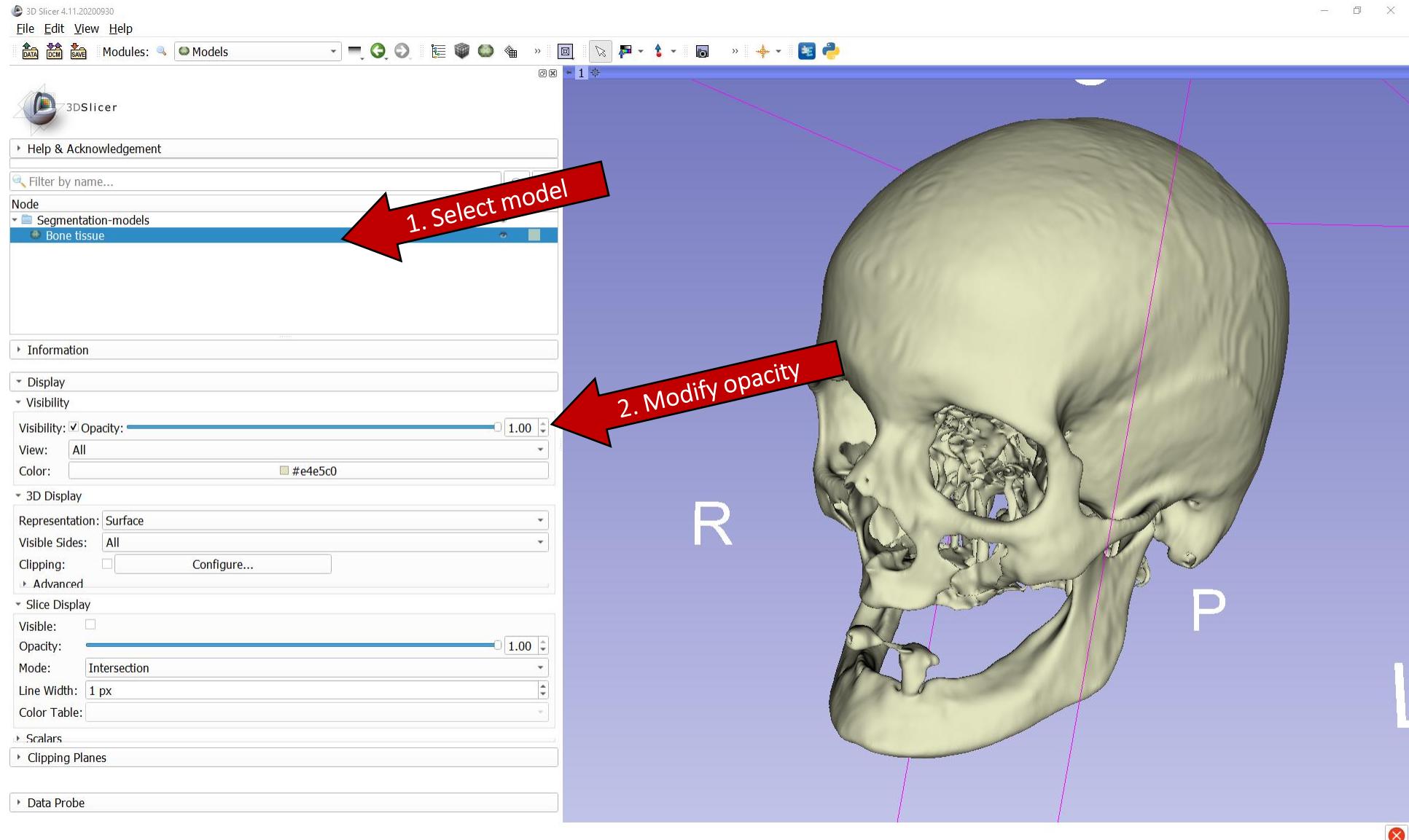
Surface rendering: bone



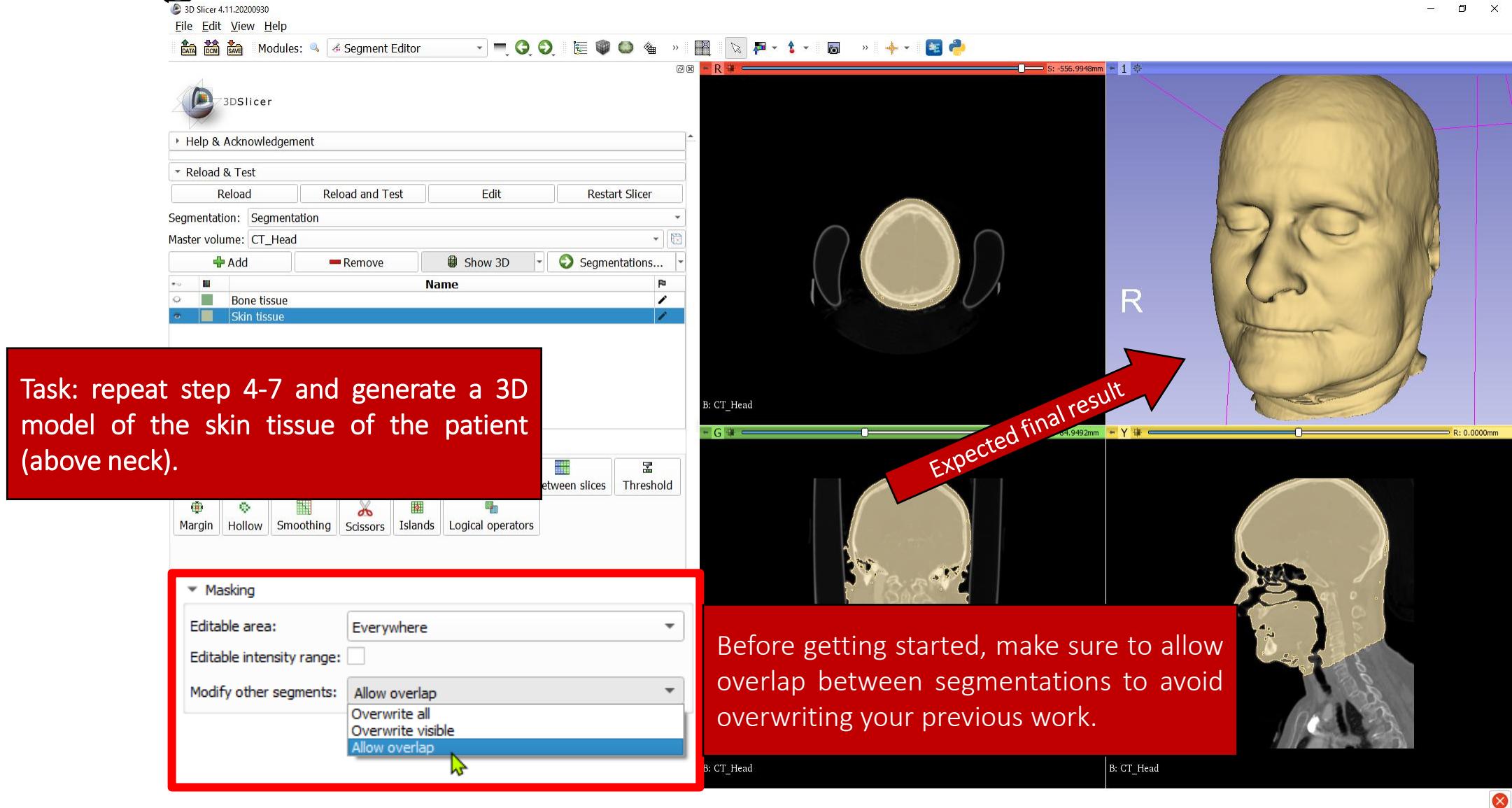
