3-D Measurement Tools

3D measurements are derived from the loaded object map for the data set. Spatial size, signal intensity information and 3D shape characteristics can be derived from an object or collection of objects. These options include; selected object and enabled object. The remaining three measurement options do not require an object map, these include; box, entire volume, and stereology.

The 3-D tab provides access to the following measurement tools:

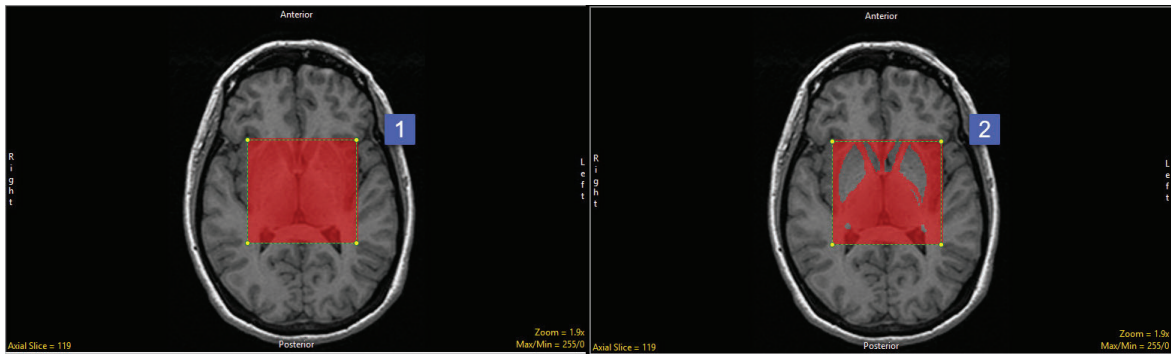
- Box
- Selected Objects
- Enabled Objects
- Entire Volume
- Stereology

Box

The Box tool enables users to interactively define and then sample a 3D box region of interest in the volume image data. The following sampling options are available.

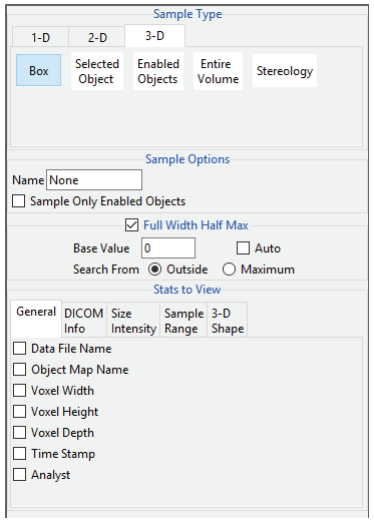
Sample Options: Provides users with access to the following 3D Box sampling options:

- **Name:** Allows users to assign a name to the selected box when reported to the log file.
- **Sample Enabled Objects:** This option is only available when an object map is loaded. When disabled (default) all voxels within the box will be sampled [1]. When enabled only voxels that form part of enabled objects within the box will be sampled [2].



Box Options (continued)

Stats to View: The stats to view area allows users to enable and disable measurements and information reported to the stats log.