Surface rendering: bone



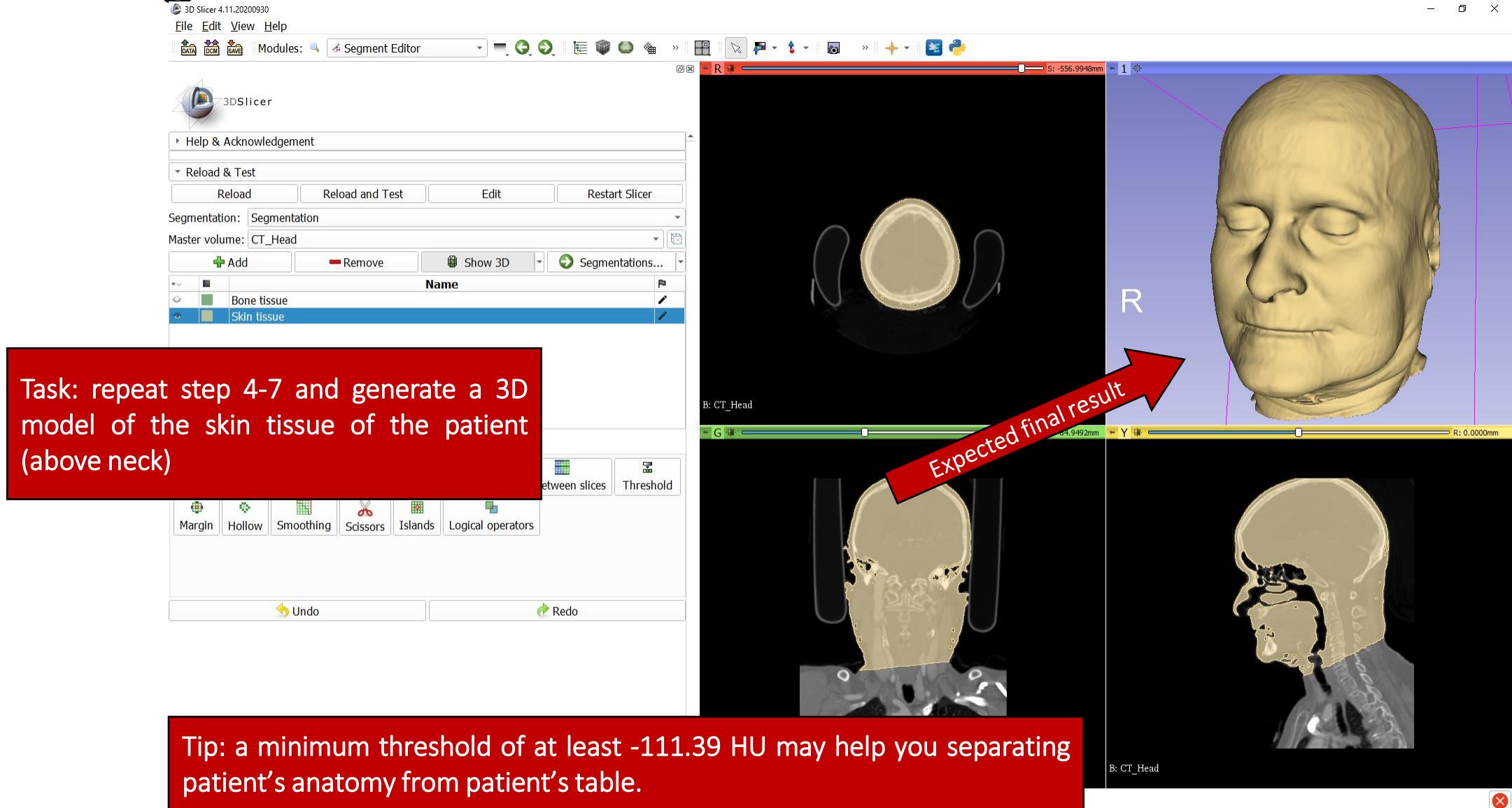
Surface rendering: bone



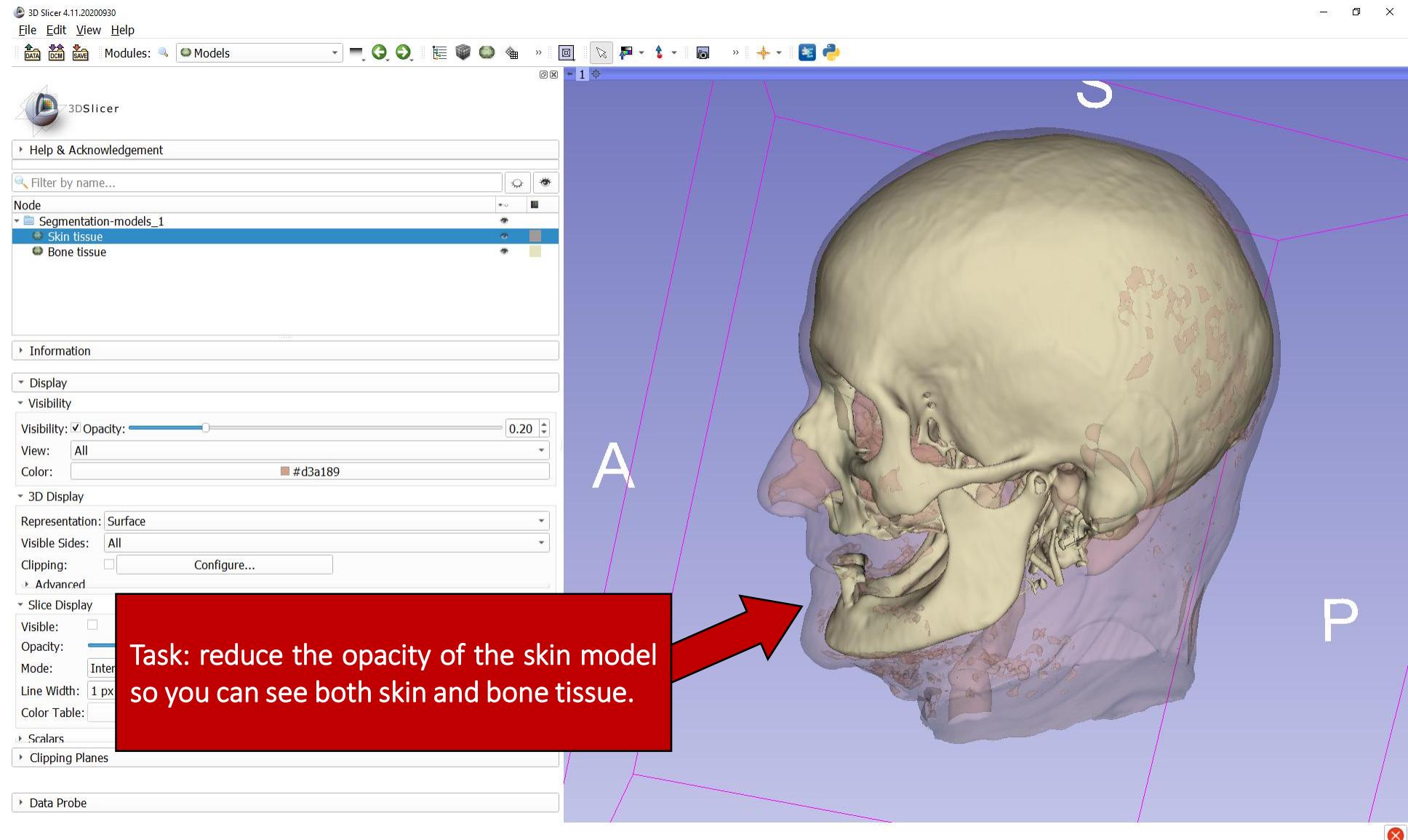
Segmentation: skin tissue



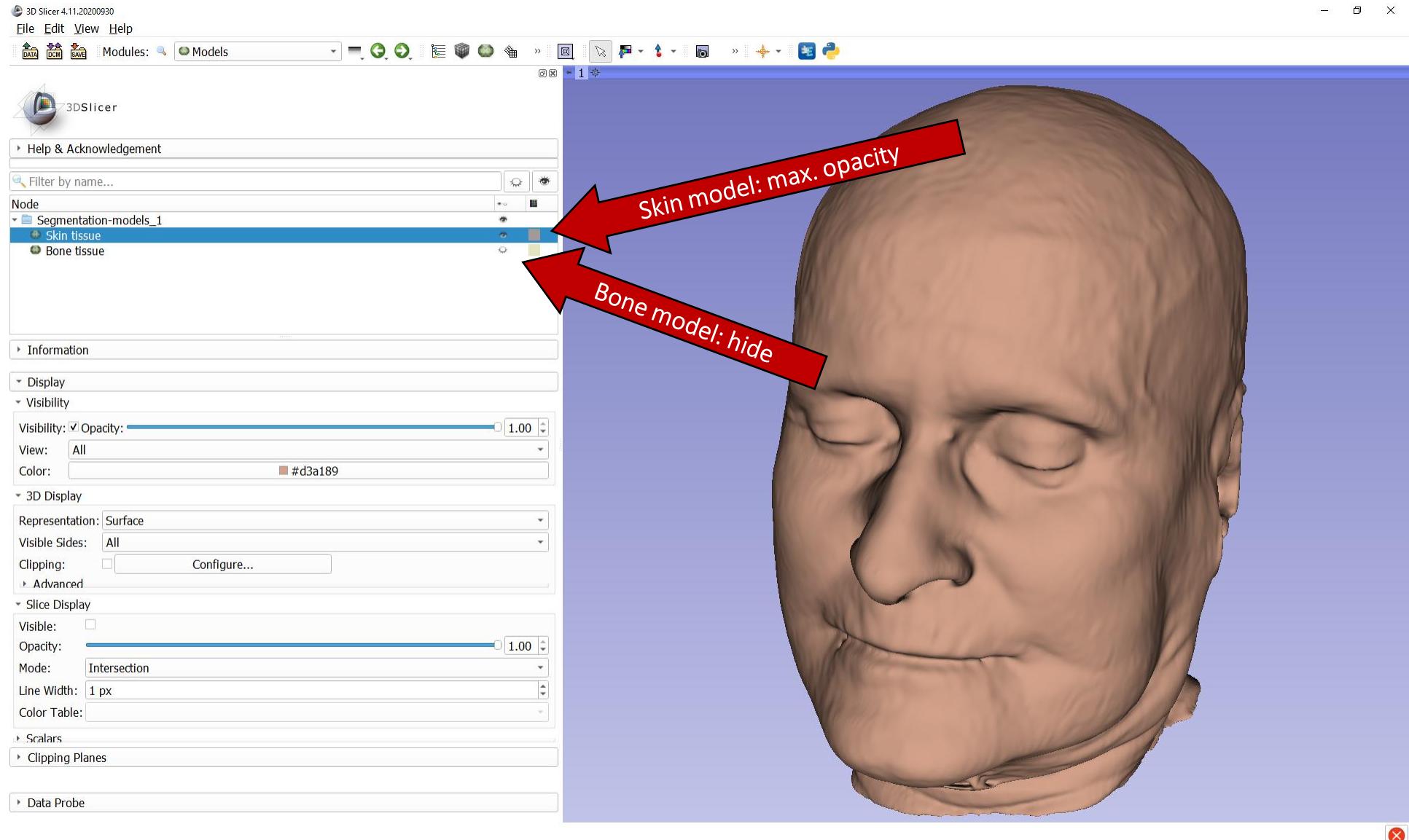
Segmentation: skin tissue