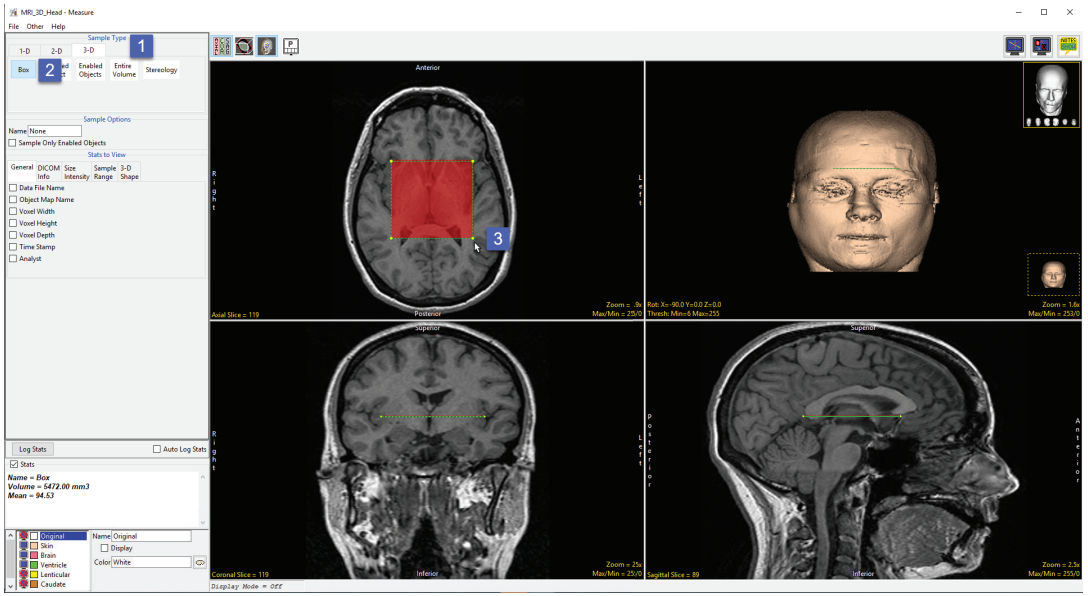


- **General:** Allows users to report general image data parameters in the stats log file. See General under Sample Point(s) > Stats to View for a full description of available options.
- **DICOM Info:** Allows users to report DICOM tag information if the data is in the DICOM format. See DICOM Info under Sample Point(s) > Stats to View above for a full description of available options.
- **Size Intensity:** Allows users to report an array of size intensity information and measurements. Refer to the size Intensity description for Sample 2-D Rectangle for a description of all available options.
- **Sample Range:** Allows users to sample voxels within the defined region based on a minimum and maximum intensity range. Refer to the Sample Range description for Sample 2-D Rectangle for a description of all available options.
- **3-D Shape:** Allow users to measure the following 3-D shape measurements:
  - **MEB Angle Resolution:** MEB (Minimum Enclosing Brick) specifies the angle resolution to be used when searching for the Minimum Enclosing Brick.
  - **Surface Area:** The surface area option reports the estimated surface area for the sampled object.
  - **MEB Angles:** The MEB Angles option reports the orientation angles of the minimum enclosing brick around the object. The angle resolution is specified in the MEB Angle Resolution option.
  - **MEB Volume:** Reports the volume of the minimum enclosing brick.
  - **MEB Coordinates:** Reports the coordinates of the eight corners of the MEB.
  - **Sphere Fit Factor:** Reports the ratio: SA_3 /($9V^2$ *4Pi) where 1 equals a perfect sphere.
  - **Bick Fit Factor:** Reports the ratio: ObjectVolume/MEB_Volume where 1 equals a brick shaped object.
  - **Centroid:** Reports the center gravity for the object.

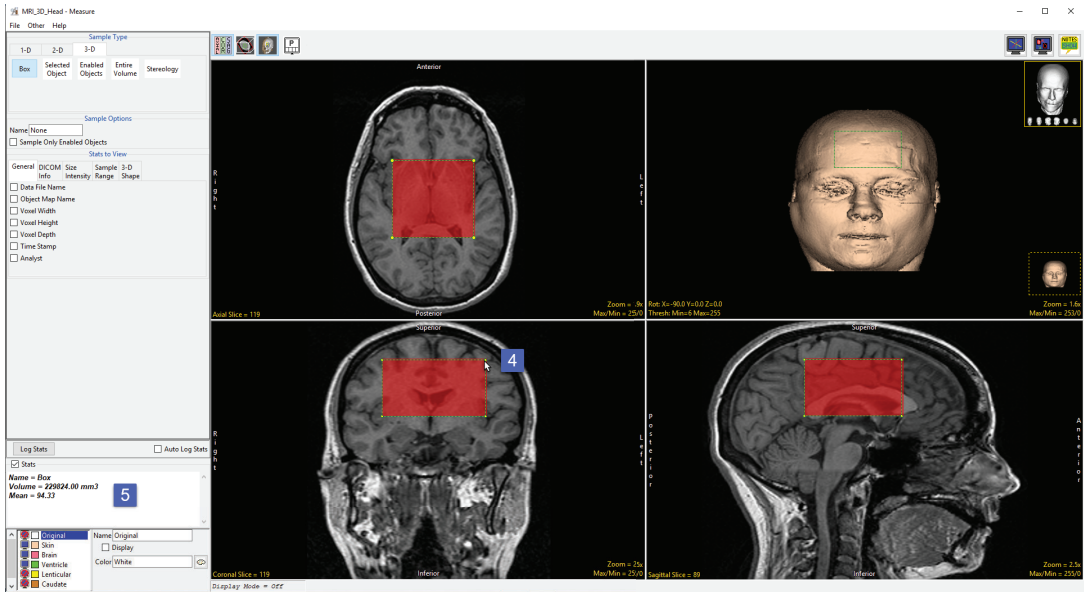
Making Measurements using Box

Download the MRI_3D_Head.avw data set from analyzedirect.com/data to follow along.

- Open Input/Output and load MRI_3D_Head.avw into Analyze. Select MRI_3D_Head and open Measure.
- Select File > Load Object Map and load the MRI_3D_Head.obj.
- Select the 3D Sample Type [1] and choose Box [2].
- To define a box first draw a rectangular region on one of the slices, in any orientation [3].



- In either of the other two orientations left click on a corner and then drag the cursor until the desired size and shape box is define [4].
- Selected measurements will be reported for the region in the stats review area [5]. Click Log Stats to return the stats to a log file that can be saved out of Analyze as a .csv file.



Making Measurements using Box (continued)

Making Box Measurements for Enabled Objects

- To sample only enabled objects within the box check the Sample Only Enabled Objects option [6].
- Only objects in the object list that are displayed [7] will be sampled [8].
- The stats review area will automatically update [9].