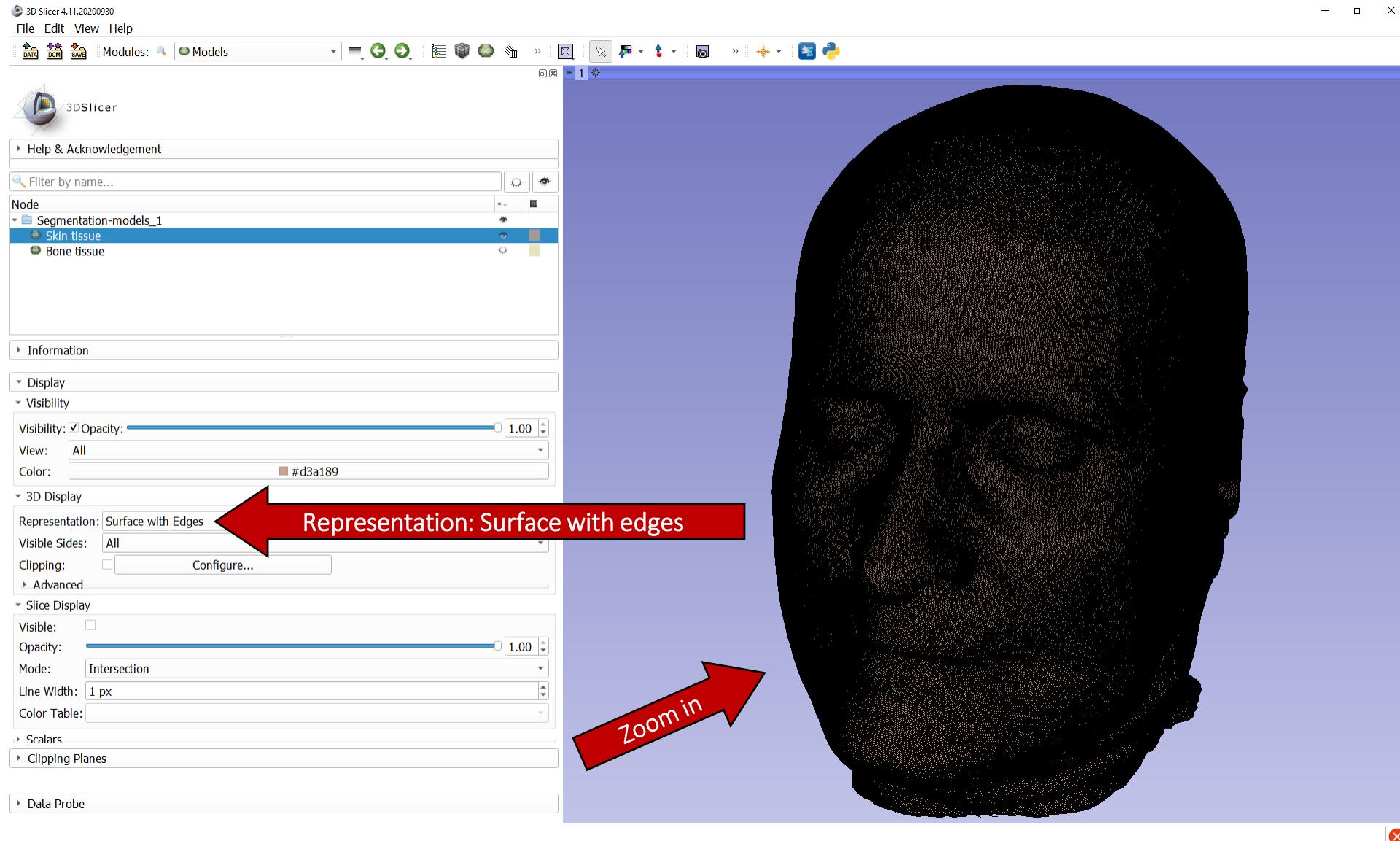
Surface rendering: skin + bone



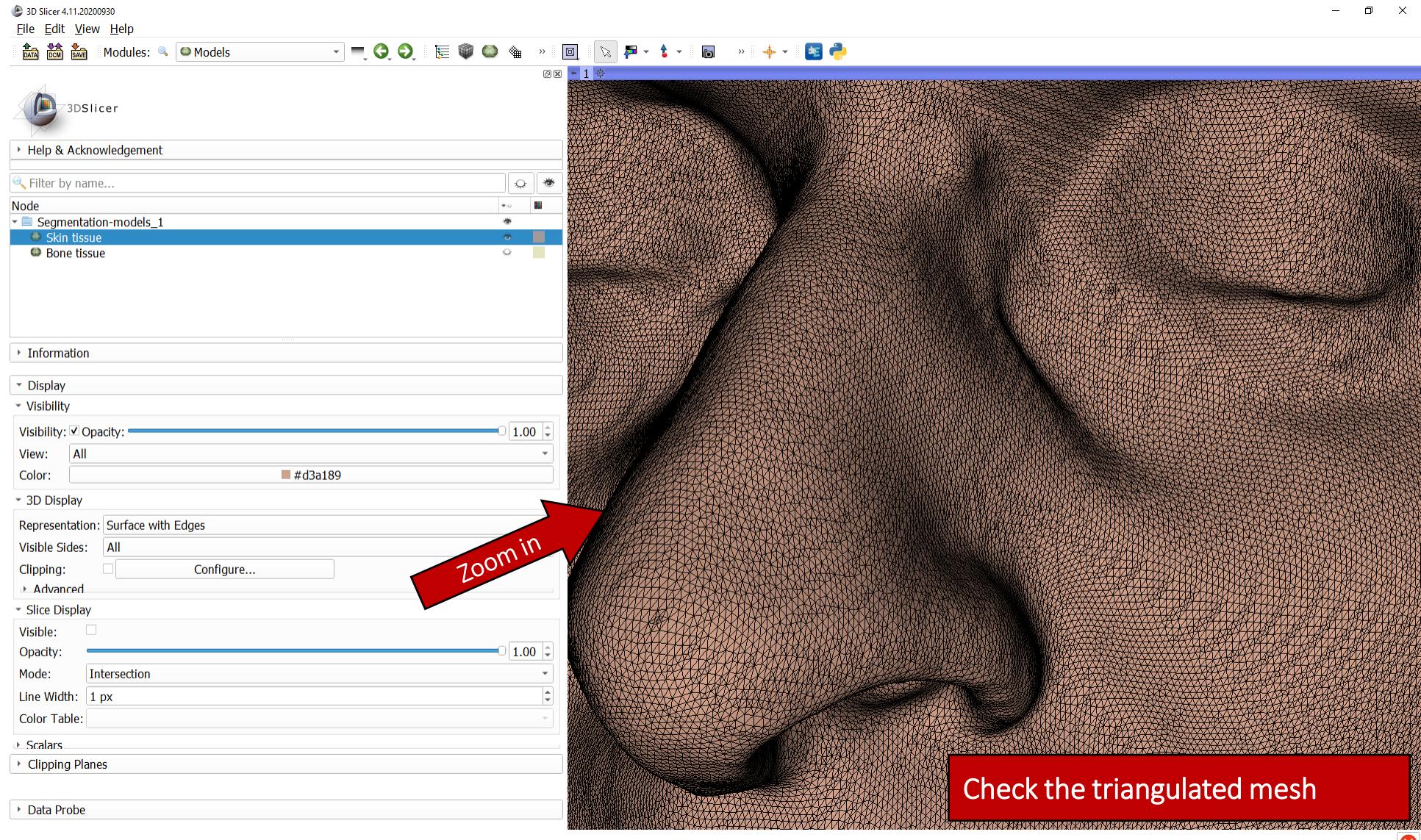
Mesh



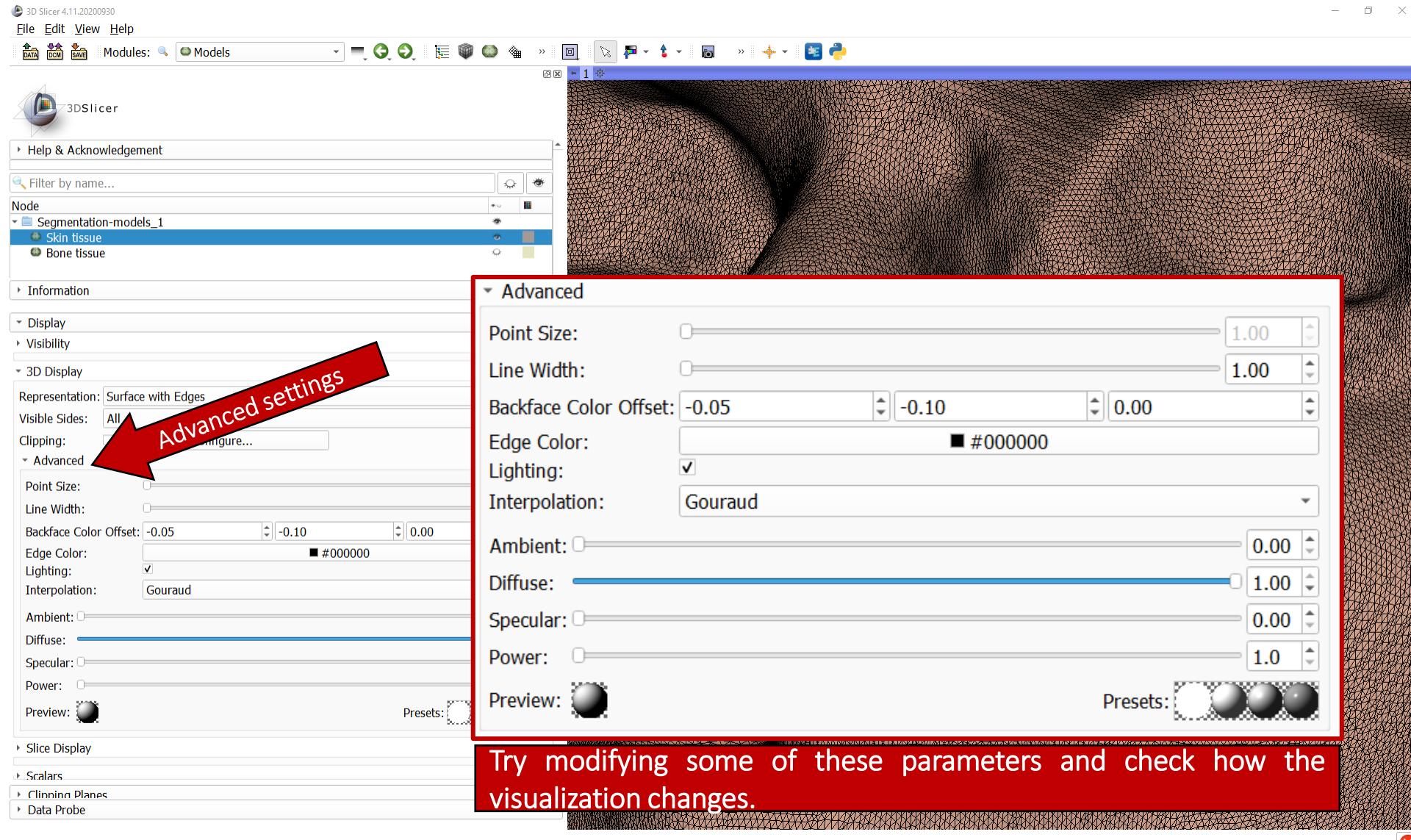
Mesh



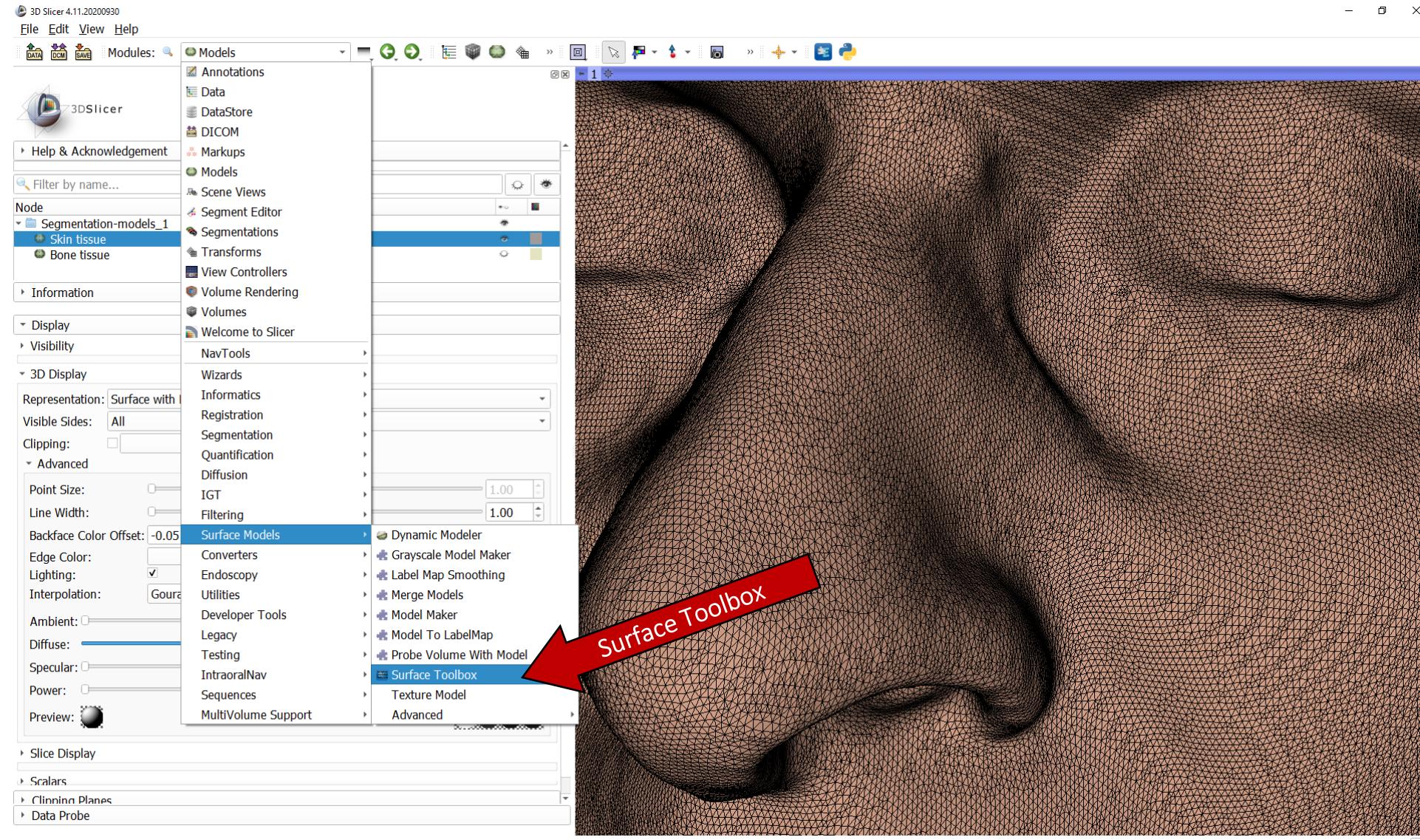
Mesh



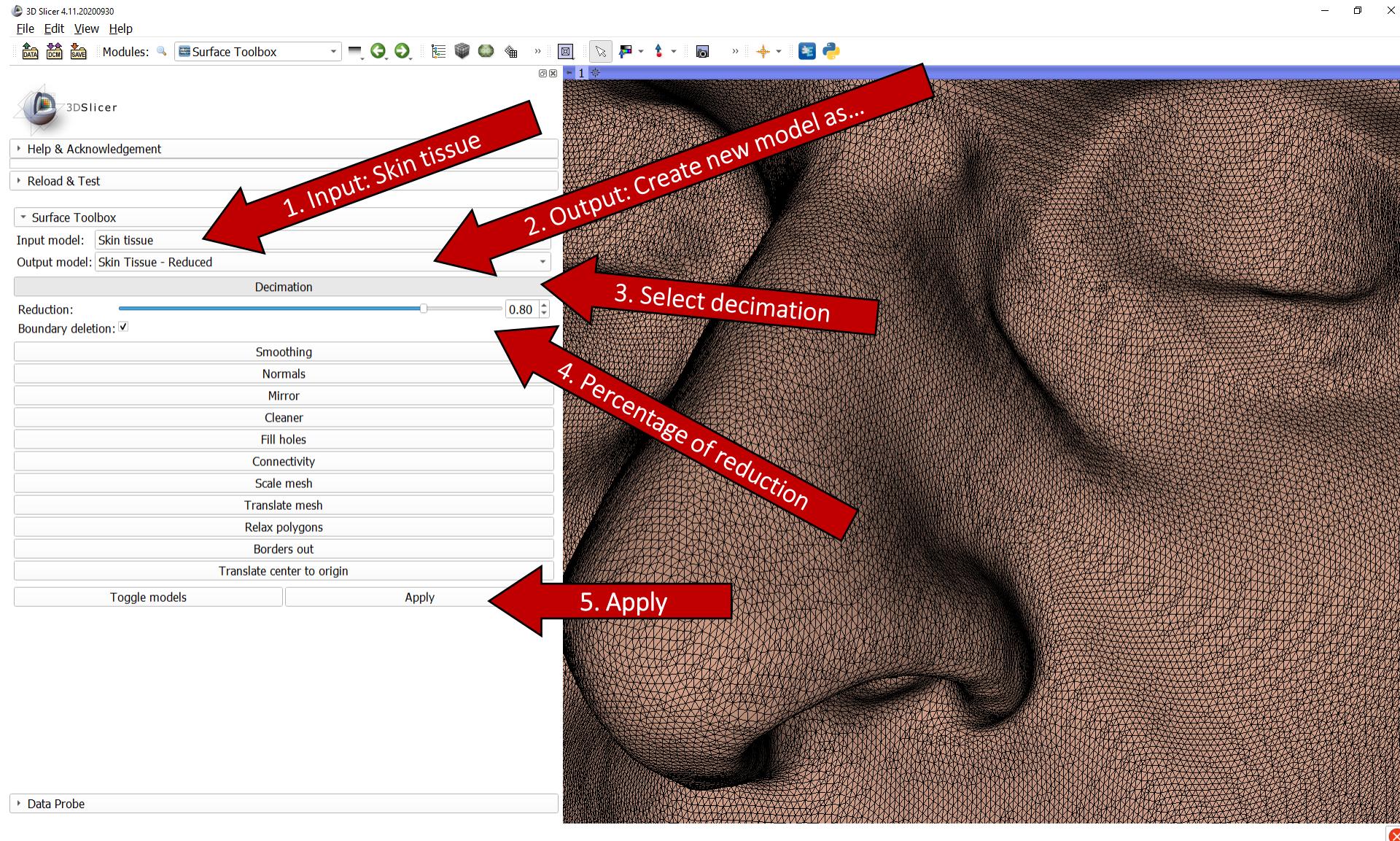
Mesh: shading



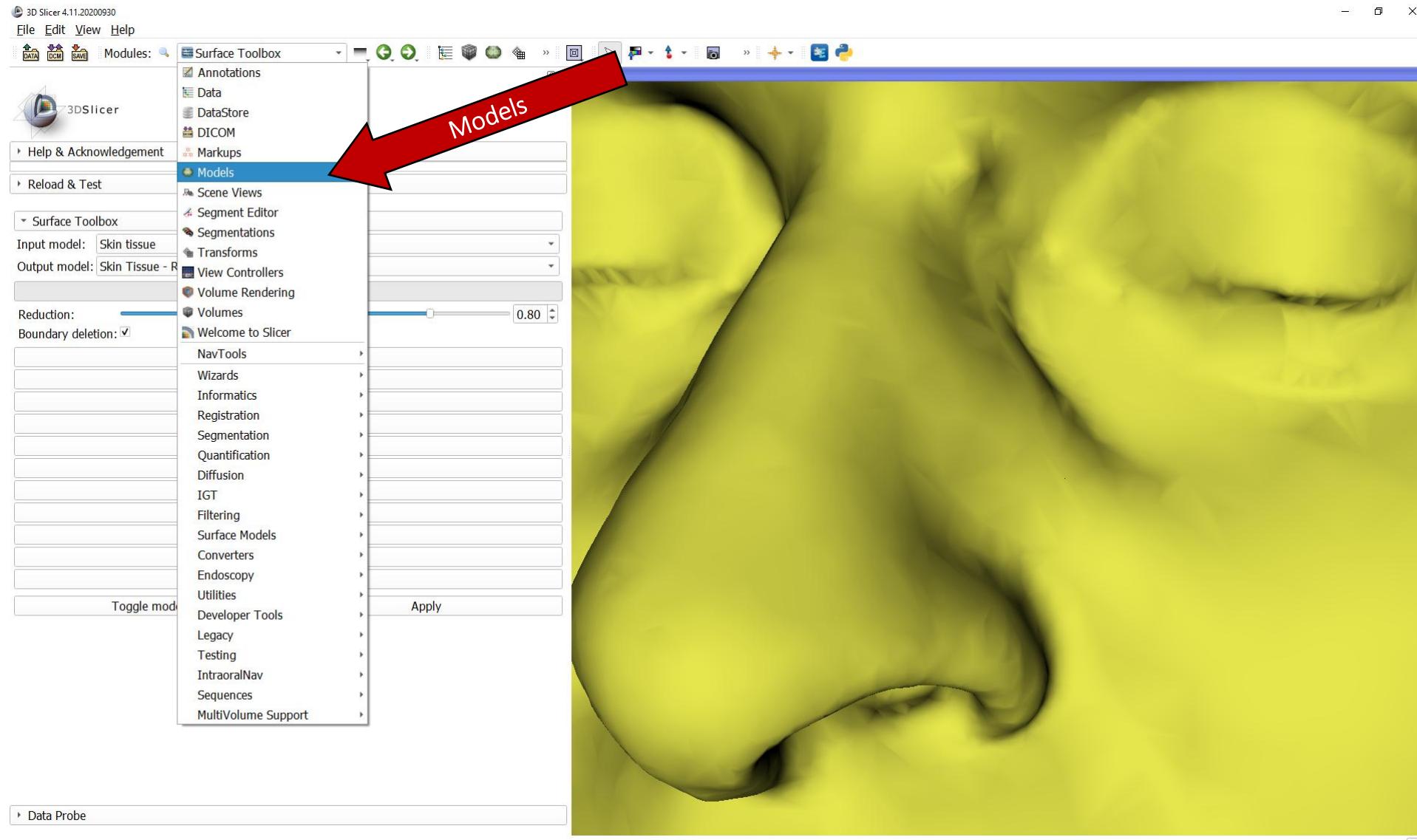
Reducing the mesh



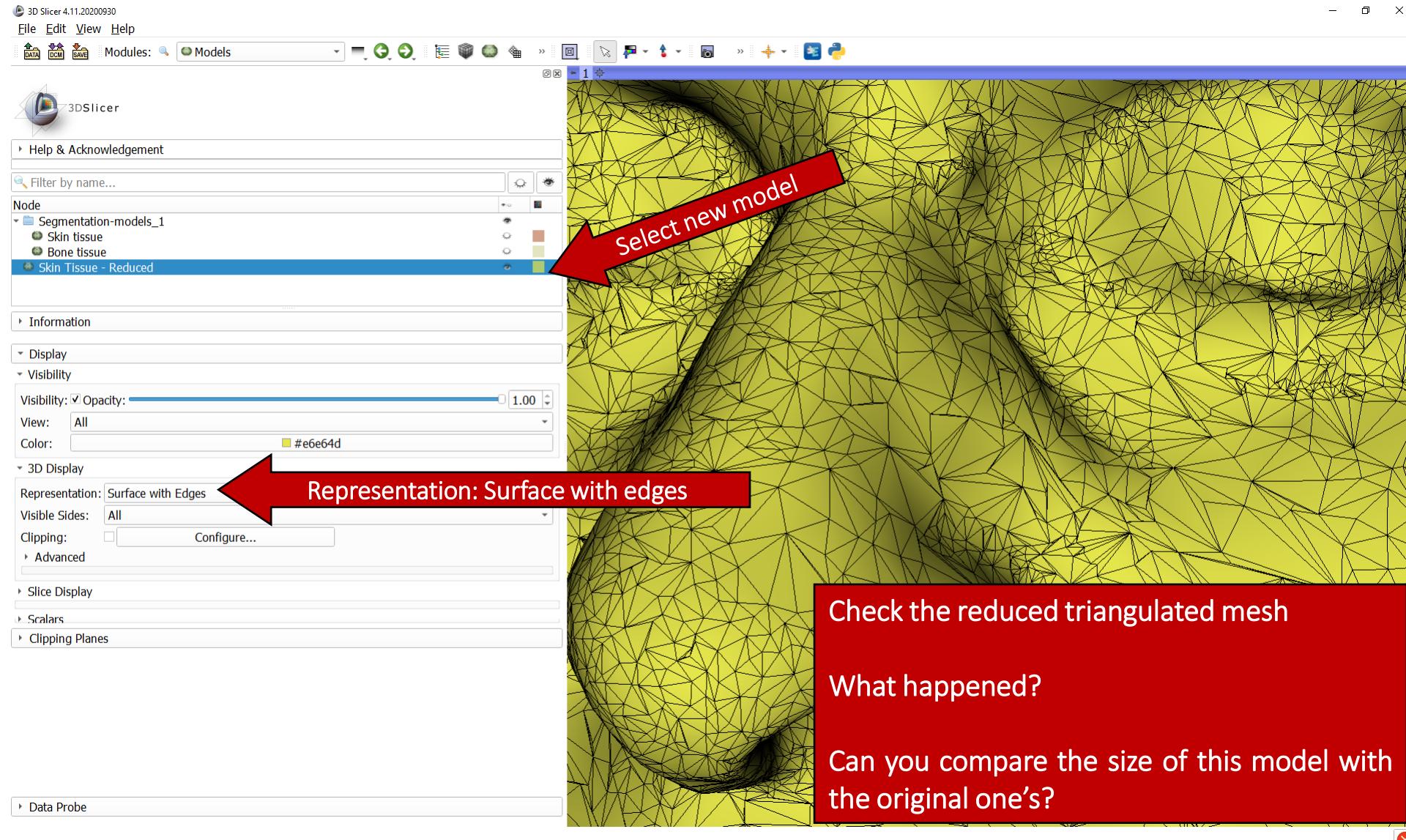
Reducing the mesh

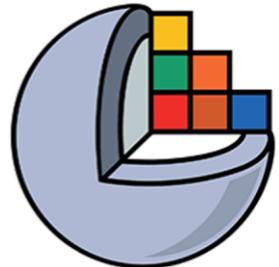


Reducing the mesh



Reducing the mesh





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